PART VFI

PART VERTICAL FLIGHT INFRASTRUCTURES

TABLE OF CONTENTS

ABBREVIATIONS

AFM	aircraft flight manual (a VCA AFM also refers to a aircraft flight manual)
AIP	Aeronautical Information Publication
APAPI	Abbreviated precision approach path indicator
ASPSL	Arrays of segmented point source lighting
CAT	Commercial Air Transport
cd	Candela
CFP	critical failure for performance
C/L	Centre line
cm	Centimeter
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 firefighting system
FAS	Fixed application system
FATO	Final approach and take-off area
FFAS	Fixed foam application system
PAS	Portable foam application system
FMS	Fixed monitor system
ft	Foot
GNSS	Global navigation satellite system
HAPI	Helicopter approach path indicator
HFM	Helicopter flight manual (also known as RFM)
Hz	Hertz
IDF	Initial departure fix
IFR	Instrument Flight Rules
kg	Kilogram
km/h	Kilometer per hour
kt	Knot
L	Litre
lb	Pounds
LED	Light Emitting Diodes
LDAH	Landing distance available
LDAV	Landing Distance Available (for VCA)
LDRV	Landing Distance Required (for VCA)
LDP	landing decision point
L/min	Litre per minute
lx	lux
LOA	Limited obstacle area
LOS	Limited obstacle sector
LP	Luminescent panel
m	Metre
MAPt	Missed approach point
MTOM	Maximum take-off mass
NVIS	Night vision imaging systems
OCS	Obstacle clearance surface

OFS	Obstacle-free sector
OLS	Obstacle limitation surface
PAPI	Precision approach path indicator
PC	Performance Class
PFAS	Portable foam application system
PinS	Point-in-space
PRP	Point-in-space reference point
RFF	Rescue and firefighting
RFM	Rotorcraft flight manual (also known as HFM)
RFFS	Rescue and firefighting service
RMS	Ring-main system
R/T	Radiotelephony or radio communications
RTO	Rejected Take-off
RTOD	Rejected take-off distance
RTODAH	Rejected take-off distance available
RTODAV	Rejected Take-off Distance Available (for VCA)
RTODRV	Rejected Take-off Distance Required (for VCA)
RTODV	Rejected Take-off Distance (for VCA)
s	Second
SMS	Safety Management System
t	Tonne (1 000 kg)
TDP	take-off decision point
TDPC	Touchdown/positioning circle
TDPM	Touchdown/positioning marking
TLOF	Touchdown and lift-off area
TODAH	Take-off distance available
TODAV	take-off distance available (for VCA)
TODRV	take-off distance required (for VCA)
UCW	Undercarriage width
VASI	Visual approach slope indicator
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)

SUBPART A - DEFINITIONS (VFI.DEF)

ADR.DEF.A.001 Applicability

Note: The term VFI refers to aeronautical infrastructures such as heliport/ helideck/ vertiports that supports operation of aircraft that are capable to take off and land vertically.

Note: When reference is made to heliports, helidecks and vertiports, it must be understood by the reader that heliports, helidecks and vertiports are also included in the definition of aerodrome.

The CAR AGA PART ADR, PART ACM, contains definitions for the terms which are used in this part (PART VFI). Those definitions are not reproduced in this part, with the exception of the following two:

'Heliport'

An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

'Obstacle'

All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

(1) are located on an area intended for the surface movement of aircraft; or

(2) extend above a defined surface intended to protect aircraft in flight; or

(3) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation. The following list contains definitions of terms that are used only in Volume II, with the meanings given below.

(a) The following definitions of terms that are used in this part, with the meanings given below:

'Ascent/Descent surface'

An inclined plane or complex surface that slopes upward from the centre of the FATO to indicate the path helicopters are expected to follow when vertical procedures are utilized – it can consist of:

a) an inverted triangle when there is no lateral component; or

b) an inverted conical surface when there is a lateral component

'Charging facility'

means 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)).

'D'

for helicopters, means the largest overall dimension of the helicopter, when rotor(s) are turning, 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.

'D'

for VCA, means the diameter of the smallest circle enclosing the VTOL aircraft 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 VTOL aircraft 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 helicopter/VCA.

'D-Value'

A limiting dimension, in terms of "D", for a heliport/helideck/vertiport or for a defined area within heliport/helideck/vertiport.

'Declared distances'

(1) Take-off distance available (TODAH). The length of the FATO plus the length of helicopter clearway or elevated helicopter clearway (if provided) declared available and suitable for helicopters to complete the take-off.

(2) Rejected take-off distance available (RTODAH). The length of the FATO declared available and suitable for helicopters operated in performance class 1 to complete a rejected take-off.

(3) Landing distance available (LDAH). The length of the FATO plus any additional area declared available and suitable for helicopters to complete the landing manoeuvre from a defined height.

(4) Landing distance available (LDAV)'. The length of the FATO plus any additional area that is declared available and suitable for VCA to complete the landing manoeuvre from a defined height.

(5) Landing distance required (LDRV). For VCA is 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.

(6) Landing decision point (LDP)', for VCA means a point along the landing flight path, which is defined as the last point from which a balked landing can be performed. After the LDP,

a balked landing is not ensured. If the aircraft is certified in the enhanced category, then a landing should be possible following a critical failure for performance (CFP) before or after the LDP.

(7) '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 VTOL-capable aircraft to complete a rejected take-off in accordance with the category (enhanced or basic) in which the aircraft is operated.

(8) 'Rejected take-off distance available (RTODAV)', for VCA means the length of the FATO that is declared available and suitable for VTOL-capable aircraft to complete a rejected take-off in accordance with the category (enhanced or basic) in which the aircraft is certified.

(9) '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).

(10) '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.

(11) '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).

'Dynamic load-bearing surface'

A surface capable of supporting the loads generated by a helicopter/VCA in motion.

'Elevated heliport'

A heliport located on a raised structure on land.

'Elevated helicopter clearway'

A helicopter clearway that has been 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.

'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 helicopters operated in performance class 1, the defined area includes the rejected take-off area available.

'Helicopter clearway'

A defined area over which a helicopter may accelerate and achieve a specified set of helicopter flight conditions.

'Helicopter / VCA stand'

A defined area intended to accommodate a helicopter/VCA for purposes of: loading or unloading passengers, mail or cargo; fuelling, parking or maintenance; and, where air taxiing operations are contemplated, the TLOF.

'Helicopter/VCA taxiway'

A defined path on a heliport/vertiport intended for the ground movement of helicopters/VCAs and that may be combined with an air taxi-route to permit both ground and air taxiing.

'Helicopter/VCA taxi-route'

A defined path established for the movement of helicopters/VCA from one part of a heliport/vertiport to another.

(a) Air taxi-route. A marked taxi-route intended for air taxiing.

(b) Ground taxi-route. A taxi-route centred on a taxiway.

'Helideck'

A heliport located on a fixed or floating offshore facility such as an exploration and/or production unit used for the exploitation of oil or gas.

'Heliport /vertiport elevation'

The elevation of the highest point of the FATO.

'Heliport/vertiport reference point (HRP/VRP)'

The designated location of a heliport/vertiport.

'Initial departure fix (IDF)'

The terminal fix for the visual segment and the fix where the instrument phase of the PinS departure begins.

'Obstacle'

All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that: are located on an area intended for the surface movement of helicopter/ VCA; extend above a defined surface intended to protect helicopter/VTOL-capable aircraft in flight; or stand outside those defined surfaces but, nonetheless, are assessed as a hazard to air navigation.

'Point-in-space (PinS) approach'

An approach procedure designed for helicopter only that include both visual and instrument segment.

'Point-in-space (PinS) departure'

A departure procedure designed for helicopters only that includes both a visual and an instrument segment.

'Point-in-space (PinS) reference point (PRP)'

Reference point for the point-in-space approach as identified by the latitude and longitude of the MAPt.

'Point-in-space (PinS) visual segment'

The segment of a helicopter PinS procedure between a point (MAPt or IDF) and the heliport.

Note.— The design criteria for PinS procedures are established in the Procedures for Air Navigation Services — Aircraft Operations, Volume II (PANS-OPS, Doc 8168- Volume II).

'Protection area'

A defined area surrounding a stand intended to reduce the risk of damage from helicopters / VCA accidentally diverging from the stand.

'Rejected take-off area'

A defined area on a heliport suitable for helicopters operating in performance class 1 to complete a rejected take-off.

'Runway-type FATO'

A FATO having characteristics similar in shape to a runway.

'Safety area'

A defined area on a heliport/vertiport surrounding the FATO which is free of obstacles, other than those required for air navigation purposes, and intended to reduce the risk of damage to helicopters accidentally diverging from the FATO.

'Shipboard heliport'

A heliport located on a ship that may be purpose or non-purpose-built. A purpose-built shipboard heliport is one designed specifically for helicopter operations. A non-purpose-built shipboard heliport is one that utilizes an area of the ship that is capable of supporting a helicopter but not designed specifically for that task.

'Static load-bearing surface'

A surface capable of supporting the mass of a helicopter/VCA situated upon it.

'Surface-level heliport'

A heliport located on the ground or on a structure on the surface of the water.

'Touchdown and lift-off area (TLOF)'

An area on which a helicopter/VCA may touch down or lift off.

'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/VCA.

'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.

'Vertical procedures'

Take-off and landing procedures that include an initial vertical or steep climb and a final vertical or steep descent profile. The profile may or may not include a lateral component.

'Vertiport'

An area of land, water, or structure that is used or intended to be used for the landing, take-off, and movement of VTOL-capable aircraft.

'Winching area'

An area provided for the transfer by helicopter of personnel or stores to or from a ship.

(b) The term 'Primary Accountable Organisation (PAO)' refers to organisations who are accepted by the GCAA to operate and manage multiple offshore locations (i.e., off-shore helideck) and have full responsibility for the management, operations, safety, maintenance, quality and compliance monitoring of their facilities, under relevant applicable requirements of this regulation.

(c) The term 'operator' when used in these regulations refers to heliport/ helideck/vertiport operator or PAO.

(d) The term 'VFI' when used in these regulations refers to heliport /helideck/vertiport.

(e) The term 'aircraft' refers to helicopters or Vertical Take-off and Landing Capable Aircraft (VCA).

SUBPART B – ORGANISATIONAL REQUIREMENTS (VFI.OR)

SECTION A - GENERAL REQUIREMENTS (VFI.OR.A)

VFI.OR.A.005 Scope

(a) Heliport/helideck/vertiport operator or the PAO shall not provide a service to civil aviation, within the UAE except under the authority of, and in accordance with the provisions of, a valid Certificate or Landing Area Acceptance, or PAO acceptance issued by the GCAA under this regulation.

(b) This regulation establishes the common requirements, unless specifically mentioned, to be followed by an operator with respect to its Certification, Landing Area Acceptance or PAO acceptance, management, manuals and other responsibilities.

VFI.OR.A.010 Competent Authority

The UAE General Civil Aviation Authority (GCAA) is the designated Competent Authority responsible for:

(a) certification and oversight of heliport / vertiport and its operators, on-shore or off-shore;

(b) acceptance and oversight of heliport / helideck / vertiport landing areas and its operators, on -shore or off-shore;

(c) acceptance and oversight of a PAO.

VFI.OR.A.015 Means of compliance

(a) The operator shall comply with the scope and conditions that are endorsed in the Certificate, Landing Area Acceptance or PAO acceptance.

(b) The operator shall provide all the relevant evidence to demonstrate compliance with the applicable requirements of this regulation at the request of the GCAA.

(c) When The operator wishes to use an alternative means of compliance to the Acceptable Means of Compliance (AMC), they shall, prior to implementing the alternative means of compliance, provide the GCAA with a full description of the alternative means of compliance.

The description shall include a clear justification for the need for alternative, any revisions to manuals or procedures that may be relevant, as well as an assessment demonstrating that the implementing rules are met.

(d) The operator shall implement alternative means of compliance subject to prior approval by the GCAA and only upon receipt of such notification.

GM1 VFI.OR.A.015 Means of compliance

The GCAA will evaluate the alternative means of compliance proposed by an operator, by analysing the documentation and evidences provided and, if considered necessary, conducting a technical inspection of the heliport, helideck or vertiport.

VFI.OR.A.020 Demonstration of compliance

(a) The operator shall:

(1) perform and document all actions, inspections, tests, safety assessments or exercises necessary, and shall demonstrate to the GCAA:

(i) compliance with the requirements of this CAR, any safety decision, as appropriate;

(ii) that the heliport/helideck/vertiport, as well as its obstacle limitation and protection surface and other areas associated with the heliport/helideck/ vertiport, have no features or characteristics making it unsafe for operation.

(2) provide to the GCAA the means by which compliance has been demonstrated.

(b) Relevant design information, including drawings, inspection, test and other relevant reports, shall be held and kept by the operator at the disposal of the GCAA, in accordance with the provisions of VFI.OR.G.035 - Record keeping, and provided on request to the GCAA.

AMC1.OR.A.020(a)(b) Demonstration of compliance

GENERAL- USE OF THIRD PARTIES TO DEMONSTRATE COMPLIANCE

While performing the necessary actions, inspections, tests, safety assessments, or exercises necessary to demonstrate compliance, the operator may also use contracted third parties. In any case, the declaration of compliance and responsibility remains with the operator.

GM1.OR.A.020(a)(b) Demonstration of compliance

Operators should maintain a compliance register that should include all the certification specification requirements pertaining to all the heliport/helideck/vertiport that is under their management/oversight. The compliance register should provide status of their compliance to all the relevant certification specification.

VFI.OR.A.025 Personnel requirements - Certified heliport or vertiport

(a) An operator prior to the grant of a certificate and on an on-going basis shall engage, employ or contract:

(1) sufficient and qualified personnel for the planned tasks and activities to be performed related to the operation, maintenance and management of the heliport/helideck/vertiport in accordance with the applicable requirements and the operator’s training programme; and

(2) sufficient number of supervisors to defined duties and responsibilities, considering the structure of the organisation.

(b) The operator shall nominate an Accountable Manager, acceptable to the GCAA, who has the authority for ensuring that all activities can be financed and carried out in accordance with the applicable requirements. The Accountable Manager shall be responsible for establishing and maintaining an effective management system. Therefore, the Accountable Manager shall:

(1) have full control of the resources, final authority over operations under the certificate/acceptance of the organisation and ultimate responsibility and accountability for the establishment, implementation and maintenance of management systems, policies, and resolution of all safety issues;

(2) have the final responsibility for all safety issues;

(3) ensure that all necessary resources are available to operate the heliport/helideck/vertiport in accordance with the applicable requirements and the heliport/helideck/vertiport manual;

(4) ensure that if there is a reduction in the level of resources or abnormal circumstances which may affect safety, the required reduction in the level of operations at the heliport helideck/ vertiport is implemented;

(5) ensure the establishment, implementation, and promotion of the safety management system;

(6) ensure the establishment of a just culture which encourages safety reporting;

(c) The operator, shall nominate the operations Post Holder, acceptable to the GCAA, who is responsible for the management and supervision of operations and safety critical aspects.

(d) The operations Post Holder shall have direct access to the Accountable Manager.

(e) The operator shall ensure that personnel involved in the operation, maintenance and management of the heliport/helideck/vertiport are adequately trained in accordance with the training programme.

(f) The operator shall determine the number of personnel needed to carry out planned tasks.

GM1 VFI.OR.A.025(a)(1) Personnel requirements - Certified heliport or Vertiport

QUALIFIED PERSONNEL

(a) The term 'qualified' denotes fitness or fit for the purpose. This may be achieved through fulfilment of the necessary conditions such as completion of required training, or acquisition of a diploma or degree, or through the gaining of suitable experience. It, also, includes the ability, capacity, knowledge or skill that matches or suits an occasion, or makes someone eligible for a duty, office, position, privilege or status.

(b) Certain posts may, by nature, be associated with the possession of certain qualifications in a specific field (e.g. rescue and firefighting, civil, mechanical or electrical engineering, wildlife biology, etc.). In such cases, the person occupying such a post is expected to possess the necessary qualifications.

AMC1 VFI.OR.A.025(b) Personnel requirements- Certified heliport or Vertiport

ACCOUNTABLE MANAGER– GENERAL REQUIREMENTS

The Accountable Manager should have:

(a) knowledge and understanding of regulations;

(b) knowledge and understanding of management system and how these are applied within the organisation;

(c) knowledge and understanding of the role of the accountable manager; and

(d) knowledge and understanding of the key issues of risk management within the heliport or vertiport.

AMC1 VFI.OR.A.025(c) Personnel requirements- Certified heliport or vertiport

OPERATIONS POST HOLDER – ACCEPTANCE

(a) The GCAA's acceptance of nominated operations post holder is based on the applicable assessment criteria, and the applicant's demonstration of knowledge of the applicable regulations and an understanding of the proposed position.

(b) Nomination of the operations post holder is the responsibility of the operator.

(c) Cases for interviews with nominated operations Post Holders, for acceptance by the GCAA, include the following:

(1) start of operations before issuing the heliport/vertiport Certificate; or

(2) change of operations Post Holder.

AMC2 VFI.OR.A.025(c) Personnel requirements- certified heliport or vertiport

POST HOLDER – CONTINUOUS AVAILABILITY

(a) The operator should ensure the roles held by the operations Post Holder is continually occupied by appropriate person.

(b) A vacancy, or potential vacancy, of operations Post Holder position should be notified to the GCAA immediately.

(c) Initial notification of a vacancy should, within 5 working days, be followed by an action plan via the management of change process, to manage and replace the vacant position.

(d) The GCAA may at any time restrict, suspend, or revoke, the acceptance of a Post Holder.

AMC5 VFI.OR.A.025(c) Personnel requirements- Certified heliport or vertiport

CHANGES TO POST HOLDERS

The operator should apply for a change to the nominated Post Holder, with required supporting documentation to the GCAA. The application should additionally include evidence of management of change.

AMC6 VFI.OR.A.025(c) Personnel requirements- Certified heliport or vertiport

TEMPORARY POST HOLDERS

When a Post Holder is unavailable for lengthy periods, the operator should notify the GCAA of a replacement.

AMC7 VFI.OR.A.025(a)(1), (c) Personnel requirements- Certified heliport or vertiport

KNOWLEDGE ASSESSEMENT CRITERIA

(a) Knowledge assessment criteria for Accountable Manager and operations Post Holders

• GCAA's regulatory framework, UAE Aviation Law, CARs, SSP, SMS, heliport / vertiport certification process, oversight, enforcement process;

<table>
<tr><td colspan="2">

- GCAA's process for the reporting and follow-up of accidents, incidents and emergencies on the heliport/vertiport;
- Management systems;
- heliport/vertiport Manual;
- Human factor principles.

</td></tr>
<tr><td>Accountable Manger</td><td>Operations Post holder</td></tr>
<tr><td>

- The documents that prescribe relevant heliport/vertiport safety standards.
- Management systems related principles and practices and their integration.
- Key issues of risk management within the heliport/vertiport.
- Understanding of the requirements for competence of heliport / vertiport management personnel, so as to ensure that competent persons are in place.

</td><td>

- The applicable requirements in the area of heliports and/or vertiport operations, maintenance, RFFS and emergency planning.
- Technical understanding of the systems, that support operations.

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</table>

Table OR 1: GCAA's Post Holder Assessment Criteria

(b) Assessment criteria for Accountable Manager and Post Holders- Supporting document

<table>
<tr><th>Accountable Manager</th><th>Post Holders</th></tr>
<tr><td>

- Organisational Structure;
- MOC (where applicable);
- Curriculum Vitae (CV);
- Other relevant documents if requested by the GCAA

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- Organisational Structure;
- Job description;
- MOC (where applicable);
- Curriculum Vitae (CV);
- Proof of relevant training/qualification/experience;
- Other relevant documents if requested by the GCAA

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Table OR 2 : Supporting documents - Assessment Criteria

Note: Acceptance of a Post Holder by the GCAA is based upon the knowledge assessment criteria and should not be considered as GCAA's endorsement of the performance capabilities of the Post Holder.

GM2 VFI.OR.A.025(c) Personnel requirements- Certified heliport or vertiport

POST HOLDER INTERVIEW

(a) The GCAA's process for acceptance of Post Holders is based on the applicant demonstrating knowledge of the applicable regulations, understanding the Post Holder's role and of the standards required by the GCAA. The process includes a review by the GCAA of the submitted details/documents to determine the suitability of the person for the role of a Post Holder.

(b) Possible agenda items include:

(1) information from the GCAA on organisation and mission of the GCAA, the regulatory framework and specifically Safety Management System requirements;

(2) information from the nominated person concerning the intended work area;

(3) enforcement methodology of the GCAA;

(4) the role and responsibility of the Post Holder;

(5) expected competence requirement of the nominated person in relation to present personal status and experience presented in their curriculum vitae (CV) or equivalent documentation;

(6) discussion concerning depth of knowledge and understanding of the applicable legislation and regulations;

(7) understanding of aviation in general and for the specific nominated post, how operators/activities at the heliport/Helideck/Vertiport including Air Navigation Service Providers, and other aviation activities can impact aircraft safety.

AMC1 VFI.OR.A.025(b)(c) Personnel requirements- Certified heliport or Vertiport

COMBINATION OF ACCOUNTABLE MANAGER AND OPERATIONS POST HOLDER

The accountable manager and the operations Post Holder should not be the same person, unless approved by the GCAA.

GM1 VFI.OR.A.025(b)(c) Personnel requirements- Certified heliport or Vertiport

COMBINATION OF ACCOUNTABLE MANAGER AND OPERATIONS POST HOLDER

The certified heliport or vertiport should consider the following, when requesting for a combined role:

(a) Size and complexity of the organisation.

(b) Understanding of the roles and responsibilities by the Post Holder.

AMC1 VFI.OR.A.025(f) Personnel requirement - Certified heliport or vertiport

RESOURCE ASSESSMENT

(a) Operator should carry out an analysis to compare existing and planned operations with the requirement to provide sufficient numbers of trained Landing Officers, Landing Assistants, Radio Operators when applicable, appropriate for the scale and complexity of the heliport/vertiport, operations, rescue and firefighting requirements.

(b) Once the analysis has been completed and fully documented, the staffing levels, resources and processes, that have been identified as missing or inadequate should form the basis for an implementation plan, which may be subject to the acceptance by the GCAA.

(c) The operator should use a task/resource analysis to determine the personnel requirement for the provision of RFF services.

GM1 VFI.OR.A.025(f) Personnel requirement - Certified heliport/vertiport

RESPONSIBILITIES

(a) **Operations Post Holder**:

Should be responsible for all aspects of the heliport/helideck/vertiport operations as applicable and maintenance, rescue and firefighting, 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 and/or vertiport requirements including:

(1) emergency response;

(2) safety plan;

(3) manoeuvring area access and control procedures;

(4) apron management where applicable;

(5) disabled helicopter/VCA removal plan;

(6) other environmental, security and safety programs as required; and

(7) oversight to ensure compliance with certification regulatory obligations.

(b) **Landing Officer (LO)**

(1) for the day-to-day management of the heliport/vertiport, associated operations and supervision of the Assistants and support staff.

(2) exercise immediate and effective control of all persons who are engaged in helicopter/VCA operations, or who are on or near the helicopter/VCA landing area.

(3) report any form of deviation on heliport/vertiport to his immediate superior/installation manager, so that the helicopter/VCA operator may be informed of the situation.

(4) Ensuring pre-operational and post-operational checks are carried out.

(5) Ensuring that on receipt of radio information regarding helicopter/VCA arrivals, facilities are ready to receive the helicopter/VCA.

(6) Ensuring the safe movement of passengers, baggage, freight and correct loading.

(7) Initiating fire-fighting and rescue procedures on the heliport/vertiport, and ensuring that members of the heliport/vertiport crew carry out their duties.

(8) Liaison with the installation fire teams and ensuring that backup fire-fighting and rescue procedures are implemented to assist after the initial stage of an emergency.

(9) Briefing the team on helicopter/VCA handling and other relevant tasks.

(10) Ensuring the management, are kept aware of helicopter/VCA movements.

(11) Ensuring that the 210° OFS is clear of obstructions before giving a helicopter/VCA clearance to land, where applicable.

(12) Ensuring that the flood lighting controls are accessible to and controlled by the LO (or Radio Operator).

(13) Ensuring that the charging/ refuelling procedures are implemented as applicable.

(14) Ensuring necessary steps are taken to deny unauthorised persons access to the helicopter deck prior to take-off and landing.

(15) Ensuring the deck is cleared of loose objects, inflammable substances, etc.

(16) Ensuring necessary personnel are present and at a state of readiness.

(17) All equipment and instruments are in place and in full working order.

(18) Passengers are held in the safe zone during landing/take off and that they are given guidance during disembarkation and embarkation.

(19) The LO shall be positioned to be able to observe as best as possible, and closely monitor, landing and take-off of helicopters/VCAs. The LO shall immediately inform the pilot via radio or visually if any abnormal situation occurs.

(c) Landing Assistant (LA):

The responsibilities of the Landing Assistant should include but not be limited to:

(1) Assisting the LO in the operation.

(2) Directing passengers to and from the helicopter/VCA.

(3) Operation of fire-fighting and rescue equipment under the direction of the LO and assisting the LO in checking fire-fighting and rescue equipment.

(4) Undertaking other duties around the facility as required by the LO.

(5) Passenger and freight control before departure and on arrival.

(6) liaison with the LO, Radio Operator on helicopter movements and requirements.

(d) Radio Operator (RO):

(1) The RO should provide information and advice for the purpose of assisting the safe and efficient operation of aircraft. This should include:

(i) information when available on other known traffic;

(ii) weather information;

(iii) information regarding radio and navigational aids;

(iv) landing area conditions and associated facilities;

(v) alerting service; and

(vi) any other information likely to affect safety.

(2) Coordinate with other agencies as required, including:

(i) other ATS and AFIS units,

(ii) meteorological services providers,

(iii) operators of aircraft and landing platforms,

(iv) rescue and fire-fighting emergency services,

(v) search and rescue authorities, and

(vi) UAE armed forces and/or police as applicable.

(3) RO's duties may include passing Weather Status Reports to the helicopter/VCA operator, estimated times of arrival, and revisions, to the LO, confirmation that the deck is ready for arriving helicopters, sending arrival messages, and obtaining flight plan and load details etc.

(4) RO's emergency preparedness includes having an emergency procedures checklist which clearly displays Alerting Service actions involving overdue or missing aircraft.

GM2 VFI.OR.A.025(f) Personnel requirement - Certified heliport/vertiport

RADIO OPERATOR

(a) Continuous two-way radio communications should be available between the helicopter/VCA pilot and the 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.

(b) Radio Operators should be aware of helicopter/VCA operations within the vicinity and should be prepared to pass on relevant information to the pilots.

(c) On most facilities, the radio operator (RO) 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 (LOs and LAs) 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.

(d) Major advantage of having a radio-equipped person is that they can maintain visual as well as radio communication during the circuit, final approach and landing, so assisting the helicopter/VCA crew with further positive identification of the facility and thereby reducing the incidence for a landing on an incorrect location. A radio-equipped person is also in a good position to warn of any developing issues to the helicopter / VCA crew.

AMC1 VFI.OR.A.025 Personnel requirements- Certified heliport or vertiport

GENERAL – ACCESS TO RULES AND PROCEDURES

(a) The operator should have a system in place to ensure the personnel has access to relevant technical documents and procedures.

(b) The system should have a mechanism to verify that the information has reached the intended recipient.

VFI.OR.A.030 Personnel requirement – Heliport, helideck or vertiport - Landing Area Acceptance

(a) An operator prior to the grant of a Landing Area Acceptance and on an on-going basis shall engage, employ or contract:

(1) sufficient and qualified personnel for the planned tasks and activities to be performed related to the operation, maintenance and management of the heliport/helideck or vertiport in accordance with the applicable requirements and the operator’s training programme; and

(2) sufficient number of supervisors to defined duties and responsibilities, considering the structure of the organisation.

(b) The operator shall nominate an Accountable Manager, acceptable to the GCAA, who has the authority for ensuring that all activities can be financed and carried out in accordance with the applicable requirements. Therefore, the Accountable Manager shall:

(1) have full control of the resources, final authority over operations and ultimate responsibility and accountability for the establishment, implementation and maintenance of management systems, policies, and resolution of all safety issues;

(2) have the final responsibility for all safety issues;

(3) ensure that all necessary resources are available to operate, in accordance with the applicable requirements and the heliport, helideck or vertiport manual;

(4) ensure that if there is a reduction in the level of resources or abnormal circumstances which may affect safety, the required reduction in the level of operations is implemented;

(c) The operator, shall nominate an Operations Post Holder, who shall be responsible for the management and supervision of safety critical aspects.

(d) The operations Post Holder shall have direct access to the Accountable Manager.

(e) The operator shall ensure that personnel involved in the operation, maintenance and management of the heliport, helideck or vertiport are adequately trained in accordance with the training programme.

(f) The operator shall determine the number personnel needed to carry out planned tasks.

GM1 VFI.OR.A.030(a)(1) Personnel requirements - Landing Area Acceptance

QUALIFIED PERSONNEL

Refer GM1 VFI.OR.A.025(a)(1).

AMC1 VFI.OR.A.030(b) Personnel requirements- Landing Area Acceptance

ACCOUNTABLE MANAGER– GENERAL REQUIREMENTS

The Accountable Manager should have:

(a) knowledge and understanding of regulations;

(b) knowledge and understanding of management system and how these are applied within the organisation

(c) knowledge and understanding of the role of the accountable manager; and

(d) knowledge and understanding of the key issues of risk management within the heliport or vertiport

AMC1 VFI.OR.A.030(c) Personnel requirements- Landing Area Acceptance

OPERATIONS POST HOLDER – ACCEPTANCE

(a) The GCAA's acceptance of nominated operations post holder is based on the applicable assessment criteria, and the applicant's demonstration of knowledge of the applicable regulations and an understanding of the proposed position.

(b) Nomination of the operations post holder is the responsibility of the operator.

(c) Cases for interviews with nominated operations Post Holders, for acceptance by the GCAA, include the following:

(1) start of operations before issuing the heliport /helideck/ vertiport landing area acceptance; or

(2) change of operations Post Holder.

AMC2 VFI.OR.A.030(c) Personnel requirements - Landing Area Acceptance

POST HOLDER – CONTINUOUS AVAILABILITY

(a) The operator should ensure the roles held by the operations post holder is continually occupied by appropriate person.

(b) A vacancy, or potential vacancy, of operations holder position should be notified to the GCAA immediately.

(c) Initial notification of a vacancy should, within 5 working days, be followed by an action plan via the management of change process, to manage and replace the vacant position.

(d) The GCAA may at any time restrict, suspend, or revoke, the acceptance of a Post Holder.

AMC5 VFI.OR.A.030(c) Personnel requirements - Landing Area Acceptance

CHANGES TO POST HOLDERS

The operator should apply for a change to the nominated Post Holder, with required supporting documentation to the GCAA. The application should additionally include evidence of management of change.

AMC6 VFI.OR.A.030(c) Personnel requirements- Landing Area Acceptance

TEMPORARY POST HOLDERS

When a Post Holder is unavailable for lengthy periods, the operator should notify the GCAA of a replacement.

AMC7 VFI.OR.A.030(b)(c) Personnel requirements- Landing Area Acceptance

KNOWLEDGE ASSESSMENT CRITERIA

(a) Knowledge assessment criteria for Accountable Manager and operations Post Holders:

<table>
<tr><td colspan="2">

GCAA's regulatory framework, UAE Aviation Law, CARs, SSP, SMS, heliport/helideck/ vertiport certification and Landing Area Acceptance process, oversight, enforcement process;
GCAA's process for the reporting and follow-up of accidents, incidents and emergencies on the heliport / vertiport;
Management systems;
heliport / helideck/vertiport Manual;
Human factor principles

</td></tr>
<tr><td>Accountable Manger</td><td>Operations Post holder</td></tr>
<tr><td>

The documents that prescribe relevant heliport/helideck/vertiport safety standards.
Management systems related principles and practices and their integration.
Key issues of risk management within the heliport/ helideck/vertiport.
Understanding of the requirements for competence of personnel, so as to ensure that competent persons are in place.

</td><td>

The applicable requirements in the area of heliports and/or vertiport operations, maintenance, RFFS and emergency planning.
Technical understanding of the systems, that support operations.

</td></tr>
</table>

Table OR 3: GCAA's Post Holder Assessment Criteria

(b) Assessment criteria for Accountable Manager and Post Holders- Supporting document:

Accountable Manager	Post Holders
• Organisational Structure; • MOC (where applicable); • CV;	• Organisational Structure; • Job description; • MOC (where applicable); • CV;

relevant documents if requested by the GCAA	• Proof of relevant training / qualification /experience; Other relevant documents if requested by the GCAA

Table OR 4 : Supporting documents - Assessment Criteria

Note: Acceptance of a Post Holder by the GCAA is based upon the knowledge assessment criteria and should not be considered as GCAA's endorsement of the performance capabilities of the Post Holder.

GM2 VFI.OR.A.030(c) Personnel requirements- Landing Area Acceptance

POST HOLDER INTERVIEW

Refer GM2 VFI.OR.A.025(c)

GM1 VFI.OR.A.030(b)(c) Personnel requirements- Landing Area Acceptance

COMBINATION OF ACCOUNTABLE MANAGER AND OPERATIONS POST HOLDER

Refer GM1 VFI.OR.A.025(b)(c)

AMC1 VFI.OR.A.030(f) Personnel requirement - Landing Area Acceptance

RESOURCE ASSESSMENT

(a) Operator should carry out an analysis to compare existing and planned operations with the requirement to provide sufficient numbers of trained Landing Officers, Landing Assistants, Radio Operators when applicable, appropriate for the scale and complexity of the heliport/helideck/ vertiport, operations, rescue and firefighting requirements.

(b) Once the analysis has been completed and fully documented, the staffing levels, resources and processes, that have been identified as missing or inadequate should form the basis for an implementation plan, which may be subject to the acceptance by the GCAA.

GM1 VFI.OR.A.030(f) Personnel requirement - Landing Area Acceptance

RESPONSIBILITIES

Refer GM VFI.OR.A.025(f).

GM2 VFI.OR.A.030(f) Personnel requirement - Landing Area Acceptance

RADIO OPERATOR

Refer GM2 VFI.OR.A.025(f).

AMC1 VFI.OR.A.025 Personnel requirements - Landing Area Acceptance

GENERAL – ACCESS TO RULES AND PROCEDURES

(a) The operator should have a system in place to ensure the personnel has access to relevant technical documents and procedures.

(b) The system should have a mechanism to verify that the information has reached the intended recipient.

VFI.OR.A.035 Personnel requirements - PAO

(a) A PAO prior to the grant of an acceptance and on an on-going basis shall engage, employ or contract:

(1) sufficient and qualified personnel for the planned tasks and activities to be performed related to the management, oversight, and operation of the helideck in accordance with the applicable requirements and the operator's training programme; and

(2) sufficient number of supervisors to defined duties and responsibilities, considering the structure of the organisation.

(b) The PAO shall nominate an Accountable Manager, acceptable to the GCAA, who has the authority for ensuring that all activities can be financed and carried out in accordance with the applicable requirements. The Accountable Manager shall be responsible for establishing and maintaining an effective management system. Therefore, the Accountable Manager shall:

(1) have full control of the resources, final authority over operations of the organisation and ultimate responsibility and accountability for the establishment, implementation and maintenance of management systems, policies, and resolution of all safety issues;

(2) have the final responsibility for all safety issues;

(3) ensure that all necessary resources are available to operate the helideck in accordance with the applicable requirements and the manual;

(4) ensure that if there is a reduction in the level of resources or abnormal circumstances which may affect safety, the required reduction in the level of operations at the helideck is implemented;

(5) ensure the establishment, implementation, and promotion of the safety policy;

(6) ensure compliance with relevant applicable requirements, the organisation's safety management system, as well as its quality assurance programme;

(7) ensure the establishment of a just culture which encourages safety reporting;

(8) ensure the establishment, implementation and maintenance of the organisation's competence to learn from the analysis of data collected through its safety reporting system and others Safety Data Collection and Processes Systems (SDCPS) in place; and establishment of safety objectives and safety targets.

(c) The PAO, shall nominate the following Post Holders, acceptable to the GCAA, who are responsible for the management and supervision of safety critical aspects, for the helidecks under their management and/or oversight, as below:

(1) operations–operations Post Holder;

(2) maintenance - maintenance Post Holder;

(3) quality assurance- quality Post Holder;

(4) safety management system- safety Post Holder; and

(5) rescue and firefighting services - rescue and firefighting service Post Holder.

(d) The Post Holders shall have direct access to the Accountable Manager.

(e) The PAO shall determine the number of personnel needed to carry out planned tasks.

(f) The PAO shall ensure that their personnel are adequately trained to carry out their responsibilities.

(g) The PAO shall update its manual including the organisational structure with respect to the accepted Post Holders.

GM1 VFI.OR.A.035(a)(1) Personnel requirements - PAO

QUALIFIED PERSONNEL

Refer - GM1 VFI.OR.A.025(a)(1)

AMC1 VFI.OR.A.035(b) Personnel requirements - PAO

ACCOUNTABLE MANAGER– GENERAL REQUIREMENTS

The Accountable Manager should have:

(a) knowledge and understanding of applicable regulations;

(b) understanding of the requirements for competence of PAO's Post Holders so as to ensure that competent postholders are employed;

(c) knowledge and understanding of safety, quality management systems related principles and practices, and how these are applied within the organisation;

(d) knowledge of the role of the accountable manager; and

(e) knowledge and understanding of the key issues of risk management within the organisation.

AMC1 VFI.OR.A.035(c) Personnel requirements - PAO

POST HOLDERS – ACCEPTANCE

(a) The GCAA's acceptance of nominated Post Holders is based on the applicable assessment criteria as established in AMC7 VFI.OR.A.035(b)(c) Personnel requirements, and the applicant's demonstration of knowledge of the applicable regulations and an understanding of the proposed position.

(b) Nomination of the Post Holder is the responsibility of the PAO.

(c) Cases for interviews with nominated Post Holders, for acceptance by the GCAA, include the following:

(1) At the acceptance stage for a PAO; or

(2) change of PAO Post Holders.

AMC2 VFI.OR.A.035(c) Personnel requirements - PAO

POST HOLDERS – CONTINUOUS AVAILABILITY

(a) The PAO should ensure the roles held by accepted post holders are continually occupied by appropriate persons.

(b) A vacancy, or potential vacancy, of any post holder positions should be notified to the GCAA immediately.

(c) Initial notification of a vacancy should, within 5 working days, be followed by an action plan via the management of change process, to manage and replace the vacant position.

(d) The roles, authority, responsibilities and accountabilities of the person(s) occupying positions as mentioned in VFI.OR.A.35(b) and (c) Personnel requirement, should be reflected in their respective job description.

(e) A person should not be permitted to hold more than one of the positions mentioned under VFI.OR A.035(b) and (c) Personnel requirement, without the acceptance of the GCAA.

(f) The GCAA may, at any time, restrict, suspend, or revoke, the acceptance of a Post Holder.

AMC3 VFI.OR.A.035(c) Personnel requirements - PAO

NOMINATED POST HOLDER'S RESPONSIBILITIES

(a) Safety Post Holder should:

(1) have appropriate Safety Management System knowledge and experience;

(2) be responsible for the overall performance of the Safety Management System, including implementation, maintenance, documentation, performance, effectiveness and oversight of the organisation in accordance with these regulations and CAR SMS;

(3) be the principal communicator with the GCAA in relation to Safety Management System;

(4) be directly responsible to the Accountable Manager on the performance of SMS and on any need for improvement;

(5) ensure safety promotion throughout the organisation.

(b) Operations Post Holder:

(1) should be responsible for overseeing that the helideck and its operations comply with the requirements of CAR AGA Part- VFI;

(2) should be the principal communicator with the GCAA in relation to operational matters;

(3) the Operations Post Holder should:

(i) ensure that requirements of PAO are met, and that the helideck operates in accordance with PAO conditions and regulatory requirements;

(ii) be responsible for the overseeing of the operational services of the helideck and for day-to-day operations;

(iii) monitor planning and development for compliance of the helideck;

(iv) analyse audit findings and inspections and initiate appropriate actions pertaining to their area of operations;

(v) use feedback from audits and inspections to recommend appropriate changes to safety management procedures and ensure implementation;

(vi) understand the PAO requirement and status of the helideck or Manual;

(c) Maintenance Post Holder:

(1) should be responsible for overseeing that the helideck's maintenance programmes for safety critical infrastructure comply with the requirements of these regulations;

(2) should be the principal communicator with the GCAA in relation to helideck maintenance;

(3) the maintenance Post Holder should:

(i) ensure that the helideck facilities are accurately maintained reported and in accordance with the regulatory requirements;

(ii) ensure helideck facilities are compatible with sizes, types and frequency of helicopter in accordance with organisation's and technical requirements;

(iii) ensure that maintenance policies, procedures and training fulfil the aims of the helideck and meet regulatory requirements;

(iv) understand regulatory requirements specific to visual aids (markings, lighting, signs), electrical systems and surfaces;

(v) understand requirement for corrective and preventive maintenance programme;

(vi) understanding of the role as related to PAO's reporting systems to include hazard identification, defect identification and reporting of safety critical information to the air traffic service unit.

(d) Rescue Firefighting Service Post Holder should:

(1) have appropriate skill, knowledge and experience based on the scale of rescue and firefighting operations;

(2) be responsible for overseeing the establishing and effectively managing all aspects of rescue and firefighting services, facilities and equipment of the helidecks under their management / oversight, as per the requirements of this CAR;

(3) be the principal communicator with the GCAA;

(4) ensure the helideck under their management /oversight operates in accordance with the regulatory requirements in the provision of RFFS;

(5) ensure rescue and firefighting services, facilities and equipment commensurate with the sizes, types and frequency of helicopter in accordance with the helideck's and regulatory requirements;

(6) assess the feasibility of continuing helideck operations in an emergency situation; and

(7) establish and implement necessary policies and procedures for the safe and effective management of emergencies and training activities.

(e) Quality Post Holder should:

(1) have appropriate Quality Management System (QMS) knowledge and experience;

(2) be responsible for overall performance of the compliance monitoring and quality assurance system, including implementation, maintenance, documentation, effectiveness of oversight system of the organisation and all the helidecks under their PAO acceptance;

(3) be a principle communicator with the GCAA in relation to audits, quality assurance and compliance issues;

(4) be directly responsible to the Accountable Manager on matters affecting the adequacy, accuracy and timeliness of the quality assurance requirements in accordance with this CAR;

(5) ensure an internal quality audit programme is implemented to audit the PAO's organisation and all the helideck in their registry for conformity with the procedures in their Manual and associated documentation;

(6) ensure the continuing suitability and effectiveness of the internal quality assurance system through the use of statistical analysis and managerial review procedures.

(f) The PAO should allocate Post Holder roles to personnel in a manner that ensures effective internal oversight and avoids conflict of interest.

(g) The Safety Post Holder and Quality Post Holder should not report to the Operations, Maintenance, or Rescue Firefighting Service Post Holder.

(h) The Post Holders should be directly responsible for the proper functioning of the management system. They should have decision making authority and financial control over the relevant part of the management system.

AMC5 VFI.OR.A.035 Personnel requirements - PAO

CHANGES TO POST HOLDERS

The PAO should apply for a change to the nominated Aerodrome Post Holder, with required supporting documentation to the GCAA. The application should additionally include evidence of management of change.

AMC6 VFI.OR.A.035 Personnel requirements - PAO

TEMPORARY POST HOLDERS

When a Post Holder is unavailable for lengthy periods, the PAO should notify the GCAA of a replacement or temporary Post Holder.

AMC7 VFI.OR.A.035(b)(c) Personnel requirements- PAO

POST HOLDERS- KNOWLEDGE ASSESSMENT

(a) Knowledge assessment criteria for Accountable Manager and Post Holders

<table>
<tr><th>Accountable Manager</th><th>Safety</th><th>Operations</th><th>Maintenance</th><th>RFFS</th><th>Quality Assurance</th></tr>
<tr><td colspan="6">Common to all:
• GCAA’s regulatory framework, UAE Aviation Law, CARs, SSP, SMS, PAO acceptance process, oversight, enforcement process;
• GCAA’s process for the reporting and follow-up of accidents, incidents and emergencies on the aerodrome;
• SMS and Quality Management;
• helidecks manual;
• Human factor principles.</td></tr>
<tr><td></td><td colspan="5">Practical expertise and experience in their domain of expertise</td></tr>
<tr><td colspan="6">Knowledge and understanding of</td></tr>
<tr><td>• The documents that prescribe relevant safety standards.
• Safety, Security and Quality Management</td><td>Technical understanding of the systems that support operations.</td><td>The applicable requirements in the area of operations.</td><td>The applicable requirements in the areas of electrical systems, and aeronautical lighting.</td><td>The applicable requirements in the areas of RFFS.</td><td>• Technical background and understanding of compliance monitoring system.
• Internal audit process.</td></tr>
</table>

systems related principles and practices and their integration. • Key issues of risk management within the helidecks.					
Understanding of the requirements for competence of management personnel, so as to ensure that competent persons are in place.	SMS and its interface with other systems.	safety and quality management systems.	applicable specific provisions adopted by the GCAA, such as ICAO publications.	applicable specific provisions adopted by the GCAA, such as ICAO publications.	QMS and its interface with other system.
	Requirements for SMS.	Requirements as stated in CAR AGA, Part VFI.			

Table OR 5: GCAA's Post Holder Assessment Criteria

(b) Assessment criteria for Accountable Manager and Post Holders, Supporting document:

Accountable Manager	Post Holders
• Organisational Structure; • MOC (where applicable); • CV;	• Organisational Structure; • Job description; • MOC (where applicable);

• Other relevant documents if requested by the GCAA	• CV; • Proof of relevant training/qualification /experience; • Other relevant documents if requested by the GCAA

Table OR 6 : Supporting documents - Assessment Criteria

Note: Acceptance of a Post Holder by the GCAA is based upon the knowledge assessment criteria and should not be considered as GCAA's endorsement of the performance capabilities of the Post Holder.

GM2 VFI.OR.A.035(c) Personnel requirements - PAO

POST HOLDER INTERVIEW

Refer GM2 VFI.OR.A.025(c)

AMC1 VFI.OR.A.035 Personnel requirements - PAO

GENERAL – ACCESS TO RULES AND PROCEDURES

(a) The PAO should have a system in place to ensure personnel have access to relevant technical documents and procedures.

(b) The system should have a mechanism to verify that the information has reached the intended recipient.

AMC2 VFI.OR.A.035 Personnel requirements - PAO

(a) PAO should carry out an analysis to compare their existing and planned oversight activities with the requirement to ensure sufficient numbers of auditors are available to carry out their compliance monitoring activities.

(b) Once the analysis has been completed and fully documented, the staffing levels, resources and processes, that have been identified as missing or inadequate should form the basis for an implementation plan, which may be subject to the acceptance by the GCAA.

(c) This analysis should be subject to regular review to identify any gaps in the requirement.

AMC3 VFI.OR.A.035 Personnel requirements - PAO

PAO'S INTERNAL AUDIT TEAM

(a) PAO should have sufficient number of qualified personnel to perform compliance monitoring and quality assurance and have the necessary knowledge, experience, initial, on-the-job and recurrent training to ensure continuing competence.

(b) PAO'S internal audit team should consist of Audit team leader and Member(s).

(c) PAO should maintain a list of trained and competent internal auditors who are tasked to internally audit their facilities.

(d) The PAO's audit team should be sufficiently staffed, taking into consideration the following:

(1) The number of facilities under their management and/or supervision;

(2) The geographical layout of the facilities under their management and/or supervision;

(3) The requirement to ensure that the audit program is satisfied.

GM1 VFI.OR.A.035 Personnel requirements- PAO

PAO'S INTERNAL AUDIT TEAM - TRAINING

The training programme should include at least the following:

(a) Applicable legislation, Organisation, and structure;

(b) the applicable requirements and procedures;

(c) safety management systems, including safety assurance principles;

(d) acceptability and auditing of safety managements systems;

(e) change management;

(f) aeronautical studies, safety assessments, and reporting techniques;

(g) evaluation and review of helideck manuals;

(h) human factors principles;

(i) helideck design;

(j) helideck signs, markings and lighting;

(k) helideck maintenance;

(l) helideck operations, including:

(1) obstacle limitation surfaces assessment

(2) airspace (Classification, height, etc.)

(3) rescue and firefighting;

(4) emergency planning;

(5) adverse weather operations;

(6) wildlife management;

(7) helideck safety management;

(8) handling of dangerous goods; and

(9) fuel, facilities, storage and handling.

(m) other suitable technical training appropriate to the role and tasks of the personnel.

SECTION B - HELIPORT, HELIDECK, AND VERTIPORT MANUAL AND DOCUMENTATION (VFI.OR.B)

VFI.OR.B.005 Heliport, helideck, and vertiport manual

(a) The operator shall establish and maintain a manual, which is a fundamental requirement for certification and Landing Area Acceptance.

(b) The manual shall:

(1) reflect the applicable elements and the requirements set out in this part;

(2) include the elements of the operator's management system;

(3) include the requirements for emergency response including RFFS and emergency planning;

(4) not contravene the scope of the Certificate or Landing Area Acceptance;

(5) contain or refer to all necessary information for the safe use, operation and maintenance of the heliport/helideck/ vertiport/, its equipment, as well as its obstacle limitation and protection surfaces and other areas associated with the heliport/helideck/vertiport; and

(6) Include a Task Resource Analysis for RFFS personnel (applicable only for certified heliport/vertiport).

(c) The operator shall ensure that all personnel and all other relevant organisation's personnel have easy access to the portions of the manual that are relevant to their duties and responsibilities.

(d) The operator shall provide the GCAA with complete and current copy of the manual electronically;

(e) The operator shall:

(1) review the content of the manual, ensure that it is kept up to date and amended whenever necessary;

(2) make all personnel and other relevant organisation's aware of the changes that are relevant to their duties and responsibilities.

(f) The operator shall ensure that the manual:

(1) is signed by the Operations Post Holder;

(2) is in electronic format and is easy to revise;

(3) has a system for version control management which is applied and made visible in the manual.

GM1 VFI.OR.B.005(b) Heliport, helideck, and vertiport manual

(a) Following details should be provided in the heliport/helideck/vertiport manual.

(1) PART A. – GENERAL

(i) Purpose and scope of the manual.

(ii) Legal requirements for the manual as prescribed in SUBPART B - (VFI.OR).

(iii) Conditions for use of the heliport/helideck/vertiport by its users.

(iv) The obligations of the heliport/helideck/vertiport operator; rights of the GCAA and guidance to staff on how to facilitate audits/inspections by the GCAA.

(v) Systems for amendments and revisions of the manual.

(2) PART B. - HELIPORT/HELIDECK/VERTIPORT MANAGEMENT SYSTEM, QUALIFICATION, AND TRAINING REQUIREMENTS

(i) Description of the organisational structure.

(ii) Names, authorities and duties of nominated accountable manager, operations post holder, LO, LA, RO.

(iii) Description of the SMS – policy, aviation focused hazard identification and risk assessment process, safety reporting, investigation, change management process, description of compliance monitoring process, procedure to report to the GCAA.

(iv) Training details of the personnel.

(v) Description of internal compliance monitoring process.

(3) PART C. - PARTICULARS OF THE HELIPORT/HELIDECK/VERTIPORT SITE

(i) Name of the heliport/helideck/vertiport.

(ii) The location of the heliport/helideck/vertiport.

(iii) The name of the operator and contact details (including telephone numbers) of the operator at which may be contacted at all times.

(iv) Details of the infrastructure, visual aids, wind direction indicator.

(v) Type of the operations that the heliport/helideck/vertiport is approved for.

(vi) Details of FATO, declared D-Value, load bearing capability, safety areas, clearways, TLOF, Taxiways, Taxi routes, parking stands, obstacle environment, level of RFF protection.

(vii) The geographical coordinates of the reference point determined in terms of the World Geodetic System — 1984 (WGS-84) reference datum.

(viii) The elevation.

(ix) Declared distances.

(x) Visual aids, slope indicators.

(xi) Helideck limitations in a Helideck Limitations List (HLL), where applicable, mentioning all limitations.

(xii) Limitations, warnings, cautions or other comments of operational importance.

(4) PART D. - THE AERODROME OPERATING PROCEDURES AND SAFETY MEASURES

(i) Movement area inspection.

(ii) Access to movement area.

(iii) Works safety.

(iv) Safeguarding.

(v) Wildlife hazard management.

(vi) Occurrence reporting.

(vii) Rescue and firefighting.

(viii) Emergency planning.

(ix) Maintenance procedures – landing surface, electrical, visual aids.

(x) Procedure for stand allocation in case of multiple parking stands.

(xi) FOD prevention.

(xii) Obstacle control and monitoring.

(b) If a particular element is not included in the manual because it is not applicable to the heliport/helideck/vertiport then the operator should state in the manual:

(1) that the particular element is not applicable; and

(2) why the particular element is not applicable.

VFI.OR.B.010 PAO Documentation

The PAO shall:

(a) establish and maintain a Safety and Quality management system manual which is a fundamental requirement for its acceptance;

(b) maintain documented agreement between the Primary Accountable Organisation and the named helideck operating companies for the system of safety oversight.

(c) establish process by which the Primary Accountable Organisation ensures that their audit team are sufficiently trained and qualified for the planned tasks and activities to be performed.

AMC1 VFI.OR.B.010(a) PAO Documentation

The PAO’s quality system should include the following documented procedures:

(a) for the internal audit process (i.e. audit scope, audit periodicity; audit plan; audit programme; definition of findings).

(b) 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).

(c) for notification of safety critical issues / findings to stakeholders and the GCAA.

(d) for document control of audits, reports and records.

SECTION C - HELIPORT AND VERTIPORT CERTIFICATION ACTIVITIES (VFI.OR.C)

VFI.OR.C.001 Scope

Unless otherwise specified, the requirements of this section are applicable to commercial heliports and vertiports that are used for international and/or commercial operations.

Note: These heliports or vertiports are characterised as commercial facilities available to the general public for ticketed or charter operations and for international operations.

VFI.OR.C.005 Certification obligations

(a) Prior to commencing the operation of a heliport or vertiport, the operator shall obtain the applicable heliport/vertiport certificate issued by the GCAA.

(b) Operator shall ensure that required approvals from other Appropriate Authorities (i.e. municipalities, civil defence, local departments of civil aviation, appropriate authorities, etc.) are obtained prior their application for a heliport / vertiport certificate.

VFI.OR.C.006 Expression of interest for certification of heliport or vertiport

The applicant for a certificate shall formally inform the GCAA in writing of their interest to develop and operate a heliport or vertiport.

GM1 VFI.OR.C.006 Expression of interest for certification of heliport or vertiport

EXPRESSION OF INITIAL INTEREST

(a) The applicant for a certificate should arrange for a meeting with the GCAA and provide details of the proposed heliport or vertiport site as well as concept of operations. The concept of operations should also indicate whether there is an intention to apply for hybrid operations. The applicant should make arrangements for its key personnel to be present during this meeting. During this meeting, the applicant should present to the GCAA their plans with regard to the design and operations.

(b) During the meeting, the applicant may be:

(1) provided by the GCAA with general information about the applicable requirements for the heliport or vertiport;

(2) provided with copies of the applicable requirements, and a description of the procedures that are followed during the certification process; and

(3) informed by the GCAA about possible approvals, permits, or clearances that may be needed to be obtained from other authorities.

(c) The GCAA will provide a formal confirmation for the applicant to proceed with a formal application.

VFI.OR.C.010 Application for a heliport or vertiport certificate

(a) Pursuant to the United Arab Emirates Federal Act No. 20 (1991) Promulgating The Civil Aviation Law Article 27 and to the Civil Aviation Regulations (CARs) for the time being in force , a heliport or vertiport certificate may be granted by the GCAA, if it is satisfied that an applicant is competent, having regard to the applicant's previous conduct and experience, the equipment, organisation, staffing, maintenance and other arrangements, to ensure that the heliport or vertiport and airspace are safe for use by helicopter/VCA.

(b) The requirement for heliport or vertiport certificate is as follows.

Heliports or vertiports that are:

(1) Used for international operations; and/or

(2) Open to the public; and/or

(3) Served by helicopters and/ or VCA performing commercial air transport;(e.g., Hospitality, tourism, photography, filming, etc.)

(c) The applicant for a heliport/vertiport certificate shall be the operator who can be:

(1) the owner of the land on which the heliport / vertiport is located; or

(2) the occupier of the land on which the heliport/vertiport is located; or

(3) the actual person or organisation operating the heliport/vertiport and holding a formal consent from the owner or occupier of the land on which the facility is located.

(d) The application for a certificate and subsequent document submissions shall be made in a form and manner established by the GCAA that includes no-objection certificates, approvals, agreements and permissions. Applicants for certificate shall obtain approvals from GCAA in relation to airspace and all relevant agencies, authorities, and entities including those mentioned in AMC2 VFI.OR.C.010(d).

(e) The applicant for heliport/vertiport certificate shall pay the applicable fees.

(f) The applicant shall provide the GCAA with the following:

(1) declaration of compliance;

(2) documentation demonstrating how it will comply with the applicable requirements. Such documentation shall include a procedure, describing how changes will be managed and notified to the GCAA; subsequent changes to these procedures shall require prior approval by the GCAA;

(g) Applicant for heliport or vertiport certificate shall demonstrate to the GCAA their compliance to the applicable requirements of CAR AGA PART VFI.

(h) The applicant shall satisfy the certification requirement at each stage of the application process as detailed in the GM1 VFI.OR.C.010(h).

(i) The applicant of heliport or vertiport certificate shall not commence any construction activity until the design is accepted by the GCAA.

GM1 VFI.OR.C.010(h) Application for a heliport or vertiport certificate

HELIPORT/VERTIPORT CERTIFICATE APPLICATION PROCESSING STAGES

Processing stage	Activity	Related AMC/GM
Stage 1	Assessment of application	• AMC1 VFI.OR.C.010(c) - Relationship of the applicant with the heliport/vertiport owner. • GM1 VFI.OR.C.010(c) - Registration of the Organisation. • AMC1 VFI.OR.C.010(d) Other no-objections, approvals and permissions. • AMC1 VFI.OR.C.010(f) Information to be provided to the GCAA for design acceptance.
	Payment of fees	• AMC1 VFI.OR.C.010(e) Applicable fees.
	Design acceptance	• AMC2 VFI.OR.C.010(f) – Design acceptance.
Stage 2	• Evaluation of the manuals, procedures submitted by the applicant. • Evaluation of emergency plan, rescue and firefighting capabilities.	• AMC1 VFI.OR.C.010(f)(g) Heliport/vertiport manual, AEP, SMS.
	• Evaluation of the competence and experience of the staff.	• VFI.OR.A.025 Personnel requirements - Certified heliport or vertiport. • AMC2 VFI.OR.C.010(f)(g) Application for a heliport or vertiport certificate-Adequacy of structure and resources.
	• Assessment of physical characteristics, facilities and equipment.	• AMC1 VFI.OR.C1.010(f) - Information to be provided to the GCAA for design acceptance. • AMC3 VFI.OR.C1.010(f)(g) - Assessments and evaluations.
	• Evaluation of operating procedures.	• AMC3 VFI.OR.C1.010(f)(g) - Assessments and evaluations.
Stage 3	• Issuance or refusal of heliport/vertiport certificate.	• GM1 VFI.OR.C.010(h) • GM2 VFI.OR.C.010(h) Issuance or refusal of heliport/vertiport certificate.

		• GM3 VFI.OR.C.010(h) Timescale for processing of applications.
	• Publication of certified status of helideck/vertiport and the required details in the AIP.	• GM1. VFI.OR.C.010 Promulgation of status of the Certificate.

Note: 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.

AMC1 VFI.OR.C.010(c) Application for a heliport or vertiport certificate

RELATIONSHIP OF THE APPLICANT WITH THE HELIPORT/VERTIPORT OWNER

(a) The applicant should provide the GCAA with all information necessary to demonstrate to the GCAA its relationship with the heliport/vertiport owner, and/or the owner of the land to be used for the heliport/vertiport development.

(b) Such documentation should include, but is not limited to, relevant portions of contracts, lease agreements, authorisations between the persons involved, etc.

GM1 VFI.OR.C.010(c) Application for a heliport or vertiport certificate

REGISTRATION OF THE ORGANISATION

(a) Applicant should register their organization in the GCAA's website, in order to make their application through GCAA's e-services or through other means established for this purpose by the GCAA.

(b) Applicants should provide evidence of their identity such as establishment / trade license documentation and official documents as required during the registration process.

(c) Applicant should provide all documents and information as required in the application portal.

(d) Applicants should have secure access to the GCAA e-Services, available on the GCAA's website: www.gcaa.gov.ae. Applicants who do not have access to the GCAA's e-Services must make an initial request through GCAA's customer service channels.

AMC1 VFI.OR.C.010(d) Application for a heliport or vertiport certificate

OTHER NO-OBJECTIONS, APPROVALS, AGREEMENTS AND PERMISSIONS

(a) A letter of no objection should be obtained from the appropriate authorities ensuring that the necessary arrangements have been made with regard to the protection of the Obstacle Limitation Surfaces (OLS). For areas outside the heliport/vertiport, safeguarding arrangements should be made with the local municipalities to aid the control of potential buildings or other structures which may affect helicopter/VCA operations.

(b) Applicants should obtain required approvals from other Appropriate Authorities (i.e. municipalities, civil defense, local departments of civil aviation.

(c) Applicants should apply for other certificates or approvals from the GCAA; this will be dependent upon the scale and type of operations the heliport/vertiport intended to be used. Other areas that require certification or approval are:

(1) Air Navigation Services:
For the purposes of arrangements for Air Navigation services.

(2) Airspace:
For the purpose of ensuring the suitability of the proposed site from an airspace perspective.

(3) Aviation Security:

(A) Security clearance to confirm that supporting resources and facilities required by aviation security services are made available at facilities serving civil aviation.

(B) Applicants should, prior to the issue of a Design Acceptance and for aviation activity, obtain a security clearance from GCAA through the established means.

(d) There may also be other bodies that the applicants should inform in their own interests and it is the responsibility of the heliport/ vertiport operator to obtain the appropriate approvals. The application for planning/building permissions and the request for a certificate are not interdependent and are required to be made separately.

(e) As a part of the heliport / vertiport certification process, the physical characteristics and design should consider, where appropriate, land-use and environmental control measures.

(f) Previously issued approvals /acceptances, if any, will generally be reassessed each 12 months if there are delays or extended periods of inactivity.

(g) Applicant should have arrangement (MOU or agreement) with the AIS to ensure up-to-date information of heliport/vertiport safety-related conditions are published.

GM1 VFI.OR.C.010(d) Application for a heliport or vertiport certificate

OTHER NO-OBJECTIONS, APPROVALS, AGREEMENTS AND PERMISSIONS

Applicant should coordinate with GCAA aviation security for more details.

GM2 VFI.OR.C.010(d) Application for a heliport or vertiport certificate

OTHER NO-OBJECTIONS, APPROVALS, AGREEMENTS AND PERMISSIONS

Security clearances as required by GCAA Aviation Security for organisations and aviation activities may be applied thru the established channels.

AMC1 VFI.OR.C.010(e) Application for a heliport or vertiport certificate

APPLICABLE FEES

Service fees, as published on the GCAA's website are varied from time to time and should be paid to the GCAA:

(a) during the initial heliport/vertiport certificate; and

(b) on a periodic basis after the grant of a heliport/vertiport certificate;

for each heliport/vertiport.

Note: Payment of the GCAA's service fee does not guarantee the grant or continuation for heliport/vertiport operations or of a heliport/vertiport certificate.

AMC1 VFI.OR.C.010(f) Application for a heliport or vertiport certificate

INFORMATION TO BE PROVIDED TO THE GCAA FOR DESIGN ACCEPTANCE

The information required to support the request for a Design Acceptance should include design drawings and a design report or other documentation as requested by the GCAA including:

(A) The location of the heliport or vertiport, and its boundaries, including maps and charts to indicate various facilities and areas in the heliport/vertiport; and the location with regards to buildings and areas of public use.

Maps should clearly indicate the operational area which include physical characteristics, visual aids, fixed equipment, details of operational areas. This defined area will be subject to safety oversight by the GCAA following the issue of a heliport / vertiport certificate.

(b) the type of operations at heliport/vertiport including:

(1) the helicopter/VCA types to be served at the heliport/vertiport, and the critical helicopter /VCA type to be used for the design of the heliport/vertiport;

(2) Hybrid operations, if applicable;

(3) the type of approaches, landing, and/or take-off operations;

(4) Airspace classification;

(5) operations during the day and/or night;

(6) operational concept and the associated airspace;

(7) any limitations to the operation of the heliport/vertiport;

(8) the design and facilities of the heliport/vertiport, in accordance with the applicable certification specifications established by the GCAA;

(9) surface and/or pavement characteristics;

(10) unmanned aircraft operations including fuelling and charging facilities;

(c) information about the location of the heliport/vertiport - the exact location of the heliport/vertiport should be depicted on a map of a suitable scale acceptable to the GCAA;

(d) drawings in suitable scale, electronic format acceptable to the GCAA should contain:

(1) orientation of FATOs;

(2) the dimensions of the heliport / vertiport's physical characteristics;

(3) the visual and non-visual aids;

(4) the obstacle limitation surfaces, obstacle environment and any other surfaces applicable; and

(5) the heliport / vertiport facilities, installations, and fixed equipment and their location.

(e) details of the Emergency Response to be provided as required by the relevant subparts/sections of this PART VFI.

(f) The applicant should identify the applicable Certification Specifications for the design and type of operations of the proposed heliport/ vertiport and provide the GCAA with evidence that the proposed design and operation complies with applicable regulations.

GM1 VFI.OR.C.010(f) Application for a heliport or vertiport certificate

Heliport/vertiport boundary should not be confused with the boundaries established for other purposes, such as fences, the land ownership boundaries used by local planning authorities, or those used to designate security restricted zones, etc.

GM2 VFI.OR.C.010(f) Application for a heliport or vertiport certificate

The GCAA may ask for clarification or additional information. Once satisfied, the GCAA will issue a Design Acceptance of the proposal.

AMC2 VFI.OR.C.010(f) Application for a heliport or vertiport certificate

DESIGN ACCEPTANCE

(a) GCAA's Design Acceptance is based on the assessment of the information provided by the applicant and is valid for a period of one year. If construction of the heliport/ vertiport has not been commenced 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.

(b) The issue of a Design Acceptance does not permit the heliport/vertiport to be used for operations until when construction is completed and a heliport/vertiport Certificate is obtained from the GCAA.

AMC1 VFI.OR.C.010(f)(g) Application for a heliport or vertiport certificate

HELIPORT / VERTIPORT MANUAL, AEP, SMS

(a) The manual mentioned below and their amendments should be submitted to the GCAA in electronic format that allows the GCAA to review, store, and reproduce it.

 (1) heliport / vertiport Manual, as required by VFI.OR.B.005 – heliport/vertiport manual and documentation, including the manual checklist.

 (2) operator's Safety Management System;

 (3) the emergency plan (AEP), including an AEP manual checklist;

(b) The GCAA will evaluate and verify if:

 (1) the heliport/vertiport manual contains all pertinent information on the heliport/vertiport site, facilities, services, equipment, operating procedures, organization and management;

 (2) the Rescue Firefighting Service is staffed, trained, equipped, operated and organised to the meet the applicable requirements.

AMC2 VFI.OR.C.010(f)(g) Application for a heliport or vertiport certificate

ADEQUACY OF STRUCTURE AND RESOURCES

(a) The applicant should provide all necessary information needed in order to demonstrate to the GCAA that its proposed organisation and management are suitable, and properly matched to the scale and scope of the operation.

(b) Evidence of adequacy of resources to operate the heliport/vertiport in accordance with VFI.OR.A.025 - Personnel requirements;

(c) The GCAA will assess nominated Post Holders based on the assessment criteria as established in this CAR.

AMC3 VFI.OR.C.010(f)(g) Application for a heliport or vertiport certificate

ASSESSMENTS AND EVALUATIONS

(a) The GCAA's assessments, site visits and inspections will assess inter-alia physical characteristics, visual aids (markings, lights, signs and markers), obstacle environment, RFFS and emergency planning;

(b) Before granting a certificate, the GCAA may verify that:

(1) the heliport/vertiport facilities, services, equipment and systems are in accordance with the CAR AGA, and further to review, inspection or certificate verification audit;

(2) the heliport/vertiport operator's processes and procedures as referenced in the heliport/vertiport manual;

(3) the applicant's ability to operate and maintain the facility properly.

(c) The applicant should provide the GCAA, documentation to demonstrate how it will comply with the applicable requirements of this CAR and any other applicable requirements.

GM1 VFI.OR.C.010(h) Application for a heliport or vertiport certificate

The applicant should provide the GCAA with declaration of compliance and the completed compliance register.

GM2 VFI.OR.C.010(h) Application for a heliport or vertiport certificate

ISSUANCE OR REFUSAL OF HELIPORT/VERTIPORT CERTIFICATE

(a) The GCAA will only issue heliport/vertiport certificate, when it is completely satisfied that all regulatory and critical safety elements have been adequately addressed; this may require a further GCAA audit/inspection follow-up visit and/or special additional operating approvals. This includes evidence of any prior approvals or permissions.

(b) The GCAA may impose operating restrictions and/or sanctions at a heliport/vertiport.

(c) After completion of the processing of the application, the GCAA while granting the certificate, may endorse the conditions of the type of use of the heliport/vertiport and other details as shown in the certificate.

(d) In the event of non-compliance with the requirements of this CAR AGA or unresolved safety deficiencies/concerns, the GCAA may refuse to grant the certificate, in such cases, will notify the applicant in writing of its reasons.

GM3 VFI.OR.C1.010(h) Application for a heliport or vertiport certificate

TIMESCALE FOR PROCESSING OF APPLICATIONS

(a) It is important that applicants submit the required documents sufficiently early to allow for detailed consideration of the application and site inspection if required.

(b) The GCAA cannot undertake to reach a certification decision within a particular timescale or to meet a commercial deadline set by the applicant.

GM1 VFI.OR.C.010 Application for heliport or vertiport certificate

PROMULGATION OF STATUS OF THE CERTIFICATE

Upon:

(a) successful issuance of the certificate; and

(b) the satisfactory submission of details for the AIP publication by the Operator, as required by the relevant CAR.

The GCAA will promulgate the status of the certificate in the AIP.

VFI.OR.C.015 Scope of the heliport or vertiport certificate

An operator shall comply with the scope and conditions of the certificate.

VFI.OR.C.020 Continued validity of a heliport or vertiport certificate

(a) The GCAA may only grant and permit heliport or vertiport to continue where it is satisfied that the operator can ensure that the heliport/vertiport and its airspace are safe for use by helicopter or VCA.

(b) Unless renewed, a heliport/vertiport certificate shall remain valid for a period of three years from the date of issue of a certificate subject to:

  (1) the operator remaining in compliance with the relevant requirements of this CAR AGA and other applicable regulations and the heliport/vertiport remaining in compliance with their compliance register;

  (2) the satisfactory outcome of regulatory surveillance activities;

  (3) the operator's handling of findings (as specified under VFI.OR.J.020 -Findings and corrective actions), to the satisfaction of the GCAA;

  (4) the GCAA being granted access to the operator's organisation as defined in VFI.OR.F.015 - Granting of access, to determine continued compliance with the relevant requirements of this CAR;

  (5) the operations are conducted within the scope and conditions as detailed in the certificate;

  (6) the heliport or vertiport certificate not being surrendered or revoked;

  (7) payment of all applicable service fees as published by the GCAA.

(c) The validity of the certificate is based upon the physical characteristics, type of use of the heliport or vertiport and continued operation in accordance with the GCAA Publications.

(d) Any change made to the physical characteristics as declared in the compliance register, aeronautical publications, use of the heliport or vertiport, as documented in the heliport/vertiport manual, that is not accepted by the GCAA shall invalidate a heliport or vertiport certificate.

(e) Upon revocation or surrender, the heliport or vertiport certificate shall be returned to the GCAA without delay.

VFI.OR.C.025 Amendment to heliport or vertiport Certificate

Operator shall submit the following with any request for amendment in certificate:

(a) detailed account of the proposed amendment including the reasons for the amendment.

(b) an assessment of the safety risks associated with any change in use or operation of the heliport or vertiport including, where appropriate, the findings of any aeronautical study undertaken on behalf of the operator.

(c) particulars of any consequential changes to the AIP, heliport/vertiport manual and emergency plan; and

(d) any other request as notified by the GCAA.

GM1 VFI.OR.C.025 Amendment to heliport or vertiport certificate

(a) a certificate may be amended by the GCAA

(1) in response to a request by the operator;

(2) as a consequence of enforcement action by the GCAA;

(3) If there is a change in the ownership or management of the heliport/vertiport;

(4) If there is a change in the use or operation of the heliport or vertiport;

(5) If there is a change in the boundaries of the heliport or vertiport.

(b) The GCAA may amend a certificate so as to restrict or prohibit specific operations if the operator breaches the scope and conditions of the certificate. The GCAA will provide notice of intention to amend a certificate stating the reasons for the proposed amendment.

GM2 VFI.OR.C.025(b) Amendment to heliport or vertiport certificate

AERONAUTICAL STUDY

Refer CAR AGA PART ADR - GM3 ADR.OPS.B.100(d) Aeronautical Studies for guidance.

VFI.OR.C.030 Restriction, suspension of revocation of heliport or vertiport Certificate

(a) Federal Act 20 - Article 27 provides that the GCAA may, on sufficient safety grounds revoke or suspend a certificate.

(b) The certificate shall be restricted, suspended or revoked by the GCAA, if in the view of the GCAA, the safety of the operations is compromised / no more ensured.

GM1 VFI.OR.C.030 Restriction, suspension of revocation of Aerodrome Certificate

(a) Restriction, suspension or revocation of certificate, could be due to non-compliance with the certificate requirements or unresolved safety deficiency/concern including inadequate resourcing, and in such cases the GCAA will notify the operator in writing of its reasons.

(b) Revocation of a certificate may be warranted if the operator:

   (1) is incapable or unwilling to carry out corrective action or has committed/repeated serious violations; or

   (2) has demonstrated a lack of responsibility, such as deliberate and flagrant acts of non-compliance; or

   (3) falsification of records jeopardizing aviation safety; or

   (4) has made it convincingly clear that the continued operation of the heliport/vertiport will be detrimental to the public interest.

VFI.OR.C.035 Transfer of heliport or vertiport Certificate

(a) The current holder of the heliport / vertiport certificate shall notify the GCAA in writing the following:

   (1) before ceasing operations of its intention and proposed date to cease operations;

   (2) name and details of the proposed transferee.

(b) The proposed transferee shall apply to the GCAA as per the requirements of VFI.OR.C.010 - Application for a heliport or vertiport certificate, as applicable; and

(c) The proposed transferee shall meet the requirements set out in this CAR AGA.

(d) The current holder of the certificate and the proposed transferee shall notify the GCAA at least 60 days in advance of the planned transfer date of the certificate.

GM1.OR.C.035 Transfer of heliport or vertiport certificate

Consent to the proposed transfer may be refused:

(a) if the GCAA is not satisfied that the proposed transferee will be able to operate and maintain the heliport or vertiport properly; or

(b) if significant changes to the operational aspects of the heliport or vertiport will result or will be made by the transferee (e.g. reduction in physical characteristics of the facilities; changes in the conditions of the existing certificate that is unacceptable to the GCAA);

(c) inadequacy or inappropriateness of the new staffing arrangements or significant revisions to the heliport or vertiport manual.

VFI.OR.C.040 Termination of operation

An operator intending to terminate the operation, shall:

(a) notify the GCAA;

(b) provide such information to the appropriate Aeronautical Information Service provider;

(c) surrender the certificate to the GCAA upon the date of termination of operation; and

(d) ensure that appropriate measures have been taken to avoid the unintended use of the heliport/vertiport by aircraft, unless the GCAA has approved the use of the heliport/vertiport for other purposes.

AMC1 VFI.OR.C.040 Termination of operation

GENERAL

Upon the termination of the operation, the operator should apply closed markings as mentioned in CS HPT-DSN, as well as any other measure the GCAA has found appropriate.

GM1 VFI.OR.C.040 Termination of operation

The notification should be done at least three months in advance, so as to allow for the timely publication of the changes, and their notification by the Aeronautical Information Regulation and Control (AIRAC) system in accordance with the related timeframe.

SECTION D – LANDING AREA ACCEPTANCE(LAA) (VFI.OR.D)

VFI.OR.D.001 Scope

Unless otherwise specified, the requirements of this subpart are applicable to heliport, helideck and vertiports.

VFI.OR.D.005 Obligations for Landing Area Acceptance

(1) Prior to commencing the operation of a heliport/helideck/vertiport, the operator shall obtain the applicable Landing Area Acceptance issued by the GCAA.

(2) Operator shall ensure that required approvals from other Appropriate Authorities (i.e. municipalities, civil defence, local departments of civil aviation, appropriate authorities, etc.) are obtained prior their application for a heliport /helideck/ vertiport Landing Area Acceptance.

VFI.OR.D.006 Expression of interest for a Landing Area Acceptance

The applicant for a Landing Area Acceptance shall formally inform the GCAA in writing of their interest to develop and operate an aerodrome.

GM1 VFI.OR.D.006 Expression interest for a Landing Area Acceptance

EXPRESSION OF INITIAL INTEREST

(a) The applicant for a Landing Area Acceptance should arrange for a meeting with the GCAA and provide details of the proposed heliport/ helideck/vertiport site as well as concept of operations. The concept of operations should also indicate whether there is an intention to apply for hybrid operations at the site. The applicant should make arrangements for its key personnel to be present during this meeting. During this meeting, the applicant should present to the GCAA its plans with regard to the heliport/helideck/vertiport.

(b) During the meeting, the applicant may be:

(1) provided by the GCAA with general information about the applicable requirements for the operator to apply and obtain a Landing Area Acceptance;

(2) provided with copies of the applicable requirements, and a description of the procedures that are followed during the Landing Area Acceptance process; and

(3) informed by the GCAA about possible approvals, permits, or clearances that may be needed to be obtained from other authorities.

(c) The GCAA will provide a formal confirmation for the applicant to proceed with a formal application for a Landing Area Acceptance.

VFI.OR.D.010 Application for a Landing Area Acceptance

(a) Pursuant to the United Arab Emirates Federal Act No. 20 (1991) Promulgating The Civil Aviation Law Article 27 and to the Civil Aviation Regulations (CARs) for the time being in force , a Landing Area Acceptance (LAA) may be granted by the GCAA, if it is satisfied that an applicant is competent, having regard to the applicant's previous conduct and experience, the equipment, organisation, staffing, maintenance and other arrangements, to ensure that the heliport/helideck/vertiport and airspace are safe for use by aircraft.

(b) The requirement for Landing Area Acceptance is as follows:

(1) Heliport/vertiports that are:

(i) not used for air services; and/or

(ii) not available for instrument approaches or departure procedures; and/or

(iii) HEMS operating base.

Note: These heliports/vertiports are characterised as private facilities not available for the general public.

(2) Helidecks that are:

(i) Temporary in nature (for oil and mineral exploration purpose);

(ii) not under the management/oversight/operations of an accepted PAO.

(c) The applicant for a Landing Area Acceptance shall be the operator of the heliport/helideck/vertiport who can be:

(1) the owner of the land on which the facility is located; or

(2) the occupier of the land on which the facility is located; or

(3) the actual person or organisation operating the facility and holding a formal consent from the owner or occupier of the land on which the facility is located.

(4) the owner or actual person or organisation operating the helideck.

(d) The application for a LAA and subsequent document submissions shall be made in a form and manner established by the GCAA that includes no-objections certificates, approvals. Applicant for LAA shall obtain approvals from GCAA in relation to Airspace and all relevant agencies, authorities and entities including those mentioned in AMC2 VFI.OR.D.010(d).

(e) The applicant shall pay the applicable fees.

(f) Applicant for Landing Area Acceptance shall demonstrate to the GCAA their compliance to the requirements of CAR AGA PART VFI.

(g) The applicant shall satisfy the Landing Area Acceptance requirements at each stage of the application process as detailed in the GM1 VFI.OR.D.010(g).

(h) The applicant of Landing Area Acceptance shall not commence any construction until the design is accepted by the GCAA.

GM1 VFI.OR.D.010(g) Application for a Landing Area Acceptance

LANDING AREA ACCEPTANCE PROCESSING STAGES

Processing stage	Activity	Related AMC/GM
Stage 1	Assessment of application	• AMC1 VFI.OR.D.010(c) Relationship of the applicant with the heliport/helideck/vertiport owner. • GM1 VFI.OR.D.010(c) - Registration of the organisation. • AMC1 VFI.OR.D.010(d) - Information to be provided to the GCAA for design acceptance. • AMC3 VFI.OR.D.010(d) - Other no-objections, approvals and permissions. • GM1 VFI.OR.D.010(d) - Other no-objections, approvals and permissions.
	Payment of fees	• AMC1 VFI.OR.D.010(e) Applicable fees.
	Design acceptance	• AMC2 VFI.OR.D.010(d) - Design Acceptance.
Stage 2	• Evaluation of the manual, operating procedures, SMS submitted by the applicant. • Evaluation of emergency plan, rescue and firefighting capabilities.	• VFI.OR.B.005 Heliport, helideck and vertiport manual.

	• Evaluation of the competence and experience of the heliport/helideck/vertiport staff.	• VFI.OR.A.030 Personnel requirements - LAA. • AMC1 VFI.OR.D.010(f)(g) - Adequacy of structure and resources
	• Assessment of physical characteristics, facilities and equipment. And certification.	• AMC2 VFI.OR.D.010(f)(g) - Assessment and Evaluation.
Stage 3	• Issuance or refusal of heliport/helideck/vertiport landing area acceptance	GM1 VFI.OR.D.010 - Issuance or refusal of Landing Area Acceptance. GM2 VFI.OR.D.010 - Timescale for processing of applications.

Note: 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.

AMC1 VFI.OR.D.010(c) Application for a Landing Area Acceptance

RELATIONSHIP OF THE APPLICANT WITH THE FACILITY OWNER

(a) The applicant should provide the GCAA with all information necessary to demonstrate to the GCAA its relationship with the heliport/helideck/vertiport owner, and/or the owner of the land (where applicable).

(b) Such documentation should include, but is not limited to, relevant portions of contracts, lease agreements, authorisations between the persons involved, etc.

GM1 VFI.OR.D.010(c) Application for a Landing Area Acceptance

REGISTRATION OF THE ORGANISATION

(a) Applicant should register their organization in the GCAA's website, in order to make their application through GCAA's e-services or through other means established for this purpose by the GCAA.

(b) Applicants should provide evidence of their identity such as establishment / trade license documentation and official documents as required during the registration process.

(c) Applicant should provide all documents and information as required in the application portal.

(d) Applicants should have secure access to the GCAA e-Services, available on the GCAA's website: www.gcaa.gov.ae. Applicants who do not have access to the GCAA's e-Services must make an initial request through GCAA's customer service channels.

AMC1 VFI.OR.D.010(d) Application for a Landing Area Acceptance

INFORMATION TO BE PROVIDED TO THE GCAA FOR DESIGN ACCEPTANCE

Refer to the requirements of AMC1 VFI.OR.C.010(d)**.**

GM1 VFI.OR.D.010(d) Application for a Landing Area Acceptance

OTHER NO-OBJECTIONS, APPROVALS, AGREEMENTS AND PERMISSIONS

Refer to GM1 and GM2 VFI.OR.C.010(d) Application for a heliport or vertiport certificate.

AMC2 VFI.OR.D.010(d) Application for a Landing Area Acceptance

DESIGN ACCEPTANCE

(a) GCAA's Design Acceptance is based on the assessment of the information provided by the applicant and is valid for a period of one year. If construction of the heliport/helideck/vertiport has not been commenced 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.

(b) The issue of a Design Acceptance does not permit the heliport/vertiport/helideck to be used for operations until when construction is completed and a Landing Area Acceptance is obtained from the GCAA.

GM1 VFI.OR.D.010(d) Application for a Landing Area Acceptance

The GCAA may ask for clarification or additional information. Once satisfied, the GCAA will issue a Design Acceptance of the proposal.

AMC3 VFI.OR.D.010(d) Application for a Landing Area Acceptance

OTHER NO-OBJECTIONS, APPROVALS AND PERMISSIONS

(a) A letter of no objection should be obtained from the appropriate authorities ensuring that the necessary arrangements have been made with regard to the protection of the Obstacle Limitation Surfaces (OLS).

(b) Applicants should obtain required approvals from other Appropriate Authorities (i.e. municipalities, civil defense, local departments of civil aviation).

(c) Applicants may be required to apply for other certificates or approvals from the GCAA; this will be dependent upon the scale and type of operations the heliport/helideck/vertiport is intended to be used. Other areas that require certification or approval are:

    (1) Air Navigation Services:

    For the purposes of arrangements for Air Navigation services.

    (2) Airspace:

For the purpose of ensuring the suitability of the proposed site from an airspace perspective.

(3) Aviation Security:

(A) Security clearance to confirm that supporting resources and facilities required by aviation security services are made available at facilities serving civil aviation.

(B) Applicants should, prior to the issue of a Design Acceptance and for aviation activity, obtain a security clearance from GCAA through the established means.

(d) There may also be other bodies that the applicants should inform in their own interests and it is the responsibility of the operator to obtain the appropriate approvals. The application for planning/building permissions and the request for a Landing Area Acceptance are not interdependent and are required to be made separately.

(e) As a part of the Landing Area Acceptance process, the physical characteristics and design should consider, where appropriate, land-use and environmental control measures.

(f) Previously issued approvals, if any, will generally be reassessed each 12 months if there are delays or extended periods of inactivity.

AMC1 VFI.OR.D.010(e) Application for a Landing Area Acceptance

APPLICABLE FEES

Service fees, as published on the GCAA's website are varied from time to time and should be paid to the GCAA:

(a) during the initial Landing Area Acceptance; and

(b) on a periodic basis after the grant of a Landing Area Acceptance;

for each heliport/helideck/vertiport.

Note: Payment of the GCAA's service fee does not guarantee the grant or continuation for heliport/helideck/vertiport operations or of a Landing Area Acceptance.

AMC1 VFI.OR.D.010(f)(g) Application for a Landing Area Acceptance

ADEQUACY OF STRUCTURE AND RESOURCES

(a) The applicant should provide all necessary information needed in order to demonstrate to the GCAA that its proposed organisation and management are suitable, and properly matched to the scale and scope of the operation.

(b) Evidence of adequacy of resources to operate the aerodrome in accordance with VFI.OR.A.030 – Personnel requirements.

(c) The GCAA will assess the operations post holder based on the assessment criteria as established in this CAR AGA.

AMC2 VFI.OR.D.010(f)(g) Application for a Landing Area Acceptance

ASSESSMENTS AND EVALUATIONS

(a) The GCAA's assessments, site visits and inspections will assess inter-alia physical characteristics, visual aids (markings, lights, signs and markers), obstacle environment;

(b) Before granting a Landing Area Acceptance, the GCAA may verify that:

  (1) the facilities, services, equipment and systems are in accordance with the CAR AGA and further to review, inspection or verification audit;

  (2) the operator's processes and procedures as referenced in the heliport/helideck/vertiport manual;

  (3) the applicant's ability to operate and maintain the facility properly.

(c) The applicant should provide the GCAA, documentation to demonstrate how it will comply with the applicable requirements of this CAR and any other applicable requirements.

(d) The applicant shall provide the GCAA with declaration of compliance and the completed compliance register.

GM1 VFI.OR.D.010 Application for a Landing Area Acceptance

ISSUANCE OR REFUSAL OF A LANDING AREA ACCEPTANCE

(a) The GCAA will only issue a Landing Area Acceptance, when it is completely satisfied that all regulatory and critical safety elements have been adequately addressed; this may require a further GCAA audit/inspection follow-up visit and/or special additional operating approvals. This includes evidence of any prior approvals or permissions.

(b) The GCAA may impose operating restrictions and/or sanctions at a heliport/helideck/vertiport.

(c) After completion of the processing of the application, the GCAA while granting the Landing Area Acceptance, may endorse the conditions of the type of use of the heliport/helideck/vertiport and other details as shown in the Landing Area Acceptance.

(d) In the event of non-compliance with the requirements of this CAR or unresolved safety deficiencies/concerns, the GCAA may refuse to grant a Landing Area Acceptance, in such cases, will notify the applicant in writing of its reasons.

GM2 VFI.OR.D.010 Application for a Landing Area Acceptance

TIMESCALE FOR PROCESSING OF APPLICATIONS

(a) It is important that applicants submit the required documents sufficiently early to allow for detailed consideration of the application and site inspection if required.

(b) The GCAA cannot undertake to reach a decision within a particular timescale or to meet a commercial deadline set by the applicant.

VFI.OR.D.015 Scope of the Landing Area Acceptance

The operator shall comply with the scope and conditions of the Landing Area Acceptance.

VFI.OR.D.020 Continued validity of a Landing Area Acceptance

(a) The GCAA may only grant and permit a Landing Area Acceptance to continue where it is satisfied that the operator can ensure that the heliport/helideck/vertiport and its airspace are safe for use by helicopter/VCA.

(b) Unless renewed, a Landing Area Acceptance shall remain valid for a period of three years from the date of issue of a Landing Area Acceptance subject to:

(1) the operator remaining in compliance with the relevant requirements of this CAR, and other applicable regulations and the heliport/helideck/vertiport remaining in compliance with their compliance register.

(2) the satisfactory outcome of regulatory surveillance activities.

(3) the operator's handling of findings as specified under VFI.OR.J.020 -Findings and corrective actions, to the satisfaction of the GCAA;

(4) the GCAA being granted access to the operator's organisation as defined in VFI.OR.F.015 - Granting of access, to determine continued compliance with the relevant requirements of this CAR;

(5) the operations are conducted within the scope and conditions as detailed in the Landing Area Acceptance;

(6) the Landing Area Acceptance not being surrendered or revoked;

(7) Payment of all applicable service fees as published by the GCAA;

(c) The validity of the Landing Area Acceptance is based upon the physical characteristics, type of use of the facility and continued operation in accordance with the GCAA Publications.

(d) Any change made to the physical characteristics, compliance register or use of the heliport/helideck/vertiport, as documented in the manual that is not accepted by the GCAA shall invalidate the Landing Area Acceptance.

(e) Upon revocation or surrender, the Landing Area Acceptance shall be returned to the GCAA without delay.

VFI.OR.D.025 Amendment to Landing Area Acceptance

Operator shall submit the following with any request for amendment in Landing Area Acceptance:

(a) detailed account of the proposed amendment including the reasons for the amendment;

(b) an assessment of the safety risks associated with any change in use or operation of the heliport/helideck/vertiport including, where appropriate, the findings of any aeronautical study undertaken on behalf of the operator;

(c) particulars of any consequential changes to the manual and emergency plan; and

(d) Any other request as notified by the GCAA.

GM1 VFI.OR.D.025 Amendment to Landing Area Acceptance

(a) A Landing Area Acceptance may be amended by the GCAA

(1) in response to a formal request by the operator;

(2) as a consequence of enforcement action by the GCAA;

(3) If there is a change in the ownership or management of the heliport/helideck/vertiport;

(4) If there is a change in the use or operation of the heliport/helideck/vertiport;

(5) If there is a change in the boundaries of the heliport/helideck/vertiport.

(b) The GCAA may amend a Landing Area Acceptance so as to restrict or prohibit specific operations if the operator breaches the scope and conditions of the Landing Area Acceptance. The GCAA will provide notice of intention to amend a Landing Area Acceptance stating the reasons for the proposed amendment.

VFI.OR.D.030 Restriction, suspension of revocation of Landing Area Acceptance

(a) Federal Act 20 - Article 27 provides that the GCAA may, on sufficient safety grounds revoke or suspend a Landing Area Acceptance.

(b) The Landing Area Acceptance shall be restricted, suspended or revoked by the GCAA, if in the view of the GCAA, the safety of the operations is compromised / no more ensured.

GM1 VFI.OR.D.030 Restriction, suspension of revocation of Landing Area Acceptance

(a) Restriction, suspension or revocation of a Landing Area Acceptance, could be due to non-compliance with the Landing Area Acceptance requirements or unresolved safety deficiency/concern including inadequate resourcing, and in such cases the GCAA will notify the operator in writing of its reasons.

(b) Revocation of a Landing Area Acceptance may be warranted if the operator:

(1) is incapable or unwilling to carry out corrective action or has committed/repeated serious violations; or

(2) has demonstrated a lack of responsibility, such as deliberate and flagrant acts of non-compliance; or

(3) falsification of records jeopardizing aviation safety; or

(4) has made it convincingly clear that the continued operation of the heliport/helideck/vertiport will be detrimental to the public interest.

VFI.OR.D.035 Transfer of Landing Area Acceptance

(a) The current holder of the Landing Area Acceptance shall notify the GCAA in writing the following:

(1) before ceasing heliport/helideck/vertiport operations of its intention and proposed date to cease operations;

(2) name and details of the proposed transferee;

(b) The proposed transferee shall apply to the GCAA as per the requirements of VFI.OR.D.010 - Application for a Landing Area Acceptance, as applicable; and

(c) The proposed transferee shall meet the requirements set out in in this CAR AGA.

(d) The current holder of the LAA and the proposed transferee shall notify the GCAA at least 60 days in advance of the planned transfer date of the Landing Area Acceptance.

GM1 VFI.OR.D.035 Transfer of Landing Area Acceptance

Consent to the proposed transfer may be refused

(a) if the GCAA is not satisfied that the proposed transferee will be able to operate and maintain the heliport/helideck/vertiport properly; or

(b) if significant changes to the operational aspects of the heliport/helideck/vertiport that will result or will be made by the transferee (changes in the conditions of the existing LAA that is unacceptable to the GCAA); or

(c) inadequacy or inappropriateness of the new staffing arrangements or significant revisions to the heliport/helideck/vertiport manual.

VFI.OR.D.040 Termination of operation- Landing Area Acceptance

An operator intending to terminate the operation of a heliport/helideck/vertiport, shall:

(a) notify the GCAA;

(b) surrender the Landing Area Acceptance to the GCAA upon the date of termination of operation; and

(c) ensure that appropriate measures have been taken to avoid the unintended use of the heliport/helideck/vertiport by helicopter/VCA, unless the GCAA has approved the use of the heliport/helideck/vertiport for other purposes.

AMC1 VFI.OR.D.040 Termination of operation- Landing Area Acceptance

GENERAL

Upon the termination of the operation, the operator should apply closed markings as mentioned in CS HPT-DSN, as well as any other measure the GCAA has found appropriate.

GM1 VFI.OR.D.040 Termination of operation- Landing Area Acceptance

The notification for termination of operations should be done at least three months in advance.

SECTION E – HELICOPTER OPERATIONS ON UNCERTIFIED / NOT ACCEPTED LANDING SURFACE (VFI.OR.E)

VFI.OR.E.010 Conditions for operations without certificate or Landing Area Acceptance

(a) 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.

(b) Temporary use: A landing location that is not identifiable as a heliport/helipad and is only used on a temporary or infrequent basis. Helicopter operations to these locations shall comply with the requirements of CAR AIR OPS.

However,

(1) Operators or owners of temporary operating sites for fixed durations (for e.g., may be associated with planned events) shall apply for and obtain a temporary Landing Area Acceptance as required by CAR AGA PART VFI.

(2) When an operating site exceeds (or expected to cater for more than) 10 days of operations within 12 consecutive months, then it is not considered as a temporary operating site and the operator or owner of the site shall comply with the requirements of CAR AGA PART VFI and obtain a Heliport Certificate or a Landing Area acceptance.

(c) Shipboard: when the heliport or helideck is used for operations and located on a ship.

(d) Public interest site (PIS): As described in CAR AIR OPS – PART SPA, as amended/superseded.

(e) Helicopter Emergency Medical Services (HEMS) operating site: means a site selected by the commander during a HEMS flight for helicopter hoist operations, landing and take-off.

GM1 VFI.OR.E.010(a) Conditions for operations without certificate or Landing Area Acceptance

EMERGENCY EVACUATION INFRASTRUCTURE (EEI)

(a) 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/VCA. For further guidance refer to EEI.DSN.E.

(b) Emergency Evacuation Heliport/Vertiport are such facilities used solely for the purpose of emergency evacuation of the building.

GM1 VFI.OR.E.010(b) Conditions for operations without certificate or Landing Area Acceptance

TEMPORARY USE

(a) A landing location that is not identifiable as a heliport/Vertiport even though the landing surface may have certain non-standard temporary visual aids (marking/lighting) only to assist the pilot to identify such a location. These uncertified/unaccepted landing areas are used on a temporary or infrequent basis.

(b) Operators or owners of these sites do not require to obtain a Heliport Certificate or Landing Area Acceptance. However, flight operations to these temporary operating sites will be subject to the requirements of CAR AIR OPS.

GM2 VFI.OR.E.010(b) Conditions for operations without certificate or Landing Area Acceptance

TEMPORARY USE- FOR FIXED DURATION

Operators or owners of temporary operating sites for fixed durations (for e.g., may be associated with planned events) while applying for temporary Landing Area Acceptance should provide a risk assessment involving all elements of operational and certification specification requirement. This assessment should consider amongst others, the obstacles clearances, provisions for night operations if applicable, firefighting provisions.

GM1 VFI.OR.E.010(e) Conditions for operations without certificate or Landing Area Acceptance

HEMS OPERATING SITE

(a) HEMS operating sites are unplanned sites used to pick up passengers in the event of medical emergency and should not be confused with HEMS operating base.

(b) HEMS operating base, should be operated under the conditions of a Landing Area Acceptance.

(c) Refer CAR AIR OPS - PART SPA, as amended / superseded for more details.

SECTION F - ADDITIONAL HELIPORT/HELIDECK/VERTIPORT OPERATOR AND PAO RESPONSIBILITIES (VFI.OR.F)

VFI.OR.F.005 Operator's responsibilities - heliport/helideck/vertiport operator

(a) The operator is responsible for the safe operation, regulatory compliance and maintenance of the heliport/helideck/vertiport in accordance with:

(1) CAR AGA and other relevant publications by the GCAA including but not limiting to Safety Decisions, Safety Alerts and any other relevant CAR that is applicable to heliport/helideck/vertiport and operators;

(2) The scope, standard conditions, and specific conditions of certificate, landing area acceptance and PAO acceptance;

(3) the content of the heliport/helideck and vertiport manual; and

(4) any other document as applicable.

(b) The operator shall coordinate with the AIS to ensure that relevant information for the safety of helicopter/VCA, that is contained in the manual, is published where appropriate. This shall include:

(1) provisions for which an equivalent level of safety was accepted by the GCAA.

(2) special conditions and limitations with regard to the use of the heliport/helideck/vertiport.

(c) If an unsafe condition develops at the heliport/helideck or vertiport, the operator shall, without undue delay, take all necessary measures to ensure of the heliport/helideck/vertiport or those parts found to endanger safety are not used by helicopter/VCA.

(d) The operator, in order to ensure the safe operation of helicopter/VCA, shall provide and maintain, directly or through arrangements with third parties, appropriate infrastructure, visual and non-visual aids for – navigation, to denote obstacles, restricted use area, meteorological equipment and any other equipment, commensurate with the type of operations conducted at the heliport/helideck/ vertiport and comply with the specification in this CAR AGA and other relevant CARs.

(e) Operator shall provide statistical and other operational information as requested by the GCAA.

(f) The operator shall when necessary for the safety of helicopter/VCA operations, establish any limitations on the use of the heliport/helideck/vertiport that arise from design or the facilities or services provided. The limitations shall be recorded in the heliport/helideck or vertiport manual and communicated to the air navigation service provider and aeronautical information services provider where applicable.

AMC1 VFI.OR.F.005(b) Operator's responsibilities- heliport/helideck/vertiport operator

INFORMATION TO THE AERONAUTICAL INFORMATION SERVICES AND OTHER ENTITIES

Certified operator should without any delay provide information to the AIS provider, of any changes in the operational status or availability of the published heliport/helideck/vertiport infrastructure.

AMC1 VFI.OR.F.005(c)(d) Operator's responsibilities - heliport/helideck/vertiport operator

Operators should ensure that they:

(a) maintain their safety responsibilities over safety related activities conducted by those third-party organisations related to, or in direct support of, the safe and secure operation of helicopter/VCA;

(b) have the power to access and inspect any third-party organisations providing a service related to, or in direct support of, the safe and secure operation of helicopter/VCA operating from their heliport/helideck/vertiport including its facilities and records to determine continued compliance with the relevant requirements through safety audits or inspections. The power to access and inspect should be included in the contractual arrangement; and

(c) are able to impose operating restrictions in the event of non-compliance with the applicable safety and security requirements or unresolved safety or security deficiencies or concerns.

VFI.OR.F.015 Granting of access

For the purpose of determining compliance with the relevant requirements, operator shall grant access to any person authorised by the GCAA to:

(a) any facility, document, records, data, procedures or any other material relevant to its activity subject to certification or declaration, whether it is contracted or not; and

(b) perform or witness any action, inspection, test, assessment or exercise that the GCAA finds as necessary.

VFI.OR.F.030 Occurrence reporting

(a) The operator shall establish procedures for the notification, investigation, and reporting of safety events to the GCAA and adhere to the requirements established in CAR OCR.

(b) The operator shall report to the GCAA, any accident, serious incident and occurrences. In accordance with CAR OCR.

(c) Without prejudice to point (b), the operator shall report to the GCAA, any malfunction, technical defects, exceeding of technical limitations, occurrence or other irregular circumstances that has or may have endangered the safety of the operations and that has not resulted in an accident or serious incident.

(d) operators shall establish procedures to carry out investigation.

AMC1 VFI.OR.F.030 Occurrence reporting

GENERAL - REPORTING PROCEDURES

The operator should establish procedures to be used for reporting to the GCAA, as required, which include at least:

(a) the description of the applicable requirements for the purpose of reporting;

(b) the description of the reporting mechanism, including reporting forms, means, and deadlines;

(c) the personnel responsible for reporting; and

(d) the description of the mechanism and personnel responsibilities for identifying root causes, and the actions that may be needed to be taken to prevent similar occurrences from happening in the future, as appropriate.

AMC1 VFI.OR.F.030 (b)(c) Occurrence reporting

REPORTING OF INCIDENT TO THE GCAA

(a) The operator should submit all reportable occurrences as defined in CAR OCR or unless specific alternative provisions are requested by the GCAA.

(b) Reports should be made via the GCAA ROSI (Reporting of Safety Incident) System applicable to the operator or any other such reporting system as established by the GCAA.

(c) Reports should be made as soon as possible and in any case within the relevant notification period defined in CAR OCR, unless otherwise instructed by the GCAA.

AMC2 VFI.OR.F.030 (b)(c) Occurrence reporting

WILDLIFE STRIKE REPORTING

In the event of a wildlife strike including bird strike, the operator should use the ROSI system or any other system as established by the GCAA to make mandatory reports to the GCAA.

VFI.OR.F.031 Voluntary reporting system

The operator shall establish a system to educate their personnel of how to report an actual or potential safety deficiency through the GCAA's Voluntary Reporting System (VORSY).

VFI.OR.F.040 Prevention of fire

(a) The operator shall establish procedures to prohibit:

(1) smoking within the movement area, other operational areas of the heliport/helideck/vertiport, or areas of the facility where fuel or other flammable material is stored;

(2) display of an open flame or undertaking of an activity that would create a fire hazard within:

(i) areas of the heliport/helideck/vertiport where fuel or other flammable material is stored;

(ii) the operational areas of the heliport/helideck/vertiport, unless authorised by the operator.

(b) The operator shall establish a fire prevention plan that:

(1) commensurate with the types of helicopter/VCA operations and other activities at the heliport/helideck/vertiport;

(2) include sufficient trained and competent personnel, equipment and facilities to implement the plan;

(3) contain sufficient procedures for the identification, control and prevention of fire hazards at the heliport/helideck/vertiport;

(4) contain sufficient procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness; and

(5) comply with all relevant requirements of CAR AGA PART VFI.

SECTION G - MANAGEMENT (VFI.OR.G)

VFI.OR.G.005 Management system

(a) The operator holding a heliport/vertiport certificate shall implement and maintain a management system including a safety management system.

(b) A PAO shall implement and maintain a management system including a safety management system, and a Quality Assurance system.

(c) The management system shall include:

(1) clearly defined lines of responsibility and accountability throughout the operator, including a direct accountability for safety on the part of senior management;

(2) a description of the overall principles and policies of the operator with regard to safety, referred to as the safety policy, signed by the accountable manager;

(3) a formal process that ensures that hazards in operations are identified and reported;

(4) a formal process that ensures analysis, assessment and mitigation of the safety risks in operations and remedial actions necessary to maintain acceptable level of safety is implemented;

(5) a formal process to:

(i) identify and manage changes within the operator's organisation, management system, the facility or its operation which may affect established processes, procedures, services and helicopter and VCA operations;

(ii) describe the arrangements to ensure safety performance before implementing changes; and

(iii) eliminate or modify safety risk controls that are no longer needed or effective due to changes in the operational environment;

(6) a safety training programme that ensures that personnel involved in the operation, rescue and firefighting, maintenance and management of the are trained and competent to perform the safety management system duties;

(7) 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;

(8) a formal process to monitor compliance of the organisation with the relevant requirements.

(d) The operator shall document all management system key processes.

(e) The management system shall be proportionate to the size of the organisation and its activities, taking into account the hazards and associated risks inherent in these activities.

(f) The operator shall organise, coordinate and implement safety programmes to promote safety at their facilities.

AMC1 VFI.OR.G.005(a) Management system

Operators holding Landing Area Acceptance should endeavour to comply with VFI.OR.G.005 Management system (a) and should in any case implement and maintain a management system that commensurate with the size of its operations and acceptable to the GCAA. This should include, as a minimum, the below:

(a) a formal process that ensures that hazards in operations are identified and reported;

(b) a formal process that ensures analysis, assessment and mitigation of the safety risks in operations and remedial actions necessary to maintain acceptable level of safety is implemented;

(c) a formal process to monitor compliance of the organisation with the relevant requirements.

AMC1 VFI.OR.G.005(c) Management system

OPERATOR'S MANAGEMENT SYSTEM DOCUMENTATION

The operator should ensure that the documented management system key processes include a process for making personnel aware of their responsibilities, as well as its amendment procedure.

The operator's management system documentation should, at least, include the following information:

(a) a statement signed by the Accountable Manager to confirm that the operator will continuously work in accordance with the applicable requirements and the operator's documentation;

(b) the operator's scope of activities;

(c) the titles and details of persons referred to in VFI.OR.A.025 and VFI.OR.A.030 – Personnel requirements;

(d) procedures specifying how the operator ensures compliance with the applicable requirements;

(e) the amendment procedure for the operator's management system documentation; and

(f) safety management system outputs.

GM1 VFI.OR.G.005(c) Management system

Safety management system outputs should include the following

(a) Safety performance indicators;

(b) Incident reports;

(c) Risk assessments;

(d) Audit and inspection reports;

(e) Safety policy and procedure;

(f) Safety training;

(g) Safety culture assessment;

(h) Corrective action / preventive action;

(i) Safety communication.

VFI.OR.G.017 Training and proficiency check programmes

The operator shall establish and implement a training and proficiency check programme as provided in CAR AGA PART TRG (TRG.OR.B.005 Training and proficiency check programmes),for personnel involved in the operation, maintenance and management of the heliport/helideck/vertiport , to ensure their continued competence, and that they are aware of the rules and procedures relevant to operation of the heliport/helideck/vertiport and the relationship of their functions and tasks to the heliport/helideck/vertiport operation as a whole.

VFI.OR.G.030 Safety reporting system

(a) The operator shall establish and implement a safety reporting system for all personnel and organisations operating or providing services at the heliport/helideck/vertiport, in order to promote safety at, and the safe use of the heliport/helideck/vertiport.

(b) The operator shall:

(1) require that the personnel and organisations mentioned in point (a) use the safety reporting system for the mandatory reporting of any accident, serious incident and occurrence; and

(2) ensure that the safety reporting system be used for the voluntary reporting of any defect, fault and safety hazard which could impact safety.

(c) The safety reporting system shall protect the identity of the reporter, encourage voluntary reporting and include the possibility that reports may be submitted anonymously.

(d) The operator shall:

(1) record all reports submitted;

(2) analyse and assess the reports, as appropriate, in order to address safety deficiencies and identify trends;

(3) ensure that all organisations operating or providing services at the heliport/helideck/vertiport which are relevant to the safety concern, participate in the analysis of such reports and that any corrective and/or preventive measures identified are implemented; and

(4) conduct investigations of reports, as appropriate.

AMC1 VFI.OR.G.030(a) Safety reporting system

SAFETY REPORTING SYSTEM

(a) The operator should:

(1) identify which events are mandatory to be reported;

(2) establish a wildlife hazard reporting system that should ensure that its safety reporting system specifically addresses the requirement to report all wildlife strikes, and relevant identified hazards;

VFI.OR.G.035 Record keeping

The operator shall establish an adequate system of record keeping, covering all its activities undertaken.

AMC1 VFI.OR.G.035 Record keeping

RECORDING OF HELICOPTER / VCA MOVEMENTS

(a) The operator should employ a system to be used for recording the helicopter/VCA movements at the heliport/helideck/vertiport;

(b) Such a system should allow the operator to record:

(1) the number of movements of each aircraft type using the heliport/helideck/vertiport;

(2) the type of each helicopter/VCA movement (commercial air transportation, cargo, etc.);

(3) the date of each movement; and

(4) the number of passengers, where applicable.

SECTION H - OTHER APPROVALS (VFI.OR.H)

VFI.OR.H.060 Continuing compliance with the Certification Specifications (CS)

The operator, following an amendment of the Certification Specifications, shall:

(a) perform a review to identify any Certification Specifications which are applicable to their heliport/helideck/vertiport; and

(b) if relevant, initiate a change process in accordance, before implementing the changes at the heliport/helideck/vertiport.

VFI.OR.H.065 Changes

(a) Any change:

(1) affecting the scope of the Certificate / Landing Area Acceptance, its compliance register and safety-critical equipment; or

(2) significantly affecting elements of the operator's management system as required in VFI.OR.G.005 - Management system; shall require prior approval by the GCAA.

(b) For changes as mentioned in (a) requiring prior approval, the operator shall notify, apply for and obtain an approval issued by the GCAA.

GM1 VFI.OR.H.065 Changes

Ref to CAR SMS for guidance on management of change.

AMC2 VFI.OR.H.065(a)(b) Changes

CHANGES REQUIRING PRIOR APPROVAL

(a) Use of alternative means of compliance.

(b) Changes to the compliance register, the conditions, scope of the certificate.

(c) Changes to safety-critical equipment.

(d) Changes significantly affecting elements of the operator's management system.

(e) Changes to the level of protection of rescue and firefighting services.

(f) Changes to Post Holders and Accountable Manager.

(g) Changes to operating procedures.

(h) New infrastructure or changes to the existing infrastructure including but not limiting to visual aids/ navigational facilities, extensions/ reductions to surface areas for use by aircraft; the erection of new buildings and alterations to existing buildings.

(i) Major maintenance, including refurbishment of the existing infrastructure.

(j) Reduction in infrastructure and the compliance register, including long term closures of infrastructure for upgrade, downgrade, investigation purpose.

(k) Works that will result in the non-availability of critical infrastructure or facility.

(l) Where specifically mentioned in this CAR VFI.

(m) When requested by the GCAA.

GM1 VFI.OR.H.065 Changes

COMPLIANCE MATRIX

Following example of compliance matrix template may be used by the operator to demonstrate compliance.

Design Element	DSN reference	Applicable Requirement	Compliance Statement (Should include current and future status of compliance)	Supporting Evidence	Post Implementation Compliance Verification	Supporting Evidence
D-Value Marking	CS HPT-DSN.A.195	The D-value marking shall be white.	The D value marking currently not provided. Will be provided before XX/xx/xx	NA	D value marking provided as per specifications of CS HPT DSN.A.195	Photos and scale drawings attached

VFI.OR.H.070 Infrastructure projects and changes to the existing infrastructure

(a) The operator shall:

(1) establish procedures to notify the GCAA and manage such projects as mentioned in (b) that are to be carried out within their boundary;

(2) Unless otherwise notified by the GCAA, apply and obtain:

(i) design acceptance from the GCAA prior to commencement of physical works;

(ii) technical acceptance verifying the completion of works.

(iii) where applicable relevant operational approval upon the completion of the project and prior to use in an operating environment.

(b) The operator shall notify the GCAA on the below changes:

(1) any infrastructure change that may have an effect on the compliance register, scope of the certificate;

(2) any change to existing airside landside boundary;

(3) developments: major upgrade/refurbishment of existing infrastructure which could affect operations during work-in-progress and new infrastructure including but not limited to buildings, taxiways, aprons, visual aids or navigational aids.

(4) changes to existing infrastructure: changes to existing infrastructure that has an impact on the safety regularity and efficiency of helicopter/VCA operations.

(5) significant maintenance of infrastructure: that may involve downgrade or temporary closure, for a duration of time that may have an impact on the safety, regularity and efficiency of helicopter/VCA operations.

(6) reduction in infrastructure: including long term closures of infrastructure for upgrade, downgrade, investigation purpose.

(c) The operator shall provide all project related details and information as requested by the GCAA.

(d) The Operator shall have a process to ensure that all projects are properly planned, managed, and coordinated.

(e) The project plan shall include sufficient time allocated for the necessary testing, readiness verification, and GCAA approval/acceptance.

AMC1 VFI.OR.H.070 Infrastructure projects

GENERAL- CERTIFICATE AND LANDING AREA ACCEPTANCE–STANDARD CONDITION

The Certificate and the LAA states that changes in the physical characteristics of the facility including the erection of new buildings and alterations to existing buildings or to visual aids/navigational facilities shall not be made without prior approval of the GCAA.

GM1 VFI.OR.H.070 Infrastructure projects

The purpose of this requirement is to ensure the GCAA is satisfied that changes to the heliport/helideck/vertiport meet regulatory requirements and do not present safety or security hazards. Failure to notify the GCAA of changes may leave the heliport/helideck/vertiport vulnerable to operational restrictions.

AMC1 VFI.OR.H.070(a)(b) Infrastructure projects

NOTIFICATION

(a) The operator should use such means as established by the GCAA to notify of any Infrastructure Project including use of e-services available on the GCAA website.

(b) The operator should notify the GCAA of any infrastructure projects that are deferred, withdrawn or superseded and use such means as established by the GCAA to request withdrawal of any irrelevant approvals/acceptances.

(c) The operator should provide status update of Infrastructure Projects on a regular basis or when requested by the GCAA.

AMC2 VFI.OR.H.070(a)(b) Infrastructure projects

INFORMATION AS A PART OF PROJECT NOTIFICATION

The operator should provide the following as a part of their project notification:

(a) Project coordinator: details of the nominated Project Coordinator;

(b) Project brief: based on the project scope including but not limited to the initial concept of operations, general compliance details, and details regarding management of works;

(c) Location Map: clearly indicating the location(s) of the proposed works, access routes and staging areas;

(d) Indicative project plan and timelines: available information and anticipated project timing;

(e) Impact Assessment: including but not limited to impacts to the obstacle limitation surface, instrument flight procedures, navigational aids, rescue firefighting services, airside/landside boundaries whether temporary or permanent; and

(f) Other information: details as requested by the GCAA as part of the notification form or as directly requested from time to time.

AMC3 VFI.OR.H.070(a) Infrastructure projects

STRUCTURED APPROACH - INFRASTRUCTURE PROJECTS

(a) The operator should use such means as established by the GCAA to apply for infrastructure project acceptances including use of e-services available on the GCAA website.

(b) The operator should establish procedures for the management of Infrastructure Projects.

(c) The GCAA may request for development meetings or project updates as well as carry out inspections of records or onsite at any stage of the infrastructure project.

(d) The GCAA's acceptance for changes to infrastructure will follow Table OR-4: Infrastructure Projects - Submissions and acceptances.

(e) Upon successful completion of works and obtaining the technical acceptance, where applicable the operator should apply for an operational approval as stated in VFI.OR.H.075-operational approval, where applicable.

Table OR-7: Infrastructure Projects - Submissions and acceptances

Acceptances that are required before commencing work		**Post Work Acceptance**
Can be applied as single application if all necessary documents are available		**Technical Acceptance (Not an approval for operations)**
Design Acceptance	**Acceptance to Commence Works**	
• Compliance Matrix. • Scale Drawings.	• Risk Assessment for works in progress.	• Verification of compliance matrix (as built).

• Design Report to include the following:
  • Physical size and layout of the facility
  • Airspace (classification, height, etc.)
  • The obstacle environment surrounding the heliport/helideck/vertiport and areas of public.
  • Size, colour, layout of any markings
  • Layout, location and colour of any lighting and other visual aids
  • RFFS requirements
  • Surface and/or pavement characteristics
• Summary of identified other acceptances, approvals or no objections, noting evidence may be requested if required.
• Other supporting information as requested by the GCAA.
	• Other supporting information as requested by the GCAA.	• As-built drawings and any other evidence confirming project completion and compliance.
		• Other supporting information as requested by the GCAA.

VFI.OR.H.075 Operational approval

(a) An operator shall apply and obtain, through means established by the GCAA, an operational approval for:

(1) changes to heliport/helideck/vertiport infrastructure upon the completion of the project and prior to use in an operating environment, when deemed applicable by the GCAA;

(2) any other changes that have an impact on the safety, regularity and efficiency of helicopter/VCA operations.

(b) Operator shall provide evidence of operational readiness, for the above changes which may include simulations, testing.

VFI.OR.H.080 Special operational approval

(a) An operator shall apply and obtain through means established by the GCAA, a special operational approval when the operator plans to introduce:

  (1) one-time provision of service;

  (2) operations trials and testing;

  (3) temporary operations for heliport/helideck/vertiport operations for a fixed duration (for example: in connection with an event, minerals/oil exploration);

  (4) emerging new technology.

(b) For helidecks as referred in (a)(3), when involved in oil/ mineral exploration is for a duration that exceeds 10 days, the operator shall apply for a LAA as required in VFI.OR.D.010.

GM1 VFI.OR.H.080 Special operational approval

(a) One-time provision of service can include the following:

  (1) infrastructure that is completed, however awaiting a technical acceptance;

  (2) infrastructure that is completed, however awaiting operational approval;

  (3) air shows including static display of helicopter/VCA.

SECTION J - OVERSIGHT (VFI.OR. J)

VFI.OR.J.017 Facilitations and cooperation

(a) An operator shall:

(1) facilitate planned and unplanned /unannounced inspections and audits by the GCAA and shall cooperate as necessary for the efficient and effective exercise of the powers of the GCAA;

(2) provide access to any offices, facilities, documents, records, certificates, reports or any other evidence required by the GCAA for the purpose of audits, inspections, investigations, enforcement, certification, approval or any other reason as decided by the GCAA; and

(3) facilitate the possession of equipment provided to GCAA inspectors to support their oversight functions. This includes computers, cameras, recording devices, range finders, utilised by the GCAA to support regulatory oversight activities.

(b) An operator shall not, directly or indirectly, restrict, impede or delay, the activities in (a).

(c) An operator shall give the oversight process the necessary priority to function efficiently and effectively.

(d) Personnel authorised by the GCAA Shall be allowed to take photographs of the facilities and equipment for certification, audit and approval purposes. An Operator shall issue photography permits/authorisation to personnel authorised by the GCAA.

GM1 VFI.OR.J.017 Facilitations and cooperation

(a) 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 (PAO).

GM2 VFI.OR.J.017 Facilitations and cooperation

GENERAL-AUDIT REPORTS

(a) Audit reports are processed through systems established by the GCAA for this purpose.

(b) Operator should nominate appropriate management team member to respond to the audits, this would normally be the relevant Post Holder.

GM1 VFI.OR.J.017(a)(1) Facilitations and cooperation

AUDIT PLANNING

(a) For planned audits, the GCAA will endeavour to provide at least two weeks' notice. Unplanned audits do not require notification.

(b) On receipt of audit notification, the operator should clarify what access requirements are in place, to ensure the inspectors can provide the necessary documentation in time.

(c) Planned audits may be rescheduled by GCAA in coordination with the operator.

(d) The operator may request a planned audit to be rescheduled by the GCAA where unforeseen circumstances may limit the effectiveness of the audit process.

(e) The GCAA may conduct a full compliance audit at any time, but usually not more than three (3) years from the previous audit, based on risk profiling.

AMC1 VFI.OR.J.017(a)(2) Facilitations and cooperation

INSPECTOR ACCESS PASSES

(a) Operator should recognise that the inspectors of the GCAA will be in possession of a nation-wide security identification card issued by the UAE Ministry of interior in lieu of the site-specific pass. This card is identified as a "National Permit - UAE Airports" and affords the associated inspector access to all UAE civilian airports in accordance with the access rights defined in the card.

(b) Operators should arrange for the issue of all additional passes to inspectors authorised by the GCAA which may be necessary to enable access any part of the heliport/helideck/vertiport, tenant company premises, equipment, records, documents and operator's personnel.

(c) Operators should take all necessary measures to ensure that inspectors are not unduly delayed by security protocols. Access control points to the facility should clearly display poster (or similar) that graphically identifies applicable passes for that checkpoint, including the 'National Permit' possessed by the inspectors of the GCAA (where applicable).

AMC2 VFI.OR.J.017(a)(2) Facilitations and cooperation

AUDITING WORK SPACE

(a) For a planned audit, the operator should allocate an area for the inspectors to use, this area should:

(1) be sufficiently free from distraction and noise;

(2) be enclosed so as to allow confidential discussion; and

(3) contain a suitable workspace with table and chairs.

(b) For unplanned audits, the operator should endeavour to provide (a).

AMC3 VFI.OR.J.017(a)(2) Facilitations and cooperation

ELECTRONIC EQUIPMENT

Operators should arrange for the provision of any approvals required to enable Inspectors of the GCAA to carry relevant electronic equipment into any part of the facilities, unit, tenant company premises, or otherwise as required to perform their duties.

AMC1 VFI.OR.J.017(c) Facilitations and cooperation

ATTENDANCE AT AUDITS

(a) All relevant Post Holders should be available for a planned audit.

(b) The opening and closing meetings should be attended by the Accountable Manager or their official delegate, supported by the relevant Post Holder.

VFI.OR.J.020 Findings and corrective actions

After receipt of a notification of findings, the operator shall:

(a) ensure that all audit reports raised by the GCAA are signed by the Accountable Manager within the stipulated time;

(b) identify the root cause of the findings;

(c) provide a corrective action plan that meets the acceptance of the GCAA;

(d) demonstrate the corrective action implementation to the satisfaction of the GCAA within the period agreed.

GM1 VFI.OR.J.020 Findings and corrective actions

FINDINGS

(Intentionally left blank)

AMC1 VFI.OR.J.020(b)(c) Findings and corrective actions

CORRECTIVE ACTIONS PLAN

(a) The corrective action plan defined by the operator should address the effects of the non-compliance, as well as its root cause.

(b) Corrective action plan does not result in appropriate action being taken within acceptable timelines, may lead to increased oversight by the GCAA.

GM1 VFI.OR.J.020(c)(d) Findings and corrective actions

PREVENTIVE AND CORRECTIVE ACTIONS

(a) Preventive action is the action to eliminate the cause of a potential non-compliance or other undesirable potential situation.

(b) Corrective action is the action to eliminate or mitigate the root cause(s), and prevent recurrence of an existing detected non-compliance, or other undesirable condition or situation.

(c) Proper determination of the root cause is crucial for defining effective corrective actions to prevent recurrence.

(d) Correction is the action to eliminate a detected non-compliance.

AMC2 VFI.OR.J.020(c) Findings and corrective actions

CORRECTIVE ACTION TARGET DATES

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VFI.OR.J.022 Non-compliance and enforcement actions

(a) An operator shall ensure compliance with any operational restrictions, suspensions or revocations in case of non-resolutions of non-compliance.

(b) Operators and their staff shall not engage in, support, or conceal unsafe acts.

(c) The GCAA may impose restrictions, suspend, limit or revoke a Certificate or a Landing Area Acceptance, if the holder cannot demonstrate its capability to maintain the appropriate safety standards.

GM1 VFI.OR.J.022 Non-compliance and enforcement actions

ON NOTICE PROGRAMME (ONP)- GENERAL

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GM2 VFI.OR.J.022 Non-compliance and enforcement actions

ON NOTICE PROGRAMME (ONP)- REQUIRED ACTION BY THE OPERATOR

(a) Upon receiving ONP notification from GCAA, the operator should submit a recovery plan.

(b) The GCAA will closely monitor the general performance of the organisation and its adherence to the recovery plan;

(1) The recovery plan should describe the “who, what, where, when and how”. The recovery plan should provide deliverables that can be measured, including specific timescales. The submitted recovery plan will be subject to GCAA review and acceptance;

(2) Failure to submit/adhere to the recovery plan to GCAA, may result in enforcement action.

(c) If the organisation carries out satisfactorily the recovery plan, it may be lifted from the ONP.

GM3 VFI.OR.J.022 Non-compliance and enforcement actions

IMMEDIATE ACTION BY THE GCAA

In the event that a serious safety deficiency is detected by GCAA, the auditor will take immediate action without placing the organisation under ONP.

GM4 VFI.OR.J.022 Non-compliance and enforcement actions

CASES THAT COULD LEAD TO PLACING AN ORGANISATION UNDER ONP
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GM5 VFI.OR.J.022 Non- compliance and enforcement actions

ENFORCEMENT ACTION
Enforcement action may be taken in response to:

(a) a violation against federal laws;

(b) demonstration of gross negligence, incompetence, or evidence of wilful act, sabotage;

(c) failure to give the GCAA access to organisation’s facilities or records;

(d) falsification of documentary evidence;

(e) malpractice or fraudulent use of the organisation or personal certificate / approval; or

(f) the lack of an Accountable Manager in an organisation.

VFI.OR.J.025 Immediate reaction to a safety problem

(a) The operator shall establish and implement procedures intended to restrict aircraft operations where an unsafe condition exists at the heliport/helideck/vertiport.

(b) A Level One (1) finding shall require immediate corrective or containment action by the organisation, the failure of which shall result in limitation, suspension, or revocation of the certificate, authorisation or license.

AMC1 VFI.OR.J.025 Immediate reaction to a safety problem

EVIDENCE OF IMPLEMENTATION

Operator should review all regulatory materials promulgated by the GCAA and record the outcomes of the review, and document all tasks required to ensure effective implementation.

SECTION K – PRIMARY ACCOUNTABLE ORGANISATION (VFI.OR. K)

CHAPTER A - GENERAL

VFI.OR.K.005 Scope

(a) The requirements of this section are applicable to Primary Accountable Organisation (PAO).

(b) 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.

CHAPTER B – PAO ACCEPTANCE

VFI.OR.K.010 Expression of interest for PAO

The applicant for a PAO shall formally inform the GCAA in writing of their interest to manage and/or oversee helidecks.

GM1 VFI.OR.K.010 Expression of interest for PAO

EXPRESSION OF INITIAL INTEREST

(a) The applicant for a PAO should arrange for a meeting with the GCAA and provide their details and area / purpose and scope of operations. The applicant should make arrangements for its key personnel to be present during this meeting. During this meeting, the applicant should present to the GCAA their plans with regard to their scope of operations.

(b) During the meeting, the applicant may be:

(1) provided by the GCAA with general information about the applicable requirements for the helidecks;

(2) provided with copies of the applicable requirements, and a description of the procedures that are followed during the PAO acceptance process; and

(3) informed by the GCAA about possible approvals, permits, or clearances that may be needed to be obtained from other authorities for their facilities.

(c) The GCAA will provide a formal confirmation for the applicant to proceed with a formal application for PAO acceptance.

VFI.OR.K.015 Application for a PAO

(a) Pursuant to the United Arab Emirates Federal Act No. 20 (1991) Promulgating The Civil Aviation Law Article 27 and to the Civil Aviation Regulations (CARs) for the time being in force, a PAO acceptance may be granted by the GCAA, if it is satisfied that an applicant is competent, having regard to the applicant's previous conduct and experience, the equipment, organisation, staffing, maintenance, and other arrangements including compliance monitoring, to ensure that the helideck and airspace are safe for use by aircraft.

(b) The applicant for a PAO Approval shall be the organization responsible for the management, oversight, and safe operation of the helidecks, whether by direct ownership, through contractual agreements, under the management of its subsidiaries or through other recognised arrangements.

(c) The application for a PAO and subsequent document submissions shall be made in a form and manner established by the GCAA that includes, where applicable, no-objection certificates, approvals, agreements, and permissions.

(d) The applicant for the PAO shall pay the applicable fees.

GM1 VFI.OR.K.015 Application for a PAO

Following are the stages for the acceptance of a PAO

Activity	Related AMC/GM
Assessment of application	GM2 VFI.OR.K.015 Registration of the organisation.
Payment of fees	AMC1 VFI.OR.D.015(d) Applicable fees.
Evaluation of the PAO's SMS	SECTION G — Management (VFI.OR.G) VFI.OR.B.010 - PAO Documentation
Evaluation of the competence and experience of the PAO staff.	VFI.OR.A.035 Personnel requirements - PAO
Evaluation of PAO's operating procedures for compliance monitoring	VFI.OR.K.040 - Compliance monitoring
Issuance or refusal of PAO Acceptance	GM4 VFI.OR.K.015 Timescale for processing of applications.

Note: 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.

GM2 VFI.OR.K.015 Application for a PAO

REGISTRATION OF THE ORGANISATION

(a) PAO Applicant should register their organization in the GCAA's website, in order to make their application through GCAA's e-services or through other means established for this purpose by the GCAA.

(b) PAO applicant should provide evidence of their identity such as establishment / trade license documentation and official documents as required during the registration process.

(c) PAO applicant should provide all documents and information as required in the application portal.

(d) PAO applicants should have secure access to the GCAA e-Services, available on the GCAA's website: www.gcaa.gov.ae. Applicants who do not have access to the GCAA's e-Services must make an initial request through GCAA's customer service channels.

AMC VFI.OR.K.015 Application for a PAO

INFORMATION TO BE PROVIDED TO THE GCAA FOR PAO ACCEPTANCE

The PAO should provide the below documents for review by the GCAA:

(a) Safety Management System;

(b) Quality assurance process;

(c) Procedures and objectives for the safety oversight of facilities under their management;

(d) Details of their trained and qualified audit team(s);

(e) Systems for reporting and communication to the GCAA;

and

(f) List of helidecks that are under their organisation's management and oversight.

AMC1 VFI.OR.K.015(d) Application for a PAO

APPLICABLE FEES

Service fees, as published on the GCAA's website are varied from time to time and should be paid to the GCAA:

(a) during the initial PAO acceptance; and

(b) on a periodic basis after the grant of a PAO acceptance;

Note: Payment of the GCAA's service fee does not guarantee the grant or continuation for a PAO acceptance.

GM3 VFI.OR.K.015 Application for PAO

ISSUANCE OR REFUSAL OF PAO CERTIFICATE

(a) The GCAA will only issue PAO certificate, when it is completely satisfied that all regulatory and critical safety elements have been adequately addressed; this may require a further GCAA audit / inspection follow-up visit and / or special additional operating approvals. This includes evidence of any prior approvals or permissions. This acceptance will only be applicable within the UAE and UAE territorial waters.

(b) After completion of the processing of the application, the GCAA while granting the acceptance, may endorse the conditions and other details as shown in the PAO Acceptance.

(c) In the event of non-compliance with the requirements of CAR AGA or unresolved safety deficiencies/concerns, the GCAA may refuse to grant a PAO Acceptance, in such cases, will notify the applicant in writing of its reasons.

GM4 VFI.OR.K.015 Application for a PAO acceptance

TIMESCALE FOR PROCESSING OF APPLICATIONS

(a) It is important that applicants submit the required documents sufficiently early to allow for detailed consideration of the application and verification inspections.

(b) The GCAA cannot undertake to reach an acceptance decision within a particular timescale or to meet a commercial deadline set by the applicant.

VFI.OR.K.015 Continued validity of a PAO acceptance

(a) The GCAA may only grant an acceptance and permit a PAO to operate where it is satisfied that the PAO can ensure that the helidecks under their management and oversight are safe for use by helicopter.

(b) A PAO acceptance shall remain valid subject to:

(1) the PAO remaining in compliance with the relevant requirements of CAR AGA PART VFI and other applicable regulations;

(2) the satisfactory outcome of regulatory surveillance activities;

(3) the PAO’s handling of findings (as specified under VFI.OR.J.020 - Findings and corrective actions), to the satisfaction of the GCAA;

(4) the GCAA being granted access to the PAO and the facilities under their management and oversight as defined in VFI.OR.F.015 - Granting of access, to determine continued compliance with the relevant requirements of CAR AGA;

(5) the operations are conducted within the scope and conditions as detailed in the PAO acceptance;

(6) the PAO's maintenance of registry of all facilities under their management and/or oversight; including documented agreement between the Primary Accountable Organisation and the named helideck operating companies for the system of safety oversight;

(7) the PAO is in compliance with their annual audit programme that is acceptable to the GCAA;

(8) payment of all applicable service fees as published by the GCAA.

(e) Upon revocation or surrender, PAO acceptance shall be returned to the GCAA without delay.

AMC1 VFI.OR.K.015 Continued validity of a PAO acceptance

(a) The PAO's annual audit programme should be acceptable to the GCAA and should include not permanently attended installation (NPAI).

(b) The annual audit plan should be submitted to the GCAA on the 12th month of the year.

VFI.OR.K.025 Amendment to PAO Acceptance

PAO shall submit the following with any request for amendment to the PAO acceptance:

(a) detailed account of the proposed amendment including the reasons for the amendment.

(b) any other request as notified by the GCAA.

VFI.OR.K.030 Restriction, suspension of revocation of PAO acceptance

Federal Act 20 - Article 27 provides that the GCAA may, on sufficient safety grounds revoke or suspend a certificate.

The PAO's acceptance shall be restricted, suspended or revoked by the GCAA, if in the view of the GCAA, the safety of the operations in helideck under their management and/or oversight is compromised / no more ensured.

GM1 VFI.OR K.030 Restriction, suspension of revocation of PAO Acceptance

(a) Restriction, suspension or revocation, could be due to non-compliance with the PAO's acceptance requirements or unresolved safety deficiency/concern including inadequate resourcing, and in such cases the GCAA will notify the operator in writing of its reasons.

(b) Revocation of a certificate may be warranted if the PAO:

(1) is incapable or unwilling to carry out corrective action or has committed/repeated serious violations; or

(2) has demonstrated a lack of responsibility, such as deliberate and flagrant acts of non-compliance; or

(3) falsification of records jeopardizing aviation safety.

VFI.OR.K.035 Termination of PAO acceptance

A PAO intending to terminate its operations, shall:

(1) notify the GCAA in writing;

(2) surrender the PAO's acceptance to the GCAA upon the date of termination of operations.

CHAPTER C – ADDITIONAL PAO RESPONSIBILITIES

VFI.OR.K.037 Additional PAO responsibility

In addition to the requirement stated in SECTION F (VFI.OR.F), the PAO shall:

(a) establish an internal quality assurance system to ensure compliance with, and the adequacy of CAR AGA, and for the continued improvement of safety levels;

(b) maintain and provide the GCAA with a current list of all the facilities under their management for helicopter operations; amended registry shall be provided to the GCAA before the operations of any facility that is added.

(c) provide their schedule for compliance monitoring and a statement of compliance of the operating sites under their management/oversight on a regular basis or when requested by the GCAA;

(d) ensure the applicable requirements for management system as required in VFI.OR.G.005 - Management system is adhered to.

(e) the PAOs registry should clearly indicate the date of addition or deletion of the facility;

(f) It is the PAO’s responsibility to ensure design and operational parameters, personnel requirements are compliant to the requirements of the CAR AGA PART VFI, before considering the helideck for operations and can only be operated when it meets the requirement of (e).

(g) Ensure that helideck operators under their overview demonstrate compliance to the relevant requirements of CAR AGA.

VFI.OR.K.038 Additional PAO responsibility - for on-shore facility

In cases where an on-shore Heliport is under the jurisdiction/management / oversight of the PAO holding a valid PAO acceptance, then the PAO shall:

(a) Notify the GCAA and provide the GCAA with the updated registry;

(b) Ensure that the Heliport design and operations is fully compliant with CAR AGA PART VFI requirements;

(c) Ensure that all permits, approvals, etc. are obtained.

GM1 VFI.OR.K.038 Additional PAO responsibility - for on-shore facility

(a) The purpose of this requirement is to avoid the separate certification/acceptance of an on-shore heliport that will be operated/managed/owned by an already accepted PAOs.

(b) The PAO will include the subject on-shore Heliport in the PAO audit programme. Should the PAO require GCAA support in ensuring the compliance of the design, they can make such a request.

CHAPTER D – MANAGEMENT- COMPLIANCE MONITORING

VFI.OR.K.040 Compliance monitoring

(a) PAO shall ensure that they establish and maintain a compliance monitoring programme, that is acceptable to the GCAA, for the facilities under their management and/or oversight.

~~(b)~~ The PAO shall establish a formal process to monitor compliance of the helidecks/heliports under their management or oversight.

AMC1 VFI.OR.K.040 Compliance monitoring

THE QUALITY ASSURANCE SYSTEM

(a) The PAO should establish a quality assurance system that is:

(1) continual, incorporating inspections, audits, and reviews to assess the adequacy of controls in key programmes and systems;

(2) ongoing, identifying deficiencies, developing corrective and preventive action plans to correct those deficiencies, and performing follow-up reviews.

(b) PAO establish and maintain a procedure for notification of safety critical issues / findings to stakeholders and the GCAA.

AMC2 VFI.OR.K.040 Compliance monitoring

COMPLIANCE MONITORING

(a) Compliance monitoring

(1) The implementation and use of a compliance monitoring process should enable the PAO to monitor compliance with the relevant requirements of CAR AGA, as well as any other applicable regulatory requirements, or requirements established by them and to that effect:

(i) the PAO should specify the basic structure of the compliance monitoring applicable to the aviation activities conducted by helidecks under their management and/or oversight;

(ii) the compliance monitoring should be properly implemented, maintained and continually reviewed and improved as necessary;

(iii) compliance monitoring should be structured according to the size of organisation (number of helidecks under their management and/or oversight);

(iv) compliance monitoring should include a feedback system of findings to the accountable manager to ensure effective implementation of corrective actions as necessary.

(b) Organisational set-up

(i) The Quality post holder of the POA should be responsible for compliance monitoring. The accountable manager, with regards to his/her direct accountability for safety, should ensure, in accordance with VFI.OR.A.035 Personnel requirements - PAO, that sufficient resources are allocated for compliance monitoring;

(ii) Personnel involved in compliance monitoring should have access to any part of the helidecks under their management and/or oversight, and any contracted organisation.

(c) Compliance monitoring documentation

(1) The PAO should maintain a compliance register and a statement of compliance for each helideck under their management and should be made available to the GCAA upon request.

(2) Relevant documentation should include the relevant part(s) of the PAO's management system documentation;

(3) In addition, relevant documentation should also include the following:

(i) terminology;

(ii) Standard Operating Procedures(s) – SOP(s);

(iii) a description of the organisation of the PAO;

(iv) the allocation of duties and responsibilities;

(v) procedures to ensure regulatory compliance;

(vi) the compliance monitoring programme, reflecting:

(A) schedule of the monitoring programme;

(B) audit procedures;

(C) reporting procedures;

(D) follow-up and corrective action procedures;

(E) recording system; and

(F) system for reporting to the GCAA.

(vii) document control.

(d) Compliance monitoring — audit scheduling

(1) The PAO should develop and maintain:

(i) a defined audit schedule, that is acceptable to the GCAA;

(ii) an audit programme that should include the schedule for audits that have to be completed during a specified calendar period and a periodic review cycle for each area of the helideck under the management and/or oversight;

(iii) an audit programme that should allow for unscheduled audits when trends indicating safety concerns are identified. Follow-up audits should be scheduled to verify that corrective action was carried out, and that it was effective and completed, in accordance with the policies and procedures specified in the helideck manual;

(2) The PAO should carry out compliance audit of the helideck under its management and/or oversight within the first 12 months since the date of the commissioning of the helideck, the audit report of which should be shared with the GCAA;

(3) Ensure the results of audits are shared with PAO management and made available to the GCAA when requested;

(4) Required preventive or corrective action to be taken by the personnel responsible for the activity being audited if findings (or) area of enhancement is found by the audit; and

(5) Ensure all audit findings and observations are evidenced and properly recorded.

GM1 AMC2 VFI.OR.K.040 Compliance monitoring

PAO's Management review procedures that should include the use of statistical analysis, to ensure the continuing suitability and effectiveness of the quality assurance system in satisfying the requirements of this regulations.

AMC1 VFI.OR.K.040(a) Compliance monitoring

RESPONSIBILITY FOR COMPLIANCE MONITORING

(a) The responsibility for the compliance monitoring should be with the Quality Post Holder who has direct access to, and is responsible to the Accountable Manager.

(b) Persons allocated the responsibility for the compliance monitoring should have:

(1) adequate experience and expertise in helideck operations;

(2) adequate knowledge of, and experience in safety management and quality assurance;

(3) knowledge of the helideck manual; and

(4) comprehensive knowledge of the applicable requirements of CAR AGA and associated ICAO documents.

(c) The quality Post Holder remains responsible for ensuring that the external personnel, when used for compliance monitoring of the helidecks under their management and/or oversight, have relevant knowledge, background and experience as appropriate to the activities being audited or inspected, including knowledge and experience in compliance monitoring.

(d) The Quality Post Holder retains the ultimate responsibility for the effectiveness of the compliance monitoring function, in particular for the effective implementation and follow-up of all corrective actions.

SUBPART C – OPERATIONAL REQUIREMENTS (VFI.OPS)

SECTION A – VERTICAL INFRASTURCTURE DATA (VFI.OPS.A)

VFI.OPS.A.005 Common reference system

For the purpose of air navigation the operator shall use the common reference system as system in ADR.OPS.A.020 - Common reference system.

VFI.OPS.A.010 VFI DATA – General

(a) Operators of certified heliports/vertiports shall as appropriate:

   (1) determine, document and maintain and report, as applicable, data relevant to their services, in accordance with the accuracy and integrity classification required to meet the needs of the end-users of aeronautical data.

   (2) provide to AIS the following:

      (i) data relevant to the heliport/vertiport and the available services;

      (ii) the operational status of the facilities, services and navigational aids within the area of responsibilities.

(b) Operators of Landing Area Accepted (heliports/helideck/vertiports) shall as appropriate:

   (1) determine, document and maintain data relevant to their services

   (2) maintain data as required in relevant AMC for VFI.OPS.A.010.

(c) Operators shall ensure that their activities are coordinated with other nearby civil and military aviation activity.

(d) Digital data error detection techniques shall be used during the transmission and/or storage of aeronautical data and digital data sets.

AMC1 VFI.OPS.A.010 VFI DATA – General

Data relevant to Heliport/helideck/vertiport should include but not limited to:

(a) Heliport/helideck/vertiport reference point;

(b) Heliport/helideck/vertiport elevation;

(c) Heliport/helideck/vertiport dimensions and Related Information;

(d) The following distances to the nearest meter shall be declared, where relevant, for a heliport:

   (1) take-off distance available (TDA);

   (2) rejected take-off distance available (RTODA); and

   (3) landing distance available (LDA).

(e) Following distances to the nearest meter shall be declared, where relevant, for a vertiport for VCA:

(4) landing distance available (LDAV);

(5) landing distance required (LDRV);

(6) rejected take-off distance available (RTODAV);

(7) rejected take-off distance required (RTODRV);

(8) rejected take-off distance (RTODV);

(9) take-off distance available (TODAV), and

(10) take-off distance required (TODRV).

AMC2 VFI.OPS.A.010 VFI DATA – General

HELIPORT/HELIDECK/VERTIPORT REFERENCE POINT

(a) A reference point should be established for a heliport/helideck/vertiport that is not co-located with an aerodrome.

(b) The heliport/helideck/vertiport reference point should be located near the initial or planned geometric centre of the heliport/helideck/vertiport and should normally remain where first established.

(c) The position of the heliport/helideck/vertiport reference point should be measured and reported to the aeronautical information services authority in degrees, minutes and seconds.

GM1 VFI.OPS.A.010 VFI DATA – General

(a) When the heliport/vertiport is co-located with an aerodrome, the established aerodrome reference point serves both aerodrome and heliport/vertiport.

(b) Specifications concerning the accuracy and integrity classification of heliport-related aeronautical data are contained in the PANS-AIM (Doc 10066), Appendix 1.

(c) Detailed specification concerning digital data error detection techniques are contained in the PANS-AIM (Doc 10066).

AMC3 VFI.OPS.A010 VFI Data – General

HELIPORT/HELIDECK/VERTIPORT ELEVATION

(a) The heliport/helideck/vertiport elevation and geoid undulation at the heliport/helideck/vertiport elevation position should be measured and reported to the aeronautical information services to the accuracy of one-half meter.

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

GM2 VFI.OPS.A.010 VFI Data – General

(a) Geoid undulation must be measured in accordance with the appropriate system of coordinates.

(b) PANS-AIM (Doc 10066), Appendix 8, provides requirements for obstacle data determination in Areas 2 and 3.

AMC4 VFI.OPS.A010 VFI Data – General

HELIPORT/HELIDECK/VERTIPORT DIMENSIONS AND RELATED INFORMATION

The following data should be measured or described, as appropriate, for each facility provided on a heliport/helideck/vertiport:

(a) Heliport/vertiport type — surface-level, elevated or helideck;

(b) TLOF — dimensions to the nearest meter, 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 meter, slope, surface type;

(d) safety area — length, width and surface type;

(e) helicopter/VCA taxiway and helicopter/VCA taxi route — designation, width, surface type;

(f) apron — surface type, helicopter/VCA stands;

(g) approach surface — when elevated, the height of the inner edge above the FATO;

Note. — When the take-off climb surface is elevated, its inner edge and height will be the outer edge of the elevated helicopter clearway as specified in CS HPT-DSN.C.115, (c)(1).

(h) helicopter clearway — length, ground profile, or, when elevated, height above the FATO, length and width; and

(i) visual aids for approach procedures, marking and lighting of FATO, TLOF, helicopter/VCA taxiways, helicopter/VCA-taxi routes and helicopter/VCA stands.

AMC5 VFI.OPS.A.010 VFI Data – General

CERTIFIED HELIPORT/VERTIPORT

(a) The geographical coordinates of appropriate centre line points of helicopter taxiways and helicopter taxi-routes should be measured and reported to aeronautical information services in degrees, minutes, seconds and hundredths of seconds

(b) The geographical coordinates of appropriate centre line points of helicopter taxiways and helicopter taxi-routes should be measured and reported to aeronautical information services in degrees, minutes, seconds and hundredths of seconds.

(c) The geographical coordinates of each helicopter/VCA stand should be measured and reported to aeronautical information services in degrees, minutes, seconds and hundredths of seconds.

(d) The geographical coordinates of obstacles in Area 2 (the part within the heliport boundary) and in Area 3 should be measured and reported (to the aeronautical information services, where applicable) in degrees, minutes, seconds and tenths of seconds. In addition, the top elevation, type, marking and lighting (if any) of obstacles should be reported to aeronautical information services.

VFI.OPS.A.015 Coordination between aeronautical information services and operators

APPLICABLE FOR CERTIFIED HELIPORT/VERTIPORT

(a) To ensure that aeronautical information services providers obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, the operator shall make arrangements to report to the relevant aeronautical information service providers, with a minimum of delay, the following:

  (1) information on the status of certification of heliports/vertiports and Information on the heliport/vertiport condition;

  (2) data relevant to the facilities, and available services;

  (3) the operational status of associated facilities, services and navigational aids at the heliport/vertiport;

  (4) any other information considered to be of operational significance.

(b) Before introducing changes to the air navigation system, the operator shall 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 aeronautical information services, close coordination between those services concerned is therefore required.

(c) Of a particular importance are changes to aeronautical information that affect charts and/or computer-based navigation systems which qualify to be notified by the aeronautical information regulation and control (AIRAC) system, as specified in Annex 15, Chapter 6. The predetermined, internationally agreed AIRAC effective dates shall be observed by the responsible operator when submitting the raw information/data to aeronautical information services.

(d) Information concerning the level of protection provided at a heliport/vertiport for helicopter/VCA rescue and firefighting purposes shall be made available.

(e) Changes in the level of protection normally available at a heliport/vertiport for rescue and firefighting shall be notified to the appropriate aeronautical information services units 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.

GM1 VFI.OPS.A.015 Coordination between aeronautical information services and operators

(a) Detailed specifications on the AIRAC system are contained in ICAO Doc 10066, PANS-AIM, Chapter 6.

(b) Specifications for issuing a Notice to Airmen (NOTAM) are contained in ICAO Annex 15, Chapter 6, and ICAO Document 10066, 'PANSAIM', Appendices 3 and 4 respectively.

(c) 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.

(d) 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.

AMC1.OPS.A.015 Coordination between aeronautical information services and operators

(a) The level of protection normally available at a heliport/vertiport should be expressed in terms of the category of the rescue and firefighting service as described in this subpart and in accordance with the types and amounts of extinguishing agents normally available at the heliport/vertiport.

(b) A change should be expressed in terms of the new category of the rescue and firefighting service available at the heliport/vertiport.

VFI.OPS.A.020 – Data quality requirements

The operator who is responsible for the provision of raw aeronautical information/data to the AIS providers shall do so as required in ADR.OPS.A.010 as applicable to heliport/helideck/vertiport, taking into account accuracy and integrity requirements that are necessary to meet the needs of the end user of aeronautical information/data.

GM1 VFI.OPS.A.020 – Data quality requirements

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

SECTION B – VFI OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATIONS (VFI.OPS.B)

VFI.OPS.E.015 Monitoring and inspection of movement area and related facilities

(a) The operator shall regularly monitor and carry out inspections of the movement area and the operational status of related facilities.

(b) operator shall maintain records of all routine, non-routine inspections, which shall be carried out by competent staff only.

GM1 VFI.OPS.E.015 Monitoring and inspection of movement area and related facilities

(a) The heliport/helideck/vertiport should be inspected prior to the commencement of helicopter/VCA operations. Additional inspections should be carried out taking into account:

- (1) the frequency of operations;
- (2) duration of operations;
- (3) types of helicopter/VCA served;
- (4) the heliport/helideck/vertiport environment; and
- (5) the complexity of operations and the size of the heliport/helideck/vertiport.

(b) 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(s). Details of each inspection should be recorded and should include any corrective action taken.

(c) During periods of unusual weather conditions, additional inspections may be required.

(d) In the event of any unserviceability that cannot be corrected within a reasonable time, helicopter/VCA operators that normally use the heliport/helideck/vertiport should be made aware of the unserviceability.

(e) A surface inspection of the appropriate area should be carried out whenever an accident or incident occurs, or a report of debris on the movement area is made.

(f) Report on matters of operational significance, whether of a temporary or permanent nature, to the relevant air traffic services providers and aeronautical information services providers as applicable.

VFI.OPS.E.020 Foreign object debris control programme

(a) The Operators shall:

- (1) develop and implement specific procedures and programmes for the elimination of the risk of FOD;
- (2) establish and implement measures to prevent generation of FOD;

(3) establish and implement procedures to:

(i) detect FOD, including the monitoring and inspection of the movement area or adjacent areas in accordance with an inspection schedule and whenever such an inspection is required due to activities, weather phenomena, or occurrences that may have led to the generation of FOD;

(ii) provide all relevant means necessary to promptly remove, contain, and dispose FOD;

(iii) notify as soon as possible to the helicopter/VCA operators in the case of identified helicopter/VCA parts;

(4) As part of the FOD control programme, the operator shall ensure personnel have successfully completed relevant training in FOD prevention and awareness.

VFI.OPS.E.025 Wildlife strike hazard reduction

(a) The operator shall:

(1) assess the wildlife hazard on, and on the surrounding of the heliport/helideck/vertiport;

(2) establish means and procedures to minimise the risk of collisions between wildlife and helicopter/VCA at the heliport/helideck/vertiport;

(3) record and notify the GCAA of all wildlife strike;

VFI.OPS.E.025 Wildlife strike hazard reduction

The heliport/helideck/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 whenever possible, (e.g. whenever birds are flocking on or near to the FATO and dispersal action is not complete or has not been fully effective.)

VFI.OPS.E.030 Movement area access

The operator shall develop and implement procedures to ensure that access to movement area are controlled.

GM1 VFI.OPS.E.030 Authorisation of airside vehicles

(a) Safeguards should be in place to prevent inadvertent entry of unauthorised persons or vehicles to the heliport/vertiport movement area. Safeguards should be in place to ensure that there is reasonable protection of persons and property from helicopter/VCA rotor wash.

(b) All vehicular entrances to the heliport/vertiport and movement areas should have gates or barriers. Barriers should be high enough to present a positive deterrent to persons inadvertently entering a movement area and yet low enough to be non-hazardous to helicopter operations.

(c) Heliport/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 heliport should comply with rules applicable to the heliport as regards keeping gates and barriers closed.

(d) All vehicular entrances should be provided with appropriate warning notices.

(e) 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.

(f) Drivers should be briefed and vehicles should be escorted, if considered necessary.

VFI.OPS.E.035 Works safety

The operator shall establish and implement procedure to ensure that helicopter/VCA safety are not affected by ongoing works.

AMC1 VFI.OPS.E.035 Works safety

(a) 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.

(b) Work on or near the FATO or TLOF in use, or within the protected surfaces, should be continuously monitored.

(c) All temporary obstacles and equipment, including personnel and vehicles should be removed prior to the arrival or departure of VCAs.

(d) 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.

(e) If works are in progress on the movement area, the area should be suitably delineated.

(f) 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.

GM1 VFI.OPS.E.035 Works safety

DELINEATION OF WORK AREA

Work area should be delineated with unserviceability markers on any portion that is unfit for the movement of helicopter/VCA but it is still possible for helicopter/VCA to bypass the area safely.

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

VFI.OPS.E.040 Safeguarding of Heliport/helideck/vertiport and surroundings

(a) Operator shall monitor on the heliport/helideck/vertiport and its surroundings, considering the planned or intended mode of operations to ensure:

(1) obstacle environment as established in accordance with the certification specifications, and other surfaces and areas associated with the heliport/helideck/vertiport, in order to take, within its competence, appropriate action to mitigate the risks associated with the penetration of those surfaces and areas;

(2) marking and lighting of obstacles in order to be able to take action within the safeguarded area associated with the heliport/helideck/vertiport, as appropriate; and

(3) hazards related to human activities and land use in order to take action within the safeguarded area associated with the heliport/helideck/vertiport, as appropriate.

(b) The operator shall have:

(1) procedures in place for assessing and mitigating the risks associated with obstacles, developments and other activities within the monitored areas that could impact on the safe operations of helicopter/VCA operating at, to or from the heliport/helideck/vertiport;

(2) arrangements in place with applicable local planning authorities, and local municipalities for the continuous assessment of developments, land use and activities around the heliport/helideck/vertiport, that may jeopardies the safe operation of helicopter/VCA and to aid the control of potential buildings or other structures which may affect helicopter/VCA operations.

GM1 VFI.OPS.E.040 Safeguarding of Heliport/helideck/vertiport and surroundings

(a) Safeguarding is the process by which the operator can, in consultation with the local authority and within their capability, protect the environment surrounding the heliport/helideck/vertiport from developments that have the potential to impact on the helicopter/VCA operation and/or business.

(b) Operator's procedures should cater for regular inspection of obstacles to ensure that they remain in compliance with the requirements of this CAR.

AMC1.OPS.E.040 Safeguarding of VFI and surroundings

CONTROL OF CRANE MOVEMENT IN THE VICINITY OF THE LANDING AREA – HELIDECK, ELEVATED ONSHORE HELIPORT

(a) The 210^0 obstacle- free sector of the helideck shall not be infringed upon by any cranes or parts thereof during helicopter movements.

(b) 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.

(c) 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.

GM2 VFI.OPS.E.040 Safeguarding - General

(a) Safeguarding assesses the implications of any development being proposed in the vicinity of an established heliport/helideck/vertiport to ensure, as far as practicable, that the heliport/helideck/vertiport and its surrounding airspace are not adversely affected by those proposals, thus ensuring the continued safety of helicopter/VCA operating at the location.

(b) The purpose of safeguarding is to protect:

(1) the airspace around a heliport/helideck/vertiport to ensure no buildings or structures cause danger to helicopter / VCA either in the air or on the ground. This is achieved through the provision of OLS;

(2) all the elements of the heliport/helideck/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;

(3) the heliport/helideck/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);

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

(5) helicopter/VCA from the risk of collision with obstacles, through appropriate marking and lighting.

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

GM3 VFI.OPS.E.040 Safeguarding - General

(a) For the purposes of safeguarding, the operator should develop and maintain a layout plan that shows the following key dimensions:

(1) Heliport/helideck/vertiport elevation;

(2) TLOF size;

(3) FATO size;

(4) Safety Area size;

(5) Clearway;

(6) distance from the safety area or clearway perimeter to the property edges; and

(7) 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.

(b) For heliport/helideck/vertiport that are elevated, the operator should develop and maintain the above- mentioned layout plan, together with OLSs, and virtual clearways, with the altitude of their origins.

GM4 VFI.OPS.E.040 Safeguarding - General

SAMPLE AVIATION SAFEGUARDING PLAN

Refer ICAO DOC 9261, Appendix A to Chapter 2, for guidance on developing safeguarding procedure.

VFI.OPS.E.045 Maintenance

(a) The operator shall establish and implement a maintenance programme, including preventative maintenance, to maintain the aerodrome facilities such as pavements, visual aids, fencing, drainage electrical systems and buildings in a condition that does not impair the safety, security, regularity or efficiency of aircraft operations.

(b) The operator shall ensure that all maintenance records are documented, including information on the design and construction of aircraft pavements and aerodrome lighting. A system for easy retrieval of such documentation shall be implemented.

AMC1 VFI.OPS.E.045 Maintenance

(a) Assessments of the condition and bearing strength of the TLOF area should be carried out during routine and non-routine surface inspections.

(b) The bearing strength should be assessed with reference to the maximum all up weight (MAUW) of the largest helicopter/VCA likely to use the heliport/helideck/vertiport.

(c) The surface of the TLOF shall be prepared so as to be skid-resistant to both helicopters/VCA and personnel using the TLOF. This entails that all essential markings on the surface shall have a coating of non-slip material.

GM1 VFI.OPS.E.045 Maintenance

(a) Refer to ICAO DOC 9261 for minimum friction coefficient to be maintained for helidecks.

(b) Whenever necessary, the heliport surface should be rendered so as to meet minimum friction coefficients (μ) acceptable to the appropriate authority, for example: not less than 0.6 inside the touchdown/position marking (TD/PM) circle and on the painted markings and 0.5 outside the TDPC.

GM3 VFI.OPS.E.045 Surface maintenance

(a) 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.

(b) 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 this Part VFI.(It is not recommended that nets be provided for operations by skid-fitted helicopters as skids can easily become enmeshed in netting).

VFI.OPS.E.50 Marshalling signals

(a) Prior to using the marshalling signals, the signalman shall ascertain that the area within which an aircraft is to be guided is clear of objects.

(b) The signals, 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) No person shall guide a helicopter/VCA unless trained in providing signal to the helicopter/VCA.

(d) Signalman shall be responsible for providing standard marshalling signals to Helicopter/VCA in a clear and precise manner using the signals as shown CAR ASP PART ROA.

(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, marshalling pads 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.

SECTION C – EMERGENCY PLANNING (VFI.OPS.C)

VFI.OPS.C.010 Applicability

Unless otherwise specified, the requirements contained in this Section shall be applicable to vertical flight infrastructure certificated and landing area acceptance holders.

VFI.OPS.C.015 Emergency planning

An emergency plan shall be established commensurate with the helicopter or VTOL-capable aircraft (VCA) operations and other activities conducted at the vertical flight infrastructure.

GM1 VFI.OPS.C.015 Emergency planning

PRINCIPAL OBJECTIVE OF EMERGENCY PLANNING

(a) Emergency planning is the process of preparing a vertical flight infrastructure to cope with an emergency that takes place at the vertical flight infrastructure or in its vicinity. Examples of emergencies include crashes on or off the vertical flight infrastructure, medical emergencies, dangerous goods occurrences, fires and natural disasters.

(b) The purpose of emergency planning is to minimize the impact of an emergency by saving lives and maintaining helicopter operations.

(c) The emergency plan sets out the procedures for coordinating the response of vertical flight infrastructure agencies or services (air traffic services unit, firefighting services, heliport administration, medical and ambulance services, Helicopter/VCA operators, security services and police) and the response of agencies in the surrounding community (fire departments, police, medical and ambulance services, hospitals, military, and harbor patrol or coast guard) that could be of assistance in responding to the emergency.

AMC1 VFI.OPS.C.015 Emergency planning

CONTENTS OF AN EMERGENCY PLAN

(a) The emergency plan should provide for the coordination of the actions to be taken in the event of an emergency occurring at a vertical flight infrastructure or in its vicinity.

(b) Where an approach/departure path at a vertical flight infrastructure is located over water, the plan should identify which agency is responsible for coordinating rescue in the event of a helicopter/VCA ditching and indicate how to contact that agency.

(c) The plan should include, as a minimum, the following information:

(1) the types of emergencies planned for;

(2) how to initiate the plan for each emergency specified;

(3) the name of agencies on and off the heliport to contact for each type of emergency with telephone numbers or other contact information;

(4) the role of each agency for each type of emergency;

(5) a list of pertinent on-heliport services available with telephone numbers or other contact information;

(6) copies of any written agreements with other agencies for mutual aid and the provision of emergency services; and

(7) a grid map of the vertical flight infrastructure and its immediate vicinity.

GM1 AMC1 VFI.OPS.C.015 Emergency planning

CONTENTS OF AN EMERGENCY PLAN

(a) Every vertical flight infrastructure should establish an emergency plan commensurate with the complexity of helicopter or VCA operations and of other activities conducted at, or in the vicinity of, the vertical flight infrastructure to deal with helicopter/VCA emergency situations.

(b) The plan should include a set of 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.

(c) Type of emergencies

(1) The emergency plan should include possible emergencies to plan for and how to initiate the plan for each emergency.

(d) Possible emergencies:

(1) may involve helicopter/VCA:

(i) accidents;

1) helicopter/VCA on-heliport/helideck/vertiport; and

2) helicopter/VCA off-heliport/helideck/vertiport (in the vicinity):

3) land; and

4) water;

(ii) incidents;

1) helicopter/VCA on ground;

2) sabotage including bomb threat; and

3) unlawful seizure;

(2) not involving helicopter/VCA:

(i) fire on the building and/or nearby buildings;

(ii) sabotage including bomb threat;

(iii) natural disaster;

(iv) dangerous goods occurrences; and

(v) medical emergencies;

(3) compound emergencies:

(i) helicopter/VCA /structures;

(ii) helicopter/VCA/fueling facilities;

(iii) helicopter /VCA/; and

(iv) helicopter /VCA/aeroplane.

(e) The helicopter/VCA emergencies for which services may be required are generally classified as:

(1) local standby: when a helicopter/VCA approaching the vertical flight infrastructure 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;

(2) full emergency: when it is known that a helicopter/VCA approaching the vertical flight infrastructure is, or is suspected to be, in such trouble that there is danger of an accident; and

(3) aircraft accident: an accident which has occurred on or in the vicinity of the vertical flight infrastructure.

(4) aircraft ground incident: an incident on the ground which has occurred on or in the vicinity of the vertical flight infrastructure.

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RENDEZVOUS POINT AND STAGING AREA

(a) The operator should specify rendezvous point(s) and staging area(s) for the assisting services involved. A rendezvous point is a prearranged reference point, i.e. road junction, crossroads or other specified place, to which personnel or vehicles responding to an emergency situation initially proceed to receive directions to staging areas and/or the accident or incident site.

(b) Specifications for Rendezvous Point Signs

(1) The signs should be designed in accordance with local road transport authority requirements and recognised by Local Emergency Services - Police, Fire and Ambulance. The sizes given are the minimum likely to allow them to be recognised easily by attending local emergency services.

(2) Rendezvous Point (RVP) Signs

(i) Rendezvous Point signs should be displayed at the point(s) designated by the Aerodrome Emergency Plan as the rendezvous point(s) for all responding Emergency Services. Signs should be clearly visible from any direction from which responding Emergency Service vehicles/personnel are likely to approach when attending aircraft accidents/incidents within the response area defined by or cross-referenced in the Aerodrome Manual. See Figure-6.

(ii) Signs should have nominal dimensions 1000 mm x 1000 mm and comprise bright, white letters '**EMERGENCY SERVICES RENDEZVOUS POINT**' on a contrasting green background. (The white lettering may also be retro-reflective.) The sign should have a bright, contrasting yellow border of 25 mm dimensions. (The border may also be retro-reflective).

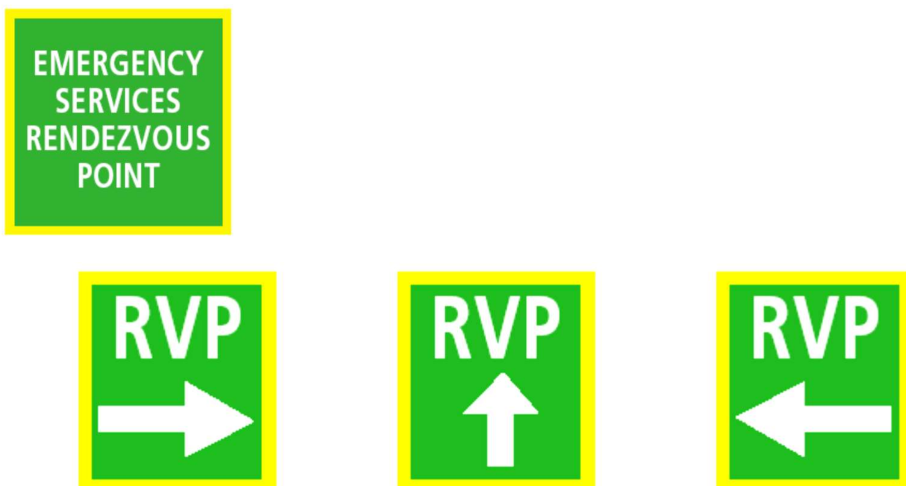


Figure: Examples of an Emergency Services Rendezvous Point and Directional Signs

(3) Rendezvous Point Directional Arrow Signs

(i) Sufficient signs bearing RVP directional arrows should be placed in such a manner that 'off-aerodrome' Emergency Service vehicles/personnel responding to an incident on the aerodrome are directed expeditiously to any previously designated RVP.

(ii) Sign(s) should be placed within and around the aerodrome perimeter so that they are visible and legible from any practicable direction of approach.

(iii) Sign(s) should have nominal dimensions 525 mm x 625 mm and comprise a bright, white arrow and the letters 'RVP' on a contrasting green background. The sign should have a bright, contrasting yellow border of 25 mm dimensions. (The lettering and border may also be retro-reflective).

(iv) Where appropriate, RVP signs and RVP Directional Arrow signs should be illuminated.

GM3 AMC1 VFI.OPS.C.015 Emergency planning

GRID MAPS

(a) It is recommended that two grid maps (or equivalent) be provided: one map depicting the confines of heliport access roads, location of water supplies, rendezvous points, staging areas, railways, highways, difficult terrain, places with dangerous goods or harmful fluids, etc., and the other map of surrounding communities depicting appropriate medical facilities, access roads, rendezvous points, etc., within a distance of approximately 4 km from the vertical flight infrastructure reference point. Where more than one grid map (or equivalent) is used, the scaling lines should not conflict and should be immediately identifiable to all participating agencies.

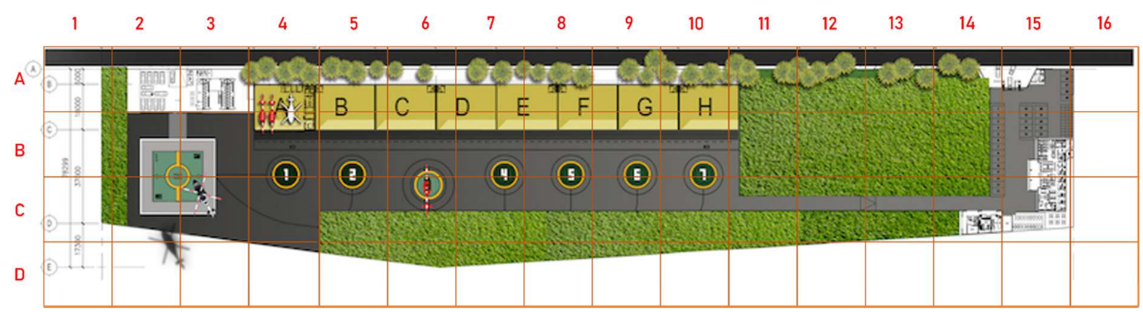


Figure – Sample of a grid map

Figure – Sample of a community map

(b) Copies of the map(s) should be kept at the emergency operations centre, the operations office, vertical flight infrastructure and local fire stations in the vicinity, all local hospitals, police stations, local telephone exchanges, and other similar emergency and information centres in the area.

GM4 AMC1 VFI.OPS.C.015 Emergency planning

EMERGENCIES IN DIFFICULT ENVIRONMENTS

(a) The 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.

(b) At those vertical flight infrastructures located close to water, swampy areas or difficult terrain, the emergency plan should include the establishment, testing and assessment at regular intervals of a predetermined response for the specialist rescue services.

VFI.OPS.C.020 Cooperating agencies

The plan shall identify agencies which could be of assistance in responding to an emergency at the vertical flight infrastructure or in its vicinity.

AMC1 VFI.OPS.C.020 Cooperating agencies

COOPERATING AGENCIES

All agencies identified in the emergency plan should be consulted about their role in the plan.

GM1 AMC1 VFI.OPS.C.020 Cooperating agencies

COOPERATING AGENCIES

(a) The emergency plan should identify agencies that could assist or respond to an emergency at the vertical flight infrastructure or in its vicinity. Names of agencies on and off the vertical flight infrastructure, 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-vertical flight infrastructure services available with telephone numbers or other contact information.

(b) The emergency plan should set out the procedures for coordinating the response of vertical flight infrastructure agencies or services (air traffic services unit, firefighting services, heliport administration, medical and ambulance services, Helicopter/VCA operators, security services and police) and the response of agencies in the surrounding community (fire departments, police, medical and ambulance services, hospitals, military and harbor 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.

GM2 AMC1 VFI.OPS.C.020 Cooperating agencies

PARTICIPATING AGENCIES AND ASSOCIATED EQUIPMENT

Testing of the emergency plan should include all participating agencies and associated equipment as detailed in the plan.

VFI.OPS.C.025 Reviewing and testing the emergency plan

The emergency plan shall contain procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness.

AMC1 VFI.OPS.C.025 Reviewing and testing the emergency plan

REVIEWING THE EMERGENCY PLAN

(a) The plan should be reviewed and the information in it updated at least yearly or, if deemed necessary, after an actual emergency, so as to correct any deficiency found during an actual emergency.

(b) Reviewing of the emergency plan should include:

(1) results, findings or lessons after emergency exercises, accident or incident at the vertical flight infrastructure for the purpose of continuous improvements to the plan; and

(2) retaining records of emergency exercises for at least five years.

GM1 AMC1 VFI.OPS.C.025 Reviewing and testing the emergency plan

REVIEWING THE EMERGENCY PLAN AFTER AN EXERCISE

(a) Evaluating the plan. Exercises provide VFI operators and exercise planners an excellent opportunity for evaluating the effectiveness and efficiency of the plan. To maximize the usefulness of evaluation, planners should carefully design the system of evaluation.

(b) Planning. In accordance with the objectives of the exercise, planners should develop an evaluation system that includes feedback, identifies benefits, and obtains the services of evaluators well before the exercise takes place.

(1) “Feedback loop”. Figure below illustrates the classic project management system for project planning and implementation. A project is planned, implemented, and then evaluated (given feedback). The feedback leads to the development of modifications, where needed, after which the cycle begins anew.

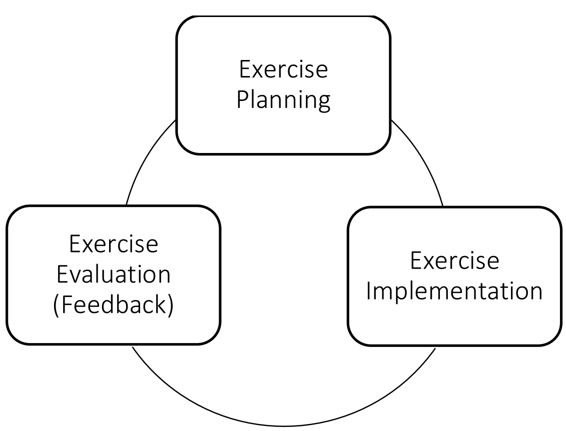


Figure: Exercise planning, implementation and evaluation process

(2) Benefits. Planning an effective evaluation system for any size aerodrome emergency response exercise is important not only for detecting problems in the exercise itself, but more importantly, for finding areas of the vertical flight infrastructure or community emergency response plans that may need refinement.

(3) Evaluators. The exercise should be totally open to a select group of knowledgeable evaluators, identifiable by distinctive clothing. The evaluators should not be involved in the planning or conduct of the exercise. Normally, government agencies, other aerodromes, and private aviation organizations can provide experienced evaluators which can benefit both the aerodrome holding the exercise and themselves. Evaluators need to be identified well before the exercise and familiarized with the aerodrome plans, including evaluation and reporting guidelines.

(c) Preparation. Evaluators experienced in vertical flight infrastructure operations, emergency response, and emergency exercises require no training by drill planners. However, a preliminary meeting detailing the scope and objectives of the exercise enables the evaluators to do their jobs effectively and thus yield the greatest benefit to the vertical flight infrastructure.

(1) Preparing evaluators. Evaluators should receive information packets and critique sheets well before the exercise takes place. Assigning evaluators to assess command, control, and communications and the emergency response functional areas ensures that the key elements of emergency response are observed in detail. Other evaluators should be assigned to critique the entire exercise. They will move about the site and observe all of the functional areas and response efforts. Outside evaluators often have preferences or certain areas of expertise, such as security or medical, which planners should determine before making evaluation assignments.

(2) Critique sheet. A critique sheet is a considerable aid in the evaluation of an emergency exercise. It is most effective if it is divided into separate sections addressing each of the distinct functional areas with sufficient space for taking notes. Questions asked should be general since being too specific may consume evaluators' time with details and prevent them from seeing the drill from a larger perspective.

(3) Briefings. Planners should brief evaluators on their functions and last-minute changes the day before the exercise. At that time, planners may give them final copies of exercise

information and critique sheets and distribute distinctive vests, apparel, hats, badges, or other means of identification. Evaluators should also attend media and response unit briefings, at which they can raise questions about the plan, identify the exercise participants, and familiarize themselves with the marking or clothing that identifies each emergency response function.

(d) Feedback. Three systems of feedback common in exercises are on-site or immediate feedback, critique conferences, and written reports. One or more of these systems should be used.

(1) On-site or immediate feedback. On-site feedback involves assembling representatives from all participating groups immediately after the exercise to get their comments while the exercise is fresh in their minds. Naturally enough, many details may escape as an evaluator tries to summarize several hours of intense activity in a five-minute oral report. Evaluators will overlook other details until later, when they compare notes with other response personnel. The great advantage of on-site feedback is that everyone's interest is at its peak; the most critical problems will likely be discovered immediately. To conduct an on-site feedback session, aerodrome operator s and exercise planners should set up rules of order to ensure uninterrupted speaking opportunities. A stenographer or tape recorder should record the session for later review.

(2) Feedback conference. The feedback conference will usually involve planners and managers of the various emergency response units involved in the exercise and the plan. Planners should schedule it no sooner than one week after the exercise. Managers will probably need at least a week to hold feedback sessions with their own personnel and gather valuable information to share at the conference. Local emergency co-ordinators should attend the feedback conference, both to benefit the vertical flight infrastructure in its use of community resources and to ensure that the community benefits from the vertical flight infrastructure's experience.

(3) Written reports. Evaluators experienced in exercises and critiques should write reports of their observations. Exercise planners may also ask other personnel for written reports. Written reports are often more candid than comments made in the on-site feedback sessions, where participants might be sensitive to outsiders' comments.

(e) Operators should make every effort to contact other agencies who have been involved in actual aircraft accidents and those who have conducted full-scale emergency exercises to acquire data and procedures to correct and upgrade their emergency plan.

GM2 AMC1 VFI.OPS.C.025 Reviewing and testing the emergency plan

REVIEWING THE EMERGENCY PLAN AFTER AN ACCIDENT/INCIDENT

(a) As soon as practicable following an aircraft accident or serious incident, the operator should ensure responding agencies obtain all necessary oral or written reports from their personnel and document all emergency response actions taken during the accident/incident.

(b) Operators should review these documents and make recommendations for changes to the emergency plan to improve the response capability for future emergencies.

(c) Following an aircraft accident or serious incident within or outside the vertical flight infrastructure, where the operator has sufficient evidence to demonstrate that the response to the accident or serious incident is delivered in accordance with the provisions detailed in the emergency plan, the operator may submit a request to the GCAA for the deferment of the next scheduled emergency exercise i.e. a full-scale or partial exercise. Upon successful deferment request, the operator should ensure that the next emergency exercise is a full-scale exercise at the vertical flight infrastructure.

AMC2 VFI.OPS.C.025 Reviewing and testing the emergency plan

TESTING THE EMERGENCY PLAN

(a) For certificated holders, the emergency plan should be tested by:

(1) conducting a full-scale aerodrome emergency exercise at intervals not exceeding three years and partial emergency exercises in the intervening year to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected;

(2) reviewed thereafter, or after an actual emergency, so as to correct any deficiency found during such exercises or actual emergency; and

(3) notifying the GCAA at least 90-days before the planned full-scale exercise.

(b) For landing area acceptance holders, the emergency plan should be tested not exceeding three years.

GM1 VFI.OPS.C.010(c) Reviewing and testing the emergency plan

TESTING OF THE EMERGENCY PLAN

(a) The purpose of a full-scale exercise is to ensure the adequacy of the plan to cope with different types of emergencies.

(b) The purpose of a partial exercise is to ensure the adequacy of the response to individual participating agencies and components of the plan, such as the communications system.

(c) Guidance on reviewing and testing emergency plan is given at ICAO Airport Services Manual, Part 7 – Airport Emergency Planning (Doc 9137).

AMC3 VFI.OPS.C.025 Reviewing and testing the emergency plan

TESTING OF THE EMERGENCY PLAN

(a) Testing the emergency plan should:

(1) commensurate with the type of helicopter/VCA operations and operational activities;

(2) ensure emergency exercises are sufficiently planned and managed with clear aims, objectives, performance criteria and understood by all participant agencies;

(3) include the participation of on and off aerodrome agencies and its associated personnel and resources;

(4) identify core elements of the emergency plan and established how and when these elements are tested;

(5) ensure key personnel participate in exercises as per their assigned strategic, tactical and operational roles and responsibilities in the emergency plan;

(6) include safety assessment of emergency exercises in accordance against the agreed aim and objectives of the exercise plan;

(7) where helicopter/VCA movement and other major operational activities are conducted at night, conduct emergency exercises during the hours of darkness; and

(8) include records of the emergency exercises and ensure such records are readily available for audit and inspection by the GCAA.

GM1 AMC3 VFI.OPS.C.025 Reviewing and testing the emergency plan

TESTING AND EXERCISING THE EMERGENCY PLAN

(a) It may be appropriate to test some parts of the emergency plan in isolation, provided satisfactory assurance of overall effectiveness of the emergency plan can be achieved.

(b) The GCAA may attend exercise pre-briefing, testing or debriefing, or choose to attend emergency exercises conducted by the aerodrome.

GM2 AMC3 VFI.OPS.C.025 Reviewing and testing the emergency plan

PURPOSE OF AERODROME EMERGENCY EXERCISES

(a) The purpose of an aerodrome emergency exercise is to ensure the adequacy of the following:

(1) response of all personnel involved;

(2) emergency plans and procedures; and

(3) emergency equipment and communications.

(b) It is therefore important that the plan contain procedures requiring that an aerodrome emergency plan be tested. This test should correct as many deficiencies as possible and familiarize all personnel and agencies concerned with the aerodrome environment, the other agencies and their role in the emergency plan.

(c) The aerodrome emergency plan provides the framework which enables aerodrome and community fire protection, security, medical, and other resources to join in an effective, coordinated response to aerodrome emergencies. By using any of several types of aerodrome emergency exercises, aerodrome operator s and community emergency resource managers can, first, produce an integrated emergency plan with a response based upon need and emergency location and, second, practice the procedures and co-ordination needed to accomplish an effective emergency response in minimum time. In addition, aerodrome operator s cannot truly have confidence in the aerodrome's plan until they study it, revise it, study it again, and test it. Testing is crucial for determining where serious gaps may exist in the plan. For example, some individuals involved in the plan may have misconceptions or misunderstandings about it; some of the procedures that seem workable on paper may not work in practice; the written estimates of time, distance or available resources may be sufficiently inaccurate to cause problems. Testing the plan may afford emergency response personnel from the aerodrome an opportunity to get to know each other and to know how other services operate. It may provide emergency response personnel from outside the aerodrome an opportunity to meet aerodrome personnel and to familiarize themselves with aerodrome facilities, resources, traffic pattern, and identifiable hazard areas. The exercises should be conducted in daylight, twilight and darkness and in various conditions of weather and visibility.

1. TYPES OF AERODROME EMERGENCY EXERCISES

(a) There are three methods of testing the aerodrome emergency plan:

(1) Full-scale emergency exercises (FEX);

(2) Partial emergency exercises (PEX); and

(3) Table top exercises/drills (TEX).

(b) These tests should be conducted on the following schedule:

(1) Full-scale: At least once every three years:

(2) Partial: At least once each year that a full-scale exercise is not held or as required to maintain proficiency;

(3) Table top: At least once each six months or annually, except during that six-month period when a full-scale exercise is held.; and

2. TABLETOP EXERCISES (TTX)

(a) Table-top exercise is a test of the integration and capability of emergency response resources without the expense and disruption of services incurred by a partial and full emergency exercise. The exercise may be held as a co-ordination exercise prior to the full-scale exercise, or it may be held at intervening times in order to reconfirm procedures, policy, telephone numbers, radio frequencies, and changes in key personnel.

(b) Table-top exercise is the simplest type of drill to stage, requiring only a meeting room, a large-scale map of the aerodrome, and a senior representative of each participating unit in attendance. A probable accident location is selected on the map and each participant describes what actions their unit would take to respond. This exercise will quickly reveal operational problems, such as conflicting communications frequencies, lack of equipment, confusing terminology and areas of jurisdiction. These exercises should be held semi-annually, but not coincidental with other exercises.

(c) Table-top exercises can be delivered in any forms – face to face, virtual or blended as long as the aim and objectives are achieved.

3. PARTIAL EMERGENCY EXERCISES (PTX)

(a) Partial emergency exercises are required for some participating units in order to train new personnel, evaluate new equipment or techniques, or to comply with mandatory recurrent training requirements. These drills are economical because of their limited scope and can be repeated as often as required in order to maintain a high standard of proficiency. They may involve only one unit, such as rescue and firefighting services or medical, or a combination of several units, as desired. These exercises should be held at least once each year that a full-scale exercise is not held to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected.

4. FULL-SCALE EXERCISES (FTX)

(a) Full scale emergency exercises are required to test the full deployment of on and off aerodrome agencies and its associated equipment in dealing with a credible worst-case emergency scenario at an aerodrome. Worst-case scenarios include different types of aircraft and non-aircraft related emergencies as detailed in the emergency plan.

(b) The aerodrome emergency plan should be given full-scale emergency exercises to test all facilities and associated agencies at intervals not exceeding three years. The exercise should be followed by a full debriefing, critique and analysis. Representatives of all organizations which participate in the exercise should also actively participate in the critique.

(c) The first step in planning full-scale emergency exercises is to have the support of all aerodrome and community authorities concerned. All departments and agency personnel should be considered.

   (1) **Develop Objectives.** In conducting an aerodrome full-scale emergency exercise, the first and most basic step aerodrome and community emergency response planners and workers should decide is exactly what should be achieved. As funds and personnel are often difficult to obtain, it is prudent for management to make plans to accomplish specific goals.

   (2) **Selecting an objective.** There are numerous objectives that can be set for an emergency exercise. For example, it may be desirable to hold an exercise at night to test the reactions of response personnel under night-time conditions. Similarly, it may be desirable to test the ability of local emergency response teams to react to the discovery of hazardous materials in the cargo of an aircraft.

   (3) **Setting limits on goals.** It is likely that more than one objective could be accomplished during an exercise. The pitfall in combining several objectives is that more may be set than can be achieved. As part of the objective setting effort, planners should limit the scope of the problems that will be explored or they run the risk of confusing and frustrating response personnel. Actual emergencies may create confusion and frustration, but confusion and frustration in training exercises will only produce a negative learning experience. This represents a misspent opportunity for emergency planners and may decrease the ability of the community to respond in real emergencies.

   (4) **Assessing results.** After the exercise, it should be possible to look back and see specific skills that were learned, new environmental conditions that were explored, communications systems that were tried out, additional mutual aid units that were integrated into the emergency plan, new equipment that was used, as well as other benefits or problems.

(d) All agency heads should be thoroughly familiar with the aerodrome emergency plan and should develop a plan for their individual departments in co-ordination with the general plan.

The agency heads should meet regularly to develop an understanding of their agencies' responsibilities and requirements in co-operation with other agencies.

(e) The use of an aircraft or similar size simulator should be sought for the full-scale emergency exercise to add realism to the exercise and to familiarize participants with the problems of removing casualties from aircraft. If an aircraft is not available, a bus or similar large vehicle may be used.

(f) The emergency exercises should be held in locations which will provide maximum realism while ensuring minimum disruption of the aerodrome operations. Various scenarios can be used. The exercise may be held either during the day or at night on the aerodrome, in the runway end safety area, or in the surrounding community. Scenarios include accidents involving:

(1) aircraft/structures;

(2) aircraft/aircraft; or

(3) aircraft/ground vehicles.

(g) Since about 80 per cent of all aircraft accidents occur on the runway end safety areas, or the approach or take-off areas, the majority of exercises should be held in the aforementioned locations. Where aircraft is not available, inclusion of small fires in the area can add realism for the fire services. Volunteer casualties should be moulage in order to provide realism for the medical responders. The use of large number of volunteers and role players provide realism for the police services.

5. EXERCISE PLANNING AND MANAGEMENT

(a) At least 120 days prior to the scheduled full-scale emergency exercise, the operator should hold a meeting of all key supervisory personnel of principal participating agencies. At this time, the aims of the exercise should be outlined, a scenario formulated, work tasks assigned, and duties of all agencies and personnel defined. Table 7 provides a suggested time schedule and checklist for planning and conducting full scale emergency exercise.

Table 8: Schedule and checklist for a full-scale emergency exercise

Exercise schedule	Suggested actions
D — 120 days	Supervisory personnel of participating agencies hold organizational meetings to outline aims, formulate the scenario, assign work tasks, and select emergency plan co-ordinators
D — 90 days	First progress report on arrangements. Submit exercise plan to GCAA for acceptance.

D — 70 days	First meeting of all participating agencies (individual committee representatives)
D — 60 days	Complete arrangements for full-scale emergency exercise site or staging area. Written scenario completed
D — 50 days	Training for moulage team begins. Second meeting of individual committee representatives. A moulage chairman can be selected from hospitals, rescue and firefighting personnel, civil defence, military personnel, etc.
D — 40 days	Arrangements for transportation, feeding, stretcher bearers and volunteer workers completed
D — 30 days	Third meeting of individual committee representative. A preliminary “warm-up” communication exercise is held
D — 21 days	Fourth meeting of individual committee representatives. Make-up for members who missed previous team training and arrangements for volunteer casualties completed
D — 14 days	Final meeting and briefing for all participants, including critique team
D — 7 days	Final meeting of supervisory personnel to review assignments
D — 0 days	Exercise day
D + 1 to 7 days	A critique following the exercise so that all participants may hear the observers' reports
D + 30 days	Supervisory personnel meet to review written critiques submitted by observers and participants; revise procedures to correct mistakes and shortcomings indicated in the exercise.

(b) In preparing the scenario, the use of real names of aircraft operators and types of aircraft should be avoided. This will prevent any possible embarrassment to civil aviation companies or agencies.

(c) In order to obtain the maximum benefit from a full-scale emergency exercise, it is important to review the entire proceedings. An observer critique team should be organized, comprised of members who are familiar with mass casualty accident proceedings. A team chairman should be appointed and should be present at all meetings. The team should be present at the final organizational meeting (seven days prior to the drill) and, in co-ordination with the GCAA in charge, ensure that significant problems are introduced into the exercise. Each member of the critique team should observe the entire exercise and complete the appropriate emergency drill critique forms.

(d) As soon as convenient after the exercise, a hot debrief should be conducted to seek immediate feedback on critical exercise areas and an exercise critique meeting should be held within 2 weeks so members of the team can present their full findings and observations. A final exercise review meeting to be attended by all participating agencies should be held within 2 months to present and discuss all exercise findings, observations and recommendations for improvement of the aerodrome emergency plan procedures and associated aerodrome emergency plan document. Where there are serious findings and/or observations arising from the full-scale emergency exercise, partial exercises should be conducted at the following year to test these improvement areas.

GM3 AMC3 VFI.OPS.C.025 Reviewing and testing the emergency plan

PLANNING AND MANAGING AERODROME EMERGENCY EXERCISE

(a) This guidance document is to assists aerodrome operator in planning and managing aerodrome emergency exercises safely and effectively.

A. INTRODUCTION

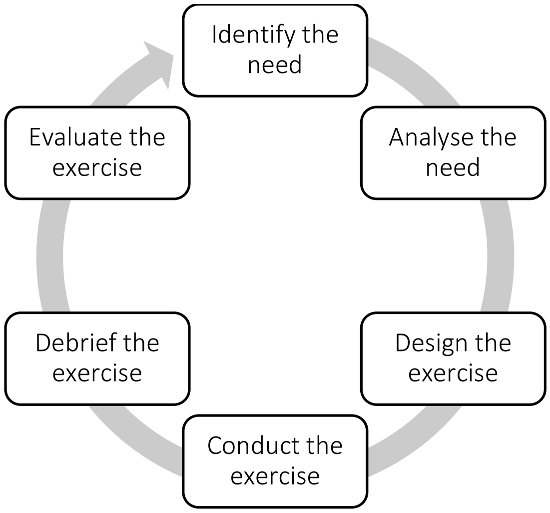
(1) This document provides guidance to aerodrome emergency planners to design, plan and manage aerodrome emergency exercises to ensure the intended aim and objectives of testing aerodrome emergency plan are achieved.

B. THE EXERCISE MANAGEMENT MODEL

(1) The success of any exercise will almost certainly be enhanced by the adoption of a structured approach to its design, conduct and evaluation. The Exercise Management Model provides such an approach.

(2) This model takes a cyclical approach to exercise management, whereby one phase is dependent upon the substantial completion of the previous and the outcomes of an exercise can contribute to the inputs or development of future exercises.

Aerodrome Emergency Exercise Management Model



(a) Identifying and analysing the need

(1) The first step in the process is to ask 'why are we conducting an exercise?'

(2) Exercises should begin with a specific need to test, evaluate, assess, practise, train or demonstrate aspects of policy, plans, procedures, systems, training of individuals or group performance. This need may have been identified from past planning, training, exercises, actual responses or as a legislative or regulatory requirement, such as with the conduct of aerodrome exercises.

(3) Once it is determined why we are conducting an exercise, this can be analysed to determine the aim and objectives to be achieved by the exercise.

(4) The aim should tell emergency planners, in a short concise statement, why we are conducting the exercise. An example might be:

"The aim of this exercise is to test the effectiveness of the response arrangements documented in the xxx Aerodrome Emergency Plan".

(5) The exercise objectives will build on the aim and provide an indication as to the expected outcomes from the exercise. Building on the aim stated above, examples of objectives may include:

- Assess the ability of emergency services to perform their prescribed roles during the response to a large aircraft incident on the xxx Aerodrome.
- Assess the ability of the xxx Aerodrome owners to provide access to emergency services and support their needs during the response to a large aircraft incident on the Aerodrome.

(6) As a rule of thumb, the number of objectives for an exercise should be kept to less than five. In a multiagency exercise, each agency involved may wish to identify their own agency

objectives. If allowed, these should be consistent with the overall objectives of the exercise. For example, a response agency wishing to assess its response times to the aerodrome, may be outside the scope of the exercise described above.

(7) Exercise managers need to be mindful of how they will identify if the exercise objectives have, or have not, been achieved. An effective way of doing this is to identify a number of actions or tangible outcomes that can be observed or measured which indicate an objective has been met or not met. These performance measures or performance indicators should be documented and agreed upon, so it is clear what is expected of participants during the exercise.

(b). Design the exercise

(1) Once the aim and objectives have been identified it is time to look at the scope, type and participants for the exercise.

(2) The scope will identify what is included in the exercise and may also identify what is not included in the exercise. It is important that this be established early in the design phase, as there is a tendency for other influences to impact on the scope. Any variation to the scope may mean that the aim and objectives need to be reviewed. (This is called “scope creep” and at best should be avoided.) For example: The scope of the exercise will be limited to:

- The response arrangements documented in the xxx Aerodrome Emergency Plan, and
- Those agencies listed as having responsibilities during the response to an aerodrome emergency.

(3) There are three broad types of exercise used by emergency managers. These are table-top, partial and full-scale exercises. Each of these has a number of variations and it is important to select the type of exercise that will best suit the aim, objectives and scope of a particular exercise. For example, a discussion exercise would not be suitable for assessing the performance of a particular role. In the aerodrome exercise example, if one of the objectives was to familiarise emergency services with their roles during a response, a discussion exercise may be appropriate.

(4) The participants and their level of participation need to be carefully assessed. Exercise managers need to pay particular attention to who should be involved and their particular role during an exercise. Once agreed, details need to be clearly communicated during the design of the exercise and articulated in exercise documentation.

(5) An issue with emergency management exercises is that conflicting commitments can often limit participation. To avoid this, participants need to be engaged at the earliest opportunity and continually informed of developments during the design phase of the exercise.

(6) Once the exercise aim, objectives and scope have been endorsed and the type of exercise and participants agreed, it is time to give consideration to the detailed scenario and look at what needs to be done before conducting an exercise.

(7) The size and complexity of an exercise will indicate how much preparation is required. A simple exercise can be designed by an experienced exercise manager, however, more detailed exercises may require a dedicated team and many months of preparation. Exercise design will also require a range of meetings and detailed documents. One thing is certain, exercises do not occur by osmosis and the

(8) amount of time and effort applied to the preparation will almost certainly contribute to the success of the exercise.

<u>(c). Conduct the exercise</u>

(1) Exercise managers often focus on the exercise itself as the end state. The reality is that the conduct of the exercise includes those activities that involve the participants and exercise staff in the lead up to the exercise, during the exercise and immediately after the exercise.

(2) **Before the exercise**, it is essential to ensure that all participants and exercise staff are aware of what is required of them during, and immediately after, the exercise. This should occur by way of written information in advance of the exercise and a briefing immediately before the exercise. Suggested topics for the briefing include:

- Exercise aims and objectives
- Roles and responsibilities during the exercise
- Information, communication and/or technology systems
- Action in the event of unforeseen circumstances
- Post exercise requirements
- Appropriate parts of the scenario

(3) In addition to briefing participants, sufficient time should be allowed to establish and test the facilities and the resources required to conduct the exercise.

(4) If careful attention is paid to pre-exercise activities, all will be in place for person appointed to the role of Exercise Director to commence the exercise.

(5) **During the exercise**, activities should occur in a predetermined way. This will commence with the Exercise Director starting the exercise, right through to its termination. These activities should occur in accordance with a pre-determined script, often referred to as the ‘master schedule’. The master schedule should detail when particular activities are expected to take place, when exercise inputs should occur and if appropriate, information about the actions or responses expected from participants.

(6) **After the exercise**, it is essential to ensure that all participants, directing staff and role players are aware that the exercise has concluded. A typical way to do this is to conduct a 'hot debrief' to wrap up activities and to disengage participants and staff from the exercise activities. A hot debrief should bring the exercise scenario to a logical conclusion and advise those involved of any follow up activities, such as formal debriefs and evaluation activities. In addition to this, any resources, facilities or sites used during the exercise need to be returned to their pre-exercise state.

<u>(d). Debrief the exercise</u>

(1) All exercises benefit from a formal debrief at some stage following the conclusion of the exercise. The aim of such is to identify whether or not the exercise met its aim and objectives. It is also an opportunity to allow participants and participating organisations to reflect on their performance during the exercise.

(2) Debriefs have typically look at what went well, what could be improved and recommendations that should be considered for future activities. More recently, there has been an inclination for agencies to replace debriefs with a process referred to as an After-Action Review (AAR). While the concept of an AAR sits well in some circumstances its purpose differs from that of a debrief and those responsible for conducting exercises are encouraged to include some form of formal debrief, as described above, following their exercise.

(3) When conducting debriefs, it is essential that the outcomes are recorded and made available to those involved. These outcomes will contribute to any review or evaluation process applied to an exercise.

<u>(e). Evaluate the exercise</u>

(1) It is recommended that a process for evaluating an exercise be considered right from the very first exercise planning meeting. The evaluation process may run in conjunction with the exercise planning process and those appointed to evaluation positions should wherever possible, work independently of those planning and conducting the exercise. The evaluation process should include both; how the participants respond to the developing scenario and also the way in which the exercise was designed and conducted. The latter point is often overlooked in the evaluation process and requires greater attention by exercise managers.

(2) An evaluation process needs to be useful, accurate, ethical, feasible and cost effective. The outcomes of the exercise evaluation process should ultimately contribute to the way in which future exercises are conducted and the way in which emergency management agencies manage their responsibilities in the real event.

<u>(f). Conclusion</u>

(1) The amount of time, effort and resources that are required to design, conduct and evaluate an effective exercise should not be underestimated. All but the simplest of exercises will require a team of people dedicated to the tasks required to conduct an exercise.

(2) The team needs to work in a cohesive manner and have a common understanding of the requirements of the process adopted, such as the exercise management model described above.

(3) The exercise design needs to be centred around a clearly defined aim, objectives and scope. The exercise manager should make use of the aim, objectives and scope to ensure that their exercise is not derailed by an overly ambitious scenario or other agenda.

C. EXERCISE WORK PLAN

(1) For exercises to have an effective outcome there needs to be a work plan. This plan could range from a simple action list of when and where certain activities will occur to more complex detailed activity schedules of flow charts, meeting agendas, etc. It is necessary to identify the type and scale of exercise required then develop the appropriate work plan. Details of the requirements for an exercise work plan are listed below.

Example of Aerodrome Emergency Exercise Work Plan

A. INTRODUCTION (1) The detail required in a work plan depends on the size and type of exercise to be undertaken. The plan should clearly identify the course to be taken and the requirements of those agencies involved in the exercise. Development of this work plan should take place well before the exercise to allow for its complete development and the inclusion of all necessary criteria.
B. POLICY MEETING (1) A policy meeting is needed early in the planning process in order to identify the scale and timings of the proposed exercise. The attendees at this meeting should be from management, staff responsible for the implementation of the exercise and persons with the GCAA to make decisions on the discussion issues listed below. (2) To give sufficient time for completion of all logistical requirements, this meeting should be held at least twelve weeks prior to a full-scale exercise or eight weeks prior to a partial exercise. Items for discussion might include: • Type, nature and scope of exercise; • Aim and objectives; • Duration;

- Policy directives;
- Organisations involved;
- Key appointments;
- Budget considerations;
- Location;
- Timings;
- Coordination;
- Logistics;
- Industrial implications;
- Planning meetings;
- Method of evaluation;
- Exercise planning committee nominations; and
- Occupational health and safety.

C. EXERCISE PLANNING COMMITTEE

(1) The exercise planning committee established through recommendations from the policy meeting should comprise representatives from all the organisations involved. The role of this committee is to write the formal exercise papers incorporating the decisions and recommendations identified at the policy meeting.

(2) Other areas to be addressed by this committee include:

- Format of the exercise;
- Schedule of events;
- Actors for role plays; and
- Exercise control requirements.

D. PROGRESS MEETINGS

(1) These meetings are necessary for the continued development of the papers including checks on authenticity of the General and Special Idea (Refer Appendix B)

(2) Other areas that may require ongoing development are:

- General instructions; and
- Intelligence background.

E. DOCUMENTS

(1) The exercise documents should be prepared by persons nominated by the exercise planning committee. Appendix B discusses the documents in more detail. The exercise planning committee should also examine and approve the exercise documents.

(2) It is also important that all organisations involved in the exercise agree to the final content prior to acceptance by the exercise director.

F. COORDINATION AND TIMINGS

(1) Participating organisations need to receive the final exercise instruction several weeks prior to the exercise to allow time for the assessment of resource commitments. If the exercise is designed to test operational response, the special idea and commencement times should be withheld until activation.

(2) The exercise planning committee also requires time to organise logistics and brief the actors in their role plays. An exercise control briefing and actors briefing needs to be held approximately four days before the exercise. A further briefing of actors is advisable before the exercise.

G. DEBRIEFING

(1) The debrief provides an opportunity for the participating organisations to report on their effectiveness to respond and operate within the AEP guidelines and for the exercise director and evaluators to report on the exercise from their perspective. Several debriefs are held after exercises with the primary of these being called the "Hot Wash up" and "Cold Wash up". The Hot Wash up debrief is held immediately after the exercise and is attended by all the exercise control staff. This type of debrief is also held by all the participating organisations individually including all participants. The Cold Wash up debrief is usually held twenty four hours later and is attended by at least one representative from each of the participating organisations.

(2) The type of questions that should be asked at these debriefs are:

- Were the objectives achieved?
- What skills and knowledge were gained as a result?
- How could procedures be improved?
- Was the exercise justified?
- What are the recommendations from the exercise?

H. POST EXERCISE ACTIVITIES

(1) There are several post exercise activities that should be undertaken immediately or as soon as practical after the end of exercise play. These include:

- Inspection and clearance of the site;
- Restoration of the site;
- Damage control report;
- Letters of appreciation;

- Payment of costs etc; and
- AEP revision/amendment as necessary

D. EXERCISE DOCUMENTS

(1) Exercise documents are necessary for the participating organisations to enable them to identify the guidelines under which they are to operate and what is to be achieved from the exercise. The scope and type of the proposed exercise will dictate the nature of the supporting documentation. Details of exercise documents are provided below:

Example of Aerodrome Emergency Exercise Instructional Plan

A. INTRODUCTION

(1) It is necessary to develop the exercise documents to suit the type and scale of exercise that is to be undertaken in accordance with this regulation. The content of this document should allow organisations to understand the parameters that they should operate within. Poor documentation will lead to confusion and poor performance by participating organisations.

(2) Points to be considered when developing an exercise instruction are as follows:

B. EXERCISE CODE NAME

(1) A code name should be considered for all exercises so they are not confused with normal every day operational activities or other exercises being held simultaneous. The name should be kept short and relevant to the activities.

C. EXERCISE INSTRUCTION

(1) The exercise instruction outlines Why, When, Where and How the exercise is to be run. There are several topics that should be addressed in the document. These are discussed below. The classification status for the exercise should also be included.

References.

Details are given here of any references that relate to the operational response associated with the exercise, i.e. AEP, SOPs etc.

Introduction.

The introduction contains information on the following:

- An explanation of the type of exercise;
- When and where the exercise will be conducted;
- Reason for the exercise;
- Participating organisations; and
- Exercise limitations.

Aim.

This is a broad statement of intent which gives direction as to what will be achieved by the exercise. The aim should be clear, concise, and practical. Examples of an aim are as follows:

- To practice coordination of rescue resources to an aircraft incident;
- To test call out procedures for an emergency at an aerodrome; and
- To evaluate the efficiency of information recording in the emergency operations centre.

Objectives.

The objectives are precise statements of the intended outcomes in terms of the knowledge, skills, attitudes and/or operating procedures to be measured or observed during and after the exercise at individual, group and agency level. They should support the aim. Objectives should state the performance required, the conditions under which performance is to be tested and the standards to be achieved. When developing exercise objectives, consider the use of SMART (Specific, Measurable, Achievable, Realistic and Time-specific) acronym. Examples of objectives are as follows:

Exercise Format.

Information necessary for the conduct of the exercise should include the following points:

- Activation and stand down times;
- Pre-exercise information;
- The level to which the exercise will be taken; and
- Intelligence gathered relevant to the exercise.

Safety/Medical.

Details of safety precautions and names of safety officers should be identified, including emergency procedures for real injury situations together with emergency contacts. Instructions should cover the use of a code word such as “No Duff” so that the exercise can be terminated should a real injury or incident occur which requires resources that are committed to the exercise.

Damage.

A damage control officer should be nominated to oversee the protection of buildings, property and other facilities including the reporting of damage caused during the exercise.

Administration.

Several areas may need clarification under this heading. These may include:

- Exercise area including any restrictions;
- Information for role players including briefing points; and
- Briefing and debriefing arrangements for exercise control staff and participants.

Security.

Areas needing security consideration are:

- Exercise area security;
- Documentation security; and
- Visitors/observers designated areas.

Media and Public Relations.

Media interaction should be considered. In particular whether there should be partial activation (internal only) or a full-scale activation of all media for public information.

Command and Control.

This applies to the organisation of the exercise and should identify the following:

- Control staff;
- Participants;
- Observers; and
- Visitors.

Reference should also be made to the prefixing of all exercise communications with the nominated code name to avoid confusion with the normal ongoing transmissions.

Annexes.

A list of all supporting documents should be attached.

Distribution List.

This is a list of organisations and personnel that the
documents should be distributed to.

Authority.

A signature of the exercise director should be included for authenticity.

D. GENERAL IDEA

(1) This is a narrative designed to inform participants of general background knowledge that would normally be available during a real incident. The general idea 'sets the scene' for the exercise.

E. SPECIAL IDEA

(1) This is a narrative providing specific information to selected personnel or organisations detailing events not written into the general idea. This information may include timings relevant to the activation of the exercise and a specific sequence of events identifying the exercise scenario and casualty extent. The special idea is to be restricted to control staff until immediately prior to the commencement of the exercise then released to selected organisational representatives.

Note: Both the general and special idea documents are normally only used in partial or table top exercises.
F. SEQUENCE OF EVENTS (1) A detailed script for the sequence of events is recommended to assist with the effective control and input to the exercise. The sequence of events script should be restricted to exercise control staff only.
G. CONTROL STAFF LISTING (1) All exercise control staff is listed by name, the organisation they represent and the function they are to perform during the exercise. A detailed list of role players may also be added in this section.
H. ORGANISATION CHART (1) An organisational diagram depicting the command and control structure may be added.
I. SUPPORTING ORGANISATIONS AIMS AND OBJECTIVES (1) Each organisations aims and objectives should be listed to clarify their roles and to avoid confusion during the exercise.
J. MAPS (1) Maps identifying the exercise site and other applicable information should be attached.
K. EXERCISE REPORT (1) On completion of the exercise, a report should be prepared which addresses all aspects of the exercise from planning through to the clean-up. The report, to be delivered in a timely manner, should highlight the good points, address deficiencies identified and make recommendations for the future. *Note: The format given above is not intended to be restrictive and should be adjusted to suit the type and scope of exercise.*

E. EXERCISE ROLES

(1) Depending on the complexity, exercises can use a large number of staff and players. Considering the level of control, coordination and resources required during aerodrome emergency exercises, there is usually a need for several field exercise control staff to cover the range of activities. Roles to be considered are:

- Exercise Director: a senior management of the aerodrome operator who has the overall authority for the exercise, commencing, stopping etc;
- Exercise Controller: controls all exercise input, pace, rulings etc;
- Umpires: make rulings for participants and control the pace on behalf of the controller;

- Evaluators: take no active part in the play, but record reactions, responses and critique the exercise. They are selected based on their knowledge and experience;
- Observers: interested parties who have no direct involvement other than observing for their own benefit and knowledge;
- Higher Control: represent authorities higher than exercise participants;
- Lower Control: represents authorities lower than exercise participants i.e. field teams etc; and
- Role Players: represent industry, victims, media, public, meeters/greeters etc.

(2) Despite the number of roles outlined above, most can be filled by multi-tasked personnel. Role players may represent both higher and lower controls. Evaluators need to be aware of who is filling what roles before exercise play commences.

(3) The exercise director and controller, umpires, evaluators and observers should be clearly identified (usually by the use of tabards) to ensure that they do not get mistaken for exercise players.

F. EXERCISE SAFETY

(1) The safety of all participants including role players, operational response organisations and exercise control staff should be monitored during the exercise by nominated safety officers overseeing all activities.

(2) A code word needs to be identified for prioritising communications during the exercise. This may be required for the termination of all or part of the exercise due to a real life injury or emergency. A commonly used code word understood by most organisations is “NO DUFF”, and its meaning should be made general knowledge to all participants.

G. EXERCISE MEDIA / PUBLIC RELATIONS

(1) Media participation is important during all exercise activities and can be a valuable asset for advising or alerting the community. Areas for media participation are:

- **Pre-exercise:** Media should be utilised to notify the community of the pending exercise to alleviate the possibility of hysteria due to a lack of understanding at what is being undertaken. The media may also advise of the reasons for the exercise and proposed outcomes;
- **During exercise:** It is important to subject operational management and response organisations to a realistic media interaction to test liaison and coordination capabilities during the exercise operation; and

- **Post exercise:** Public education is important and media may advise on the state of operational readiness and higher safety standards achieved as a result of the exercise and ongoing planning.

H. EXERCISE EVALUATION

(1) Evaluation is aimed at providing valid judgements about how well the exercise objectives were achieved. The objectives should be S.M.A.R.T. They should be clearly defined during planning.

(2) The ultimate result of evaluation should be a list of specific recommendations to be implemented in order to increase preparedness.

<u>Exercise Objectives</u>

To sufficiently assess the effectiveness of any exercise, there should first have been written objectives against which the success of the exercise can be measured.

<u>Exercise Evaluators</u>

Evaluators should:

i Be familiar with the subject being exercised (Aerodrome Emergencies);

ii Be familiar with Aerodrome Emergency Procedures;

iii Observe and record functional performance during the exercise;

iv Participate in the exercise debriefing;

v Analyse evaluation data; and

vi Develop follow-up conclusions and recommendations.

<u>Principles of Evaluation</u>

Participant Evaluation: Participants, role players, and control staff, have a role in evaluation. A complete exercise report should contain all views, not just that of designated evaluators.

Evaluator Guidelines: Whether evaluators are evaluating only, or are doubling as role players or control staff, there are a number of applicable guidelines:

- They should remain objective;
- They should be prepared to observe the unexpected,
- They should know what they are looking for;
- They should not interfere with operations; and
- They should not provide evaluation information to participants during the exercise.

All evaluation does not have to wait until the conclusion of the exercise. Evaluators can be a valuable mechanism to help control the progress of the exercise. They can make critical observations about the scenario and responses and give controllers the opportunity to redirect the exercise play as necessary to ensure the maintenance of realism.

Immediate Debriefing: During the “hot washup” or debriefing at the end of play, the exercise is given a fairly thorough overview by participants who critique their performance. Guidelines are required to avoid the debrief wandering or becoming rancorous.

Though exercise developers are responsible for the debrief, some guidelines are stated here to provide evaluators with a more constructive guidelines for the debriefing:

- The debrief should be held soon as possible after the end of the exercise;
- Only provide constructive criticism (blame-fixing should be avoided);
- Contributions should be progressively prepared during the exercise;
- Focus on correcting identified problems; and
- Focus on cooperation.

Participant reactions which may be sought by evaluators during debrief include:

- Overall general reactions, suggested improvements, modifications;
- Usefulness of AEP guidelines, job cards and other suggested improvements;
- Reactions and suggested improvements to control arrangements i.e., physical layouts, information displays, staffing etc;
- Realism of the scenario, suggested improvements;
- Reactions to exercise format, length;
- Effectiveness of individual lead-up training, suggested improvements;
- Reaction to information management and flow; and
- Effectiveness of management issues such as briefings, instructions, participation etc.

While there are obviously many more issues which can be addressed, according to the particular interests of evaluators, the debrief is not the only evaluation forum. It is only the start.

Comments at the debriefing should be recorded and treated as data for the evaluation report. Evaluators should complete the evaluation objectively and develop recommendations for follow-up action. These recommendations should be aimed at improving preparedness. An evaluation report should be developed from individual reports and circulated to participants for review and comment.

Evaluation Method

To dictate in detail how each evaluator should actually perform an assessment, and when and where these assessments should be undertaken, would be too directive and counter-productive. A critique format for the exercise should be standardised, but also should allow each evaluator to have some flexibility in how they evaluate their designated area. By using the same format for each component of each exercise, some commonality of perception can be achieved, thus enhancing the quality of input into each exercise follow-up.

Evaluation Reports

Each evaluator's report should present an analysis of needed improvements in the AEP, based on an examination of such response during the exercise. Each report should reflect the evaluator's view of proceedings, (depending on which areas were evaluated), their view of the measure of proceedings against the exercise objectives, and their view of the actual exercise management (realism v practicality, time constraints, optimism v reality etc). A useful format for an evaluator's report is to use the objectives as subheadings. An analysis of what went well and what did not can then be developed from the various sources of information. The analysis should address:

- Evaluator's group observations;
- Players' debriefing comments;
- Comments from controllers and/or umpires and observers; and
- Any subsequent clarification and/or discussion with players.

The overall evaluation report should be directed to the Aerodrome Emergency Planning Committee and should be the subject of review and discussion. It should not be seen as an edict handed down by evaluators. The best recommendations (those with the greatest chance of being implemented) are those that are agreed by all involved agencies.

A draft evaluation report should be prepared by evaluators based on their individual reports. This draft report should be discussed at a meeting of at least the main exercise evaluators, exercise planners, and exercise participants. The focus should be on developing a consensus on which recommendations can and should be implemented with recommended priorities.

The final evaluation report can be a useful tool for future exercises and for improving the emergency response system. The following format for preparing recommendations in the report may be useful:

Sample Recommendation

- SUBJECT:
- PROBLEM DESCRIPTION:
- ACTION REQUIRED:
- ACTION AGENCY:
- PROPOSED COMPLETION DATE:
- SUBMITTED BY:

Example of Aerodrome Emergency Exercise Evaluation Checklist

EXERCISE EVALUATION FORM	
Name of Evaluator:	

nisation:		
Aerodrome/Facility:		
Exercise Activity / Area:		
:		
uation:		
NOTE: RATE THE FOLLOWING CRITERIA FROM 1 TO 10 WITH 1 BEING THE LOWEST. ADD COMMENTS AS NECESSARY		
1. Was there a clearly defined overall exercise aim?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10	
Comments:		
2. Were there clear and relevant objectives for each participating organisation?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10	
Comments:		
3. Did the exercise address the aims and objectives?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10	
Comments:		
4. Was the exercise realistic for the scale of normal operations at an aerodrome (timings, scenario, etc.)?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10	
ments:		
5. Was the exercise carried out in a logical sequence?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10	
Comments:		

6. Were the response times realistic?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10				
Comments:					
7. Was the response to the exercise in accordance with local plans?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10				
Comments:					
Vas the debrief conducted effectively to identify issues from all response organisations?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10				
ments:					
Vere the recommendations from the last exercise implemented?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10				
Comments:					
10. Was the exercise planned and staged as an effective evaluation tool?	☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7 ☐8 ☐9 ☐10				
Comments:					
Overall Score:	0-20%	21-40%	41-60%	61-80%	81-100%
Overall Comments: (did the exercise achieved the aim and objectives?)					
Evaluator Signature:					

SECTION D – RESCUE AND FIRE FIGHTING (VFI.OPS.D)

CHAPTER A – HELIPORTS (VFI.OPS.D.HPT)

VFI.OPS.D.HPT.005 Rescue and firefighting provisions

(a) Rescue and firefighting equipment and services shall be provided at surface-level and at elevated heliports located above occupied structures.

(b) The requirements contained in this chapter shall apply to both certificated and landing area acceptance holders.

GM1 VFI.OPS.D.HPT.005 Rescue and firefighting provisions

RESCUE AND FIREFIGHTING PROVISIONS

(a) It is important this section be read in conjunction with the appropriate detailed guidance on rescue and firefighting options given in the ICAO Heliport Manual (Doc 9261).

(b) Provisions described in this section are intended to address incidents or accidents within the heliport response area only.

(c) 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.

(d) Complementary agents are ideally dispensed from one or two extinguishers (although more extinguishers may be permitted where high volumes of an agent are specified, e.g. V3 operations). The discharge rate of complementary agents needs to be selected for optimum effectiveness of the agent used. When selecting dry chemical powders for use with foam, care needs to be exercised to ensure compatibility. Complementary agents need to comply with the appropriate specifications of the International Organization for Standardization (ISO).

(e) Where a fixed monitor system (FMS) is installed, trained monitor operators, where provided, are 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).

GM2 VFI.OPS.D.HPT.005 Rescue and firefighting provisions

PRINCIPAL OBJECTIVE OF RESCUE AND FIREFIGHTING RESPONSE

(a) The principal objective of a 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.

(b) 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. 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 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 helideck and/or its supporting structure has to be considered. In the event of a fire at a purpose-built heliport, a full structural analysis should be undertaken post-accident, and before helicopter operations are permitted to resume.

(c) For a surface-level heliport, especially where it contains a remote FATO, a suitable vehicle may need to be provided to meet the response time objective stated in AMC3 VFI.OPS.D.HPT.010 Level of protection. Where a heliport is located close to water, swampy areas or in difficult terrain and where a significant portion of the approach and departure operation takes place over these areas, an assessment will need to be carried out to determine if specialist RFFS equipment appropriate to specific hazards and risks should be made available. This may include, for example, a rescue boat.

(d) Prior to selection of a dedicated heliport rescue and firefighting response (RFFR), the following should be considered: concept and definitions for the characteristics of helicopters; types of heliport facility they may be expected to operate to; and effective distribution of primary extinguishing agent to address a worst-case crash and burn.

(e) An operator should also have a good understanding of emerging technologies that demonstrate effective methods for delivering primary extinguishing agents. To provide a speedy and effective response, a heliport operator should be able to determine the practical critical area, the response area and response time objectives for their facility.

AMC1 VFI.OPS.D.HPT.005 Rescue and firefighting provisions

SAFETY RISK ASSESSMENT

A safety risk assessment should be performed to determine the need for rescue and firefighting equipment and services at surface-level and elevated heliports located above unoccupied structures.

GM AMC1 VFI.OPS.D.HPT.005 Rescue and firefighting provisions

CONDUCTING A SAFETY RISK ASSESSMENT

(a) A risk assessment should be performed to first determine whether there is a need for rescue and firefighting equipment and services at surface level heliports and at elevated heliports located above unoccupied structures. This assessment should include staffing models for heliports without a dedicated RFFS and with only occasional movements, and for initiating the heliport emergency response.

(b) The important distinction to make is that no one is permanently residing beneath the heliport, and it is possible to restrict the movement of persons to and from vehicles during helicopter operations, to ensure that as far as reasonably practicable no one is left in their vehicle during helicopter landing and take-off.

(c) The following factors need to be considered in any risk assessment, but it is the responsibility of the heliport operator to determine appropriate threshold limits, including:

(1) number of movements planned/ unplanned;

(2) frequency of movements;

(3) total number of helicopters in use at the site during peak periods;

(4) type of movements, i.e. whether conducting commercial air transport (CAT) and/or general aviation (GA);

(5) number of passengers;

(6) types of helicopters in use, their certification status with respect to crashworthiness and their performance characteristics;

(7) size and complexity of the response area, e.g. other helicopters are present in apron area;

(8) nature of the terrain, e.g. located near water or swampy areas;

(9) whether the heliport is elevated or at surface level;

(10) whether the heliport is in a congested or non-congested environment;

(11) availability of the local fire and rescue services, i.e. how rapidly can services respond to an incident on the heliport;

(12) types of helicopters and specific hazards, e.g. construction materials are used in airframes such as composites, i.e. man-made mineral fibres (MMMF); and

(13) whether or not an emergency response plan has been established.

VFI.OPS.D.HPT.010 Level of protection

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 heliport under control within one minute, measured from activation of the system at the appropriate discharge rate.

GM1 VFI.OPS.D.HPT.010 Level of protection

DETERMINING THE PRACTICAL CRITICAL AREA

(a) To determine the amount of water required for foam production it is first necessary to calculate a practical critical area (in m2) which is multiplied by the application rate (in L/min/m2) of the respective foam performance level to determine the discharge rate for foam solution (in L/min). By multiplying the discharge rate by the discharge duration, this determines the amount of water needed for foam production.

(b) The assumptions used to determine practical critical area depend on whether primary extinguishing agent (foam or water) is initially applied in a solid stream (jet) application or in a dispersed (spray) pattern.

GM2 VFI.OPS.D.HPT.010 Level of protection

FIRE CONTROL TIME

(a) A fire is deemed to be under control at the point when the initial intensity of the fire is reduced by 90 per cent. The helicopter operation, consistent also with a fixed wing operation, should achieve a 1-minute control time in the practical critical area using a quantity of primary extinguishing agent for initial attack, over an appropriate discharge duration, which is required for the continued control of the fire thereafter, and/or for possible complete extinguishment of the fire and which may have spread across the heliport operating area.

(b) Speed of response has an important bearing on the effectiveness of escape in a survivable helicopter accident. Intuitively, a prompt intervention will likely bring the fire under control more quickly if firefighting primary extinguishing agent can be applied, at the full application rate, during the earliest stages of a fire's development.

AMC1 VFI.OPS.D.HPT.010 Level of protection

PRACTICAL CRITICAL AREA CALCULATION WHEN PRIMARY MEDIA IS APPLIED AS A SOLID STREAM

(a) 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 6-1.

Table 6-1: Heliport firefighting category

Category (1)	Maximum fuselage length (2)	Maximum fuselage width (3)
H0	up to but not including 8 m	1.5
H1	from 8 m up to but not including 12 m	2
H2	from 12 m up to but not including 16 m	2.5
H3	from 16 m up to 20 m	3

GM AMC1 VFI.OPS.D.HPT.010 Level of protection

PRACTICAL CRITICAL AREA CALCULATION WHEN PRIMARY MEDIA IS APPLIED AS A SOLID STREAM

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

(b) The practical critical area may be considered on helicopter type-specific basis by using the formula in AMC1 VFI.OPS.D.HPT.010 Level of protection.

(c) A solid stream is used 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, or from a hose-line, in a jet configuration, are examples of typical solid stream applications. In each case, 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 provides a safer environment for RFF personnel to approach the accident/ incident location.

Figure II-6-3. Solid stream application utilising a fixed monitor system (FMS)

(d) The practical critical area (helicopters), where primary extinguishing agent is applied as a solid stream-jet, is determined by multiplying the maximum fuselage length for a given firefighting category (H0 to H3) by the maximum fuselage width of the same category, then applying an additional width factor (W1) of 4 m. This has been presented in detail in Table 6-1 (where discretionary 10 per cent upper limit tolerances are also applied). Alternatively, by knowing the fuselage length and width dimensions, a practical critical area calculation can be applied to any specific type of helicopter; this has an application, in practice, when only one type of helicopter is being operated at a heliport.

AMC2 VFI.OPS.D.HPT.010 Level of protection

PRACTICAL CRITICAL AREA CALCULATION WHEN PRIMARY MEDIA IS APPLIED IN A DISPERSED PATTERN

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.

GM AMC2 VFI.OPS.D.HPT.010 Level of protection

PRACTICAL CRITICAL AREA CALCULATION WHEN PRIMARY MEDIA IS APPLIED IN A DISPERSED PATTERN

(a) A dispersed pattern is used 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. Here, due to the greater coverage of primary extinguishing agent applied in a dispersed spray pattern, the assumed practical critical area has to be much larger than in a case where primary extinguishing agent is applied in a solid stream (jet). A particularly effective way of delivering primary extinguishing agent in a dispersed pattern is through a Deck

Integrated Fire Fighting System (DIFFS) (see Figure II-6-4) typically consisting of 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.

Figure II-6-4. Example of a dispersed pattern application utilising DIFFS

Note. — In some cases, fixed nozzles may sit very slightly proud of the surrounding deck surface prior to activation, and so it becomes unnecessary for them to physically 'pop-up' on activation of the system for this type of nozzle to be effective.

(b) The practical critical area (helicopters) where primary extinguishing agent is applied in a dispersed (spray) pattern, is predicated on the dimensions of the operating area that needs to be protected. For an onshore purpose built, or limited-sized heliport (e.g., an elevated heliport at rooftop level), the practical critical area is assumed to accommodate the whole load-bearing area which always includes the TLOF, and to the extent that it is a load-bearing surface, the FATO also. In this case, the area to be considered is based on the specific shape of the TLOF, and where applicable, the shape of the FATO.

(c) Another form of foam dispensing equipment, capable of delivering primary extinguishing agent in a dispersed pattern, is a ring-main system (RMS). In this case, 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. Given the relative ranges at which nozzles are expected to perform, especially in windy conditions, it has been established through practical testing that sole use of an RMS has proven ineffective for TLOFs which are greater than 20 m diameter. In this case, an RMS could only be utilised effectively if supplemented by DIFF nozzles in the centre of the TLOF (a combination solution of RMS plus DIFFS). However, in the case of a large new-build heliport, it is probably more cost-effective and efficient, to provide a full DIFFS.

VFI.OPS.D.HPT.015 Extinguishing agents

(a) Both principal and complementary extinguishing agents shall be provided at the heliport.

(b) From 1 January 2026, environmental-sustainable principal and complementary extinguishing agents shall be provided for new builds or replacement of existing firefighting systems or part thereof.

GM1 VFI.OPS.D.HPT.015 Extinguishing agents

PRINCIPAL AGENTS

(a) Principal agents are the primary media produce for a permanent control of a fire, i.e. for a period of several minutes or longer.

(b) The principal extinguishing agent should be either a foam meeting the minimum performance level B or C.

(c) The discharge rate of a performance level B foam is assumed to be based on an application rate of 5.5 L/min/m2, and for a performance level C foam and for water, is assumed to be based on an application rate of 3.75 L/min/m2. these rates may be reduced if, through practical testing, an operator demonstrates that the objectives of VFI.OPS.D.HPT.010 Level of protection can be achieved for a specific foam use at a lower discharge rate (L/min).

(d) When selecting the appropriate type of foam concentrate as the principal media to be used at the heliport, considerations should be given to those environmental-sustainable agents, to ensure compliance with relevant pollution regulations, having equivalent level of firefighting performance. A certificate of conformity demonstrating compliance with ICAO’s foam requirements should be provided and available for inspection.

(e) When selecting the appropriate type of foam concentrate to be used at the heliport, considerations should be given to those environmental-friendly agents, to ensure compliance with relevant pollution regulations, having equivalent level of firefighting performance. A certificate of conformity demonstrating compliance with ICAO’s foam requirements should be provided and available for inspection.

(f) 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 Airport Services Manual (Doc 9137), Part 1.

GM2 VFI.OPS.D.HPT.015 Extinguishing agents

COMPLEMENTARY AGENTS

(a) Complementary agents have rapid fire suppression capability but offer a "transient" control which is usually only available during application.

(b) The complementary extinguishing agent should be:

(1) dry chemical powders (classes B and C powders); or

(2) gaseous media; or

(3) other extinguishing agents with at least the same firefighting capability.

(c) When selecting dry chemical powder or other complementary agent for use with foam, care must be exercised to ensure compatibility.

(d) Complementary agents should ideally be dispensed from one or two extinguishers, although more containers may be permitted when high volumes of the agent are specified, e.g. for V3 operations.

(e) The discharge rate of complementary agents should be selected for the optimum effectiveness of the agent used. When selecting dry chemical powder for use with foam, compatibility should be ensured. Complimentary agents should comply with the appropriate specifications of the International Organization for Standardization (ISO).

(f) Alternative complementary agents can be considered provided, through practical testing, an operator demonstrates to the GCAA equivalent level of performance.

(g) Reserve stocks of complementary media, at least 200%). to allow for replenishment as a result of activation of the system during an incident, or following training or testing, should be held.

(h) Complementary agents should be subject to annual visual inspection by qualified personnel and pressure tested in accordance with manufacturers' recommendations.

GM3 VFI.OPS.D.HPT.015 Extinguishing agents

ENVIRONMENTAL-SUSTAINABLE EXTINGUISHING AGENTS

(a) Environmental-sustainable extinguishing agents refer to fire suppression materials that are designed to mitigate the environmental impact of fire extinguishment operations while maintaining efficacy in controlling and extinguishing fires. These agents are characterized by the absence or significant reduction of harmful chemicals, such as per- and polyfluoroalkyl substances (PFAS), which are known to persist in the environment and pose risks to human health and ecosystems. Instead, they are formulated with biodegradable, non-toxic compounds that break down naturally, reducing long-term environmental contamination.

(b) Key attributes of environmental-sustainable extinguishing agents include low toxicity to aquatic and terrestrial life, rapid biodegradability, and minimal contribution to soil and water pollution. Additionally, these agents aim to have a reduced carbon footprint throughout their lifecycle, from production and transportation to application and disposal. They are increasingly adopted in sectors where environmental stewardship is a priority, such as aviation fire protection, aligning with global regulatory trends towards reducing hazardous chemical usage.

GM4 VFI.OPS.D.HPT.015 Extinguishing agents

FOAM HEALTH, SAFETY, AND ENVIRONMENTAL ISSUES

1. GENERAL

(a) There has been a significant shift in the emphasis on environmental and health concerns associated with legacy foam products. The purpose of this information is to provide the aerodrome operator with high-level information and information on suggested solutions to the questions being asked about firefighting foam health, safety, and environmental issues.

(b) In general, the chemicals contained in legacy fluorinated foams, such as AFFF, AR-AFFF, FFFP, etc. (i.e., fluorinated surfactants which are classified as PFAS), have come under significant health and environmental scrutiny.

(c) The approach of dilution and release into the environment and/or wastewater treatment systems is obsolete and unacceptable going forward for all fluorinated foams. International, federal, state, and local jurisdictions are limiting the use of legacy AFFF as a result of these concerns.

(d) International civil aviation authorities are also researching and implementing new restrictions on the use of these legacy products.

(e) Current international standards that cover foam fire suppression agents and systems are being revised to address these new trends and to allow for flexibility going forward.

(f) Currently, the criteria for defining an environmentally/toxicologically acceptable alternative is still changing. Once defined, the industry will also need to define the testing and metrics needed to validate the acceptability of such criteria. With that said, there has been a significant shift to the use of synthetic fluorine-free foam (SFFF).

(g) The following are key issues that should be evaluated when using existing legacy fluorinated foams, switching to AFFF C6 foams, or switching to SFFF foams.

  (1) Firefighter health and safety. First responder exposure should be minimized using safer work practices and personal protective equipment. In addition, procedures should be developed for rinsing if the foam comes into contact with a person's eyes or skin.

(2) Collection of firefighting foam after use. Industry best practice is that all foams and fire water/foam runoff should be contained, collected, and disposed of based on federal, state, and local requirements and the most current technical information as suggested in the references listed. Foam discharge is more easily handled where there is an in-place collection capability, i.e., primary and secondary containment. This situation might be found in warehouses, tank farms, and firefighting training facilities. Where these facilities are not available, temporary diking is an alternative where time and resources permit. The overall environmental impact of foam discharge requires additional evaluation and development of generally recognized guidance. Until recognized guidance is promulgated, users should rely on manufacturers' data and guidance from national environmental authorities and agencies. In all situations, discussions with the environmental regulatory authorities are appropriate. Work is continuing to identify appropriate policy and criteria to protect facilities that have typically been protected by foam suppression systems. These efforts are focusing on identifying applicable codes and standards, analysing environmental impact, evaluating alternatives, and revisiting containment options.

(3) Disposal of firefighting foams. Currently, high-temperature incineration by an accredited environmental firm should be considered the default for disposing of legacy AFFF products (concentrates, solutions, and effluents).

(4) Procedures for decontaminating legacy equipment and acceptable levels of cleanliness. Trying to determine how clean is clean continues to be an issue and might need to be determined based on regulators' direction or manufacturers' information. Unless equipment is properly cleaned, it might allow the new foam to continue to contaminate the environment. Clean levels might be in the parts per billion to trillion range. Testing and metrics will also need to be defined to validate the level of cleanliness.

(h) The environmental/health concerns associated with these chemicals are challenging for both toxicologists and regulators, requiring continued research and updated regulatory requirements that are still changing. Any users of firefighting foam should research the latest procedures and precautions for their use and disposal prior to placing them into service.

2. DISCHARGE SCENARIOS.

(a) The following are examples of scenarios that might include the use of foam, which are presented here to provide the user with ideas on how to handle these types of situations. The examples are not intended to be complete, as the science on how to handle these scenarios is changing very rapidly. The discharge of a foam-water solution is most likely to be the result of one of the four following scenarios:

(1) Manual firefighting or fuel-blanketing operations

(2) Training

(3) Foam equipment system and foam fire apparatus tests

(4) Fixed system releases

(b) These four scenarios include events at such places as aircraft facilities, firefighter training facilities, and special hazards facilities (such as flammable/hazardous warehouses, bulk flammable liquid storage facilities, and hazardous waste storage facilities).

3. FIREFIGHTING OPERATIONS.

(a) Fires occur in many locations and under many different circumstances. In some cases, it is possible to collect the foam solution used to douse a fire after it has been put out; and in others, such as in marine firefighting, it is not. These incidents include aircraft rescue and firefighting operations, vehicular fires (i.e., cars, vessels, train cars), structural fires involving hazardous materials, and flammable liquid fires. A foam-water solution that has been used in firefighting operations will probably be heavily contaminated with the fuel or fuels involved in the fire. It is also likely to have been diluted with water discharged for cooling purposes.

(b) In some cases, the foam solution used during fire department operations can be collected. However, it is not always possible to control or contain the foam; therefore, a non-persistent foam such as SFFF, should be considered. This could be a result of the location of the incident, size of incident, or the circumstances surrounding the incident.

(c) Event-initiated manual containment measures are usually executed by the responding fire department to contain the flow of a foam-water solution when conditions and manpower permit. Those operations include the following measures:

(1) Blocking sewer drains. This is a common practice used to prevent contaminated foam-water solution from entering the sewer system unchecked. It is then diverted to an area suitable for containment.

(2) Portable dikes. These are generally used for land-based operations. They can be set up by fire department personnel during or after extinguishment to collect runoff.

(3) Portable booms. These are used for marine-based operations in the absence of better techniques and are set up to contain foam in a defined area. These operations generally involve the use of floating booms within a natural body of water. The boom contains the foam bubbles, but as the bubbles drain, the foam solution might not be contained and could spread into the rest of the body of water.

4. TRAINING.

(a) There are specially designed training foams available from most foam manufacturers that simulate firefighting foam during live training but do not contain fluoro-surfactants. These foams are biodegradable, have minimal environmental impact, and can be safely treated at a local wastewater treatment plant. Because they do not contain fluoro-surfactants, training foams also have reduced burn back resistance that allows for more repeat fire training sessions. Firefighters and other foam users should work with the GCAA having jurisdiction (AHJ) to ensure that the use of training foams meet all the local and application-specific live training requirements. In some cases, training foams can also be used as substitutes for legacy fluorinated foams in vehicle and equipment testing.

(b) Training should be conducted under circumstances conducive to the collection of spent foam. Some fire training facilities have elaborate systems designed and constructed to collect foam solution, separate it from the fuel, treat it, and, in some cases, reuse the treated water. At a minimum, most fire training facilities collect the foam solution for discharge to a wastewater treatment facility. Training can include the use of special training foams or actual firefighting foams. Training facility designs should include containment systems.

5. SYSTEM TESTS.

(a) Testing primarily involves engineered, fixed foam fire-extinguishing systems. Two types of tests are generally conducted on foam systems: acceptance tests, which are conducted pursuant to installation of the system, and maintenance tests, which are usually conducted annually to ensure the operability of the system.

(b) In the execution of both acceptance and maintenance tests, only a small amount of foam concentrate should be discharged to ensure the correct concentration of foam in the foam-water solution. Designated foam-water test ports can be designed into the piping system so that the discharge of foam-water solution can be directed to a controlled location. The controlled location can consist of a portable tank that would be transported to an accepted disposal site by a licensed contractor. The remainder of the acceptance test and maintenance test should be conducted using only water.

(c) NFPA 11 explicitly recognizes proportioning test methods that limit or eliminate the need to discharge foam concentrate. These methods are permitted in Chapter 12.6.4 of NFPA 11.

6. FIXED SYSTEM RELEASES.

(a) This type of release is generally uncontrolled, whether it is the result of a fire incident or a malfunction in the system. The foam solution discharge in this type of scenario can be dealt with via event-initiated operations or engineered containment systems. Event-initiated operations encompass the same temporary measures that would be taken during fire department operations: portable dikes, floating booms, and so forth. Engineered containment is based mainly on the location and type of facility and would consist of holding tanks or areas where the contaminated foam-water solution would be collected, treated, and disposed of properly.

7. FIXED SYSTEMS.

(a) Facilities can be divided into those without an engineered containment system and those with an engineered containment system.

8. FACILITIES WITHOUT ENGINEERED CONTAINMENT.

(a) Given the absence of any past requirements for containment, many existing facilities have allowed foam-water solution to flow out of the facility and evaporate into the atmosphere or percolate into the ground. Steps should be taken to avoid this as part of future foam management planning. The choices for containment of foam-water solution at such facilities fall into two categories: event-initiated manual containment measures and installation of engineered containment systems. Selecting the appropriate option depends on the location of the facility, the risk to the environment, the risk of an automatic system discharge, the frequency of automatic system discharges, and any applicable rules or regulations.

(b) Event-initiated manual containment measures are the most likely option for existing facilities without engineered containment systems. This can fall under the responsibility of the responding fire department and include such measures as blocking storm sewers, constructing temporary dikes, and deploying temporary floating booms. The degree of such measures should be dictated by the facility's location, as well as the available resources and manpower.

(c) The installation of engineered containment systems is an option for existing facilities. There are cases, however, that might warrant the design and installation of such systems.

9. FACILITIES WITH ENGINEERED CONTAINMENT.

(a) Any engineered containment system will usually incorporate an oil/water separator. During normal drainage conditions (i.e., no foam solution runoff), the separator functions to remove any fuel particles from drainage water. However, when foam-water solution is flowing, the oil/water separator should be bypassed so that the solution is diverted directly to storage tanks.

(b) The size of the containment system should be dependent on the duration of the foam-water flow, the flow rate, and the maximum anticipated rainfall. Most new containment systems only accommodate individual facilities. However, some containment systems can accommodate multiple facilities depending on the topography of the land and early identification during the overall site planning process.

(c) The specific type of containment system selected should also depend on the location, desired capacity, and function of the facilities in question. The available systems include earthen retention systems, belowground tanks, open-top inground tanks, and sump and pump designs (i.e., lift stations) piped to aboveground or in-ground tanks. Storing spent foam below ground is not advisable due to the potential for leaks. Regular checks can reduce the risk of leaks, but even a small leak over time could result in contaminated soil.

(d) The earthen retention designs consist of open-top earthen berms, which usually rely on gravity-fed drainage piping from a protected facility. They allow the foam-water solution to be collected in an impermeable liner. Legacy foams should not be contained using earthen retention, as the soil can become contaminated.

(e) Closed-top, belowground storage tanks usually consist of a gravity-fed piping arrangement and can be suction pumped out.

(f) Open-top, belowground storage tanks are usually lined concrete tanks that can rely on gravity-fed drainage piping or a sump and pump arrangement. These can accommodate individual or multiple facilities. They should also accommodate the maximum anticipated rainfall.

(g) Aboveground tanks incorporate a sump and pump arrangement to closed, aboveground tanks. Such designs usually incorporate the use of one or more submersible or vertical shaft, large-capacity pumps. These can accommodate individual or multiple facilities.

10.NEW FACILITIES.

(a) The decision to design and install a fixed foam-water solution containment system is dependent on the location of the facility, the risk to the environment, the possible impairment of facility operations, the design of the fixed foam system (i.e., automatically or manually activated), the ability of the responding fire department to execute event-initiated containment measures, and any pertinent regulations.

(b) Where conditions warrant the installation of engineered containment systems, there are a number of considerations. They include the size of the containment system, the design and type of containment system, and the capability of the containment system to handle individual or multiple facilities. Engineered containment systems can be used where foam extinguishing systems are installed in facilities that are immediately adjacent to a natural body of water. These systems might also be prudent at new facilities, where site conditions permit, to avoid impairment of facility operations.

GM5 VFI.OPS.D.HPT.015 Extinguishing agents

TRANSITIONING TO ENVIRONMENTAL-SUSTAINABLE FOAM

1. PURPOSE AND SCOPE

(a) This guidance is issued to provide a structured and comprehensive framework for aerodrome operators to transition from the use of traditional firefighting foams, particularly those containing per- and polyfluoroalkyl substances (PFAS), to environmentally sustainable extinguishing agents. The transition is aligned with international regulatory trends and best practices, aimed at reducing environmental impact while maintaining fire safety standards.

(b) The guidance applies to all aerodrome operators and is intended to ensure compliance with updated environmental protection standards.

2. REGULATORY REQUIREMENTS

(a) Compliance with Environmental Standards

(1) Operators are required to transition to foams that are compliant with internationally recognised environmental standards, such as those established by the International Civil Aviation Organization (ICAO) and local environmental agencies. All newly adopted extinguishing agents must be fluorine-free, biodegradable, and demonstrate minimal toxicity to aquatic and terrestrial ecosystems.

(b) Performance Standards

(1) The selected environmentally sustainable extinguishing agents must meet the operational performance requirements set out in ICAO Annex 14, Volume II. Agents should be certified for their effectiveness in controlling Class A and B fires, particularly those involving aviation fuel.

(c) Transition Timeline

(1) Operators must develop a transition plan with a full transition to environmentally sustainable extinguishing agents.

3. OPERATIONAL CONSIDERATIONS

(a) Risk Assessment and Planning

(1) Prior to the transition, operators must conduct a comprehensive risk assessment to evaluate the potential impacts of switching to new extinguishing agents. This assessment should include:

(i) Firefighting Capability: Testing the new agents for compatibility with existing firefighting infrastructure, including vehicles, discharge systems, and foam delivery mechanisms.

(ii) Environmental Impact: Assessing the local environmental conditions and ensuring that the selected agents pose no harm to nearby ecosystems, water sources, or soil quality.

(iii) Personnel Training: Updating training programmes to ensure that fire and emergency services personnel are proficient in the use of the new extinguishing agents, including safe handling, storage, and application.

(b) Testing and Validation

(1) All environmentally sustainable extinguishing agents must undergo a thorough testing process prior to full deployment. This includes:

(i) Operational Testing: Conduct live fire drills to evaluate the effectiveness of the agents under real-world conditions, ensuring they meet the minimum extinguishing performance for aviation-specific fires.

(ii) Equipment Compatibility: Ensure that the agents are compatible with existing firefighting systems, including nozzles, pumps, and foam proportioning equipment. Any necessary modifications to equipment must be identified and implemented prior to the transition.

(iii) Environmental Monitoring: Establish a monitoring programme to track the environmental impact of the new agents, including potential runoff into water bodies or impact on surrounding flora and fauna.

4. PHASED IMPLEMENTATION

(a) Phase 1: Evaluation and Procurement

(1) Operators should initiate the transition by evaluating available environmentally sustainable extinguishing agents and selecting products that meet both performance and environmental criteria. Procurement contracts should include provisions for long-term supply and warranties on environmental compliance.

(b) Phase 2: Infrastructure and Equipment Modification

(1) Where necessary, modifications to existing firefighting systems should be undertaken to ensure compatibility with the new agents. This may include recalibrating foam proportioning systems, updating discharge nozzles, and ensuring that storage tanks are compliant with the handling requirements of the new agents.

(c) Phase 3: Training and Operational Testing

(1) All personnel involved in fire suppression operations must be retrained in the use of the new agents. This includes fire and emergency services personnel, maintenance crews,

and response team supervisors. Operational testing through live drills should be carried out to validate the effectiveness of the new agents in a controlled environment.

(d) Phase 4: Full Deployment

(1) Once all testing, training, and infrastructure adjustments have been completed, operators are required to fully implement the environmentally sustainable extinguishing agents. The date of full implementation must be monitored and all stocks of legacy foams containing harmful substances must be appropriately disposed of, following environmental disposal regulations.

5. REPORTING AND DOCUMENTATION

(a) Transition Plan must include:

(1) A timeline for the transition.

(2) A summary of the selected environmentally sustainable extinguishing agents.

(b) Risk assessments and mitigation measures.

(1) Training programmes for personnel.

(2) Infrastructure modifications, if required.

(c) Progress Reporting

(1) Operators must monitor the status of the transition. These reports must include any challenges encountered and adjustments made to the original plan.

(d) Final Compliance Report

(1) Upon full implementation, operators are to provide a final compliance report, including certification of the extinguishing agents, records of training completion, and evidence of successful operational testing. This report must also document the proper disposal of legacy foams.

AMC1 VFI.OPS.D.HPT.015 Extinguishing agents

SURFACE LEVEL HELIPORTS WITH PRIMARY MEDIA APPLIED AS A SOLID STREAM USING A PORTABLE FOAM APPLICATION SYSTEM (PFAS)

(a) Where a rescue and firefighting service (RFFS) is provided at a surface-level heliport, the minimum amount of primary media and complementary agents should be in accordance with Table 6 2.

(b) The minimum discharge duration in Table 6-2 is calculated based on two minutes. However, if the availability of back-up specialist fire services is remote from the heliport, the discharge duration should be increased to three minutes or longer.

Table 6-2. Minimum usable amounts of extinguishing agents for surface-level heliports

	Foam meeting performance level B		Foam meeting performance level C / water		Complementary agents	
Category (1)	**Water (L) (2)**	**Discharge rate foam solution/minute (L) (3)**	**Water (L) (2)**	**Discharge rate foam solution/minute (L) (3)**	**Dry chemical powder (kg) (6)**	**Gaseous Media (kg) (7)**
H0	500	250	330	165	23	9
H1	800	400	540	270	23	9
H2	1 200	600	800	400	45	18
H3	1 600	800	1 100	550	90	36

GM AMC1 VFI.OPS.D.HPT.015 Extinguishing agents

SURFACE LEVEL HELIPORTS WITH PRIMARY MEDIA APPLIED AS A SOLID STREAM USING A PORTABLE FOAM APPLICATION SYSTEM (PFAS)

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

(b) At some heliports, it may become 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).

(c) The ability to transport the equipment to the accident location means it is classed as a PFAS 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. A PFAS may include, but not necessarily be limited to, hand-controlled portable foam branch pipes capable of being pulled 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.

AMC2 VFI.OPS.D.HPT.0150 Extinguishing agents

SURFACE LEVEL HELIPORTS WITH PRIMARY MEDIA APPLIED AS A SOLID STREAM USING A FIXED FOAM APPLICATION SYSTEM (FFAS)

Where an RFFS is provided at an elevated heliport, the minimum amount of primary media and complementary agents should be in accordance with Table 6-3. The minimum discharge duration in Table 6-3 is calculated based on five minutes.

Table 6-3. Minimum usable amounts of extinguishing agents for elevated heliports

Category (1)	Foam meeting performance level B		Foam meeting performance level C/water		Complementary agents	
	Water (L) (2)	Discharge rate foam solution/minute (L) (3)	Water (L) (2)	Discharge rate foam solution/minute (L) (3)	Dry chemical powder (kg) (6)	Gaseous media (kg) (7)
H0	1 250	250	825	165	23	9
H1	2 000	400	1 350	270	23	9
H2	3 000	600	2 000	400	45	18
H3	4 000	800	2 750	550	90	36

GM AMC2 VFI.OPS.D.HPT.0150 Extinguishing agents

SURFACE LEVEL HELIPORTS WITH PRIMARY MEDIA APPLIED AS A SOLID STREAM USING A FIXED FOAM APPLICATION SYSTEM (FFAS)

(a) The assumption is made that primary media (foam) will be delivered through a fixed foam application system such as a Fixed Monitor System (FMS).

(b) When installed at a heliport, a fixed foam application system (FFAS) should deliver 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, an FMS), a DIFFS or a RMS. A variation on an FFAS is a fixed application system (FAS) 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.

(c) Where an FMS is installed, trained monitor operators, where provided, should be positioned on at-least the upwind location to ensure the primary extinguishing agent is directed efficiently to the seat of the fire.

(d) Compressed air foam systems (CAFS) may be considered, with foam distributed through a DIFFS using Performance Level B foam (B-CAFS). Fire suppression capabilities are enhanced by injecting compressed air into the foam to generate an effective solution to control a fire on the heliport. This type of foam has a tighter, denser bubble structure than standard foams, which allows it to penetrate deeper into the fire before the bubbles are broken down. B-CAFS rapidly controls a fire by smothering it (starving it of oxygen), by diminishing heat, using trapped air within the bubble structure, and by disrupting the chemical reaction needed for a fire to continue. Consequently, the opportunity presents to deliver B-CAFS at a lower application rate than would otherwise be required for a Standard Level B foam.

(e) An FFAS may be used at a limited-sized heliport where there is no requirement to physically move foam dispensing equipment towards the fire (hence the equipment is fixed in location). Where foam dispensing equipment is required to be moved towards the accident/ incident location, this is classed as a portable foam application system (PFAS) as detailed in GM AMC1 VFI.OPS.D.HPT.015 Surface level heliports with primary media applied as a solid stream using a portable foam application system (PFAS).

AMC3 VFI.OPS.D.HPT.015 Extinguishing agents

ELEVATED HELIPORTS WITH PRIMARY MEDIA APPLIED IN A DISPERSED PATTERN THROUGH A FIXED FOAM APPLICATION SYSTEM (FFAS) — SOLID PLATE HELIPORT

(a) The amount of water required for foam production should be predicated on the practical critical area (m2) multiplied by the appropriate application rate (L/min/m2), 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.

(c) The discharge duration should be at least three minutes.

(d) Complementary media should be in accordance with Table 6-3, for H2 operations. 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 should be considered.

GM1 AMC3 VFI.OPS.D.HPT.015 Extinguishing agents

Given the difficulties in quickly accessing an elevated heliport from ground level it is necessary to assume that no assistance will be available from external emergency services or trained sources during the initial suppression, control and evacuation phases. Therefore, the overall capacity of the foam system should comfortably exceed that necessary for initial control and suppression of a fire plus a quantity available, held-back for a second ‘attack’ should the original foam blanket, when applied on a solid plate heliport, subsequently break down, causing a previously suppressed fire to re-ignite. In consideration of this, three minutes’ discharge capability is generally acceptable.

GM2 AMC3 VFI.OPS.D.HPT.015 Extinguishing agents

ELEVATED HELIPORTS WITH PRIMARY MEDIA APPLIED IN A DISPERSED PATTERN THROUGH A FIXED FOAM APPLICATION SYSTEM (FFAS) — SOLID PLATE HELIPORT

(a) Solid plate surface deck at most new-build purpose-built heliports are either 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.

Figure II-6-5. A foam DIFFS on a solid plate surface at an elevated heliport

Note. — While this description is most commonly met by a purpose-built arrangement, it could 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.

AMC4 VFI.OPS.D.HPT.015 Extinguishing agents

ELEVATED HELIPORTS WITH PRIMARY MEDIA APPLIED IN A DISPERSED PATTERN THROUGH A FIXED APPLICATION SYSTEM (FAS) — PASSIVE FIRE RETARDING SURFACE DECK USING WATER-ONLY DECK INTEGRATED FIREFIGHTING SYSTEM (DIFFS)

(a) 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).

(b) The discharge rate should be multiplied by the discharge duration to determine the total amount of water needed.

(c) The discharge duration should be at least two minutes.

(a) Complementary media should be in accordance with Table 6-3 for H2 operations. 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 should be considered.

GM AMC4 VFI.OPS.D.HPT.015 Extinguishing agents

ELEVATED HELIPORTS WITH PRIMARY MEDIA APPLIED IN A DISPERSED PATTERN THROUGH A FIXED APPLICATION SYSTEM (FAS) — PASSIVE FIRE RETARDING SURFACE DECK USING WATER-ONLY DECK INTEGRATED FIREFIGHTING SYSTEM (DIFFS)

(a) As an alternative to the solid-plate surface deck, many manufacturers now give an option 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.

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

(b) 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 II-6-7 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).

Note. — Practical testing (see Figures II-6-6 and II-6-7) 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 II-6-7. A fire test on a passive fire-retarding surface (180 L of fuel is collected)

(c) Where a passive fire-retarding surface is selected in lieu of a solid plate surface, the requirement to provide foam for primary extinguishing agent is removed 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.

Note. — Apart from the potential for a reduction in helpful ground effect, there is also a practical consideration for this type of porous design in-so-far-as fuel is removed from the surface by numerous holes, so too is the primary extinguishing agent. Consequently, as it is not possible to form an effective foam blanket on a perforated surface, a significant benefit of using foam is nullified. A passive fire-retarding surface is best used with a system capable of providing primary extinguishing agent (water) in a dispersed pattern that can envelop a burning helicopter. The recommendation is for a combination solution: a passive fire-retarding surface incorporating a water-only DIFFS, delivering water at an application rate that is consistent with a Performance Level C foam.

(d) 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.

Figure II-6-8. A water-only DIFFS on a heliport with a passive fire-retarding surface

AMC5 VFI.OPS.D.HPT.015 Extinguishing agents

PROVISION OF ADDITIONAL HOSE LINES FOR THE APPLICATION OF PRIMARY MEDIA

In addition to fixed foam application system (FFAS), at least two hose lines with hand-controlled branches for the application of primary media at a minimum application rate of 225-250 litres/minute through each hose line should be provided at the heliport.

GM AMC5 VFI.OPS.D.HPT.015 Extinguishing agents

PROVISION OF ADDITIONAL HOSE LINES AND HAND-CONTROLLED FOAM BRANCHES FOR THE APPLICATION OF PRIMARY MEDIA

(a) Not all fires are capable of being accessed by fixed foam application systems (FFAS) delivering foam. Further, in certain scenarios, their use may endanger helicopter occupants who are seeking to escape from the fire.

(b) A single hose line, capable of delivering aspirated foam at a minimum application rate of 225-250 litres/minute, may be acceptable 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.

(c) Taking account of the open-air environment in which 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. The inline inductor should be set to the appropriate rate corresponding to the strength of the foam concentrate used e.g. 3 per cent or 6 per cent.

(d) The hose line(s) provided should be capable of being fitted with a branch pipe able to apply primary media in the form of a jet or spray pattern for cooling, or for specific firefighting tactics.

AMC6 VFI.OPS.D.HPT.015 Extinguishing agents

USE AND MAINTENANCE OF FOAM APPLICATION SYSTEM AND EQUIPMENT

(a) All parts of the portable and fixed foam application system including its associated equipment, including the finished foam, should be tested by qualified personnel upon commissioning and annually thereafter.

(b) Where non-environmentally foam concentrate is used at the heliport, the tests should assess the performance of the system against original design expectations while ensuring compliance with any relevant pollution regulations.

GM AMC6 VFI.OPS.D.HPT.010 Extinguishing agents

USE AND MAINTENANCE OF FOAM APPLICATION SYSTEM AND EQUIPMENT

(a) Mixing different concentrates in the same tank, i.e., different either in make or strength, is generally unacceptable. Many different strengths of concentrate are on the market, but the most common concentrates are 1 per cent, 3 per cent or 6 per cent. Any decision regarding selection should take into account the design characteristics of the foam system. It is important to ensure that foam containers and tanks are correctly labelled.

(b) Induction equipment ensures that water and foam concentrate are mixed in the correct proportions. The settings of adjustable inductors, if installed, should correspond with the strength of concentrate in use.

(c) Guidance on foam performance testing is given at Chapter 8, ICAO Doc 9137, Airport Services Manual Part I — Rescue and Firefighting.

AMC7 VFI.OPS.D.HPT.015 Extinguishing agents

RESERVE SUPPLY

Sufficient reserve supplies of principal and complementary agents, at least 200%, to allow for replenishment as a result of operation of the system during an accident or following training or testing, should be provided at the heliport.

GM AMC7 VFI.OPS.D.HPT.015 Extinguishing agents

RESERVE SUPPLY

Calculation of total foam discharge and minimum operational stocks:

(a) Using an example of 25 m x 25 m FATO suitable for operation of the AW 189, assumes a total area of required coverage of 625 m2. Based on an application rate of Level C foam (3.75 litres per square metre per minute), the application rate per minute is 625 x 3.75 = 2 344 litres.

(b) The total required discharge for Level C foam, assuming three minutes' discharge duration for an elevated heliport, is 2 344 x 3 = 7,032 litres.

(c) A 3% performance Level C foam solution discharged over three minutes at the minimum application rate will require the following stock of foam concentrate (based on a standard 3% solution): 2,344 x 3% x 3 = 211 litres of foam concentrate.

(d) For a 3% Level C foam concentrate 200% reserve stocks: 211 x 2 = 422 litres.

VFI.OPS.D.HPT.020 Response objectives

Rescue and firefighting services and facilities provided at surface-level and elevated heliports shall be designed to achieve the operational response objectives.

AMC1 VFI.OPS.D.HPT.020 Response objectives

RESPONSE TIME

(a) At surface-level heliports, the operational objective of the rescue and firefighting response should be to achieve response times not exceeding two minutes in optimum conditions of visibility and surface conditions.

(b) At elevated heliports, the response time for the discharge of primary media at the required application rate should be 15 seconds measured from system activation.

(c) Rescue and firefighting personnel should be immediately available on or in the vicinity of the heliport while helicopter movements are taking place.

GM AMC1 VFI.OPS.D.HPT.020 Response objectives

MEETING THE RESPONSE TIME OBJECTIVE

(a) At surface-level heliport, response time is considered to be the time between the initial call to the RFFS and the time when the first responding vehicle(s) (the service) is (are) in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in Table 6-2.

(b) 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.

(c) 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). However, where it is necessary to move primary extinguishing agent-dispensing equipment to the scene of the incident or accident (i.e. a PFAS located on a vehicle), the response time is likely to be more protracted (up to 2 minutes in optimum conditions of visibility and surface conditions).

(d) 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 favorably 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.

(e) In considering the response area at a heliport, all areas used for the maneuvering, landing, take-off, rejected take-off, ground taxiing, air-taxiing and parking of helicopters that are in the direct control of the heliport operator should be considered. At a limited-sized heliport, including surface level, the response area will usually be the TLOF, and when load bearing, the FATO. However, if a heliport is served by one or more taxiways linking to stands, the heliport operator will have to consider rescue and firefighting arrangements for each additional element of the response area that is under their control.

(f) At a surface-level heliport laid out in a similar way 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 will normally be provided by a PFAS, i.e. a specialist vehicle, and in this case, following an alarm, firefighting and rescue equipment will be moved directly to the scene of the incident or accident.

AMC2 VFI.OPS.D.HPT.020 Response objectives

RESCUE ARRANGEMENTS

(a) Rescue arrangements commensurate with the overall risk of the helicopter operation should be provided at the heliport.

(b) Information on hazards and risks for the specific type of helicopter operating at the heliport should be provided to RFF personnel covering the following areas:

(1) flammable materials locations;

(2) emergency rescue access;

(3) battery Locations; and

(4) flight deck control switch locations.

(c) Minimum rescue equipment inventory required to ensure effective rescue arrangements should be provided at the heliport (see Table 6-1). Equipment should only be used by personnel who have received adequate information, instruction and training.

Table 6-1. Rescue equipment

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)	access to casualties in an Helicopter/VCA that may be on its side, the ladder should be of an appropriate length.
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	Each RFF personnel
Man-Made Mineral Fibre (MMMF) Filter masks	
Gloves, fire resistant	
Power cutting tool	iires additional approved training by competent personnel. Equipment only specified for helicopter/VCA with a D-value above 24m.
Extendable applicator (high engine inlet fires)	1

GM1 AMC2 VFI.OPS.D.HPT.020 Response objectives

RESCUE ARRANGEMENTS

(a) Rescue arrangements may 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.

(b) Rescue arrangements at a heliport must be carefully structured and adaptable, considering the findings of a comprehensive risk assessment. Depending on the specific risks identified, these arrangements can follow different models, including assisted rescue or self-rescue. In situations where a self-rescue model is favored, clear protocols and precise coordination between involved agencies are essential to ensure the effectiveness of emergency responses.

(c) The self-rescue model emphasizes personnel and passengers' capacity to evacuate the helicopter and navigate the situation with minimal external intervention. However, for this model to function successfully, the roles of on-site responders, heliport staff, and external emergency services must be clearly delineated. This coordination is crucial, as it dictates how each agency will interface during an emergency, ensuring a seamless transfer of responsibility and action as the situation unfolds.

(d) The detailed establishment of these roles and responsibilities should be integral to the heliport's emergency plan. Furthermore, regular testing and rehearsals of this plan are critical to its success. Through periodic drills and simulations, the effectiveness of the rescue strategy, communication pathways, and the interplay between different agencies can be assessed and refined. This ensures that all parties are fully prepared to act swiftly and in unison in a real emergency, safeguarding lives and maintaining operational resilience at the heliport.

GM2 AMC2 VFI.OPS.D.HPT.020 Rescue equipment

RESCUE EQUIPMENT

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

(b) The provision of minimum equipment is recommended as listed in Table 6-1. Sizes of equipment are not detailed in this table, but should be appropriate for the types of helicopters expected to use the facility.

(c) Appropriate personnel should be appointed to ensure that the rescue equipment is checked and maintained regularly.

(d) 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.

AMC3 VFI.OPS.D.HPT.020 Response objectives

COMMUNICATION AND ALERTING SYSTEM

A suitable alerting and/or communication system should be provided in accordance with the emergency response plan.

GM AMC3 VFI.OPS.D.HPT.020 Response objectives

COMMUNICATION AND ALERTING SYSTEM

(a) 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 helicopter/VCA emergency will require the provision and management of a complex communications system. The requirement is examined in the ICAO Airport Services Manual, Part 7 – Airport Emergency Planning, Chapter 12 (Doc 9137).

(b) 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 tower (when provided). Examples include:

  (1) direct telephone line to the rescue control center or service room of the rescue personnel;

  (2) alarm button for direct alarm of the fire brigade;

  (3) heat sensor for alarm and/or automatic switching of the extinguishing system; or

  (4) monitored video surveillance.

(c) Further 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).

VFI.OPS.D.HPT.025 Rescue and firefighting personnel

(a) Rescue and firefighting personnel at the heliport shall be:

  (1) sufficient for the required tasks;

  (2) trained to perform their duties and maintain their competence; and

  (3) provided with personal protective equipment.

AMC1 VFI.OPS.D.HPT.025 Rescue and firefighting personnel

TASK RESOURCE ANALYSIS

(a) Certificated holders should conduct a task resource analysis in determining the sufficient number of RFF personnel at the heliport.

(b) Landing area acceptance holders should ensure sufficient number of RFF personnel are readily available at the heliport.

GM AMC1 VFI.OPS.D.HPT.025 Rescue and firefighting personnel

TASK RESOURCE ANALYSIS GUIDANCE

Guidance in completing a task and resource analysis is given below. For additional guidance on task/resource analysis, see ICAO Doc 9137 — Part 1 Rescue and Firefighting, Chapter 10.5.

1. SCOPE

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

(b) 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

(a) 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

(a) 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-points1 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 ASSESSMENT — PINCH-POINTS

(a) 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:

(1) task criticality, i.e. the importance of the task to the success of the overall activity; and

(2) task difficulty, defined in terms of:

(i) (c) cues necessary to initiate or complete the task;

(ii) (T) time limitations imposed upon the staff to complete the task within a given window of time;

(iii) (P1) precision or skill required to undertake the task which, if excessive, could influence performance;

(iv) (M) mental demands, i.e the necessary skill and knowledge required from staff for a successful performance; and

(v) (P) physical: demands upon staff due to heavy or sustained physical effort for successful task performance.

(b) 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:

Table. 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

(a) 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.

(b) 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: local 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

(a) 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.

(b) 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?

(a) 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?

(a) 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.

(b) The team may have identified that the following factors contributed to a worst-case location:

    (1) travel time;

    (2) route to the accident site (hard or soft ground);

    (3) terrain, including surface conditions;

(4) crossing active runways or FATOs;

(5) aircraft congestion;

(6) communications;

(7) supplementary water supplies;

(8) adverse weather conditions; and

(9) 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?

(a) Has the TRA and workload assessment been combined in a spreadsheet or matrix?

(b) Does the spreadsheet/matrix identify activities and sub-tasks in a logical sequence in real time?

(c) Does the spreadsheet/matrix identify staff utilization and vehicle deployment (as required)?

(d) Does the workload assessment identify task criticality, cues, time, precision, mental, physical and overall rating? Are they scored appropriately?

(e) Have any pinch-points been identified?

(f) Is there appropriate mitigation of the identified pinch-points?

8. ASSESSMENT CONCLUSION

(a) Following this assessment, the applicant's TRA is either acceptable or is required to address the issues raised in this assessment.

GM2 AMC1 VFI.OPS.D.HPT.025 Personnel

MINIMUM NUMBER OF RFF PERSONNEL

Table 6-4 provides a guidance on the minimum rescue and firefighting staffing levels at the heliports.

Table 6-4: Heliport RFF minimum staffing level

Category	Surface-level heliport		Elevated heliport	
	Team Leader	Team Member	Team Leader	Team Member
H0	1	1	1	2
H1	1	1	1	2
H2	1	2	1	3
H3	1	2	1	3

AMC2 VFI.OPS.D.HPT.025 Rescue and firefighting personnel

FITNESS

(a) Certificated holders should establish and implement a fitness programme including medical and physical fitness for rescue and firefighting personnel to ensure these personnel are fit to perform their assigned roles and responsibilities.

(b) Landing area acceptance holders should ensure rescue and firefighting personnel are fit to perform their assigned roles and responsibilities.

(c) Fitness records of rescue and firefighting personnel should be maintained for audit and inspection by the GCAA.

GM AMC2 VFI.OPS.D.HPT.025 Rescue and firefighting personnel

PHYSICAL AND MEDICAL FITNESS ASSESSMENTS FOR RFF PERSONNEL

(a) As the nature of RFF operations involves periods of intense physical activity, all RFF personnel have to possess a minimum level of physical fitness and medical fitness to be able to perform the tasks associated with these operations. Physical fitness and medical fitness is often described as the overall physical condition of the body, which can range from peak condition for performance at one end of the spectrum to extreme illness or injury at the other. The key fitness components for RFF are generally aerobic fitness, anaerobic fitness, flexibility and medical fitness. Optimum physical fitness and medical fitness for RFF personnel would mean that a firefighter is able to carry out RFF activities safely, successfully and without undue fatigue.

(b) Physical fitness assessment should be catered to the components mentioned above. Operators should develop various types of tests to ensure that these components are tested to determine if the RFF personnel has the required physical fitness level for the job. The physical fitness assessment should also be conducted at least once a year. The physical fitness assessment should be conducted for pre-employment entry as a firefighter as well as ongoing physical fitness assessments for existing RFF staff to ensure they are maintaining their level of physical fitness.

(1) **Aerobic fitness** is the ability to continue to exercise for prolonged periods of time at low to moderate or high intensity. This is typically what limits the ability to continue to run, cycle or swim for more than a few minutes and is dependent upon the body's heart, lungs and blood to get the oxygen to the muscles (VO2) providing the sustained energy needed to maintain prolonged exercise. Typical aerobic activities include walking, jogging, cycling, rope skipping, stair climbing, swimming, or any other endurance activities.

(2) **Anaerobic fitness** works differently to aerobic fitness. It is an activity that requires high levels of energy and is done for only a few seconds or minutes at a high level of intensity. The term anaerobic means "without oxygen". Participation in anaerobic activities leads to anaerobic fitness, which may be defined as higher levels of muscular strength, speed and power. Examples of anaerobic activities include heavy weight lifting, running up several flights of stairs, sprinting, power swimming, or any other rapid burst of hard exercises.

(3) **Flexibility** refers to the ability to move the limbs and joints into specific positions at the end of their normal range of movement. Flexibility is important as it will allow the body to work in cramped positions without unduly stressing the muscles, tendons and ligaments and may reduce the risk of injury. Flexibility is best developed using slow controlled stretching exercises.

(c) **Medical fitness assessment** specific to RFF personnel should be developed. The medical fitness assessments should be conducted for pre-employment entry as a firefighter as well as ongoing medical fitness assessments for existing staff. The frequency of medical fitness assessments should be determined by each agency. The medical fitness assessments should be used to identify any underlying medical conditions, which may pose a risk to the individual firefighter during physically demanding activities.

(d) The services of qualified occupational medical person may be considered in developing the fitness programme and testing of RFF personnel.

(e) Detailed guidance on fitness requirements for RFF personnel can refer to CAG AGA PART ACM – RESCUE AND FIREFIGHTING.

AMC3 VFI.OPS.D.HPT.025 Rescue and firefighting personnel

TRAINING AND PROFICIENCY CHECKS

Training and proficiency checks programmes should be established and implemented for rescue and firefighting personnel, in accordance with the requirements detailed in CAR AGA PART TRG.

GM AMC1 VFI.OPS.D.HPT.025 Rescue and firefighting personnel

TRAINING AND PROFICIENCY CHECKS

(a) If they are to effectively utilize the equipment provided, all personnel assigned to RFF duties on the heliport should be fully trained to carry out their duties to ensure competence in role and task. It is recommended that personnel attend an established helicopter rescue and firefighting courses.

(b) In addition, regular recurrent training in the use of all RFF equipment, helicopter type familiarization and rescue tactics and techniques should be carried out. Correct selection and use of principal and complementary media for specific types of incidents should form an integral part of personnel training.

(c) Detailed guidance on detailed training and proficiency checks programmes for RFF personnel are given at CAR AGA PART TRG.

AMC4 VFI.OPS.D.HPT.025 Rescue and firefighting personnel

PERSONAL PROTECTIVE EQUIPMENT

(a) Rescue and firefighting personnel should be provided with personal protective equipment (protective clothing and respiratory equipment) in order to perform their assigned roles and responsibilities safely and effectively.

(b) All personal protective equipment should be installed, stored, used, checked and maintained in accordance with the manufacturer's instructions.

(c) Well-ventilated and secure facilities should be provided for the cleaning, drying and storage of PPE when crews are off duty.

GM AMC4 VFI.OPS.D.HPT.015 Rescue and firefighting personnel

PERSONAL PROTECTIVE EQUIPMENT

(a) Depending on the rescue model employed (whether an assisted or self-rescue model), sufficient dedicated rescue and firefighting personnel should be provided with appropriate training and PPE to enable them to perform their duties effectively.

(b) All responding RFF personnel should be provided with fit for purpose personal protective clothing (PPC) and respiratory protective equipment (RPE) to allow them to carry out their duties in an effective manner.

(c) Personnel qualified to operate the RFF equipment effectively should be dressed in protective clothing 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 accompanied by suitable safety measures, e.g. protective devices, markings and warnings. The specifications for PPE should meet one of the international standards shown in Table 6-2.

Table 6-2. Standards for PPC and RPE

PPE Type	NFPA	EN	BS
Helmet with visor	NFPA 1971	EN443	BS EN 443
Gloves	NFPA 1971	EN659	BS EN 659
Boots (footwear)	NFPA 1971	EN ISO 20345	EN ISO 20345
Tunic and trousers	NFPA 1971	EN469	BS EN ISO 14116
Flash-hood	NFPA 1971	EN 13911	BS EN 1391
lf-contained breathing apparatus	NFPA 1981	EN 137	BS EN 145

VFI.OPS.D.HPT.030 Means of escape

Elevated heliports shall be provided with a main access and at least one additional means of escape.

AMC VFI.OPS.D.HPT.030 Means of escape

MEANS OF ESCAPE

(a) Main access and means of escape at heliports should be located as far apart from each other as is practicable, at least 90-degrees from each other.

(b) Means of escape should be suitably designed to guide aircraft occupants to a safe area.

GM AMC VFI.OPS.D.HPT.030 Means of escape

MEANS OF ESCAPE

(a) The provision of an alternative means of escape is necessary for evacuation and for access by RFF personnel. The size of an emergency access/egress route may require consideration of the number of passengers and of special operations such as helicopter emergency medical services that require passengers to be carried on stretchers or trolleys.

(b) A minimum of two access/egress points should be provided to give occupants of a helicopter the option to escape upwind of an aircraft fire. 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.

(c) Design of the means of escape should lead occupants to a safe area and should not create a condition that prevent rapid egress. The provision of a vertical access ladder (cat ladder) as a means of escape should be avoided.

VFI.OPS.D.HPT.035 Fire protection

Fire and life safety protection shall be provided at surface level and at elevated heliport.

GM VFI.OPS.D.HPT.035 Fire protection

FIRE AND LIFE SAFETY PROTECTION

Guidance on specific fire protection measures at the heliport can refer to UAE Fire Codes and/or NFPA 418, Standard for Heliports and Vertiports.

AMC1 VFI.OPS.D.HPT.035 Fire protection

SURFACE-LEVEL HELIPORT

(a) At a surface-level heliport, the minimum fire and life safety protection should be provided are:

(1) 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;

(2) at least one clear access point that provides rapid access to RFF or civil defense personnel;

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

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

AMC2 VFI.OPS.D.HPT.035 Fire protection

ELEVATED HELIPORT

(a) At an elevated heliport, the minimum fire and life safety protection should be provided are:

(1) 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.

(2) 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;

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

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

(5) at least two access points from the FATO/TLOF, including sufficient illumination at night, are provided for rapid access by RFF or civil defense personnel;

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

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

(8) flammable liquids, compressed gas and liquefied gas are not be permitted within the FATO/TLOF and safety area; and

(9) where the heliport firefighting systems are integrated with the building fire protection systems, conduct a fire water needs assessment to determine the adequate amount of water is provided to meet the level of protection required in the event of an Helicopter/VCA accident.

CHAPTER B - HELIDECKS (VFI.OPS.D.HDC)

VFI.OPS.D.HDC.005 Rescue and firefighting provisions

Rescue and firefighting equipment, facilities and services shall be provided at helidecks.

GM1 VFI.OPS.D.HDC.005 Rescue and firefighting provisions

RESCUE AND FIREFIGHTING PROVISIONS

(a) It is important this section be read in conjunction with the appropriate detailed guidance on rescue and firefighting options given in the ICAO Heliport Manual (Doc 9261).

(b) Provisions described in this section are intended to address incidents or accidents within the heliport response area only.

(c) 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 a helideck.

(d) Complementary agents are ideally 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 needs to be selected for optimum effectiveness of the agent used. When selecting dry chemical powders for use with foam, care needs to be exercised to ensure compatibility. Complementary agents need to comply with the appropriate specifications of the International Organization for Standardization (ISO).

(e) Where a fixed monitor system (FMS) is installed, trained monitor operators are 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).

GM2 VFI.OPS.D.HDC.005 Rescue and firefighting provisions

PRINCIPAL OBJECTIVE OF RESCUE AND FIREFIGHTING RESPONSE

Guidance on the principal objective of rescue and firefighting response at helidecks can refer to **GM2 VFI.OPS.D.HPT.005 Rescue and firefighting provisions**.

AMC1 VFI.OPS.D.HDC.005 Rescue and firefighting provisions

SAFETY RISK ASSESSMENT

A safety risk assessment should be performed to determine the need for RFF equipment and services at helidecks located above unoccupied structures.

GM AMC1 VFI.OPS.D.HDC.005 Rescue and firefighting provisions

SAFETY RISK ASSESSMENT

(a) A risk assessment should be performed to first determine whether there is a need for rescue and firefighting equipment and services at helidecks located above unoccupied structures. This assessment should include staffing models for helidecks without a dedicated RFFS and with only occasional movements, and for initiating the emergency response.

(b) The important distinction to make is that no one is permanently residing beneath the helidecks, and it is possible to restrict the movement of persons to and from vehicles during helicopter operations, to ensure that as far as reasonably practicable no one is left in their vehicle during helicopter landing and take-off.

(c) The following factors need to be considered in any risk assessment, but it is the responsibility of the operator to determine appropriate threshold limits, including:

(1) number of movements planned/ unplanned;

(2) frequency of movements;

(3) total number of helicopters in use at the site during peak periods;

(4) type of movements, i.e. whether conducting commercial air transport (CAT) and/or general aviation (GA);

(5) number of passengers;

(6) types of helicopters in use, their certification status with respect to crashworthiness and their performance characteristics;

(7) size and complexity of the response area, e.g. other helicopters are present in apron area;

(8) nature of the terrain, e.g. located near water or swampy areas;

(9) whether the heliport is elevated or at surface level;

(10) whether the helideck is in a congested or non-congested environment;

(11) availability of the local fire and rescue services, i.e. how rapidly can services respond to an incident on the helidecks;

(12) types of helicopters and specific hazards, e.g. construction materials are used in airframes such as composites, i.e. man-made mineral fibres (MMMF); and

(13) whether or not an emergency response plan has been established.

VFI.OPS.D.HDC.010 Level of protection

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 heliport under control within one minute, measured from activation of the system at the appropriate discharge rate.

GM1 VFI.OPS.D.HDC.010 Level of protection

DETERMINING PRACTICAL CRITICAL AREA

(a) To determine the amount of water required for foam production it is first necessary to calculate a practical critical area (in m2) which is multiplied by the application rate (in L/min/m2) of the respective foam performance level to determine the discharge rate for foam solution (in L/min). By multiplying the discharge rate by the discharge duration, this determines the amount of water needed for foam production.

(b) The assumptions used to determine practical critical area depend on whether primary extinguishing agent (foam or water) is initially applied in a solid stream (jet) application or in a dispersed (spray) pattern.

GM2 VFI.OPS.D.HDC.010 Level of protection

FIRE CONTROL TIME

(a) A fire is deemed to be under control at the point when the initial intensity of the fire is reduced by 90 per cent. The helicopter operation, consistent also with a fixed wing operation, should achieve a 1-minute control time in the practical critical area using a quantity of primary extinguishing agent for initial attack, over an appropriate discharge duration, which is required for the continued control of the fire thereafter, and/or for possible complete extinguishment of the fire and which may have spread across the heliport operating area.

(b) Speed of response has an important bearing on the effectiveness of escape in a survivable helicopter accident. Intuitively, a prompt intervention will likely bring the fire under control more quickly if firefighting primary extinguishing agent can be applied, at the full application rate, during the earliest stages of a fire’s development.

AMC1 VFI.OPS.D.HDC.010 Level of protection

PRACTICAL CRITICAL AREA CALCULATION WHEN PRIMARY MEDIA IS APPLIED IN A DISPERSED PATTERN

At helidecks, the practical critical area should be based on the largest circle capable of being accommodated within the TLOF perimeter.

Note. — The practical critical area calculation for helidecks is applied regardless of how primary media is being delivered.

GM1 AMC1 VFI.OPS.D.HDC.010 Level of protection

PRACTICAL CRITICAL AREA CALCULATION WHEN PRIMARY MEDIA IS APPLIED IN A DISPERSED PATTERN

(a) A dispersed pattern is used 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. Here, due to the greater coverage of primary extinguishing agent applied in a dispersed spray pattern, the assumed practical critical area has to be much larger than in a case where primary extinguishing agent is applied in a solid stream (jet). A particularly effective way of delivering primary extinguishing agent in a dispersed pattern is through a Deck Integrated Fire Fighting System (DIFFS) (see Figure II-6-4) typically consisting of 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 helideck.

Figure II-6-4. Example of a dispersed pattern application utilising DIFFS

Note. — In some cases, fixed nozzles may sit very slightly proud of the surrounding deck surface prior to activation, and so it becomes unnecessary for them to physically ‘pop-up’ on activation of the system for this type of nozzle to be effective.

(b) The practical critical area (helicopters) where primary extinguishing agent is applied in a dispersed (spray) pattern, is predicated on the dimensions of the operating area that needs to be protected. For an onshore purpose built, or limited-sized heliport (e.g. an elevated heliport at rooftop level), the practical critical area is assumed to accommodate the whole load-bearing area which always includes the TLOF, and to the extent that it is a load-bearing surface, the FATO also. In this case, the area to be considered is based on the specific shape of the TLOF, and where applicable, the shape of the FATO.

(c) Another form of foam dispensing equipment, capable of delivering primary extinguishing agent in a dispersed pattern, is a ring-main system (RMS). In this case, 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. Given the relative ranges at which nozzles are expected to perform, especially in windy conditions, it has been established through practical testing that sole use of an RMS has proven ineffective for TLOFs which are greater than 20 m diameter. In this case, an RMS could only be utilised effectively if supplemented by DIFF nozzles in the centre of the TLOF (a combination solution of RMS plus DIFFS). However, in the case of a large new-build heliport, it is probably more cost-effective and efficient, to provide a full DIFFS.

VFI.OPS.D.HDC.015 Extinguishing agents

(a) Both principal and complementary extinguishing agents shall be provided at helidecks.

(b) From 1 January 2026, environmental-sustainable principal and complementary extinguishing agents shall be provided for new builds or replacement of existing firefighting systems or part thereof.

GM1 VFI.OPS.D.HDC.015 Extinguishing agents

PRINCIPAL AGENTS

Guidance on provisions of principal agents can refer to GM1 VFI.OPS.D.HPT.015 Extinguishing agents.

GM2 VFI.OPS.D.HDC.015 Extinguishing agents

COMPLEMENTARY AGENTS

Guidance on provisions of complementary agents can refer to GM2 VFI.OPS.D.HPT.015 Extinguishing agents.

GM3 VFI.OPS.D.HDC.015 Extinguishing agents

ENVIRONMENTAL-SUSTAINABLE EXTINGUISHING AGENTS

(a) For further guidance on the environmental-sustainable extinguishing agents and transition plan, refer to:

  (1) GM3 VFI.OPS.D.HPT.015 Extinguishing agents - ENVIRONMENTAL-SUSTAINABLE EXTINGUISHING AGENTS

  (2) GM4 VFI.OPS.D.HPT.015 Extinguishing agents - FOAM HEALTH, SAFETY, AND ENVIRONMENTAL ISSUES

(3) GM5 VFI.OPS.D.HPT.015 Extinguishing agents - TRANSITIONING TO ENVIRONMENTAL-SUSTAINABLE FOAM

AMC1 VFI.OPS.D.HDC.015 Extinguishing agents

PURPOSE-BUILT HELIDECKS WITH PRIMARY MEDIA APPLIED IN A SOLID STREAM OR A DISPERSED PATTERN THROUGH A FIXED FOAM APPLICATION SYSTEM (FFAS) — A SOLID-PLATE HELIPORT

(a) The amount of water required for foam media production should be predicated on the practical critical area (m2) multiplied by the application rate (L/min/m2) 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.

(c) The discharge duration should be at least five minutes.

(d) Complementary media should be in accordance with Table 6-3 to H0 levels for helidecks up to and including 16.0 m and to H1/H2 levels for helidecks greater than 16.0 m. Helidecks greater than 24 m should adopt H3 levels.

GM1 AMC2 VFI.OPS.D.HDC.015 Extinguishing agents

HELIDECKS WITH PRIMARY MEDIA APPLIED AS A SOLID STREAM USING A FIXED FOAM APPLICATION SYSTEM (FFAS)

(a) The assumption is made that primary media (foam) will be delivered through a fixed foam application system such as a Fixed Monitor System (FMS).

(b) When installed at a helideck, a fixed foam application system (FFAS) should deliver 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, an FMS, a DIFFS or a RMS. A variation on an FFAS is a fixed application system (FAS) 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.

(c) Where an FMS is installed, trained monitor operators, where provided, should be positioned on at-least the upwind location to ensure the primary extinguishing agent is directed efficiently to the seat of the fire.

(d) Compressed air foam systems (CAFS) may be considered, with foam distributed through a DIFFS using Performance Level B foam (B-CAFS) or Performance Level C foam (C-CAFS). Fire suppression capabilities are enhanced by injecting compressed air into the foam to generate an effective solution to control a fire on the heliport. This type of foam has a tighter, denser bubble structure than standard foams, which allows it to penetrate deeper into the fire before the bubbles are broken down. CAFS rapidly controls a fire by smothering it (starving it of oxygen), by diminishing heat, using trapped air within the bubble structure, and by disrupting the chemical reaction needed for a fire to continue. Consequently, the opportunity presents to deliver CAFS at a lower application rate than would otherwise be required for a Standard Level B or C foam.

GM2 AMC3 VFI.OPS.D.HDC.015 Extinguishing agents

HELIDECKS WITH PRIMARY MEDIA APPLIED IN A DISPERSED PATTERN THROUGH A FIXED FOAM APPLICATION SYSTEM (FFAS) — SOLID PLATE HELIPORT

(a) Solid plate surface deck at most new-build purpose-built helidecks are either 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.

Figure II-6-5. A foam DIFFS on a solid plate surface at an elevated heliport

Note. — While this description is most commonly met by a purpose-built arrangement, it could 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.

AMC2 VFI.OPS.D.HDC.015 Extinguishing agents

PURPOSE-BUILT HELIDECKS WITH PRIMARY MEDIA APPLIED IN A DISPERSED PATTERN THROUGH AN FAS — A PASSIVE FIRE-RETARDING SURFACE WITH WATER-ONLY DIFFS

(a) The amount of water required should be predicated on the practical critical area (m2) multiplied by the 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 calculate the amount of water needed.

(b) The discharge duration should be at least three minutes.

(c) Complementary media should be in accordance with Table 6-3 to H0 levels for

(d) helidecks up to and including 16.0 m and to H1/H2 levels for helidecks greater than 16.0 m. Helidecks greater than 24 m should adopt H3 levels.

Note. — Sea-water may be used.

GM AMC2 VFI.OPS.D.HDC.015 Extinguishing agents

HELIDECKS WITH PRIMARY MEDIA APPLIED IN A DISPERSED PATTERN THROUGH A FIXED APPLICATION SYSTEM (FAS) — PASSIVE FIRE RETARDING SURFACE DECK USING WATER-ONLY DECK INTEGRATED FIREFIGHTING SYSTEM (DIFFS)

(a) As an alternative to the solid-plate surface deck, many manufacturers now give an option 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.

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

(b) 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 II-6-7 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).

Note. — Practical testing (see Figures II-6-6 and II-6-7) 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 II-6-7. A fire test on a passive fire-retarding surface (180 L of fuel is collected)

(c) Where a passive fire-retarding surface is selected in lieu of a solid plate surface, the requirement to provide foam for primary extinguishing agent is removed 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.

Note. — Apart from the potential for a reduction in helpful ground effect, there is also a practical consideration for this type of porous design in-so-far-as fuel is removed from the surface by numerous holes, so too is the primary extinguishing agent. Consequently, as it is not possible to form an effective foam blanket on a perforated surface, a significant benefit of using foam is nullified. A passive fire-retarding surface is best used with a system capable of providing primary extinguishing agent (water) in a dispersed pattern that can envelop a burning helicopter. The recommendation is for a combination solution: a passive fire-retarding surface incorporating a water-only DIFFS, delivering water at an application rate that is consistent with a Performance Level C foam.

(d) 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.

Figure II-6-8. A water-only DIFFS on a heliport with a passive fire-retarding surface

AMC3 VFI.OPS.D.HDC.015 Extinguishing agents

PROVISION OF ADDITIONAL HOSE LINES FOR THE APPLICATION OF PRIMARY MEDIA

In addition to fixed foam application system (FFAS), at least two hose lines with hand-controlled branches for the application of primary media at a minimum application rate of 225-250 litres/minute through each hose line should be provided at the helideck.

GM AMC3 VFI.OPS.D.HDC.015 Extinguishing agents

PROVISION OF ADDITIONAL HOSE LINES AND HAND-CONTROLLED FOAM BRANCHES FOR THE APPLICATION OF PRIMARY MEDIA

Guidance on the provision of additional hose lines and hand-controlled foam branches can refer to GM AMC5 VFI.OPS.D.HPT.015 Extinguishing agents.

AMC4 VFI.OPS.D.HDC.015 Extinguishing agents

USE AND MAINTENANCE OF FOAM APPLICATION SYSTEM AND EQUIPMENT

(a) All parts of the portable and fixed foam application system including its associated equipment, including the finished foam, should be tested by qualified personnel upon commissioning and annually thereafter.

(b) Where non-environmental sustainable foam concentrate is used at helidecks, the tests should assess the performance of the system against original design expectations while ensuring compliance with any relevant pollution regulations.

GM AMC4 VFI.OPS.D.HDC.010 Extinguishing agents

USE AND MAINTENANCE OF FOAM APPLICATION SYSTEM AND EQUIPMENT

Guidance on the use and maintenance of foam application system and equipment can refer to GM AMC6 VFI.OPS.D.HPT.010 Extinguishing agents.

AMC5 VFI.OPS.D.HDC.015 Extinguishing agents

RESERVE SUPPLY

Sufficient reserve supplies of principal and complementary agents, at least 200%, to allow for replenishment as a result of operation of the system during an incident or following training or testing, should be provided at helidecks.

GM AMC5 VFI.OPS.D.HDC.015 Extinguishing agents

RESERVE SUPPLY

Guidance in calculating the total foam discharge and minimum operational stocks can refer to GM AMC7 VFI.OPS.D.HPT.015 Extinguishing agents.

VFI.OPS.D.HDC.020 Response objectives

Rescue and firefighting services and facilities provided at helidecks shall be designed to achieve the operational response objectives.

AMC1 VFI.OPS.D.HDC.020 Response objectives

RESPONSE TIME

(a) At helidecks, the response time for the discharge of primary media at the required application rate should be 15 seconds measured from system activation.

(b) Rescue and firefighting personnel should be immediately available on or in the vicinity of the helideck while helicopter movements are taking place.

GM AMC1 VFI.OPS.D.HDC.020 Response objectives

MEETING THE RESPONSE TIME OBJECTIVE

Guidance in meeting the response objectives can refer to GM AMC1 VFI.OPS.D.HPT.020 Response objectives.

AMC2 VFI.OPS.D.HDC.020 Response objectives

RESCUE ARRANGEMENTS

(a) Rescue arrangements commensurate with the overall risk of the helicopter operation should be provided at helidecks.

(b) Minimum rescue equipment inventory required to ensure effective rescue arrangements should be provided at the helideck (see Table 6-1). Equipment should only be used by personnel who have received adequate information, instruction and training.

Table 6-1. Rescue equipment

Equipment type	Quantity
Adjustable wrench	1
Rescue axe, large (non-wedge or Helicopter/VCA 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)	ıccess to casualties in an Helicopter/VCA that may be on its side, the ladder should be of an appropriate length.
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	Each RFF personnel
Man-Made Mineral Fibre (MMMF) Filter masks	
Gloves, fire resistant	
Power cutting tool	ıires additional approved training by competent personnel. Equipment only specified for HELICOPTERs with a D-value above 24m.
Extendable applicator (high engine inlet fires)	1

GM1 AMC2 VFI.OPS.D.HDC.020 Response objectives

RESCUE ARRANGEMENTS

Guidance on rescue arrangements can refer to GM1 AMC2 VFI.OPS.D.HPT.020 Response objectives.

GM2 AMC2 VFI.OPS.D.HDC.020 Rescue equipment

RESCUE EQUIPMENT

Guidance on rescue equipment can refer to GM2 AMC2 VFI.OPS.D.HPT.020 Rescue equipment.

AMC3 VFI.OPS.D.HDC.020 Response objectives

COMMUNICATION AND ALERTING SYSTEM

A suitable alerting and/or communication system should be provided in accordance with the emergency plan.

GM AMC3 VFI.OPS.D.HDC.020 Response objectives

COMMUNICATION AND ALERTING SYSTEM

Guidance on communication and alerting systems can refer to GM AMC3 VFI.OPS.D.HPT.020 Response objectives.

VFI.OPS.D.HDC.025 Rescue and firefighting personnel

(a) Rescue and firefighting personnel at the helideck shall be:

(1) sufficient for the required tasks;

(2) trained to perform their duties, and maintain their competence; and

(3) provided with personal protective equipment.

GM VFI.OPS.D.HDC.025 Rescue and firefighting personnel

TASK RESOURCE ANALYSIS

(a) Guidance on completing a task and resource analysis can refer to GM AMC1 VFI.OPS.D.HPT.025 Personnel.

(b) Table 6-4 provides a guidance on the minimum staffing levels at the helideck.

Table 6-4: Heliport RFF minimum staffing level

Helidecks	Personnel	
	Landing Officer	Landing Assistant
H0 up to and including 16.0 m	1	2
H1 / H2 from 16.0 m up to and including 24 m		3
H3 or greater than 24 m		4

AMC1 VFI.OPS.D.HDC.025 Rescue and firefighting personnel

FITNESS

Rescue and firefighting personnel should be fit to perform their assigned roles and responsibilities.

GM AMC1 VFI.OPS.D.HDC.025 Rescue and firefighting personnel

PHYSICAL AND MEDICAL FITNESS ASSESSMENTS FOR RFF PERSONNEL

Guidance on physical and medical fitness assessments for RFF personnel can refer to GM AMC2 VFI.OPS.D.HPT.025 Rescue and firefighting personnel.

AMC2 VFI.OPS.D.HDC.025 Rescue and firefighting personnel

TRAINING AND PROFICIENCY CHECKS

Training and proficiency checks programmes should be established and implemented for rescue and firefighting personnel, in accordance with the requirements detailed in CAR AGA PART TRG.

GM AMC2 VFI.OPS.D.HDC.025 Rescue and firefighting personnel

TRAINING AND PROFICIENCY CHECKS

Guidance on training and proficiency checks programme for rescue and firefighting person can refer to GM AMC1 VFI.OPS.D.HPT.025 Personnel.

AMC3 VFI.OPS.D.HPT.025 Personnel

PERSONAL PROTECTIVE EQUIPMENT

(a) Rescue and firefighting personnel should be provided with personal protective equipment in order to perform their assigned roles and responsibilities safely and effectively.

(b) Appropriate personnel should be appointed to ensure that all PPE is installed, stored, used, checked and maintained in accordance with the manufacturer's instructions.

(c) Facilities should be provided for the cleaning, drying and storage of PPE when crews are off duty. Facilities should be well-ventilated and secure.

GM AMC3 VFI.OPS.D.HPT.015 Personnel

PERSONAL PROTECTIVE EQUIPMENT

(a) Depending on the rescue model employed (whether an assisted or self-rescue model), sufficient dedicated heliport rescue and firefighting personnel should be provided with appropriate training and PPE to enable them to perform their duties effectively.

(b) All responding RFF personnel should be provided with fit for purpose personal protective clothing (PPC) and respiratory protective equipment (RPE) to allow them to carry out their duties in an effective manner.

(c) Personnel qualified to operate the RFF equipment effectively should be dressed in protective clothing 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 accompanied by suitable safety measures, e.g. protective devices, markings and warnings. The specifications for PPE should meet one of the international standards shown in Table 6-2.

Table 6-2. Standards for PPC and RPE

PPE Type	NFPA	EN	BS
Helmet with visor	NFPA 1971	EN443	BS EN 443
Gloves	NFPA 1971	EN659	BS EN 659
Boots (footwear)	NFPA 1971	EN ISO 20345	EN ISO 20345
Tunic and trousers	NFPA 1971	EN469	BS EN ISO 14116
Flash-hood	NFPA 1971	EN 13911	BS EN 1391
Self-contained breathing apparatus	NFPA 1981	EN 137	BS EN 145

VFI.OPS.D.HDC.030 Means of escape

At helidecks, a main access and at least one additional means of escape shall be provided.

AMC VFI.OPS.D.HDC.030 Means of escape

MEANS OF ESCAPE

(a) Main access and means of escape at the helideck should be located as far apart from each other as is practicable, at least 90-degrees from each other.

(b) Means of escape should be suitably designed to guide aircraft occupants to a safe area.

GM AMC VFI.OPS.D.HDC.030 Means of escape

MEANS OF ESCAPE

Guidance on the provision of means of escape can refer to GM AMC VFI.OPS.D.HPT.030 Means of escape.

VFI.OPS.D.HDC.035 Fire protection

Fire and life safety protection shall be provided at helidecks.

AMC VFI.OPS.D.HDC.035 Fire protection

(a) At helidecks, the minimum fire and life safety protection should be provided are:

(1) 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.

(2) 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;

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

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

(5) at least two access points from the FATO/TLOF, including sufficient illumination at night, are provided for rapid access by RFF personnel;

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

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

(8) flammable liquids, compressed gas and liquefied gas are not be permitted within the FATO/TLOF and safety area; and

(9) where the helideck firefighting systems are integrated with the installation's fire protection systems, conduct a fire water needs assessment to determine the adequate amount of water is provided to meet the level of protection required in the event of an accident.

GM AMC VFI.OPS.D.HDC.035 Fire protection

FIRE AND LIFE SAFETY PROTECTION

Further guidance on specific fire protection measures at the helideck can refer to UAE Fire Codes and/or NFPA 418, Standard for Heliports and Vertiports.

VFI.OPS.D.HDC.040 Not permanently attended installations (NPAI)

Rescue and firefighting facilities and equipment shall be provided commensurate with the type of helicopter operations and other activities at not permanently attended installations.

GM1 VFI.OPS.D.HDC.040 Not permanently attended installations (NPAI)

FIXED PLATFORMS (PERMANENTLY ATTENDED AND NOT PERMANENTLY ATTENDED)

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. Separate modules are generally linked by bridges and can be served by more than one helideck. Fixed platforms that are occupied year-round are often referred to as permanently attended installations (PAI), while those facilities that do not subscribe to a permanent attendance model are referred to in this Section as not permanently attended installations (NPAIs). The acronyms PAI and NPAI are used throughout this Section, although it is appreciated that individual operators/organisations may use additional or alternative acronyms to describe particular attendance models to distinguish specific levels of occupancy of offshore facilities.

AMC1 VFI.OPS.D.HDC.040 Not permanently attended installations (NPAI)

RESCUE AND FIREFIGHTING FACILITIES (WITH DIFFS)

(a) 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 should be given to the selection and provision of Fixed Foam Application System (FFAS) integrated into helideck.

(b) 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.

(c) 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.

(d) DIFFS on NPAI's should 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.

(e) The overall design of a DIFFS should 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.

(f) Similar to a DIFFS provided for a Permanently Attended Installation, 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.

AMC2 VFI.OPS.D.HDC.040 Not permanently attended installations (NPAI)

RESCUE AND FIREFIGHTING FACILITIES (WITHOUT DIFFS)

(a) Where no automatic fire detection/protection system is provided then the operator should 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.

(b) Where DIFFS are not part of the installation, then the following minimum rescue and firefighting facilities and equipment should be provided:

NPAI	Type and quantities of rescue and firefighting facilities and equipment
Helidecks up to and including 16.0 m	(a) Principal agent (foam): (1) 90 kg of foam meeting performance level B; or (2) 60 kg of foam meeting performance level C (b) Complementary agents: (1) 23 kg of dry powder delivered from one or two extinguishers; and (2) 9 kg of CO_2 delivered from one or two extinguishers (gaseous agent with extendable applicator for high engine access) (c) Rescue equipment: (1) Refer to AMC2 VFI.OPS.D.HDC.020 Response objectives for list of rescue equipment (d) Personal protective equipment (1) 2 x full sets of fire protective clothing (2) 2 x full sets of breathing apparatus with 2 spare cylinders
Helidecks above 16.0 m and up to 24.0 m	(a) Principal agent (foam): (1) 120 kg of foam meeting performance level B; or (2) 90 kg of foam meeting performance level C (b) Complementary agents: (1) 45 kg of dry powder delivered from one or two extinguishers; and (2) 18 kg of CO_2 delivered from one or two extinguishers (gaseous agent with extendable applicator for high engine access) (c) Rescue equipment: (1) Refer to AMC2 VFI.OPS.D.HDC.020 Response objectives for list of rescue equipment (d) Personal protective equipment (1) 2 x full sets of fire protective clothing (2) 2 x full sets of breathing apparatus with 2 spare cylinders
Helidecks above 24.0 m	(a) Principal agent (foam): (1) 150 kg of foam meeting performance level B; or

	(2) 120 kg of foam meeting performance level C (b) Complementary agents: (1) 90 kg of dry powder delivered from two, three or four extinguishers; and (2) 36 kg of CO2 delivered from one or more extinguishers (gaseous agent with extendable applicator for high engine access) (c) Rescue equipment: (1) Refer to AMC2 VFI.OPS.D.HDC.020 Response objectives for list of rescue equipment (d) Personal protective equipment (1) 2 x full sets of fire protective clothing (2) 2 x full sets of breathing apparatus with 2 spare cylinders

(c) 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.

AMC3 VFI.OPS.D.HDC.040 Not permanently attended installations (NPAI)

PERSONNEL

Emergency response personnel and procedures should be established at not permanently attended installations (NPAI).

GM AMC3 VFI.OPS.D.HDC.040 Not permanently attended installations (NPAI)

PERSONNEL

(a) Minimum emergency response personnel and procedures should be considered at not permanently attended installations (NPAI) are as follows:

(1) a Helicopter Landing Officer (HLO) should on be on board the first arriving helicopter.

(2) 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.

(3) the HLO is to analyse the weather, checked the state of the deck, and coordinate the deck arrival in terms of safety.

(4) 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.

(5) there should be at least one additional fully trained fire person on board.

(6) 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.

(7) 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.

(8) 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.

(9) once all the passengers and luggage/equipment is on board the HLO should indicate to the pilot all is loaded and ready.

(10) the HLO should conduct a final visual inspection of the flight direction and surrounding area give the “thumbs up” to the pilot and aboard the helicopter.

CHAPTER C - VERTIPORTS (VFI.OPS.D.VPT)

VFI.OPS.D.VPT.005 Rescue and firefighting provisions

Rescue and firefighting equipment and services shall be provided at surface-level and at elevated vertiports located above occupied structures.

GM1 VFI.OPS.D.VPT.005 Rescue and firefighting provisions

RESCUE AND FIREFIGHTING PROVISIONS

(a) Provisions described in this section are intended to address incidents or accidents within the vertiport response area only.

(b) No dedicated firefighting provisions are included for VCA accidents or incidents that may occur outside the response area, such as on an adjacent roof near an elevated vertiport.

(c) Complementary agents are ideally dispensed from one or two extinguishers (although more extinguishers may be permitted where high volumes of an agent are specified, e.g. V3 operations). The discharge rate of complementary agents needs to be selected for optimum effectiveness of the agent used. When selecting dry chemical powders for use with foam, care needs to be exercised to ensure compatibility. Complementary agents need to comply with the appropriate specifications of the International Organization for Standardization (ISO).

(d) Where a fixed monitor system (FMS) is installed, trained monitor operators, where provided, are 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).

GM2 VFI.OPS.D.VPT.005 Rescue and firefighting provisions

PRINCIPAL OBJECTIVE OF RESCUE AND FIREFIGHTING RESPONSE

Guidance on the principal objective of rescue and firefighting response at vertiports can refer to GM2 VFI.OPS.D.HPT.005 Rescue and firefighting provisions.

GM3 VFI.OPS.D.VPT.005 Rescue and firefighting provisions

FIRE CONTROL STRATEGY

(a) VTOL-capable aircrafts (VCA) come in various designs and features - both fuel and electric powered. For fuel-powered VCA fires, it is expected that such fires are dealt with similar to conventional aircraft rescue and firefighting strategy. For an electric-VCA fires powered by lithium-ion batteries, it is assumed such fire will continue to burn for a period of time. Lithium-ion battery fires are known for their intensity and prolonged burning due to the nature of thermal runaway. Based on current industry practices, the immediate goal is to achieve initial control of the fire within the critical first minute of ignition to allow safe and rapid evacuation of aircraft occupants. This rapid response is essential to prevent the fire from escalating and spreading beyond the confines of the aircraft.

(b) With this in mind, the most appropriate fire control strategy to be employed at a vertiport is to achieve initial control of a fire within one minute within the practical critical area. The practical critical area is assumed to accommodate the whole load-bearing area which always includes the TLOF, and to the extent that it is a load-bearing surface, the FATO also. This strategy minimizing risks to both personnel and infrastructure until the arrival of back-up specialist fire services. The arrival of these back-up specialist fire services, equipped with additional extinguishing media, equipment and expertise specific to lithium-ion battery incidents, marks the next phase of the firefighting operation. Until their arrival of back-up specialist fire services, the primary focus should be to ensure the fire does not spread beyond the practical critical area, utilizing all available resources at the vertiport. It is imperative that safety protocols for emergency responders and a pre-planned closed coordination between vertiport and specialist fire services are established for an effective response to such VCA fires.

(c) A fire is deemed to be under control at the point when the initial intensity of the fire is reduced by 90 per cent. The VCA operation, consistent also with a fixed wing operation, should achieve a 1-minute control time in the practical critical area using a quantity of primary extinguishing agent for initial attack, over an appropriate discharge duration, which is required for the continued control of the fire thereafter, and/or for possible complete extinguishment of the fire and which may have spread across the vertiport operating area.

(d) Speed of response has an important bearing on the effectiveness of escape in a survivable VCA accident. Intuitively, a prompt intervention will likely bring the fire under control more quickly if firefighting primary extinguishing agent can be applied, at the full application rate, during the earliest stages of a fire's development.

AMC1 VFI.OPS.D.VPT.005 Rescue and firefighting provisions

SAFETY RISK ASSESSMENT

A safety risk assessment should be conducted to determine the need for rescue and firefighting equipment and services at elevated vertiports located above unoccupied structures.

GM AMC1 VFI.OPS.D.VPT.005 Rescue and firefighting provisions

SAFETY RISK ASSESSMENT

Refer to GM AMC1 VFI.OPS.D.HPT.005 Rescue and firefighting provisions for more guidance on conducting a safety risk assessment.

VFI.OPS.D.VPT.010 Level of protection

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 vertiport under control within one minute, measured from activation of the system at the appropriate discharge rate.

GM VFI.OPS.D.VPT.010 Determining practical critical area

DETERMINING THE PRACTICAL CRITICAL AREA

Guidance on determining the practical critical area can refer to GM1 VFI.OPS.D.HPT. 010 Level of protection.

AMC1 VFI.OPS.D.VPT.010 Level of protection

PRACTICAL CRITICAL AREA CALCULATION WHEN PRIMARY MEDIA IS APPLIED AS A SOLID STREAM

The practical critical area should be calculated by multiplying the VCA fuselage length (m) by the VCA fuselage width (m) plus an additional width factor (W1) of 4 m. Categorization from V0 to V3 should be determined on the basis of the fuselage dimensions in Table 6-1.

Table 6-1: Vertiport firefighting category

Category (1)	Maximum fuselage length (2)	Maximum fuselage width (3)
V0	up to but not including 8 m	1.5
V1	from 8 m up to but not including 12 m	2
V2	from 12 m up to but not including 16 m	2.5
V3	from 16 m up to 20 m	3

GM AMC1 VFI.OPS.D.VPT.010 Level of protection

PRACTICAL CRITICAL AREA CALCULATION WHEN PRIMARY MEDIA IS APPLIED AS A SOLID STREAM

Guidance on practical critical area calculation when primary media is applied as a solid stream can refer to GM AMC1 VFI.OPS.D.HPT.010 Level of protection.

AMC2 VFI.OPS.D.VPT.010 Level of protection

PRACTICAL CRITICAL AREA CALCULATION WHEN PRIMARY MEDIA IS APPLIED IN A DISPERSED PATTERN

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

GM AMC2 VFI.OPS.D.VPT.010 Level of protection

PRACTICAL CRITICAL AREA CALCULATION WHEN PRIMARY MEDIA IS APPLIED IN A DISPERSED PATTERN

Guidance on practical critical area calculation when primary media is applied as a dispersed pattern can refer to GM AMC2 VFI.OPS.D.HPT.010 Level of protection.

VFI.OPS.D.VPT.015 Extinguishing agents

Both environmental-sustainable principal and complementary extinguishing agents shall be provided at surface-level and elevated vertiports.

GM1 VFI.OPS.D.VPT.015 Extinguishing agents

PRINCIPAL AGENTS

Guidance on principal agents can refer to GM1 VFI.OPS.D.HPT.015 Extinguishing agents.

GM2 VFI.OPS.D.VPT.015 Extinguishing agents

COMPLEMENTARY AGENTS

Guidance on complementary agents can refer to GM2 VFI.OPS.D.HPT.015 Extinguishing agents.

GM3 VFI.OPS.D.VPT.015 Extinguishing agents

ENVIRONMENTAL-SUSTAINABLE EXTINGUISHING AGENTS

Guidance on environmental-sustainable agents can refer to GM3 VFI.OPS.D.HPT.015 Extinguishing agents.

GM4 VFI.OPS.D.VPT.015 Extinguishing agents

FOAM HEALTH, SAFETY, AND ENVIRONMENTAL ISSUES

Guidance on understanding foam health, safety and environmental issues can refer to GM4 VFI.OPS.D.HPT.015 Extinguishing agents.

GM5 VFI.OPS.D.VPT.015 Extinguishing agents

OTHER AGENTS

These agents are typically carried in a handheld extinguisher for a specific application specified by either Underwriters Laboratories (UL) or National Fire Protection Association (NFPA) certification. When considering the alternative use of these agents, safety assessment and practical testing should be conducted to demonstrate that these agents display equivalent performance to conventional firefighting agents specified by ICAO Doc 9137 Part 1 – Rescue and firefighting.

(a) Combustible Metal Agents are used to combat Class D fires, such as magnesium fires, are referred to as combustible metal agents. Heat from the fire causes the powder to form an air-excluding crust. Powders do not cling well to vertical surfaces. Two agents currently approved for use are Metal-X as a dry powder agent and FEM-12 as either a liquid or a dry powder agent.

(b) Water Additives are agents that, when added to water in proper quantities, suppresses, cools, mitigates fire and/or vapors, and/or provides insulating properties for fuels exposed to radiant heat or direct flame impingement. Water additives can materially reduce water's surface tension and increase its penetrating and spreading abilities; they also might provide enhanced cooling, emulsification, and foaming characteristics. The two most common water additives are wetting agents and encapsulator agents. Wetting agents reduce the surface tension and increase the water's ability to penetrate and spread. Emulsification and foaming characteristics may be enhanced. Encapsulator agents change the chemical make-up of a water droplet with the introduction of spherical micelles to neutralize the fuel. For further information, refer to NFPA 18, Standard on Wetting Agents (National Fire Protection Association 2021), and NFPA 18A, Standard on Water Additives for Fire Control and Vapor Mitigation (National Fire Protection Association 2022).

AMC1 VFI.OPS.D.VPT.015 Extinguishing agents

SURFACE LEVEL VERTIPORTS WITH PRIMARY MEDIA APPLIED AS A SOLID STREAM USING A PORTABLE FOAM APPLICATION SYSTEM (PFAS) OR FIXED FOAM APPLICATION SYSTEM (FFAS).

The minimum amount of principal and complementary agents to be provided should be in accordance with Table 6 2.

Table 6-2. Minimum usable amounts of extinguishing agents for surface-level vertiports

	Foam meeting performance level B		Foam meeting performance level C/water		Complementary agents	
Category (1)	**Water (L) (2)**	**Discharge rate foam solution/minute (L) (3)**	**Water (L) (2)**	**Discharge rate foam solution/minute (L) (3)**	**Dry chemical powder (kg) (6)**	**Gaseous media (kg) (7)**
V0	Discharge rate/min x PDA	250	Discharge rate/min x PDA	165	23	9
V1		400		270	23	9
V2		600		400	45	18
V3		800		550	90	36

The minimum amounts of water requirements for each category in Table 6-2 should be calculated based on the discharge rate of foam solution per minute multiply by the pre-determined arrival (PDA) time of back-up specialist fire services.

GM1 AMC1 VFI.OPS.D.VPT.015 Extinguishing agents

SURFACE LEVEL VERTIPORTS WITH PRIMARY MEDIA APPLIED AS A SOLID STREAM USING A PORTABLE FOAM APPLICATION SYSTEM (PFAS)

(a) The assumption is made that foam dispensing equipment will be transported to the incident or accident location on an appropriate vehicle or mobile equipment (a PFAS).

(b) At some vertiports, it may become necessary to move primary extinguishing agent-dispensing equipment towards the accident or incident location, for example at a surface level vertiport 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).

(c) The ability to transport the equipment to the accident location means it is classed as a PFAS 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. A PFAS may include, but not necessarily be limited to, hand-controlled portable foam branch pipes capable of being pulled across the vertiport surface by trained personnel, and monitors or foam cannons that are mounted on an appropriate rescue and firefighting

(d) Example of calculating the amount of water required is given below:

Example of calculating minimum amount of water required for Category V1 based on level B foam

Discharge rate foam solution/minute (400 L/min) x pre-determined arrival time of back-up specialist fire services (estimated 10 minutes) = 4 000 litres

(e) When selecting the appropriate type of foam concentrate as the principal media to be used at the vertiport, considerations should be given to those environmentally-sustainable agents to ensure compliance with relevant pollution regulations. Selection of such agents should demonstrate having equivalent level of firefighting performance. A certificate of conformity demonstrating compliance with ICAO's foam performance requirements should be provided and available for inspection.

GM2 AMC2 VFI.OPS.D.VPT.015 Extinguishing agents

SURFACE LEVEL VERTPORTS WITH PRIMARY MEDIA APPLIED AS A SOLID STREAM USING A FIXED FOAM APPLICATION SYSTEM (FFAS)

(a) The assumption is made that primary media (foam) will be delivered through a fixed foam application system such as a Fixed Monitor System (FMS).

(b) When installed at a vertiport, a fixed foam application system (FFAS) should deliver a primary foam extinguishing agent at the required application rate and over the assumed practical critical area.

(c) Where an FMS is installed, trained monitor operators should be positioned on at-least the upwind location to ensure the primary extinguishing agent is directed efficiently to the seat of the fire.

(d) Compressed air foam systems (CAFS) may be considered, with foam distributed through a DIFFS using Performance Level B foam (b-CAFS) or Level C (c-CFAS). Fire suppression capabilities are enhanced by injecting compressed air into the foam to generate an effective solution to control a fire on the heliport. This type of foam has a tighter, denser bubble structure than standard foams, which allows it to penetrate deeper into the fire before the bubbles are broken down. CAFS rapidly controls a fire by smothering it (starving it of oxygen), by diminishing heat, using trapped air within the bubble structure, and by disrupting the chemical reaction needed for a fire to continue. Consequently, the opportunity presents to deliver CAFS at a lower application rate than would otherwise be required for a Standard Level B or C foam.

(e) An FFAS may be used at a limited-sized vertiport where there is no requirement to physically move foam dispensing equipment towards the fire (hence the equipment is fixed in location). Where foam dispensing equipment is required to be moved towards the accident/ incident location, this is classed as a portable foam application system (PFAS).

AMC2 VFI.OPS.D.VPT.015 Extinguishing agents

ELEVATED VERTIPORTS WITH PRIMARY MEDIA APPLIED IN A DISPERSED PATTERN THROUGH A FIXED FOAM APPLICATION SYSTEM (FFAS) — SOLID PLATE DECK

(a) The amount of water required for foam production should be predicated on the practical critical area (m2) multiplied by the appropriate application rate (L/min/m2), 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.

(c) The discharge duration should be calculated based on the estimated pre-determined arrival time of back-up specialist fire services.

(d) Complementary media should be in accordance with Table 6-3, for V2 operations.

(e) For VCAs with a fuselage length greater than 16 m and/or a fuselage width greater than 2.5 m, complementary media in Table 6-3 for V3 operations should be considered.

GM AMC2 VFI.OPS.D.VPT.015 Extinguishing agents

(a) Guidance on solid plate deck can refer to GM AMC3 VFI.OPS.D.HPT.015 Extinguishing agents.

(b) When determining the discharge duration at elevated vertiports, total time taken by the estimated pre-determined arrival time of back-up specialist fire services should also consider the time taken for the back-up specialist fire services from the ground to landing deck area.

AMC3 VFI.OPS.D.VPT.015 Extinguishing agents

ELEVATED VERTIPORTS WITH PRIMARY MEDIA APPLIED IN A DISPERSED PATTERN THROUGH A FIXED APPLICATION SYSTEM (FAS) — PASSIVE FIRE RETARDING SURFACE DECK USING WATER-ONLY DECK INTEGRATED FIREFIGHTING SYSTEM (DIFFS)

(a) 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).

(b) The discharge rate should be multiplied by the discharge duration to determine the total amount of water needed.

(c) The discharge duration should be calculated based on the estimated pre-determined arrival time of back-up specialist fire services.

(d) Complementary media should be in accordance with Table 6-3 for V2 operations.

(e) For VCAs with a fuselage length greater than 16 m and/or a fuselage width greater than 2.5 m, complementary media for V3 operations should be considered.

GM AMC3 VFI.OPS.D.VPT.015 Extinguishing agents

(a) Guidance on passive fire-retarding surface deck can refer to GM AMC4 VFI.OPS.D.HPT.015 Extinguishing agents.

(b) When determining the discharge duration at elevated vertiports, total time taken by the estimated pre-determined arrival time of back-up specialist fire services should also consider the travelling time taken by the back-up specialist fire services from the ground to landing deck area.

AMC4 VFI.OPS.D.VPT.015 Extinguishing agents

PROVISION OF ADDITIONAL HOSE LINES FOR THE APPLICATION OF PRIMARY MEDIA

In addition to fixed foam application system (FFAS), at least two hose lines with hand-controlled branches for the application of primary media at a minimum application rate of 225-250 litres/minute through each hose line should be provided at the vertiport.

GM AMC4 VFI.OPS.D.VPT.015 Extinguishing agents

PROVISION OF ADDITIONAL HOSE LINES AND HAND-CONTROLLED FOAM BRANCHES FOR THE APPLICATION OF PRIMARY MEDIA

Guidance on the provision of additional hose lines and hand-controlled foam branches can refer to GM AMC5 VFI.OPS.D.HPT.015 Extinguishing agents.

AMC5 VFI.OPS.D.VPT.015 Extinguishing agents

USE AND MAINTENANCE OF FOAM APPLICATION SYSTEM AND EQUIPMENT

All parts of the portable and fixed foam application system including its associated equipment, including the finished foam, should be tested by qualified personnel upon commissioning and annually thereafter.

GM AMC5 VFI.OPS.D.VPT.015 Extinguishing agents

USE AND MAINTENANCE OF FOAM APPLICATION SYSTEM AND EQUIPMENT

Guidance on the use and maintenance of foam application system and equipment can refer to GM AMC6 VFI.OPS.D.HPT.010 Extinguishing agents.

AMC6 VFI.OPS.D.VPT.015 Extinguishing agents

RESERVE SUPPLY

Sufficient reserve supplies of principal and complementary agents, at least 100%, to allow for replenishment as a result of operation of the system during an accident or following training or testing, should be provided at the vertiport. Where there is anticipated delay, the quantity should be increased accordingly.

GM AMC6 VFI.OPS.D.VPT.015 Extinguishing agents

RESERVE SUPPLY

(a) Guidance in calculating total foam discharge and minimum operational stocks can refer to GM AMC7 VFI.OPS.D.HPT.015 Extinguishing agents.

(b) Where a major delay in the replenishment of the supplies is anticipated, the amount of reserve supply should be increased as determined by, among others, the following considerations:

(1) location of RFF service (may be remote);

(2) availability of supplies;

(3) delivery times; and

(4) customs considerations.

VFI.OPS.D.VPT.020 Response objectives

Rescue and firefighting services and facilities provided at surface-level and elevated vertiports shall be designed to achieve the operational response objectives.

AMC1 VFI.OPS.D.VPT.020 Response objectives

RESPONSE TIME

(a) At surface-level vertiports, the operational objective of the rescue and firefighting response should be to achieve response times not exceeding two minutes in optimum conditions of visibility and surface conditions.

(b) At elevated vertiports, the response time for the discharge of primary media at the required application rate should be 15 seconds measured from system activation.

(c) Rescue and firefighting personnel should be immediately available on or in the vicinity of the vertiport while VCA movements are taking place.

GM1 AMC1 VFI.OPS.D.VPT.020 Response objectives

MEETING THE RESPONSE TIME OBJECTIVE

Guidance on understanding the response time definition and meeting the response time objective can refer to GM AMC1 VFI.OPS.D.HPT.020 Response objectives.

AMC2 VFI.OPS.D.VPT.020 Response objectives

RESCUE ARRANGEMENTS

(a) Rescue arrangements commensurate with the overall risk of the VCA operation should be provided at the vertiport.

(b) Adequate rescue and firefighting information for the type of VCA should be provided for RFF personnel including:

(1) flammable materials locations;

(2) emergency rescue access;

(3) battery Locations; and

(4) flight deck control switch locations.

(c) Minimum rescue equipment inventory required to ensure effective rescue arrangements should be provided at the vertiport (see Table 6-1). Equipment should only be used by personnel who have received adequate information, instruction and training.

Table 6-1. Rescue equipment

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 (Non-conductive)	1
Hacksaw (heavy duty) and six spare blades	1
Blanket, fire resistant	1
Ladder (two-piece)	For access to casualties in an aircraft that may be on its side, the ladder should be of an appropriate length.
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	Each RFF personnel
Man-Made Mineral Fibre (MMMF) Filter masks	
Gloves, fire resistant	
Power cutting tool	Requires additional approved training by competent personnel. Equipment only specified for VCAs with a D-value above 24m.
Extendable applicator (high engine inlet fires)	1
Piercing nozzle	If required

GM1 AMC2 VFI.OPS.D.VPT. 020 Response objectives

RESCUE ARRANGEMENTS

Guidance on rescue arrangements can refer to GM1 AMC2 VFI.OPS.D.HPT.020 Response objectives.

GM2 AMC2 VFI.OPS.D.VPT. 020 Response objectives

RESCUE EQUIPMENT

Guidance on rescue equipment can refer to GM2 AMC2 VFI.OPS.D.HPT.020 Response objectives.

AMC3 VFI.OPS.D.VPT. 020 Response objectives

COMMUNICATION AND ALERTING SYSTEM

A suitable alerting and/or communication system should be provided in accordance with the emergency plan.

GM1 AMC3 VFI.OPS.D.VPT. 020 Response objectives

COMMUNICATION AND ALERTING SYSTEM

Guidance on communication and alerting systems can refer to GM AMC3 VFI.OPS.D.HPT.020 Response objectives.

VFI.OPS.D.VPT.025 Rescue and firefighting personnel

(a) The vertiport operator shall ensure:

(1) rescue and firefighting personnel are sufficient for the required task;

(2) rescue and firefighting-personnel are trained to perform their duties, and maintain their competence; and

(3) rescue and firefighting personnel are provided with personal protective equipment.

AMC1 VFI.OPS.D.VPT.025 Rescue and firefighting personnel

NUMBER OF RESCUE AND FIREFIGHTING PERSONNEL

(a) For certificated holders, a task resource analysis should be completed in determining the sufficient number of RFF personnel at the vertiport.

(b) For landing area acceptance holders, sufficient number of RFF personnel should be readily available at the vertiport.

GM1 AMC1 VFI.OPS.D.VPT.025 Rescue and firefighting personnel

TASK RESOURCE ANALYSIS GUIDANCE

Guidance on completing a task and resource analysis can refer to GM AMC1 VFI.OPS.D.HPT.025 Personnel.

GM2 AMC1 VFI.OPS.D.VPT.025 Rescue and firefighting personnel

MINIMUM NUMBER OF RFF PERSONNEL

Table 6-4 provides a guidance on the minimum number of rescue and firefighting personnel at the vertiport.

Table 6-4: Vertiport RFF minimum staffing level

Category	Surface-level vertiport		Elevated vertiport	
	Team Leader	Team Member	Team Leader	Team Member
V0	1	1	1	2
V1	1	1	1	2
V2	1	2	1	3
V3	1	2	1	3

AMC2 VFI.OPS.D.VPT.025 Rescue and firefighting personnel

FITNESS

Rescue and firefighting personnel should be fit to perform their assigned roles and responsibilities.

GM1 AMC2 VFI.OPS.D.VPT.025 Rescue and firefighting personnel

PHYSICAL AND MEDICAL FITNESS ASSESSMENTS FOR RFF PERSONNEL

Guidance on physical and medical fitness assessments for RFF personnel can refer to **GM AMC2 VFI.OPS.D.HPT.025 Rescue and firefighting personnel**.

AMC3 VFI.OPS.D.VPT.025 Rescue and firefighting personnel

TRAINING AND PROFICIENCY CHECKS

Training and proficiency checks should be established and implemented for rescue and firefighting personnel.

GM1 AMC1 VFI.OPS.D.VPT.025 Rescue and firefighting personnel

TRAINING AND PROFICIENCY CHECKS

Detailed requirements on training and proficiency checks programmes for RFF personnel can refer to CAR ADR PART TRG.

AMC4 VFI.OPS.D.VPT.025 Rescue and firefighting personnel

PERSONAL PROTECTIVE EQUIPMENT

(a) Rescue and firefighting personnel should be provided with personal protective equipment in order to perform their assigned roles and responsibilities safely and effectively.

(b) Trained personnel should be appointed to ensure that all PPE is installed, stored, used, checked and maintained in accordance with the manufacturer's instructions.

(c) A well-ventilated and secure facility should be provided for the cleaning, drying and storage of PPE when crews are off duty.

GM1 AMC4 VFI.OPS.D.VPT.025 Rescue and firefighting personnel

PERSONAL PROTECTIVE EQUIPMENT

Guidance on personal protective equipment for RFF personnel can refer to GM AMC4 VFI.OPS.D.HPT.015 Personnel.

VFI.OPS.D.VPT.030 Means of escape

Elevated vertiports shall be provided with a main access and at least one additional means of escape.

AMC1 VFI.OPS.D.VPT.030 Means of escape

MEANS OF ESCAPE

(a) Main access and means of escape at the vertiport should be located as far apart from each other as is practicable.

(b) Main access and means of escape at the vertiport should not be on the same side and located at least 90-degrees from each other.

GM AMC1 VFI.OPS.D.VPT.030 Means of escape

MEANS OF ESCAPE

Guidance on means of escape can refer to GM AMC VFI.OPS.D.HDC.030 Means of escape.

VFI.OPS.D.VPT.035 Fire protection

Fire and life safety protection shall be provided at surface level and at elevated vertiports.

AMC1 VFI.OPS.D.VPT.035 Fire protection

SURFACE-LEVEL VERTIPORT

(a) At a surface-level vertiport, the minimum fire and life safety protection should be provided are:

(1) 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;

(2) at least one clear access point that provides rapid access to RFF or civil defense personnel;

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

(4) no smoking signs are erected at access and egress points of the vertiport.

AMC2 VFI.OPS.D.VPT.035 Fire protection

ELEVATED VERTIPORT

(a) At an elevated vertiport, the minimum fire and life safety protection should be provided are:

(1) 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.

(2) 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;

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

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

(5) at least two access points from the FATO/TLOF, including sufficient illumination at night, are provided for rapid access by RFF or civil defense personnel;

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

(7) no smoking signs are erected at access and egress points of the vertiport;

(8) flammable liquids, compressed gas and liquefied gas are not be permitted within the FATO/TLOF and safety area; and

(9) where fire protection systems are integrated with the building structure, sufficient contingency measures are provided to ensure minimal disruption to fire water requirements at the vertiport when VCA movements are taken place.

GM AMC2 VFI.OPS.D.VPT.035 Fire protection

FIRE AND LIFE SAFETY PROTECTION

Further guidance on specific fire protection measures at vertiports can refer to UAE Fire Codes and/or NFPA 418, Standard for Heliports and Vertiports.

SECTION E – HYBRID AIRCRAFT OPERATIONS (VFI.OPS.E)

VFI.OPS.D.HYB.005 Emergency planning

(a) An emergency plan shall be established commensurate with the hybrid aircraft operations and other activities conducted at the heliport or vertiport.

(b) The plan shall identify agencies which could be of assistance in responding to an emergency at the heliport or vertiport or in its vicinity.

(c) The emergency plan shall contain procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness.

GM VFI.OPS.D.HYB.005 Emergency planning

RISK-BASED APPROACH TO EMERGENCY PLANNING FOR HYBRID HELICOPTER AND VCA OPERATIONS

(a) Introduction

(1) The integration of hybrid helicopter and VTOL-capable aircraft into aviation operations introduces new complexities that require a comprehensive and risk-based approach to emergency planning. Heliport and vertiport operators must develop tailored emergency plans that address the unique risks associated with these advanced aircraft, including their propulsion systems, energy storage technologies, and operational profiles. A risk-based approach ensures that emergency preparedness measures are effective, efficient, and aligned with regulatory requirements, ultimately safeguarding lives, property, and the continuity of operations.

(c) Risk Assessment and Hazard Identification

(1) A thorough risk assessment forms the foundation of emergency planning. Operators must systematically identify hazards associated with hybrid helicopter and VTOL-capable aircraft operations. These hazards may include risks from battery thermal runaway, alternative fuel spills, confined-space emergencies, and urban operational challenges. The likelihood and severity of these hazards must be evaluated using recognised risk assessment tools. By categorising and prioritising risks, operators can focus their resources on addressing the most critical scenarios, ensuring that the emergency plan is both practical and comprehensive.

(d) Development of Emergency Response Strategies

(1) Emergency response strategies must be designed to address the specific risks identified during the assessment process. Operators must establish clear protocols for managing incidents such as fire involving fuel and batteries, energy system failures, and collision

scenarios involving hybrid aircraft. Response strategies should include procedures for the rapid deployment of RFF personnel, the containment of hazards, and the safe evacuation of passengers and personnel. Coordination with local emergency services and aviation stakeholders is essential to ensure a seamless and effective response.

(e) Emergency Facilities and Equipment

(1) Operators must ensure emergency facilities and equipment that support the effective implementation of the emergency plan. This includes designing emergency access routes, equipping firefighting and rescue teams with tools compatible with hybrid aircraft technologies, and ensuring the availability of extinguishing agents suitable for advanced energy systems. Emergency facilities should also include command centres that enable real-time coordination and communication during incidents. The adequacy and functionality of facilities and equipment must be regularly reviewed and updated to reflect evolving operational needs.

(f) Training and Competency Development

(1) The effectiveness of an emergency plan depends on the readiness and competency of personnel. Operators must implement training programmes that focus on the unique challenges posed by hybrid helicopter and VTOL aircraft. This includes familiarisation with advanced propulsion and energy storage systems, as well as procedures for managing confined-space and urban emergencies. Regular emergency drills and exercises should be conducted to validate personnel preparedness and identify areas for improvement. Training programmes must be iterative, incorporating lessons learned from incidents and advancements in hybrid aviation technologies.

(g) Stakeholder Collaboration

(1) Emergency planning for hybrid aircraft operations requires close collaboration with stakeholders, including aircraft manufacturers, regulatory authorities, local emergency services, and community representatives. Operators must ensure that emergency plans are aligned with regulatory requirements and reflect best practices within the aviation industry. Stakeholder engagement is essential for identifying potential gaps, addressing shared concerns, and fostering trust in the emergency preparedness framework.

(h) Testing, Validation, and Continuous Improvement

(1) The emergency plan must be regularly tested and validated through simulation exercises and live drills. These activities should replicate realistic scenarios, including those unique to hybrid aircraft operations, to assess the effectiveness of response strategies, communication protocols, and resource deployment. Post-exercise reviews

should be conducted to document findings and implement corrective actions. Operators must also establish mechanisms for the continuous improvement of the emergency plan, incorporating advancements in hybrid aviation technologies, operational changes, and insights from real-world incidents.

VFI.OPS.D.HYB.010 Rescue and firefighting

(a) The provision of rescue and firefighting equipment and services shall commensurate with the types of hybrid aircraft operations and other activities conducted at the at a heliport or vertiport.

(b) 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 heliport or vertiport under control within one minute, measured from activation of the system at the appropriate discharge rate.

(c) The heliport or vertiport operator conducting hybrid operations and activities shall ensure:

(1) the number of rescue and firefighting personnel are sufficient for the required task;

(2) rescue and firefighting personnel are trained to perform their duties, and maintain their competence; and

(3) rescue and firefighting personnel are provided with personal protective equipment.

(d) A main access and at least one additional means of escape shall be provided at an elevated hybrid heliport or vertiport.

GM VFI.OPS.HYB.RFF.010 Rescue and firefighting provisions

RISK-BASED APPROACH TO RESCUE AND FIREFIGHTING PROVISIONS FOR HYBRID HELICOPTER AND VCA OPERATIONS

(a) Introduction

(1) The introduction of hybrid helicopter and VTOL-capable aircraft operations presents unique challenges to heliport and vertiport operators. To ensure the safe and efficient management of such operations, a risk-based approach to rescue and firefighting (RFF) provisions must be adopted. This approach enables operators to identify and address specific risks associated with hybrid aircraft, ensuring that the principal aim and objectives of RFF services, facilities, and equipment are met. The implementation of a risk-based approach supports compliance with regulatory requirements while enhancing safety and operational readiness at the facility.

(b) Risk Assessment Framework

(2) A structured risk assessment framework is fundamental to determining appropriate RFF provisions for hybrid aircraft operations. Operators must systematically identify potential hazards, such as those related to energy storage systems, alternative propulsion technologies, and the operational complexities of hybrid aircraft. These hazards should be analysed in terms of their likelihood and severity, using recognised risk analysis tools to categorise and prioritise risks. The outcomes of this process will inform resource allocation, ensuring that the most critical risks are addressed effectively. Risk assessments must be reviewed periodically to accommodate changes in technology, operational activities, or lessons learned from past incidents.

(i) Determination of RFF Requirements

(1) Based on the risk assessment, operators must establish RFF provisions tailored to the specific needs of hybrid aircraft operations. This includes ensuring the availability of RFF personnel with specialised training to manage incidents involving advanced energy systems, thermal runaway events, and alternative propulsion technologies. RFF facilities must be designed to allow for rapid response and effective containment of hazards, while RFF equipment must be compatible with the unique characteristics of hybrid aircraft. The provision of extinguishing agents, specialised rescue tools, and equipment designed for confined or urban operational environments must be prioritised.

(j) Integration of Stakeholder Inputs

(1) Effective RFF planning requires collaboration with key stakeholders. Operators must engage aircraft manufacturers, emergency response agencies, regulatory authorities, and industry experts to ensure that RFF strategies are comprehensive and aligned with best practices. Stakeholder input should be incorporated at every stage of the planning process to address all relevant aspects of hybrid aircraft operations. This collaborative approach ensures that the RFF provisions are robust, practical, and reflective of the latest advancements in hybrid aviation.

(k) Operational Readiness and Training

(1) Operational readiness is critical to the success of RFF provisions. Operators must develop and implement training programmes that address the unique hazards associated with hybrid aircraft. RFF personnel should be trained in procedures to manage incidents involving energy storage systems and alternative propulsion technologies. Regular proficiency checks and emergency drills must be conducted to validate personnel readiness and the functionality of RFF equipment. Continuous

training ensures that personnel are equipped with the knowledge and skills necessary to respond effectively to emergencies.

(l) Testing and Validation of RFF Provisions

(1) The effectiveness of RFF provisions must be tested and validated through regular simulation exercises and live drills. These exercises should replicate realistic scenarios involving hybrid aircraft to evaluate emergency plans, personnel preparedness, and equipment performance. The results of these activities should be documented and used to refine RFF strategies. This iterative process ensures that RFF provisions remain effective and aligned with operational demands.

SUBPART D - CERTIFICATION SPECIFICATIONS AND GUIDANCE MATERIAL (CS-VFI-DSN)

SECTION A - HELIPORT (HPT-DSN)

CHAPTER A – GENERAL (HPT-DSN.A)

CS HPT-DSN.A.010 Applicability

(a) Unless otherwise specified, the certification specifications (CSs) and the related guidance material (GM) are applicable to the design of surface-level and elevated heliports. They shall be equally applicable to area that are for exclusive use of helicopters at an aerodrome that is primarily meant for the use of aeroplanes. Where relevant, the requirements PART ADR, shall apply to helicopter operations being conducted in aerodromes.

(b) Unless otherwise specified, the provisions given in this chapter are applicable for onshore heliports and based on the design assumption that no more than one helicopter will be in the FATO at the same time.

(c) The specifications of this chapter are applicable for visual heliports that may or may not incorporate the use of a Point-in-space (PinS) approach or departure.

(d) Where relevant, the CS and GM for design as stated in CS-ADR-DSN shall apply to the areas and infrastructure. Unless otherwise specified, the specifications for a colour referred to within CS-HPT-DSN should be those contained in CS-ADR-DSN.

(e) The dimensions discussed in this subpart are based on consideration of single-main-rotor helicopters. For tandem-rotor helicopters the heliport design will be based on a case-by-case review of the specific models using the basic requirement for a safety area and protection areas specified in this Part-VFI.

(f) When designing a heliport, a design helicopter, which represent the largest dimensions and the greatest maximum take-off mass (MTOM) the heliport is intended to serve, is taken into account.

(g) The specifications of this subpart are not applicable for water heliports (touchdown or lift - off on the surface of the water).

(h) The design provisions given in this chapter 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 CS-HPT-DSN, Section A, Chapter C, do not overlap.

(i) The provisions given in this PART VFI are common for surface-level heliports and elevated heliports unless otherwise specified. An elevated heliport located on roof top or other elevated structure where the TLOF is at least 30 inches (76cm) above the surrounding surface (a ground level heliport with a TLOF on a mound is not considered as an elevated heliport).

GM1 HPT-DSN.A.010 Applicability

(a) 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).

(b) For guidance on establishing a design helicopter see the Heliport Manual (Doc 9261)

(c) 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).

(d) 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).

CHAPTER B – PHYSICAL CHARACTERISTICS (HPT-DSN.B)

CS HPT-DSN.B.020 Final approach and take-off areas (FATOs) – Onshore heliports

(a) Applicability: A heliport shall be provided with at least one final approach and take-off area (FATO), which need not be solid.

(b) FATO shall:

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;

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

(i) when collocated 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 collocated with a TLOF, is free of hazards should a forced landing be required;

(3) be associated with a safety area.

(c) Dimensions

The minimum dimensions of a FATO shall be:

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

(i) 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

(ii) 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;

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

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

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

(d) Characteristics:

(1) A FATO shall be obstacle-free; essential objects located in a FATO shall not penetrate a horizontal plane at the FATO elevation by more than 5 cm.

(2) When the FATO is solid, the slope shall not:

(i) exceed 2 per cent in any direction; except as provided in (ii) or (iii) below,

(ii) 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

(iii) 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.

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

(f) For safety area surrounding the FATO refer CS HPT-DSN.A.025(a), (b) as applicable.

GM1 HPT-DSN.B.020 Final approach and take-off areas (FATOs) – Onshore heliports

(a) Local conditions, such as elevation, temperature and permitted manoeuvring shall be considered when determining the size of a FATO.

(b) 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.

(c) The RTOD is intended to ensure containment of the helicopter during a rejected take-off. Although some HFMs 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 1.5D for the FATO, should the HFM not deliver data. For further guidance see the Heliport Manual (Doc 9261).

(d) A FATO may be located on or near a runway strip or taxiway strip.

(e) 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).

GM1 HPT-DSN.B.020 (b)(1) Final approach and take-off areas (FATOs) – Onshore heliports

Essential objects are visual aids (e.g., lighting) or others (e.g., firefighting systems) necessary for safety purposes.)

GM1 HPT-DSN.B.020 (b)(2) Final approach and take-off areas (FATOs) – Onshore heliports

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

CS HPT-DSN.B.025(a) Safety areas – onshore heliports

(a) General: A FATO shall be surrounded by a safety area which need not be solid.

(b) Characteristics:

(1) A safety area shall provide:

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

(ii) when solid, a surface which is contiguous and flush with the FATO, is resistant to the effects of rotor downwash and ensures effective drainage.

(2) A 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 (Figure CS-B - 1).

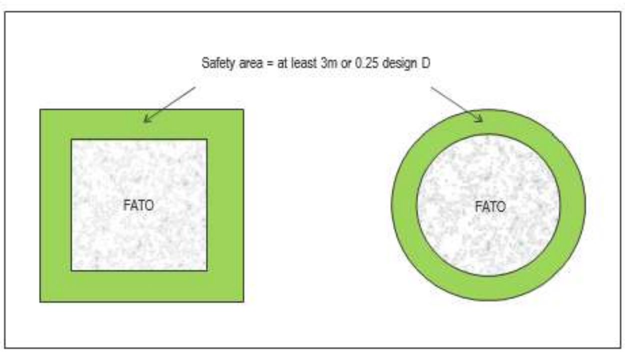


Figure CS-B- 1: FATO and associated safety area

(3) 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.

(4) No mobile object shall be permitted in a safety area during helicopter operations.

(5) 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.

CS HPT-DSN.B.025(b) Safety areas – for instrument heliports with non-precision and/or precision approaches and instrument departures

Applicable for instrument heliports with non-precision and/or precision approaches and instrument departures.

A safety area surrounding an instrument FATO shall extend:

(1) laterally to a distance of at least 45 m on each side of the centre line; and

(2) longitudinally to a distance of at least 60 m beyond the ends of the FATO.

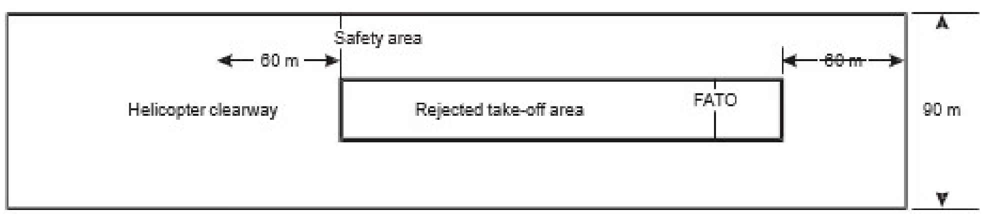


Figure CS-B- 2 - Safety Area for instrument FATO

CS HPT-DSN.B.030 Protected side slope - onshore heliports

(a) Protected side slop

(1) 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. Where possible, a heliport should be provided with at least two protected side slopes. (see Figure CS-B-3: FATO Simple/complex safety area and side slope).

(2) The surface of a protected side slope shall not be penetrated by obstacles.

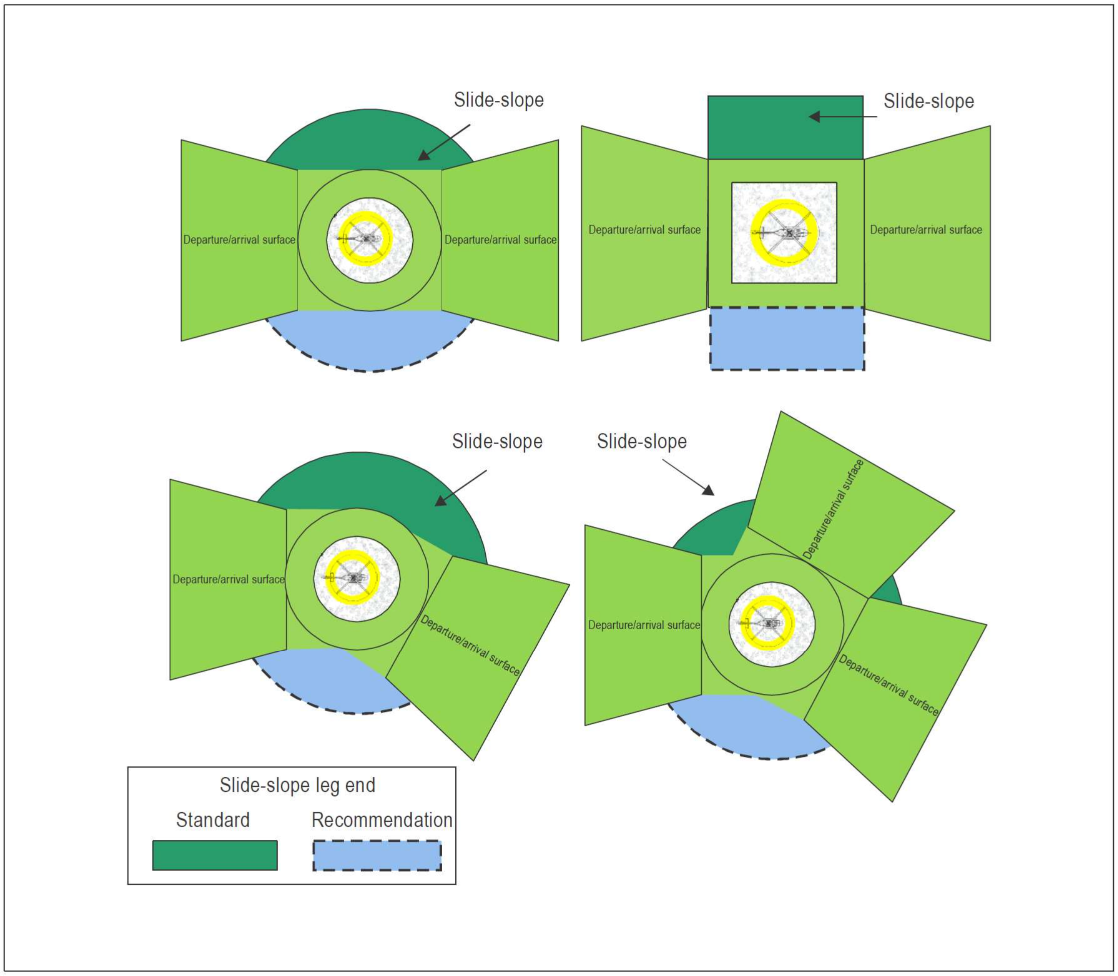


Figure CS-B- 3: FATO Simple/complex safety area and side slope

Note: The diagrams show a number of configurations of FATO/safety areas/side slopes. For a more complex departure/arrival arrangement which consists of: two surfaces that are not diametrically opposed; more than two surfaces; or an extensive obstacle-free sector which abuts directly to the FATO, it can be seen that appropriate provisions are necessary to ensure that there are no obstacles between the FATO and/or safety area and the departure/arrival surfaces.

GM1 CS HPT-DSN.B.030 Protected side slope - onshore heliports

A heliport can 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.

CS HPT-DSN.B.035 Helicopter clearways - onshore heliports

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

(a) Applicability:

(1) 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, to achieve its safe climbing speed;

(B) when solid, the surface shall be contiguous and flush with the FATO and safety area , is resistant to the effects of rotor downwash and is free of hazards should a forced landing be required; or

(C) when elevated, clearance above all obstacles.

(2) When a helicopter clearway is provided, the inner edge shall 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.

(b) Characteristics:

(1) The width of a helicopter clearway shall not be less than the FATO that of the associated safety area (see Figure CS-B-1: FATO and associated safety area)

(2) When solid, the ground in a helicopter clearway shall not project above a plane having an overall 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.

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

GM1 HPT-DSN.B.035 Helicopter clearways-onshore heliports

(a) A helicopter clearway would need to be considered when the heliport is intended to be used by helicopters operating in performance class 1.

(b) Guidance on designing a clearway that is below the FATO of an elevated heliport/helideck is provided in Heliport Manual (Doc 9261).

CS HPT-DSN.B.040 Touchdown and lift-off area (TLOF) – onshore heliports

(a) General:

(1) A heliport shall be provided with at least one TLOF.

(2) 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.

(b) Characteristics:

(1) The TLOF area and its surface shall:

(i) be 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;

(ii) be free of irregularities that would adversely affect the touchdown or lift-off of helicopters;

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

(iv) have sufficient friction to avoid skidding of helicopters or slipping of persons;

(v) have resistant to the effects of rotor downwash;

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

(vii) be associated with a FATO or a stand.

(c) Minimum dimensions of TLOF shall be:

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

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

(i) 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:

1) in a FATO, the design helicopter; or

2) in a stand, the largest helicopter the stand is intended to serve; and

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

1) in a FATO, the design helicopter; or

2) in a stand, the most demanding helicopter the stand is intended to serve.

(d) 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.

(e) The slope on a TLOF shall not:

(1) except as provided in (2) or (3) below, exceed 2 per cent in any direction;

(2) 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

(3) 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.

(f) When a TLOF is within a FATO, it shall be:

(1) centred on the FATO; or

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

(g) When a TLOF is within a helicopter stand, it shall be centred on the stand.

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

(i) Where an elongated performance class 1 FATO/TLOF contains more than one TDPM, measures should be in place to ensure that only one can be used at a time.

(j) Where alternative TDPMs are provided, they should be placed to ensure containment of the undercarriage within the TLOF and the helicopter within the FATO.

(k) 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.

GM1 HPT-DSN.B.040 Touchdown and lift-off areas (TLOFs)

(a) When a TLOF in a FATO is larger than the minimum dimensions, the touchdown/positioning marking (TDPM) may be offset while ensuring containment of the undercarriage within the TLOF and the helicopter within the FATO.

GM1 HPT-DSN.B.040(j) Touchdown and lift-off areas (TLOFs)

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

CS HPT-DSN.B.045 General – Helicopter taxiways and taxi-routes- onshore heliports

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 rotor downwash would need to be considered.

CS HPT-DSN.B.050 Helicopter taxiways - onshore

(a) General

A helicopter taxiway area and surface shall:

(1) be 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) has bearing strength to accommodate the taxiing loads of the helicopters the taxiway is intended to serve;

(3) is free of irregularities that would adversely affect the ground taxiing of helicopters; and

(4) is resistant to the effects of rotor downwash;

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

(6) Be associated with a taxi-route.

(b) Characteristics:

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

(1) twice the Under-Carriage Width (UCW) of the most demanding helicopter the taxiway is intended to serve; or

(2) a width meeting the requirement of (a)(1).

(c) The transverse slope of a taxiway shall not exceed 2 per cent and the longitudinal slope should not exceed 3 percent.

GM1 HPT-DSN.B.050 Helicopter taxiways - onshore

(a) A helicopter taxiway is intended to permit the surface movement of a wheeled helicopter under its own power.

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

(c) 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.

CS HPT-DSN.B.055 Helicopter taxi-routes-onshore

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; of sufficient width to ensure containment of the largest helicopter the taxi-route is intended to serve; and

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

(1) when collocated with a taxiway:

(i) is contiguous and flush with the taxiway;

(ii) does not present a hazard to operations; and

(iii) ensures effective drainage; and

(2) when not collocated with a taxiway, is free of hazards if a forced landing be required.

(c) No mobile object shall be permitted on a taxi-route during helicopter operations.

(d) When solid and collocated, the taxi-route shall not exceed an upward transverse slope of 4 per cent outwards from the edge of the taxiway.

GM1 CS HPT-DSN.B.055 Helicopter taxi-routes-onshore

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

CS HPT-DSN.B.060 Helicopter ground taxi-routes - onshore

(a) 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. (Figure CS-B-4: Helicopter taxiway/ground taxi-route).

(b) Essential objects located in a helicopter ground 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.

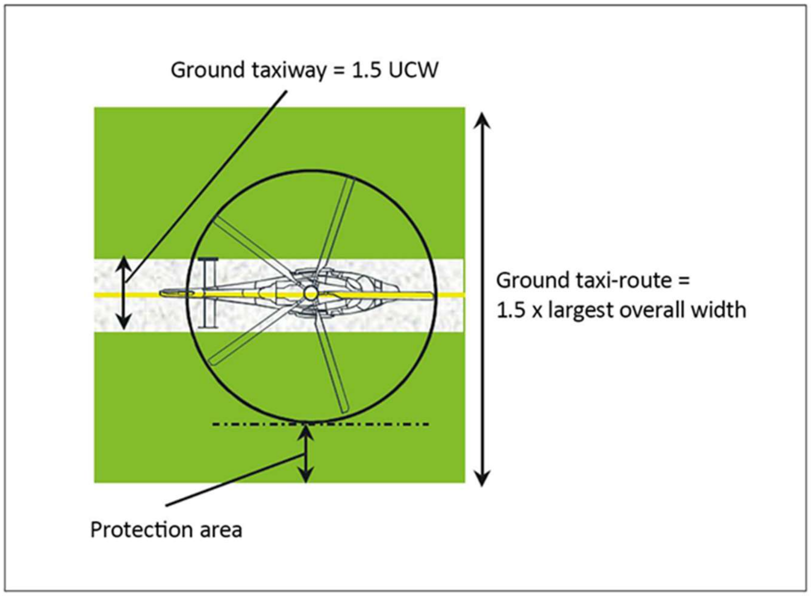


Figure CS-B- 4: Helicopter taxiway/ground taxi-route

CS HPT-DSN.B.062 Helicopter air taxi-routes - onshore

Objective :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 kt).

Characteristics:

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

(b) If collocated with a taxiway for the purpose of permitting both ground and air taxi operations (see Figure CS-B-5: Helicopter air taxi-route and combined air taxi-route/taxiway):

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

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

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

    (ii) 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.

(c) When not collocated with a taxiway, the slopes of the surface of an air taxi-route shall not exceed the slope landing limitations of the helicopters the taxi-route is intended to serve. In any event, the transverse slope shall not exceed 10 per cent and the longitudinal slope shall not exceed 7 per cent.

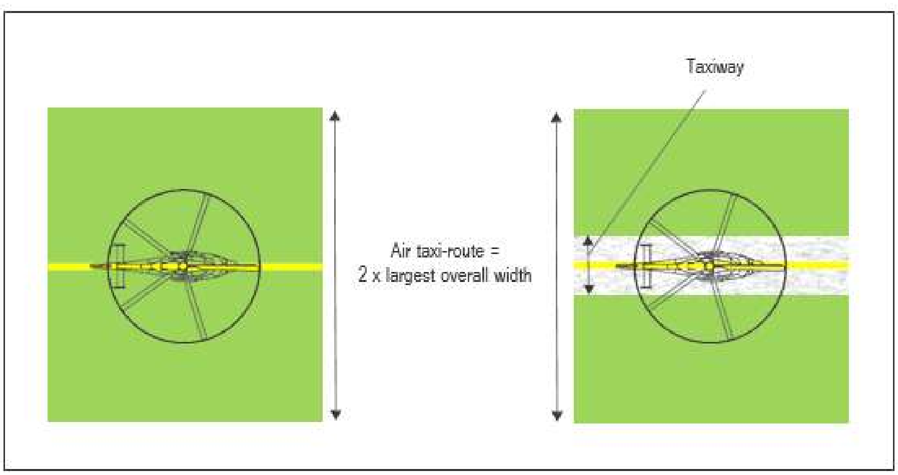


Figure CS-B- 5: Helicopter air taxi-route and combined air taxi-route/taxiway

CS HPT-DSN.B.065 Helicopter stands - onshore

(a) Applicability: The provisions of CS HPT-DSN.B.065 do not specify the location for helicopter stands but allow a high degree of flexibility in the overall design of the heliport.

(b) Characteristics:

(1) A helicopter stand area and surface shall :

(i) be 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;

(ii) be resistant to the effects of rotor downwash;

(iii) be free of irregularities that would adversely affect the manoeuvring of helicopters;

(iv) have a bearing strength capable of withstanding the intended loads;

(v) have sufficient friction to avoid skidding of helicopters or slipping of persons; and

(vi) ensure effective drainage while having no adverse effect on the control or stability of a wheeled helicopter when being maneuvered under its own power, or when stationary.

(2) A helicopter stand shall be surrounded by a protection area which need not be solid.

(3) The minimum dimensions of a helicopter stand shall be:

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

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

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

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

GM1 HPT-DSN.B.065 Helicopter stands

(a) It is not considered good practice to locate helicopter stands under a flight path.

(b) For a helicopter stand intended to be used by wheeled helicopters for turning on the ground, the dimension of the helicopter stand and the protection area, including the dimension of the central zone, would need to be significantly increased.

(c) For a helicopter 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 CS HPT-DSN.A.065 (b)

(d) 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.

CS HPT-DSN.B.070 Protection areas - onshore

(a) A protection area shall provide:

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

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

(b) When associated with a stand designed for turning, the protection area shall extend outwards from the periphery of the stand for a distance of 0.4 D (see. Figure CS-B- 6: Turning stands).

(c) 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. (Figure CS-B-7: Ground taxi-through stands (with taxiway/ground taxi-route) simultaneous use and Figure CS-B-8: Air taxi-through stands (with air taxi route) simultaneous use).

(d) When associated with a stand designed for non-simultaneous use (see Figure CS-B- 9 and CS-B- 10):

(1) 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

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

(e) No mobile object shall be permitted in a protection area during helicopter operations.

(f) Essential objects located in the protection area shall not:

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

(2) if located at a distance of 0.75 D or more from the centre of the helicopter stand, penetrate a surface 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.

(g) When solid, the slope of a protection area should not exceed an upward slope of 4 per cent outwards from the edge of the stand.

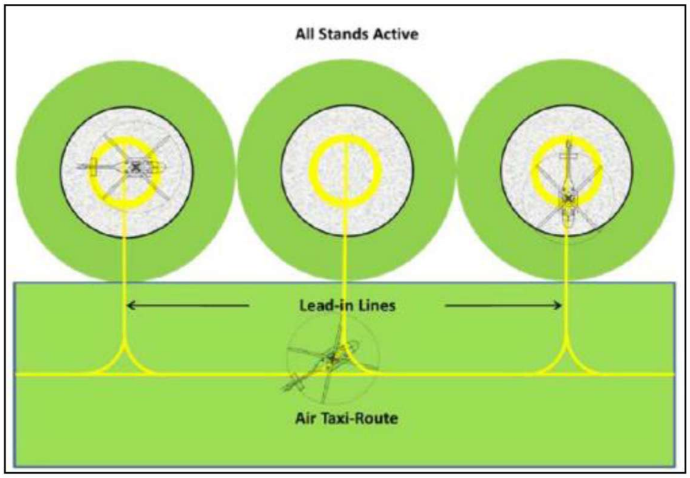


Figure CS-B- 6: Turning stands (with air taxi-routes)/ simultaneous use

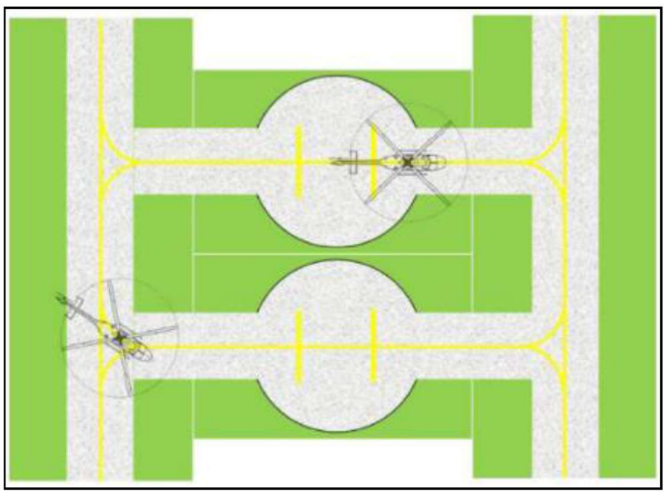


Figure CS-B- 7: Ground taxi-through stands (with taxiway/ground taxi-route) simultaneous use

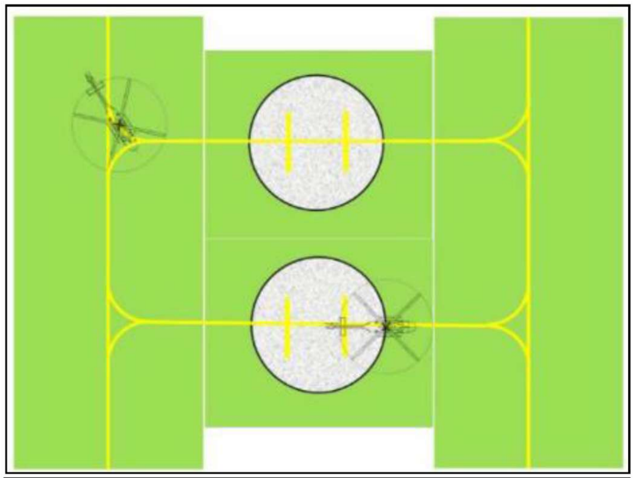


Figure CS-B- 8: Air taxi-through stands (with air taxi route) simultaneous use

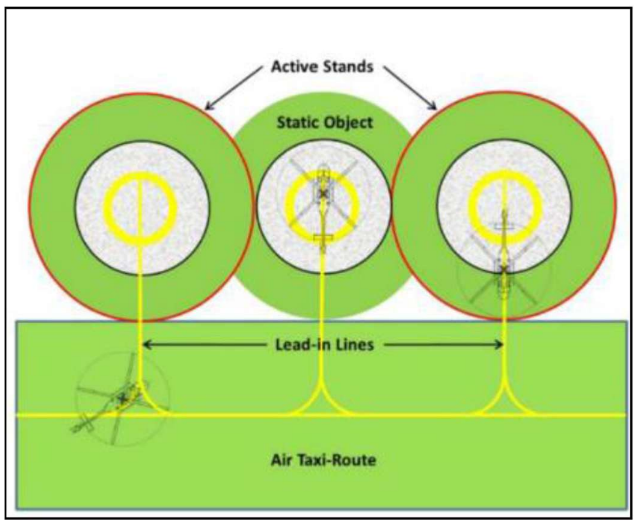


Figure CS-B- 9: Turning stands (with air taxi-routes) non-simultaneous use – outer stands active

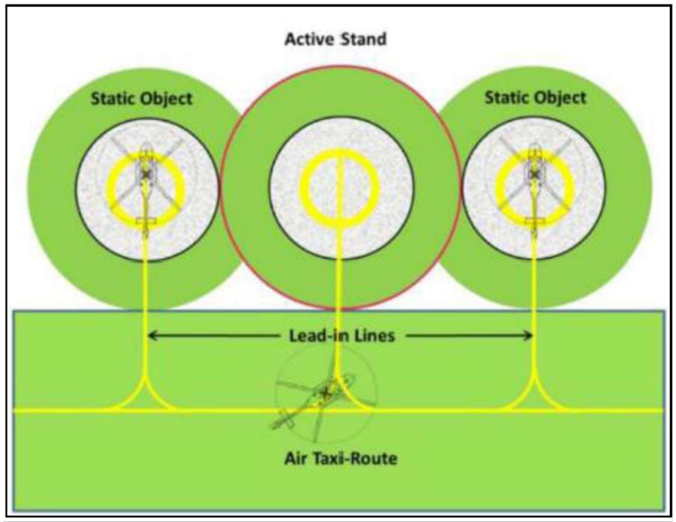


Figure CS-B- 10: Turning stands (with air taxi-route) non-simultaneous use – inner stand active

CS HPT-DSN.B.075 Location of a FATO in relation to a runway or taxiway - onshore

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 below (Table CS-B- 1: FATO minimum separation distance for simultaneous operations).

Table CS-B- 1: FATO minimum separation distance for simultaneous operations

If aeroplane mass and/or helicopter mass are	Distance between FATO edge and runway edge or taxiway edge
up to but not including 3 175 kg	60 m
3 175 kg up to but not including 5 760 kg	120 m
5 760 kg up to but not including 100 000 kg	180 m
100 000 kg and over	250 m
Note: The values specified in this table are primarily intended to mitigate risks of wake turbulence encounters. In addition to this table, when positioning a FATO intended to be used simultaneously with a nearby runway or taxiway, attention should be given to other CS ADR-DSN requirements such as the minimum runway strip width. Local environment should be taken into account when setting the separation between the FATO and nearby infrastructure elements to ensure the safety of simultaneous operations .	

GM1 CS HPT-DSN.B.075 Location of a FATO in relation to a runway or taxiway - onshore

(a) A FATO should not be located:

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

(2) near areas where aeroplane vortex wake generation is likely to occur.

CS HPT-DSN.B.085 Safety devices around an elevated heliport - onshore

(a) 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 (e)).

(b) 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:

(1) 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;

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

(3) 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.

(c) 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.

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

(e) 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).

(f) 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.

CS HPT-DSN.B.090 Means of escape - elevated heliport- onshore

Elevated heliports and helidecks shall be provided with a main access and at least one additional means of escape.

GM1 CS HPT-DSN.B.090 Means of escape- elevated heliport- onshore

(a) Access points shall be located as far apart from each other as is practicable.

(b) 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.

GM CS HPT-DSN.B.100 FATOs and TLOFs – Shipboard heliports

(a) When helicopter operating areas are provided in the bow or stern of a ship or are purpose-built above the ship's structure, they should be regarded as purpose-built shipboard heliports.

(b) A shipboard heliport should be provided with one FATO and one coincidental or collocated TLOF.

(c) 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 heliport is intended to serve.

(d) The TLOF of a shipboard heliport should be dynamic load-bearing.

(e) The TLOF of a shipboard heliport should provide ground effect.

(f) For purpose-built shipboard heliports provided in a location other than the bow or stern, the TLOF should be of sufficient size to contain a circle with a diameter not less than 1 D of the largest helicopter the heliport is intended to serve.

(g) For purpose-built shipboard heliports provided in the bow or stern of a ship, the TLOF should be of sufficient size to:

    (1) contain a circle with a diameter not less than 1 D of the largest helicopter the heliport is intended to serve; or

    (2) for operations with limited touchdown directions, contain an area within which can be accommodated two opposing arcs of a circle with a diameter of not less than 1 D in the helicopter's longitudinal direction. The minimum width of the heliport shall be not less than 0.83 D.(see Figure CS-B- 11).

(h) For non-purpose-built shipboard heliports, the TLOF should be of sufficient size to contain a circle with a diameter not less than 1 D of the largest helicopter the heliport is intended to serve.

(i) A shipboard heliport should be arranged to ensure that a sufficient and unobstructed air-gap is provided which encompasses the full dimensions of the FATO.

Note. — Specific guidance on the characteristics of an air-gap is given in the Heliport Manual (Doc 9261). As a general rule, except for shallow superstructures of three stories or less, a sufficient air-gap will be at least 3 m.

(j) 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.

(k) No fixed object should be permitted around the edge of the TLOF except for objects, which, because of their function, must be located thereon.

(l) 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.

(m) 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 1 D, objects in the obstacle-free sector, whose function requires them to be located on the edge of the TLOF, should 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.

(n) 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.

(o) Safety devices such as safety nets or safety shelves should be located around the edge of a shipboard heliport, except where structural protection exists, but shall not exceed the height of the TLOF.

(p) The surface of the TLOF shall be skid-resistant to both helicopters and persons.

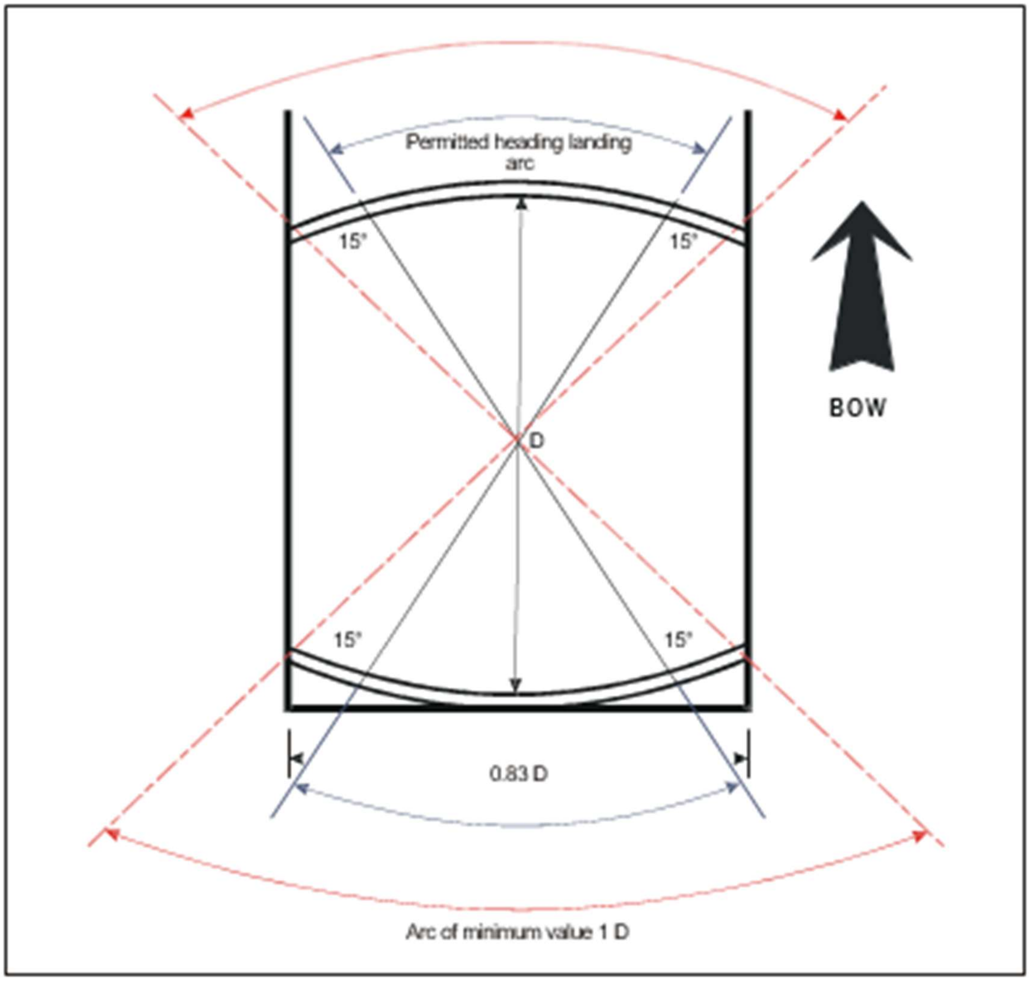


Figure CS-B- 11 : Shipboard permitted landing headings for limited heading operations

CHAPTER C - OBSTACLE ENVIRONMENT (HPT-DSN.C)

CS HPT-DSN.C.100 Applicability

The objectives of the specifications in this chapter are to describe the airspace around heliports/helidecks so as to permit intended helicopter operations to be conducted safely and to prevent, heliports/helidecks 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.

OBSTACLE LIMITATIONS SURFACES AND SECTORS

CS HPT-DSN.C.105 Approach surface

(a) The objective of an approach surface is to protect a helicopter during the final approach to the FATO by defining an area that should be kept free from obstacles to protect a helicopter in the final phase of the approach to land manoeuvre.

(b) Description: An inclined plane or a combination of planes or, when a turn or turns are involved, a complex surface sloping upwards from the inner edge and centred on a line passing through the centre of the FATO.

(c) Characteristics:

(1) The limits of an approach surface shall comprise:

(i) an inner edge horizontal and perpendicular to the centre line of the approach surface with a minimum width equal to the specified width/diameter of the FATO plus the safety area, and located at:

(ii) the outer edge of the safety area; or

(iii) when vertical procedures are being utilized, directly above the outer edge of the safety area.

(iv) 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

(v) an outer edge horizontal and perpendicular to the centre line of the approach surface:

(A) at a height of 152 m (500 ft) above the elevation of the FATO; or

(B) when a PinS approach procedure with proceed visually instruction is defined, a specified height above the elevation of the FATO.

(2) The elevation of the inner edge shall be:

(i) the elevation of the FATO at the point on the inner edge that is intersected by the centre line of the approach surface; or

(ii) When vertical procedures are being utilized; the level at which obstacle clearance is achieved.

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

(4) In the case of an approach surface involving a turn or turns, the surface shall 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.

(5) Where a curved portion of an approach surface is provided, the sum of the radius of the 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.

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

GM1 HPT-DSN.C.105 Approach surface

(a) For heliports intended to be used by helicopters operated in performance class 2 or 3, it is good practice for the approach 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.

(b) A full description, detailed explanation and visual depiction of the obstacle limitation surfaces and sectors is provided in the Heliport Manual (Doc 9261).

(c) For guidance on the provision of elevated helicopter clearways and elevated surfaces, see the Heliport Manual (Doc 9261).

(d) For guidance on construction of turns in approach or take-off climb surfaces see the Heliport Manual (Doc 9261).

CS HPT-DSN.C.110 Transitional surface

(a) Description: A complex surface along the side of the safety area and helicopter clearway when provided, and part of the side of the approach or take-off climb surface, that slopes upwards and outwards to a predetermined height.

(b) Characteristics.

(1) The limits of a transitional surface shall comprise:

(i) a lower edge beginning at a point on the side of the approach or take-off climb surface at a specified height extending down the side of the approach or take-off climb surface to the inner edge and from there along the length of the side of the helicopter clearway, when provided and safety area, parallel to the centre line of the FATO; and

(ii) an upper edge located at:

(A) 45 m (150 ft) above the FATO; or

(B) when vertical procedures are being utilized; 15 m (50 ft) above the elevation of the upper edge of the ascent/descent surface.

(2) The elevation of a point on the lower edge shall be:

(i) along the side of the approach or take-off climb surface — equal to the elevation of the approach or take-off climb surface at that point; then

(ii) if provided, along the helicopter clearway – equal to the elevation of the helicopter clearway; and

(iii) along the safety area — equal to the elevation of the FATO.

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

CS HPT-DSN.C.115 Take-off climb surface

(a) The purpose of the take-off climb surface is to protect a helicopter on take-off and during climb-out.

(b) Description: An inclined plane, a combination of planes or, when a turn or turns are involved, a complex surface sloping upwards from the end of the safety area, or the helicopter clearway, when provided and centred on a line passing through the centre of the FATO.

(c) Characteristics:

(1) The limits of a take-off climb surface shall comprise:

(i) an inner edge horizontal and perpendicular to the centre line of the take-off climb surface, with a minimum width/diameter of:

(A) when located at the outer edge of the safety area or helicopter clearway the FATO plus the safety area; or

(B) when located at the outer edge of the elevated helicopter clearway, the elevated helicopter clearway.

(ii) 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

(iii) an outer edge horizontal and perpendicular to the centre line of the take-off climb surface and at:

(A) a height of 152 m (500 ft) above the elevation of the FATO; or

(B) when a PinS departure procedure with proceed visually instruction is defined, a specified height above the elevation of the FATO.

(2) The elevation of the inner edge shall be:

(A) 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: or

(B) When located at the outer edge of the helicopter clearway, the elevation of the helicopter clearway.

(3) 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.

(4) In the case of a take-off climb surface involving a turn or turns, the surface shall 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 take-off climb surface.

(5) Where a curved portion of a take-off climb surface, that does not have its inner edge at the outer edge of a clearway, is provided, the sum of the radius of the 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. (see Figure CS-C- 1: Curved approach and take-off climb surface for all FATOs).

(6) Any variation in the direction of the centre line of a take-off climb surface should be designed so as not to necessitate a turn of radius less than 270 m. (see Figure CS-C- 1: Curved approach and take-off climb surface for all FATOs).

GM1 HPT-DSN.C.115 Take-off climb surface

(a) For heliports intended to be used by helicopters operated in performance class 2 and 3, it is an operational requirement for departure paths to be selected so as to permit safe forced landings or one-engine-inoperative landings such that injury to persons on the ground or damage to property are minimised. 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.

(b) The approach and take-off surfaces should be offset from each other ideally by an angle of not less than 135 degrees.

(c) Helicopter take-off performance is reduced in a turn and as such a straight portion along the take-off climb surface prior to the start of the curve allows for acceleration.

(d) For guidance on construction of turns in approach or take-off climb surfaces see the Heliport Manual (Doc 9261).

CS HPT-DSN.C.117 Obstacle-free sector/surface — helidecks

(a) Description: 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.

(b) Characteristics. An obstacle-free sector/surface shall subtend an arc of specified angle.

(c) A helideck obstacle-free sector shall comprise of two components, one above and one below helideck level (see Figure CS-C- 2):

  (1) 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.

  (2) 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.

GM1 CS HPT-DSN.C.117 Obstacle-free sector/surface — helidecks

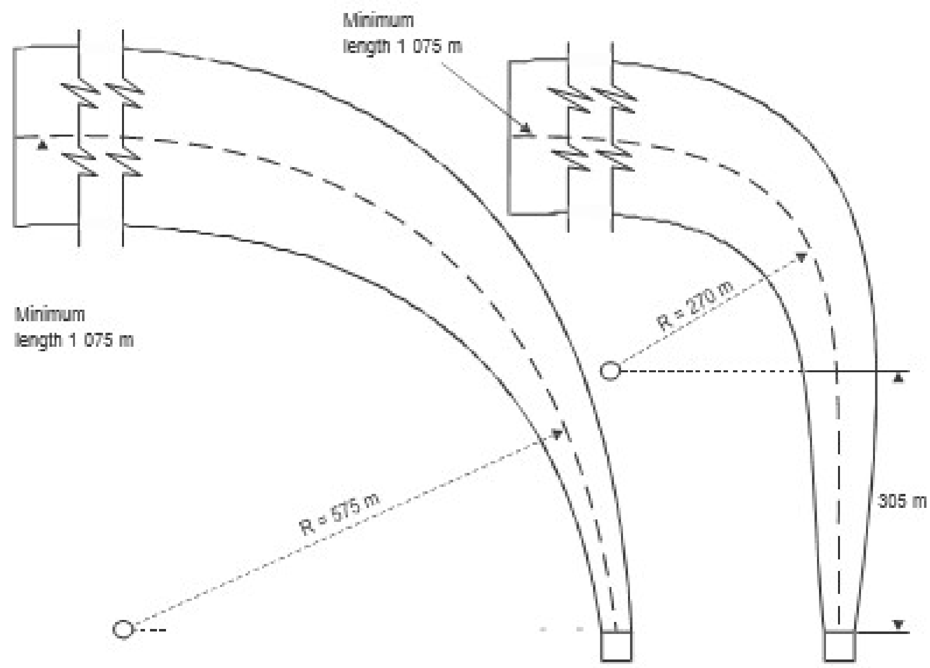
For both the above obstacle-free sectors for helicopters operated in performance class 1 or 2, the horizontal extent of these distances from the helideck will be compatible with the one-engine-inoperative capability of the helicopter type to be used.

CS HPT-DSN.C.118 Limited obstacle sector/surface — helidecks

(a) Where obstacles are necessarily located on the structure, a helideck may have a limited obstacle sector (LOS).

(b) Description: 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.

(c) Characteristics: A limited obstacle sector shall not subtend an arc greater than 150 degrees. Its dimensions and location shall be as indicated in Figure CS-C-3 for a 1 D FATO with coincidental TLOF and Figure CS-C-4 for a 0.83 D TLOF.



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 CS-C- 1: Curved approach and take-off climb surface for all FATOs

OBSTACLE LIMITATION REQUIREMENTS

CS HPT-DSN.C.130 Obstacle limitation requirements – Onshore heliports

(a) General: 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.

(b) Onshore heliports: The following obstacle limitation surfaces shall be established for a FATO at heliports with a PinS approach or departure procedure with a proceed visually instruction:

(1) take-off climb surface;

(2) approach surface; and

(3) transitional surface.

(c) The following obstacle limitation surface shall be established a FATO at heliports, other than specified in (b) above, including heliports with a PinS approach or departure procedure without a proceed visually instruction:

(1) take-off climb surface; and

(2) approach surface.

(d) Characteristics:

(1) The slopes of the obstacle limitation surfaces should not be greater than, and their other dimensions not less than, those specified in Table CS-C-1.

(2) Except for heliports facilitating performance class 1 operations that have an approach/take-off climb surface with a 4.5 per cent 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.

(3) New objects or extensions of existing objects shall not be permitted above the approach or take-off climb or transitional surfaces except when shielded by an existing immovable object.

(4) Existing objects above the approach, take off climb surfaces or transitional surface should, as far as practicable, be removed except when the object is shielded by an existing immovable object.

(5) A heliport shall have at least one approach and take-off climb surface.

GM HPT-DSN.C.030 Obstacle limitation requirements

(a) A surface-level heliport should have at least two approach and take-off climb surfaces, separated by not less than 135°.

(b) The application of curved approach or take-off climb surfaces may alleviate the problems created by objects infringing these surfaces.

(c) The Procedures for Air Navigation Services — Aircraft Operations, (PANS-OPS, Doc 8168), Volume II, Part IV details procedure design criteria.

(d) Annex 6, Part 3, provides procedures that may be useful in determining the extent of obstacle penetration

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

Table CS-C- 1: Approach and take-off climb slope design categories

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 (Helicopter 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
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:			
Slope	50% (1:2)	50% (1:2)	50% (1:2)

Height	45m[d]	45m[d]	45m[d]
(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 helicopter to 152 m (500 ft) above FATO elevation. (b) 7 rotor diameters overall width for day operations or 10 rotor diameters overall width for night operations. (c) This length may be reduced if vertical procedures are in place or extended/reduced if the approach or take-off climb surface is extended/reduced to meet the OCS of the PinS approach or departure procedure. (d) See CS HPT-DSN.C.110 (b)(ii)			

CS HDC-DSN.C.140 Obstacle limitation requirements - Helidecks

(a) A helideck shall have an obstacle-free sector.

(b) There shall be no fixed obstacles within the obstacle-free sector above the obstacle-free surface.

(c) 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 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 vertically within the 180-degree sector for multi-engine helicopters operated in performance class 1 or 2. (See Figure CS-C-2: Helideck obstacle-free sector)

(d) 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 LOS, 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 CS-C-3: Helideck obstacle limitation sectors and surfaces for a FATO and coincidental TLOF of 1 D and larger)

(e) 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 CS-C-4: Helideck obstacle limitation sectors and surfaces for a TLOF of 0.83 D and larger).

(f) Shipboard heliports:

(1) Purpose-built heliports located forward or aft: When helicopter operating areas are provided in the bow or stern of a ship, they shall apply the obstacle criteria for helidecks.

(2) Amidships location — Purpose-built and non-purpose-built:

(i) 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.

(ii) 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.

(iii) 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 CS- C-5)

(g) Non-purpose-built heliports — Ship's side location

(1) 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.

(2) 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 CS-C-6: Ships-side non-purpose-built heliport obstacle limitation sectors and surfaces) Such objects shall only be present if they do not represent a hazard to helicopters.

(3) A LOS 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 LOS 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.

(h) Winching areas

(1) An area designated for winching on-board ships shall be comprised of 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 CS-C-7: Winching area of a ship)

(2) The manoeuvring zone shall be comprised of two areas:

(i) 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

(ii) the outer manoeuvring zone extending from the perimeter of the inner manoeuvring zone and of a circle of diameter not less than 2 D.S

(3) Within the clear zone of a designated winching area, no objects shall be located above the level of its surface.

(4) Objects located within the inner manoeuvring zone of a designated winching area shall not exceed a height of 3 m.

(5) Objects located within the outer manoeuvring zone of a designated winching area shall not exceed a height of 6 m.

GM1 HDC-DSN.C.140 Obstacle limitation requirements – Helidecks

A helideck may have a LOS. (refer to CS HPT-DSN.C.118 Limited obstacle sector/surface — helidecks)

GM1 HDC-DSN.C.140(c) Obstacle limitation requirements - Helidecks

Where there is a requirement to position, at sea surface level, one or more offshore support vessel(s) (e.g., a Standby Vessel) essential to the operation of a fixed or floating offshore facility, but located within the proximity of the fixed or floating offshore facility, any offshore support vessel(s) would need to be positioned so as not to compromise the safety of helicopter operations during take-off departure and/or approach to landing.

GM1 HDC-DSN.C.140(d) Obstacle limitation requirements - Helidecks

(a) 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. Figure CS-C-3 has been constructed on the assumption that an octagonal helideck arrangement is provided. (see Figure CS-C-3: Helideck obstacle limitation sectors and surfaces for a FATO and coincidental TLOF of 1 D and larger)

(b) Further guidance for square (quadrilateral) and circular FATO and TLOF arrangements is given in the Heliport Manual (Doc 9261).

GM1 HDC-DSN.C.140(e) Obstacle limitation requirements - Helidecks

(a) 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. Figure CS-C-4 has been constructed on the assumption that an octagonal helideck arrangement is provided. (see Figure CS-C- 4:Helideck obstacle limitation sectors and surfaces for a TLOF of 0.83 D and larger)

(b) Further guidance for square (quadrilateral) and circular FATO and TLOF arrangements is given in the Heliport Manual (Doc 9261).

GM1 HDC-DSN.C.140(g) Obstacle limitation requirements - Helidecks

Any objects located within the areas described in (g)(2)(3) 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 (g)(3), particularly if objects are significantly higher than 25 cm and in close proximity to the boundary of the LOS. See the Heliport Manual (Doc 9261) for guidance.

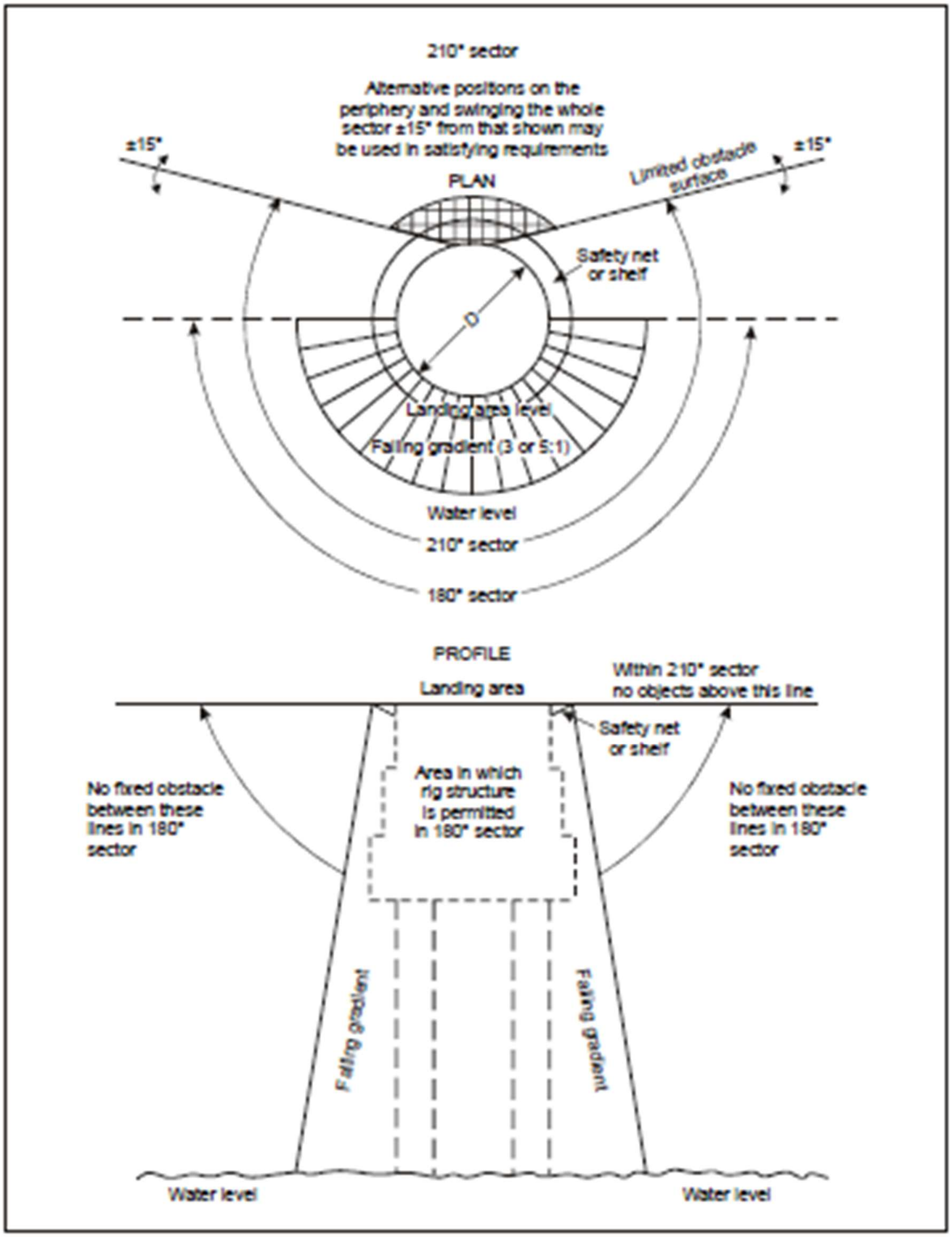


Figure CS-C- 2:Helideck obstacle-free sector

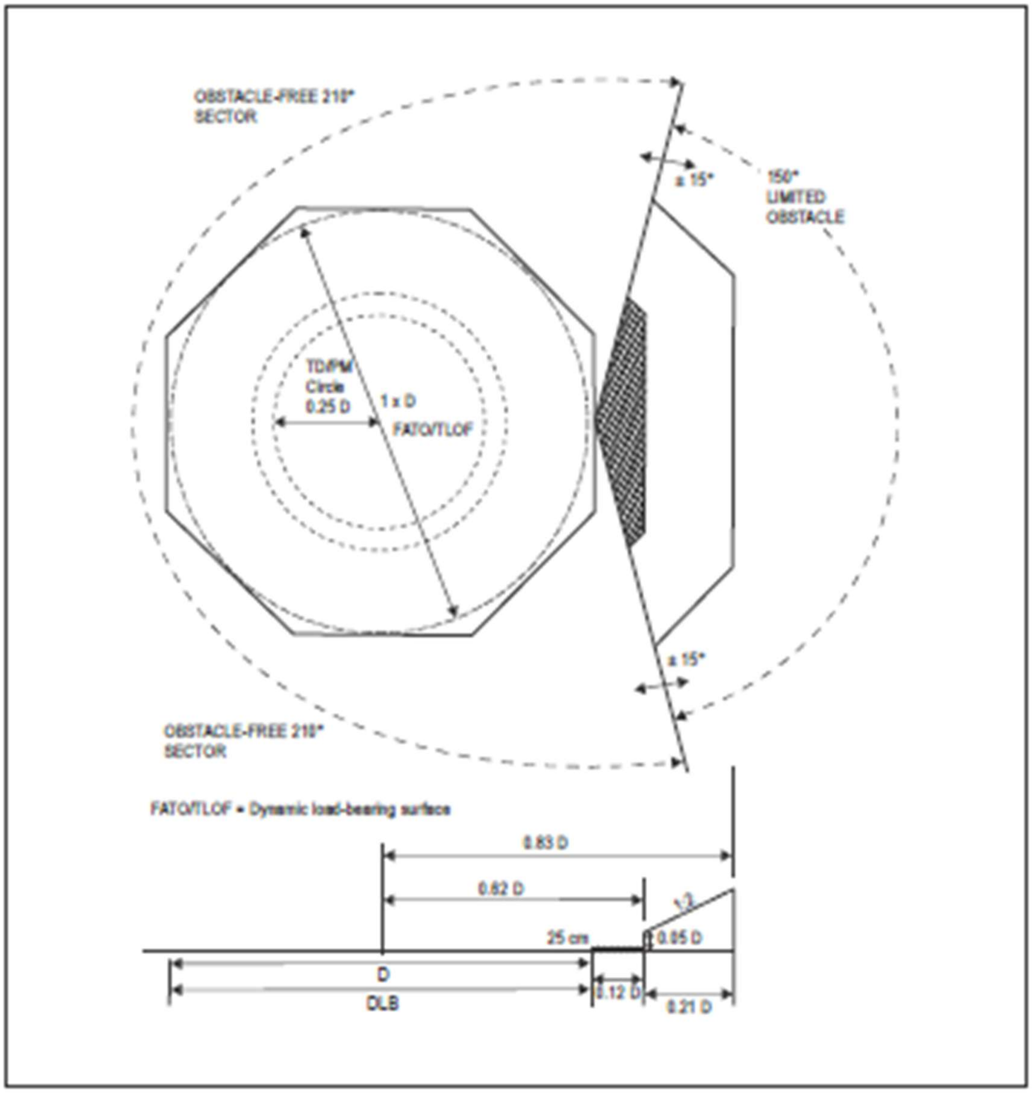


Figure CS-C- 3:Helideck obstacle limitation sectors and surfaces for a FATO and coincidental TLOF of 1 D and larger

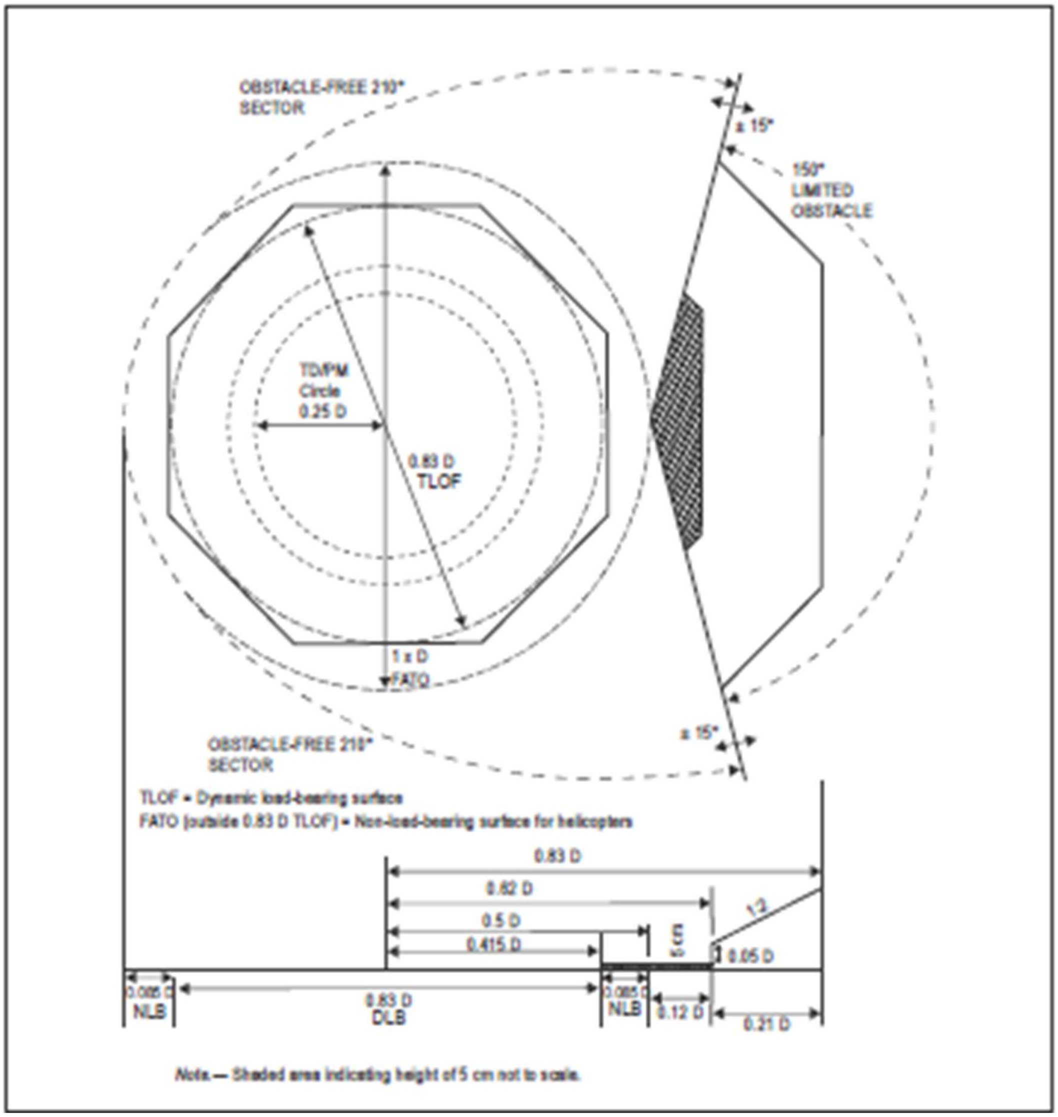


Figure CS-C- 4:Helideck obstacle limitation sectors and surfaces for a TLOF of 0.83 D and larger

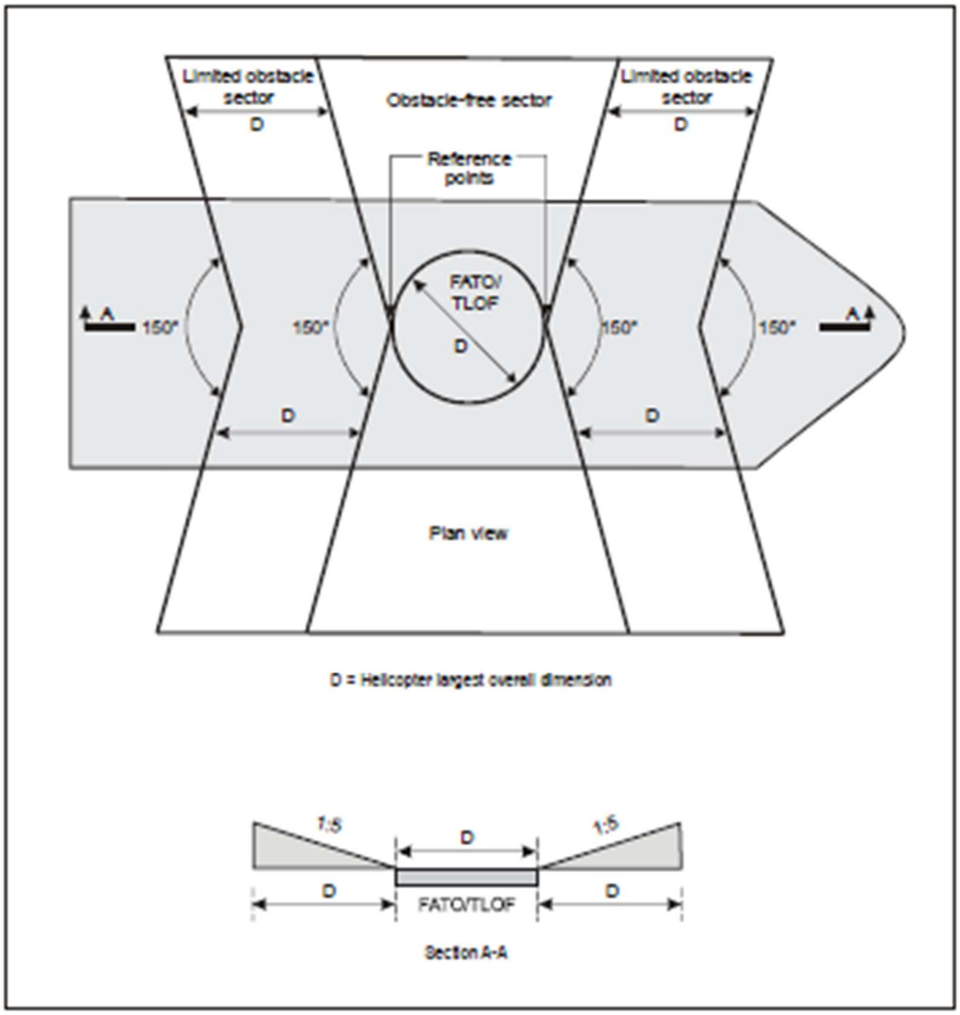


Figure CS-C- 5: Amidship's location — shipboard heliport obstacle limitation surfaces

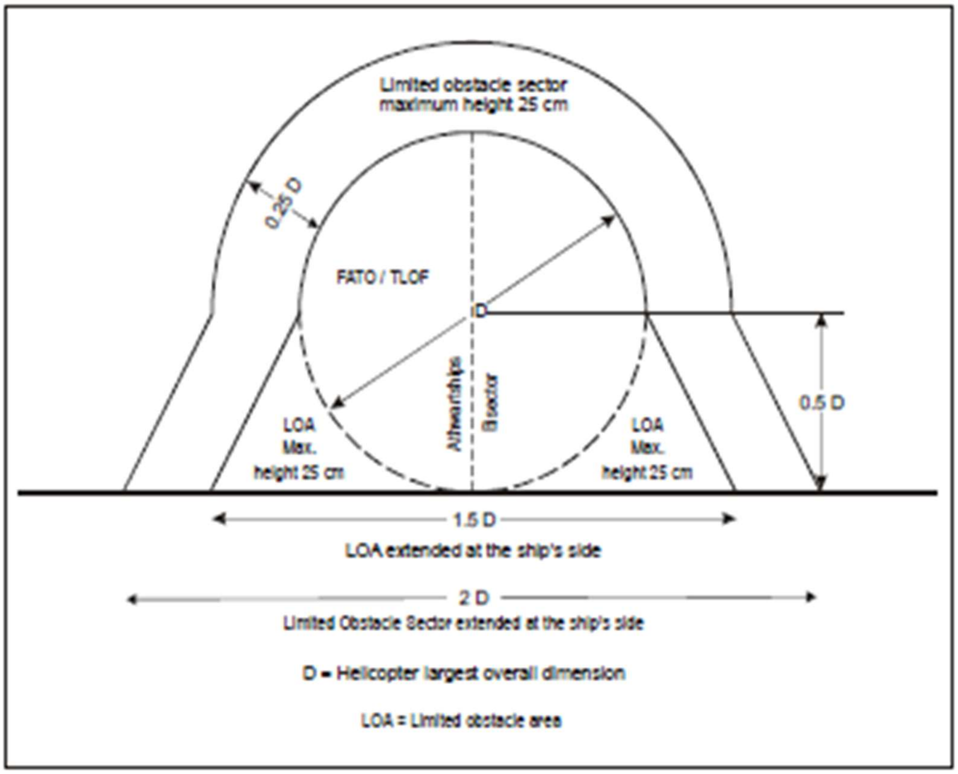


Figure CS-C- 6: Ships-side non-purpose-built heliport obstacle limitation sectors and surfaces

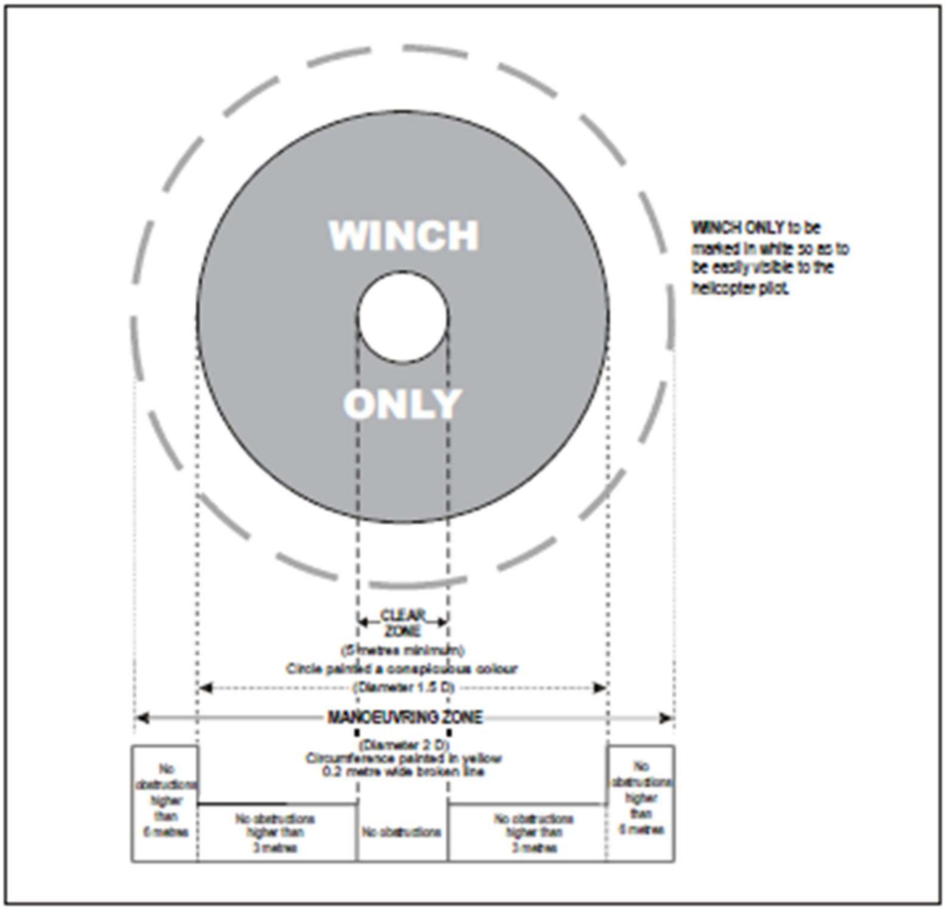


Figure CS-C- 7: Winching area of a ship

CS HDC-DSN.C.145 Obstacle protection surfaces for circular or square helidecks

(a) Where the area enclosed by the TLOF perimeter marking is a shape other than circular, the extent of the LOS segments is represented as lines parallel to the perimeter of the TLOF rather than arcs. Figure CS-C-3, CS-C-4 has been constructed on the assumption that an octagonal helideck arrangement is provided.

(b) For circular helidecks or shipboard helidecks, the segments and sectors represented by straight lines are replaced using sectors shaped in an arc. Figure CS-C- 8 to Figure CS-C- 11 provides examples.

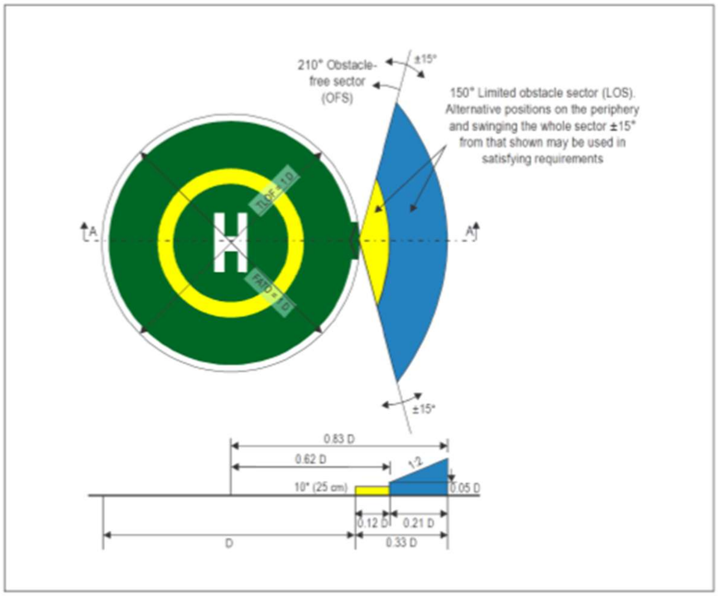


Figure CS-C- 8: Circular obstacle limitation sectors and surfaces for 1D FATO and coincidental TLOF

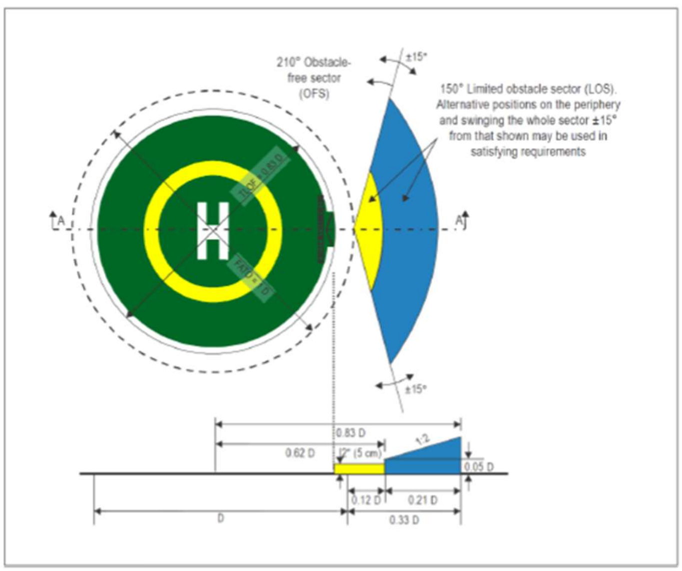


Figure CS-C- 9: Circular obstacle limitation sectors and surfaces for 0.83D TLOF with co-located 1D TLOF

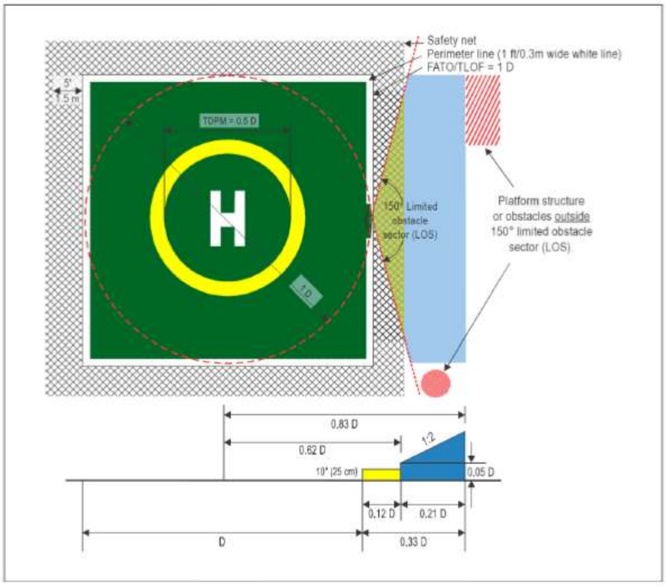


Figure CS-C- 10 : Square obstacle limitation sectors and surfaces for 1D FATO and coincidental TLOF

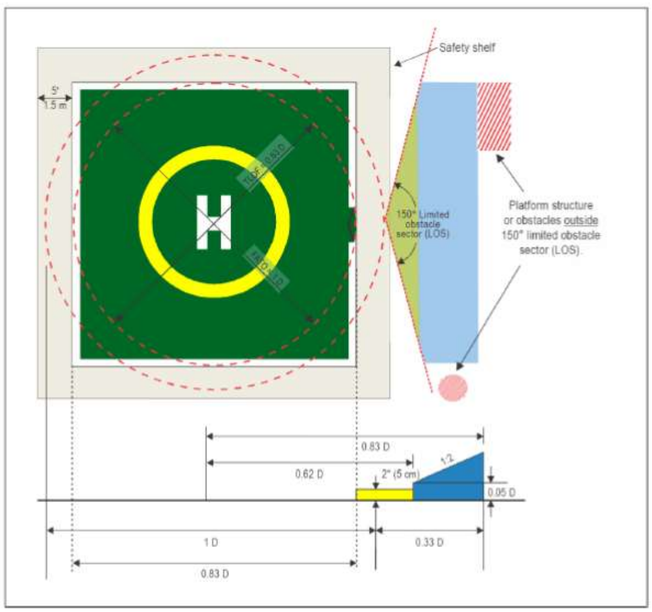


Figure CS-C- 11 : Square obstacle limitation sectors and surfaces for 0.83D TLOF with co-located 1D TLOF

CS HPT-DSN.C.150 Obstacle Environment – for instrument heliports with non-precision and/or precision approaches and instrument departures

(a) Approach surface:

The limits of an approach surface shall comprise:

(1) 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;

(2) two side edges originating at the ends of the inner edge;

(i) 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;

(ii) 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

(3) 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.

(b) Obstacle limitation requirements:

The following obstacle limitation surfaces shall be established for an instrument FATO with a non-precision and/or precision approach:

(1) take-off climb surface;

(2) approach surface; and

(3) transitional surfaces.

Note. — See Figure CS-C-12, to CS-C-15

(c) The slopes of the obstacle limitation surfaces shall not be greater than, and their other dimensions not less than, those specified in:

Table-CS-C- 2: Dimensions and slopes of obstacle limitation surfaces Instrument (non-precision) FATO;

Table-CS-C- 3: Dimensions and slopes of obstacle limitation surfaces Instrument (precision) FATO;

Table-CS-C- 4: Dimensions and slopes of obstacle limitation surfaces Straight take-off;

Table-CS-C- 5: Dimensions and slopes of the obstacle protection surface. (Non-Instrument and Non-Precision FATO);

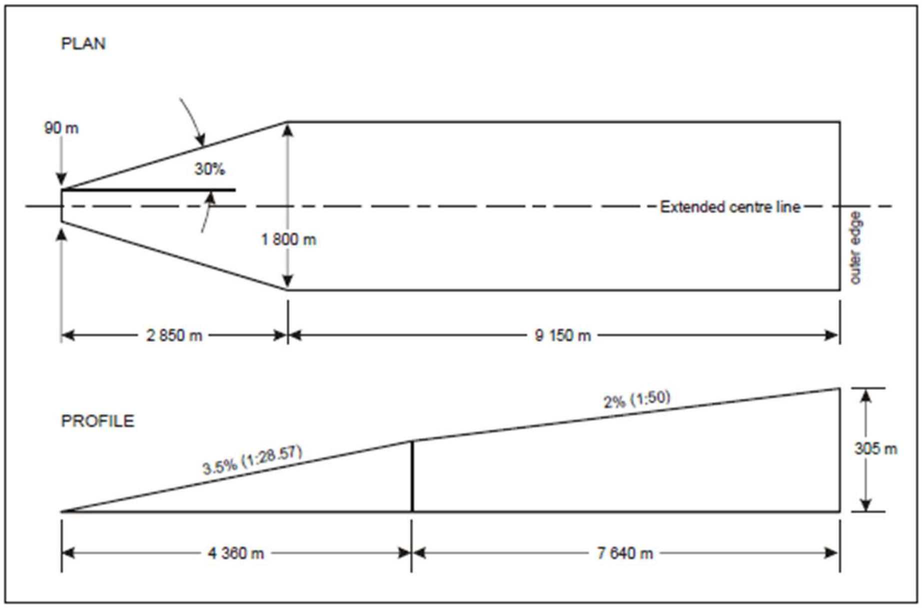


Figure CS-C- 12: Take-off climb surface for instrument FATO

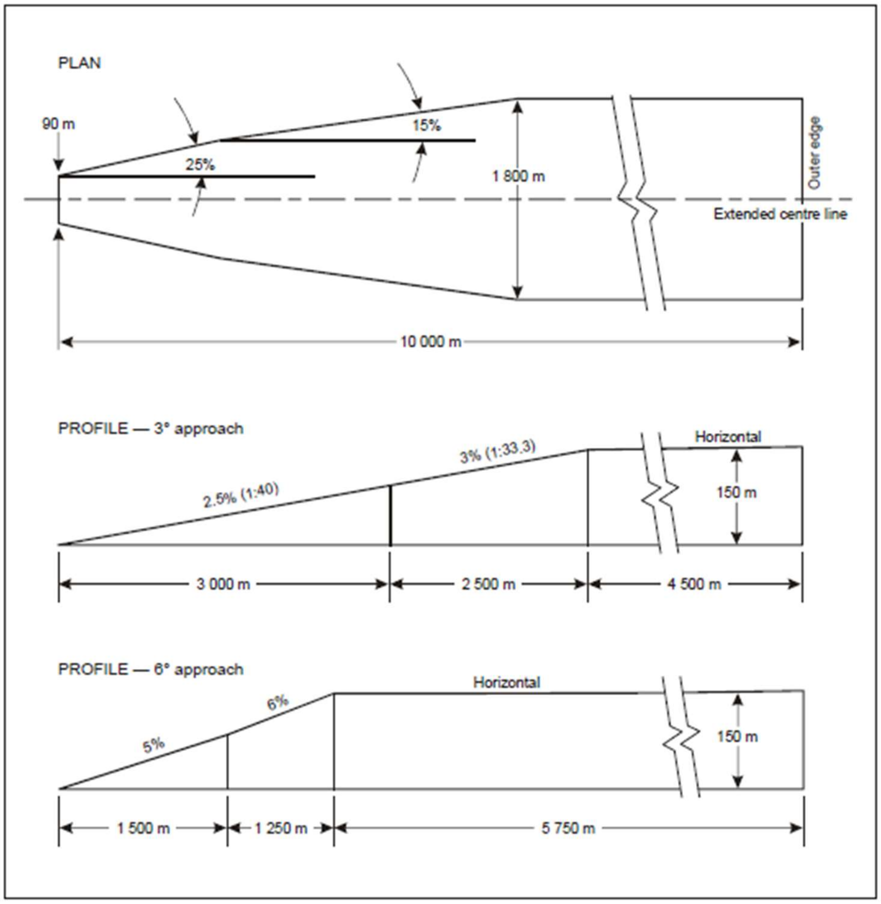


Figure CS-C- 13: Approach surface for precision approach FATO

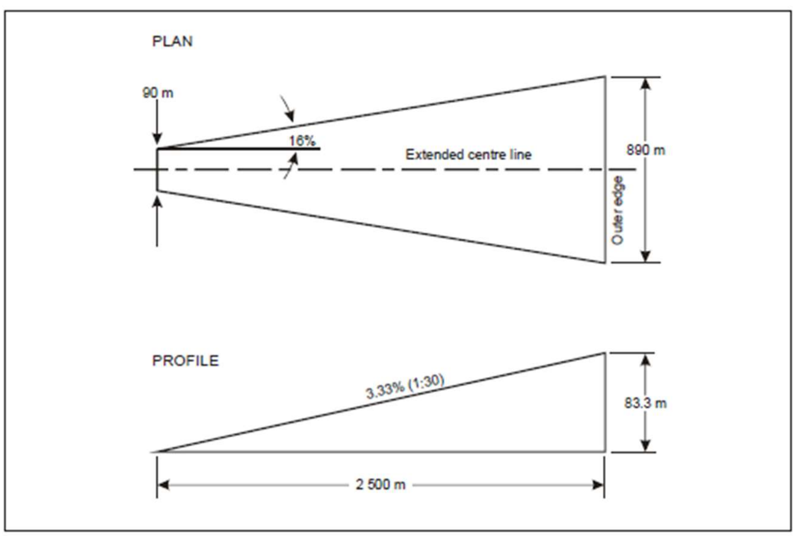
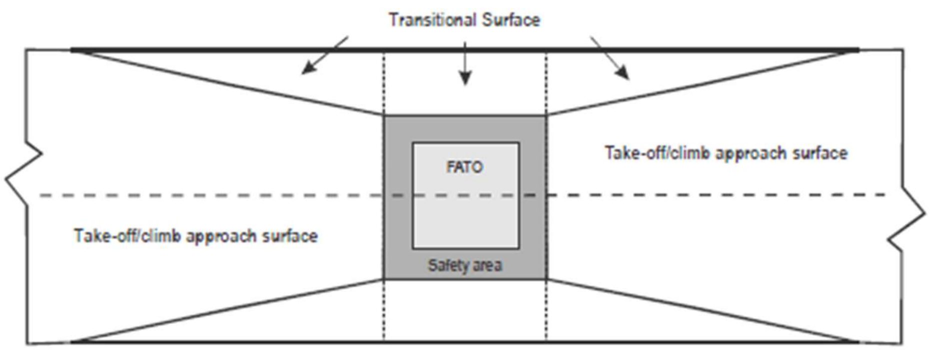


Figure CS-C- 14: Approach surface for non-precision approach FATO



Note 1.— For single take-off/climb approach surface. Transition surface extends to far side of safety area.

Note 2.— Doc 8168, Vol II, Part IV, details further obstacle limitation surface requirements associated with a visual segment surface.

Figure CS-C- 15: Transitional surfaces for an instrument FATO with a non-precision and/or precision approach

Table CS-C- 2: Dimensions and slopes of obstacle limitation surfaces Instrument (non-precision) FATO

APPROACH SURFACE	Width of safety area
Width of inner edge Location of inner edge	boundary
First section	
Divergence day/ night	16%
Length day/night	2 500 m
Outer width day/ night	890 m
Slope (maximum)	3.33%
Second section / third section	
Divergence day/ night	—
Length day/ night	—

Outer width day/ night	—
Slope (maximum)	—
TRANSITIONAL	
Slope	20%
Height	45 m

Table CS-C- 3: Dimensions and slopes of obstacle limitation surfaces Instrument (precision) FATO

	3^0 approach				6^0 approach			
	90m (300ft)	60m (200ft)	45m (150ft)	30m (100ft)	90m (300ft)	60m (200ft)	45m (150ft)	30m (100ft)
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	60m
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	2793m	3763m	4246 m	4733 m	4250 m	4733 m	4975m	5217 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	5074m	4882 m	4686 m	3380m	3187m	3090m	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%	2.5%	2.5%	2.5%	5%	5%	5%	5%
Length of first section	3000m	3000m	3000 m	3000 m	1500 m	1500m	1500m	1500 m
Slope of second section	3%	3%	3%	3%	6%	6%	6%	6%
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

Table CS-C- 4: Dimensions and slopes of obstacle limitation surfaces straight take-off

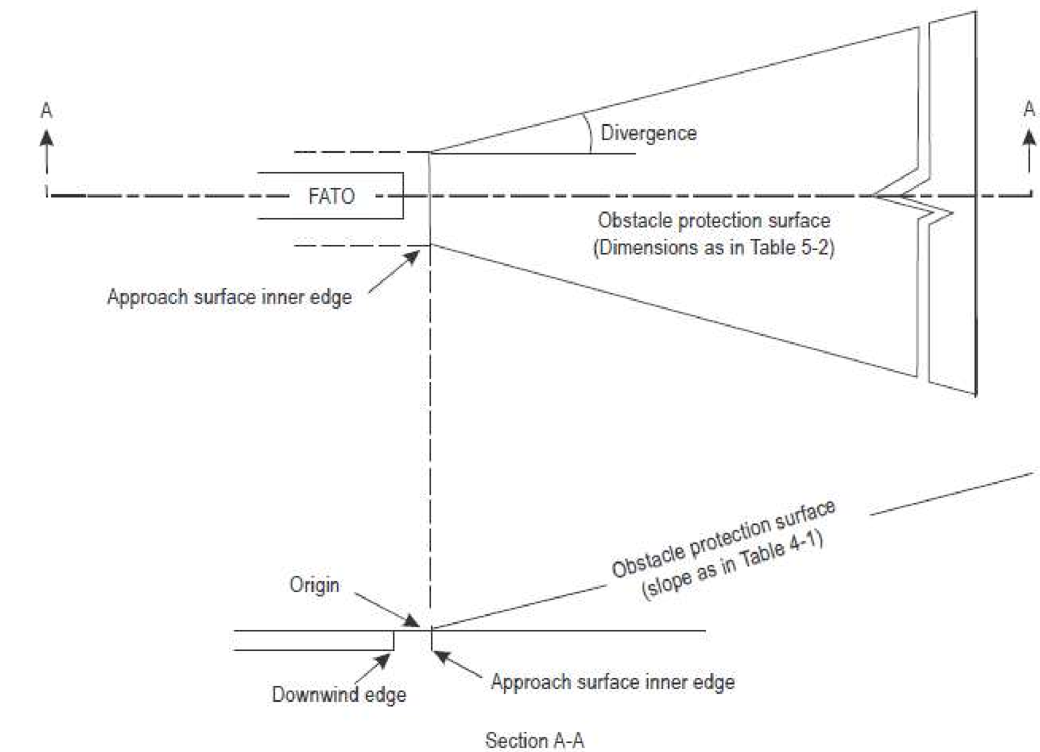
Surface and dimensions	Instrument
TAKE-OFF CLIMB	
Width of inner edge Location of inner edge	90 m Boundary of end of clearway
First section	
Divergence day/ night	30%
Length day/ night	2 850 m
Outer width day/ night	1 800 m
Slope (maximum)	3.5%

Second section	
Divergence day/ night	parallel
Length day/ night	1 510 m
Outer width day/ night	1 800 m
Slope (maximum)	3.5%*
Third Section	
Divergence	parallel
Length day/ night	7 640 m
Outer width day/ night	1 800 m
Slope (maximum)	2%
* This slope exceeds the maximum mass one-engine-inoperative climb gradient of many helicopters which are currently operating.	

Table CS-C- 5: 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	2 500 m	
Slope	PAPI	A[a] – 0.57°
	HAPI	A[b] – 0.65°
	APAPI	A[a] – 0.9°

a. *As indicated in Annex 14, Volume I, Figure 5-19.*
b. *The angle of the upper boundary of the "below slope" signal.*



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 CS-C- 16: Obstacle protection surface

CHAPTER D - VISUAL AIDS (HPT-DSN.D)

CS HPT-DSN.D.170 - General

(a) When a FATO has similar characteristics to a runway, the applicable CSs are provided in the paragraphs below titled 'Runway-type FATO'.

(b) For all other types of FATO, the applicable CSs are provided in the paragraphs below entitled 'All FATOs except runway-type FATOs'.

GM1 CS HPT-DSN.D.170 - General

(a) When a runway is marked in accordance with the provisions of CS-ADR-DSN, and is utilised as a FATO, no additional runway markings or lighting are required for helicopter use.

(b) 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.

(c) It has been found that, on surfaces of light colour, the conspicuousness of white and yellow markings can be improved by outlining them in black.

CS HPT-DSN.D.175 Wind direction indicators

(a) Applicability: A heliport shall be equipped with at least one wind direction indicator.

(b) Location:

(1) A wind direction indicator shall be located so as to indicate the wind conditions over the FATO and TLOF 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.

(2) Where a TLOF and/or FATO are subject to a disturbed airflow, additional wind direction indicators located close to the area shall be provided to indicate the surface wind on the area.

(c) Characteristics:

(1) 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.

(2) A wind direction indicator shall a truncated cone made of lightweight fabric and should have the following minimum dimensions:

Elevation / Dimensions	Surface-level Heliports	Elevated heliports and helidecks
Length	2.4 m	1.2 m
Diameter (larger end)	0.6 m	0.3 m
Diameter (smaller end)	0.3 m	0.15 m

(3) The colour of the wind direction indicator shall 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 the background:

(i) where practicable, a single colour, preferably white or orange, should be used;

(ii) 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.

(d) A wind direction indicator at a heliport intended for use at night shall be illuminated.

GM1 CS HPT-DSN.D.175 - Wind direction indicators

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

CS HPT-DSN.D.177 Winching area marking

(a) The objective of winching area markings is to provide to the pilot visual cues to assist a helicopter to be positioned over, and retained within, an area from which a passenger or equipment can be lowered or raised.

(b) Winching area markings shall be provided at a designated winching area (See Figure CS-C-7: Winching area of a ship).

(c) Location : Winching area markings shall be located so that their centre(s) coincides with the centre of the clear zone of the winching area (See Figure CS-C-7: Winching area of a ship).

(d) Characteristics:

(i) winching area markings shall comprise a winching area clear zone marking and a winching area manoeuvring zone marking.

(ii) a winching area clear zone marking shall consist of a solid circle of diameter not less than 5 m and of a conspicuous colour.

(iii) a winching area manoeuvring zone marking shall consist of a broken circle 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.

CS HPT-DSN.D.180 Heliport identification marking

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

(b) Applicability: Heliport identification markings shall be provided at a heliport/ helideck or a shipboard heliport.

(c) Location:

(1) For all FATOs except runway-type FATOs:

(i) A heliport / identification marking shall be located at or near the centre of the FATO.

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

(iii) On a FATO which does not contain a TLOF and which is marked with an aiming point marking, the heliport identification marking is established in the centre of the aiming point marking as shown in Figure CS-D- 1: Combined heliport identification, aiming point and FATO perimeter marking and Figure CS-D- 2: Heliport identification markings with TLOF and aiming markings for heliport and hospital heliport.

(iv) For helidecks, the bar of the “H” points to the centre of the limited obstacle sector (LOS).

(v) For helidecks, the bar of the “H” points to the centre of the limited obstacle sector (LOS).

Note 1.— For other than helidecks, the preferred direction(s) of approach corresponds to the median of the departure/arrival surface(s).

Note 2.— If the touchdown/positioning marking (TDPM) is offset, the heliport identification marking is established in the centre of the TDPM.

(2) For runway-type FATOs:

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 (Figure CS-

D- 3: FATO designation marking and heliport identification marking for a runway-type FATO).

(d) Characteristics:

(1) A heliport identification marking , except for a heliport at a hospital, shall consist of a letter ‘H’, white in colour. The dimensions of the ‘H’ marking should be no less than those shown in Figure CS-D-4: Hospital heliport identification and heliport identification marking. Where the ‘H’ marking is used for a runway-type FATO, its dimensions should be increased by a factor of 3 (see Figure CS-D-3).

(2) heliport identification marking for a heliport at a hospital shall consist of a letter H, red in colour, on a white cross made of squares adjacent to each of the sides of a square containing the H as shown in Figures CS-D-2 and CS-D-4.

(3) A heliport identification marking shall be oriented with the cross arm of the H at right angles to the preferred final approach direction. For a helideck, the cross arm shall be on or parallel to the bisector of the obstacle-free sector. For a non-purpose-built shipboard heliport located on a ship’s side, the cross arm shall be parallel with the side of the ship.

(4) On a helideck or a shipboard heliport where the D-value is 16.0 m or larger, the size of the heliport 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 heliport 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 (Refer Figure CS-D-5).

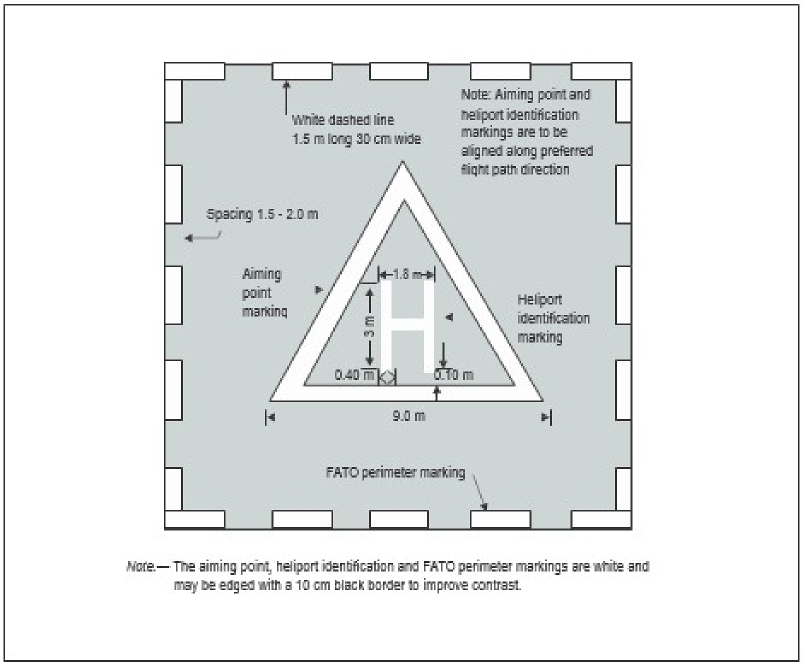


Figure CS-D-1: Combined heliport identification, aiming point

and FATO perimeter marking

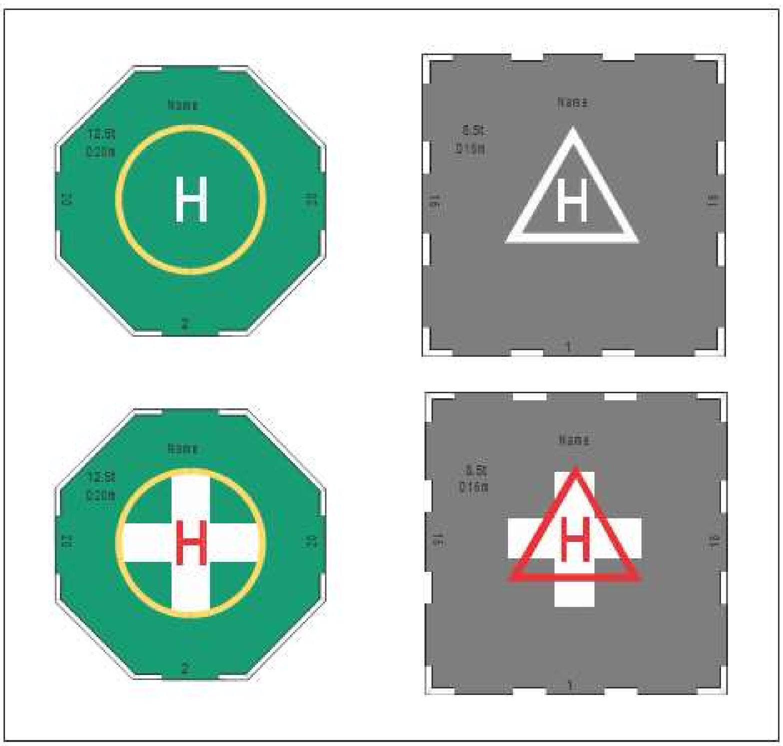


Figure CS-D-2 : Heliport identification markings with TLOF and aiming markings for heliport and hospital heliport

Figure CS-D-3: FATO designation marking and heliport

identification marking for a runway-type FATO

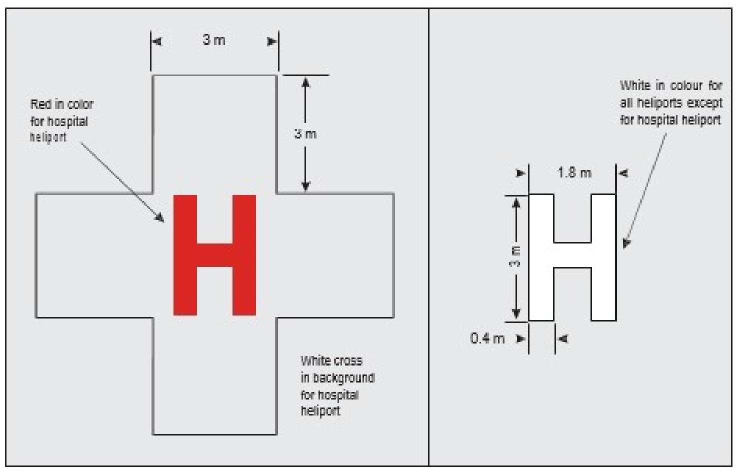


Figure CS-D-4: Hospital heliport identification and heliport identification marking

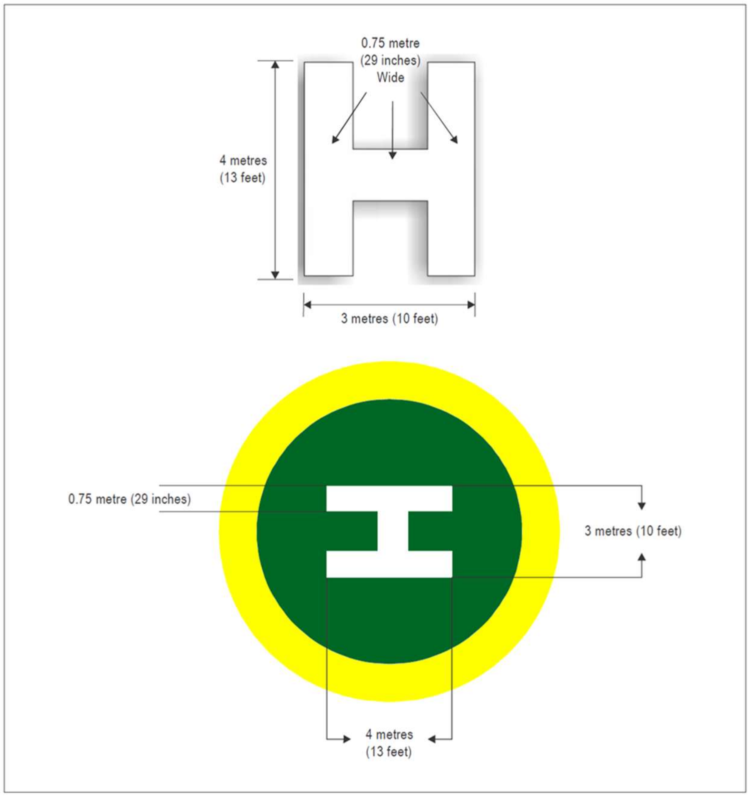


Figure CS-D-5: Identification marking on a helideck or a shipboard heliport where the D-value is 16.0 m or larger

CS HPT-DSN.D.185 - FATO identification marking

(a) The objective of the FATO identification markings is to provide the pilot with an identification of different FATOs at heliport equipped with two or more FATOs. FATO identification markings are not intended to be used in runway-type FATOs where the differentiation can be provided by the designation markings.

(b) Application: Where appropriate for differentiation, FATO identification markings shall be provided.

(c) Location: FATO identification marking should be located within the FATO and so arranged as to be readable from the preferred final approach direction.

(d) Characteristics

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

(2) The numbers code will have the size and proportions shown in Figure CS-D- 6 - FATO identification marking.

(3) The FATO identification number will be inside a yellow square with diameter 175 cm as shown in Figure CS-D- 6 - FATO identification marking.

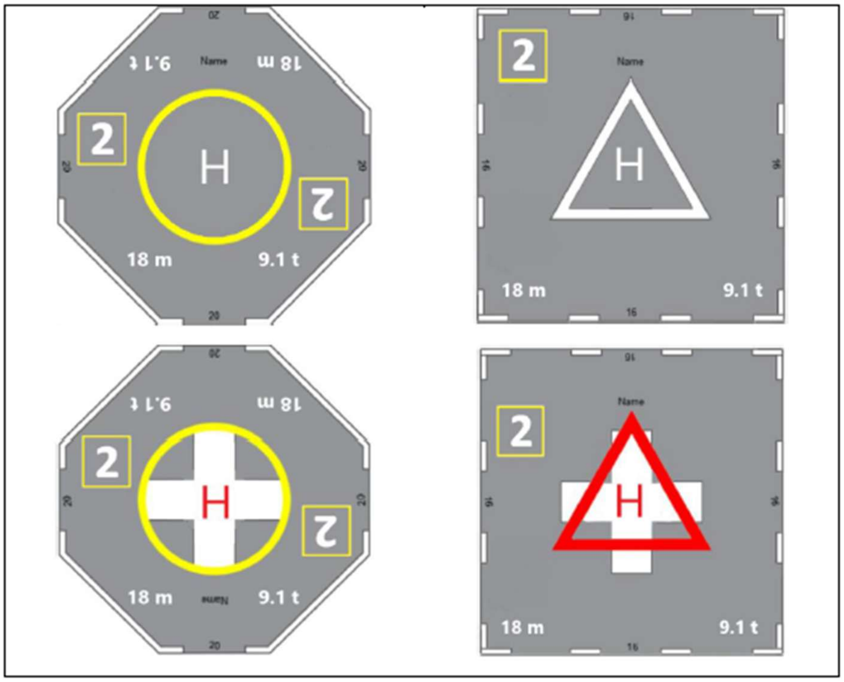


Figure CS-D-6: FATO identification marking

CS HPT-DSN.D.190 Maximum allowable mass marking

(a) 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.

(b) Application: A maximum allowable mass marking shall be displayed at a surface level and elevated heliport, a helideck and a shipboard heliport.

(c) Location: A maximum allowable mass marking shall be located within the TLOF or FATO and so arranged as to be readable from the preferred final approach direction.

(d) Characteristics:

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

(2) The maximum allowable mass shall be expressed in tonnes (1 000 kg) rounded down to the nearest 1 000 kg followed by the letter “t”.

(3) All FATOs except runway-type FATOs: 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 CS-D-7: Form and proportions of numbers and letters, for a D-value of more than 30 m. For a D-value between 15 m and 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.

(4) Runway-type FATOs: 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 CS-D-7: Form and proportions of numbers and letters.

GM1 CS HPT-DSN.D.190 Maximum allowable mass marking

(a) The maximum allowable mass 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".

(b) 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.

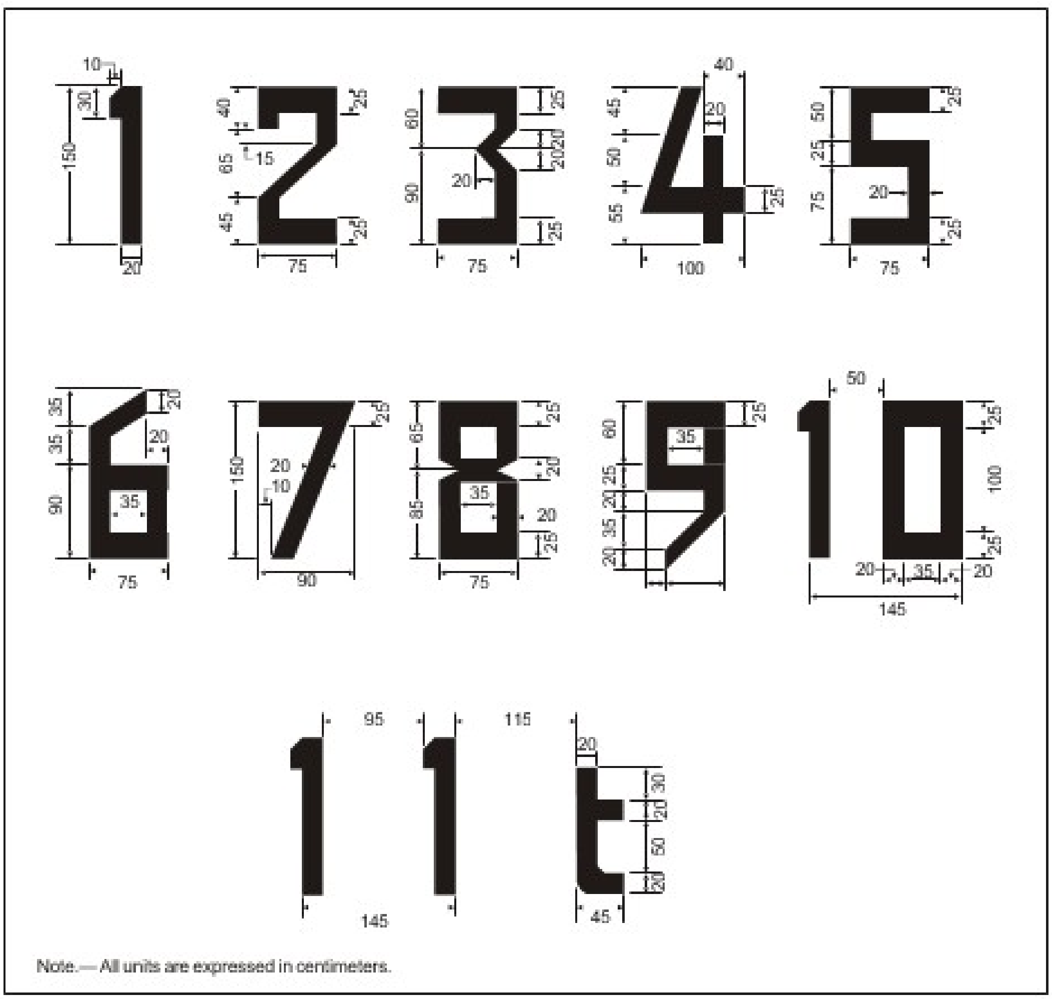


Figure CS-D-7 : Form and proportions of numbers and letters

CS HPT-DSN.D.195 D-Value marking

(a) The objective of 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- C.

(b) Application :

(1) Runway type FATO - 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.)

(2) All FATOs except Runway type FATO - The D-value marking shall be displayed helidecks and shipboard heliport.

(c) Location

(1) 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.

(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. direction.

(d) Characteristics

(1) The D-value marking shall be white.

(2) The D-value marking shall be rounded to the nearest whole metre or foot with 0.5 rounded down.

(3) The numbers of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure CS-D- 7: Form and proportions of numbers and letters, for a D-value of more than 30 m. For a D-value between 15 m and 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.

GM1 CS HPT-DSN.D.195 D-Value marking

(a) For a non-purpose-built heliport 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.

CS HPT-DSN.D.200 FATO perimeter marking or markers

(a) The objective of FATO 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 obstacles and in which intended procedures or permitted manoeuvring may take place.

(b) Applicability: FATO perimeter marking or markers shall be provided at surface level where the extent of the FATO is not self-evident.

(c) Location: The FATO perimeter marking or markers shall be located on the edge of the FATO.

(d) Characteristics:

(1) For runway-type FATOs:

(i) 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.

(ii) 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.

(iii) FATO perimeter markings shall be white.

(iv) A FATO perimeter marker shall have dimensional characteristics as shown in Figure CS-D-8.

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

(2) For all FATOs except runway-type FATOs:

(i) 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.

(ii) 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.

(iii) FATO perimeter markings and flush in-ground markers shall be white.

GM1 HPT-DSN.D.200 Final approach and take-off area perimeter marking or markers

(a) Where a TLOF is coincident with a FATO, the TLOF marking can be used.

(b) Or FATO perimeter markers should be 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.

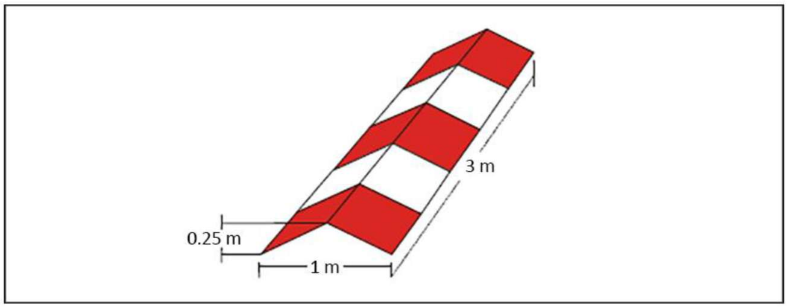


Figure CS-D- 8 : Runway-type FATO edge marker

CS HPT-DSN.D.205 FATO designation marking for runway type FATO

(a) The objective of final FATO designation markings for runway-type FATOs is to provide to the pilot an indication of the magnetic heading of the runway.

(b) Applicability: A FATO designation marking should be provided on a runway-type FATO at a heliport where it is necessary to designate the FATO to the pilot.

(c) Location: A FATO designation marking shall be located at the beginning of the Runway type-FATO (see Figure CS-D-3).

(d) Characteristics: 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 CS-D-3, shall be supplemented by the heliport identification marking.

GM1 HPT-DSN.D.205 Final approach and take-off area designation marking for runway type FATO

For a runway-type FATO, the numbers and the letter of the marking should have a white colour.

CS HPT-DSN.D.210 Aiming point marking

(a) The objective of the aiming point marking is to provide to the pilot a visual cue indicating 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.

(b) Applicability: 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.

(c) Location:

(1) Runway-type FATOs :The aiming point marking shall be located within the FATO.

(2) All FATOs except runway-type FATOs: The aiming point marking shall be located at the centre of the FATO as shown in Figure CS-D-1.

(d) Characteristics:

(i) 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 CS-D-9.

(ii) The marking shall consist of continuous white lines, 1.0 m in width and where needed edged with a 10cm black border to improve contrast.

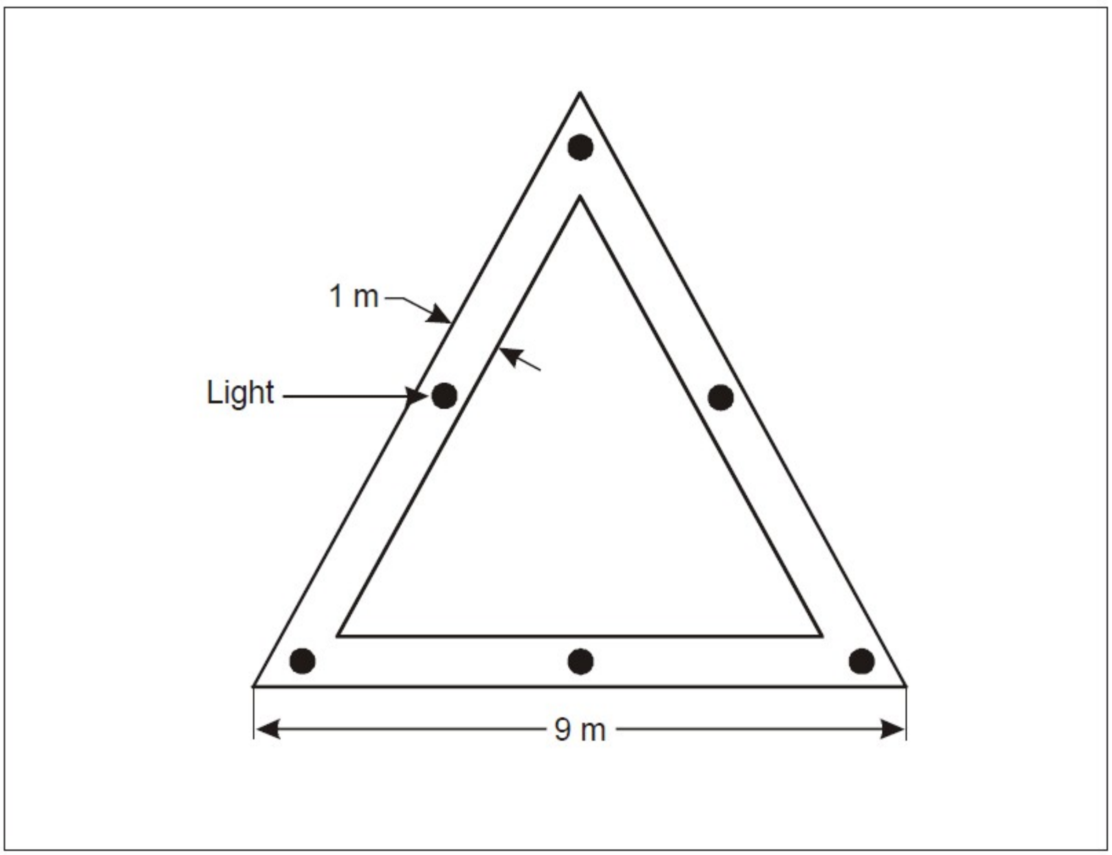


Figure CS-D- 9: Aiming point marking

CS HPT-DSN.D.215 TLOF perimeter marking

(a) The objective of TLOF 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.

(b) Applicability: 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.

(c) A TLOF perimeter marking shall be displayed on an elevated heliport, a helideck and a shipboard heliport.

(d) Location: A TLOF perimeter marking shall be located along the edge of the TLOF.

(e) Characteristics: A TLOF perimeter marking shall consist of a continuous white line with a width of at least 30 cm.

GM1 HPT-DSN.D.215 TLOF perimeter marking

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.

CS HPT-DSN.D.220 Touchdown/positioning marking (TDPM)

(a) The objective of 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.

(b) Applicability:

- (1) A TDPM shall be provided for a helicopter to touch down or be accurately placed in a specific position.
- (2) The TDPM shall be:
  - (i) when there is no limitation on the direction of touchdown/positioning, a touchdown/positioning circle (TDPC) marking; and
  - (ii) when there is a limitation on the direction of touchdown/positioning:
    - (1) for unidirectional applications, a shoulder line with an associated centreline; or
    - (2) for multidirectional applications, a TDPC marking with prohibited landing sector(s) marked.

(c) Location:

(1) The inner edge/inner circumference of the TDPM shall be at a distance of 0.25 D from the centre of the area in which the helicopter is to be positioned.

(2) On a helideck, the centre of the TDPC 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 is necessary and would not impair safety.

(3) Prohibited landing sector markings, when provided, shall be located on the TDPM, within the relevant headings, and extend to the inner edge of the TLOF perimeter marking.

(d) Characteristics:

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

(2) A TDPM shall have a line width of at least 0.5 m. For a helideck and a purpose-built shipboard heliport, the line width shall be at least 1 m.

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

(4) The prohibited landing sector marking, when provided, shall be indicated by white and red hatched markings as shown in Figure CS-D-10.

(5) The TDPM shall take precedence when used in conjunction with other markings on the TLOF except for the prohibited landing sector marking.

GM1 HPT-DSN.D.220 Touchdown/positioning marking

(a) 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.

(b) For helidecks which are less than 1D it is not recommended that an offset marking be utilised.

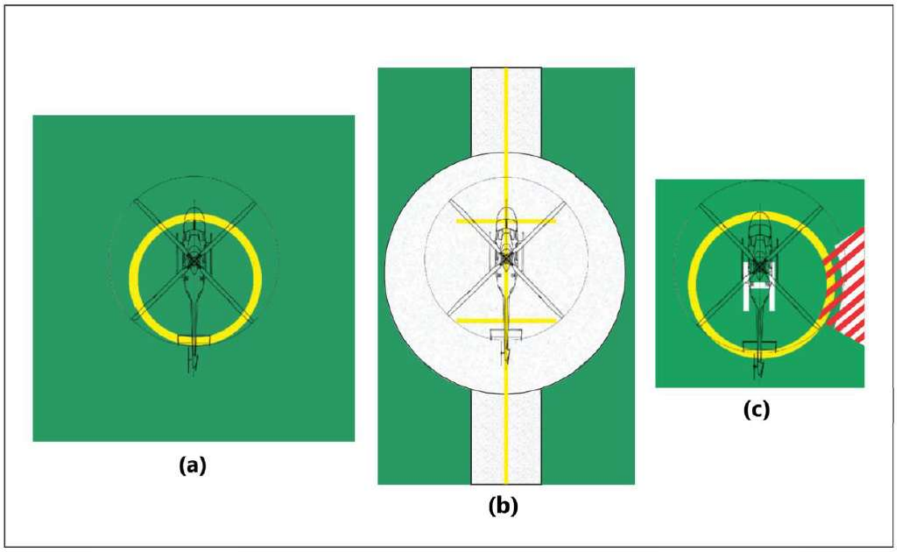


Figure CS-D-10 : (a) Multidirectional TDPC with no limitations (left), (b) Unidirectional marking shoulder line with associated centreline (centre), and (c) Multidirectional TDPC with prohibited landing sector marking (right)

CS HPT-DSN.D.225 - Heliport name marking

(a) The objective of 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.

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

GM1 CS HPT-DSN.D.225 - Heliport name marking

(a) Applicability: A heliport name marking should be provided at a heliport and helideck where there is insufficient alternative means of visual identification.

(b) Location:

(1) 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

(2) Where a limited obstacle sector (LOS) exists on a heliport or helideck, the marking should be located on that side of the heliport identification marking. For a non-purpose-built heliport located on a ship’s 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

(c) Characteristics:

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

(2) Runway- type FATO: The characters of the marking should be not less than 3 m in height.

(3) All FATOs except runway-type FATOs: 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, helidecks and shipboard heliports. The colour of the marking should contrast with the background and preferably be white.

CS HPT-DSN.D.230 Helicopter taxiway markings and markers

(a) 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.

(b) Applicability:

(1) The specifications for runway-holding position markings defined in CS ADR-DSN and for intermediate holding position marking defined in CS ADR-DSN are equally applicable to taxiways intended for ground taxiing of helicopters.

(2) The centre line of a helicopter taxiway shall be identified with a marking.

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

(c) Location:

(1) Helicopter taxiway markings shall be along the centre line, and, if provided, along the edges of a helicopter taxiway.

(2) Helicopter taxiway edge markers shall be located at a distance of 1 m to 3 m beyond the edge of the helicopter ground taxiway.

(3) 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.

(d) Characteristics:

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

(2) On an unpaved taxiway that will not accommodate painted markings, a helicopter taxiway centre line 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.

(3) 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).

(4) Helicopter taxiway edge markers shall be frangible to the wheeled undercarriage of helicopters.

(5) A helicopter taxiway edge marker shall not exceed the height of 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) A helicopter taxiway edge marker shall be blue.

(7) If the helicopter taxiway is to be used at night, the edge markers should be internally illuminated or retro-reflective.

(8) A helicopter taxiway edge marker shall be frangible to the wheeled undercarriage of a helicopter.

GM1 HPT-DSN.D.230 Helicopter taxiway markings and markers

(a) taxi-routes and air taxi-routes over a taxiway are not required to be marked.

(b) Unless otherwise indicated, it may be assumed that a helicopter taxiway is suitable for both ground taxiing and air taxiing of helicopters.

(c) Where necessary, signage should be provided on an aerodrome to indicate that a ground taxiway is suitable only for the use of helicopters.

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

(e) A helicopter ground taxiway edge marker should not present a hazard for helicopter operations.

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

CS HPT-DSN.D.235 Helicopter air taxi-route markings and markers

(a) 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.

(b) Applicability: The centre line of a helicopter air taxi-route shall be identified with markers or markings.

(c) Location: A helicopter air taxi-route centre line marking or markers shall be located along the centre line of the helicopter air taxi-route.

(d) Characteristics:

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

(2) A helicopter air taxi-route centre line, that will not accommodate painted markings of a helicopter air taxiway centre line cannot be provided, it should be marked with 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.

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

GM1 CS HPT-DSN.D.235 Helicopter air taxi-route markings and markers

Further guidance on the characteristics of markers is provided in the Heliport Manual (Doc 9261).

CS HPT-DSN.D.240 Helicopter stand markings

(a) The objective of helicopter stand markings 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 limitations, when required; and guidance for manoeuvring and positioning of the helicopter within the stand.

(b) Applicability:

(1) A helicopter stand perimeter marking shall be provided.

(2) A helicopter stand shall be provided with the appropriate TDPM (See Figure CS-D-10).

(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 CS-D-12, except that a touchdown/positioning marking shall be provided if the helicopter stand perimeter marking is not practicable.

(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.

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

(c) Location:

(1) 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.

(2) Alignment lines and lead-in/lead-out lines shall be located as shown in Figure CS-D-11.

(d) Characteristics:

(1) 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.

(2) 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.

(3) The TDPM shall have the characteristics described in CS HPT-DSN.D.220

(4) Alignment lines and lead-in/lead-out lines shall be continuous yellow lines and have a width of 15 cm.

(5) Alignment lines and lead-in/lead-out lines shall be continuous yellow lines and shall have a width of 15 cm.

(6) 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.

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

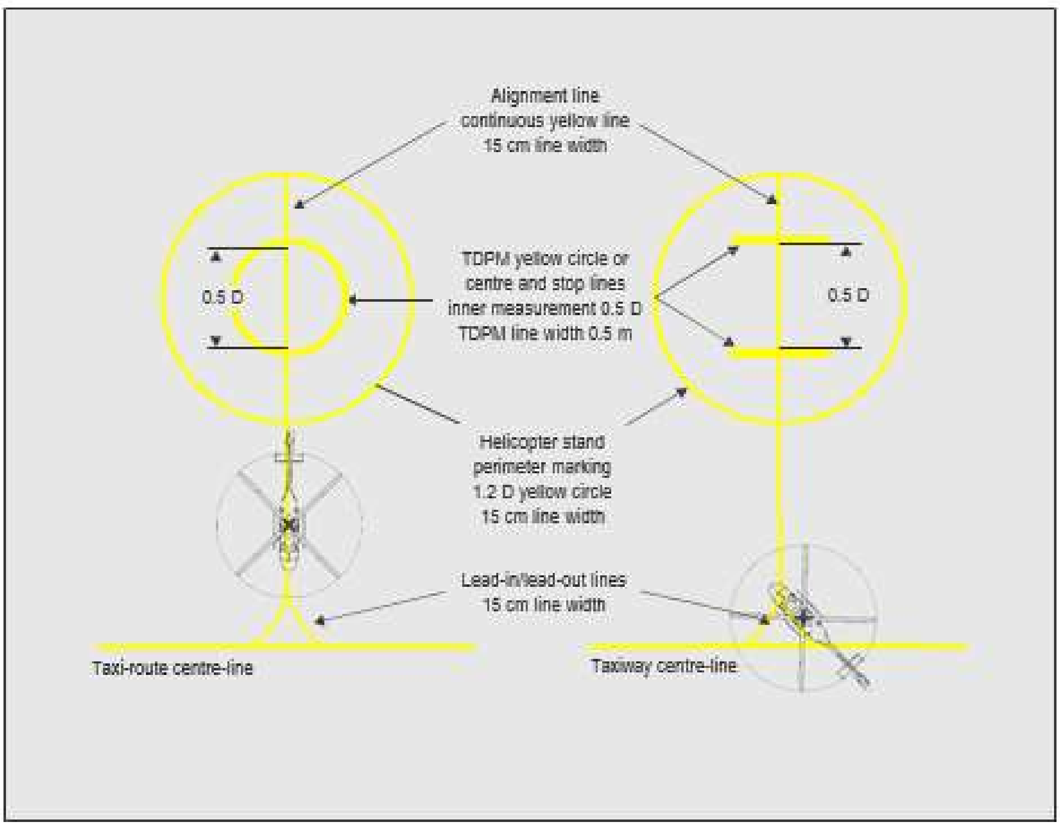


Figure CS-D-11: Helicopter stand markings

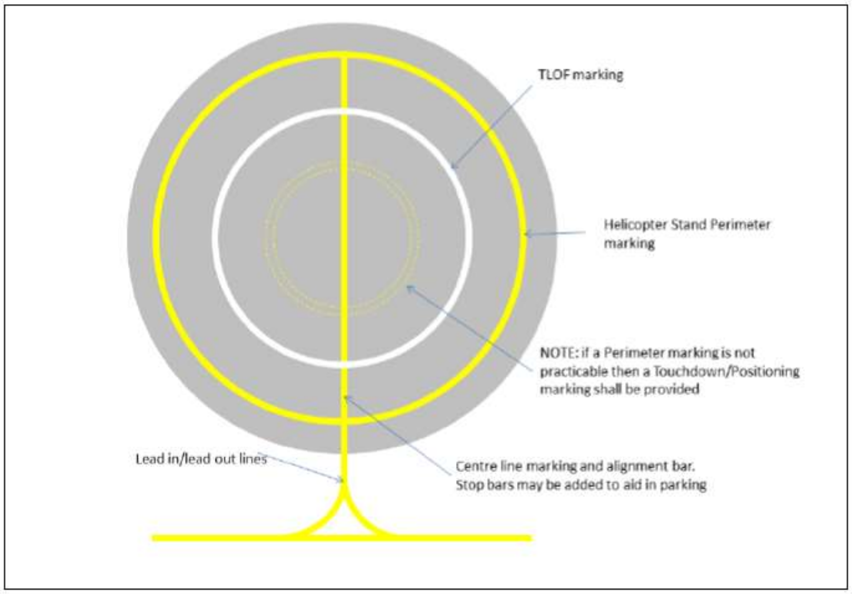


Figure CS-D-12: Helicopter stand markings Helicopter stand markings at a stand designated for hover turning

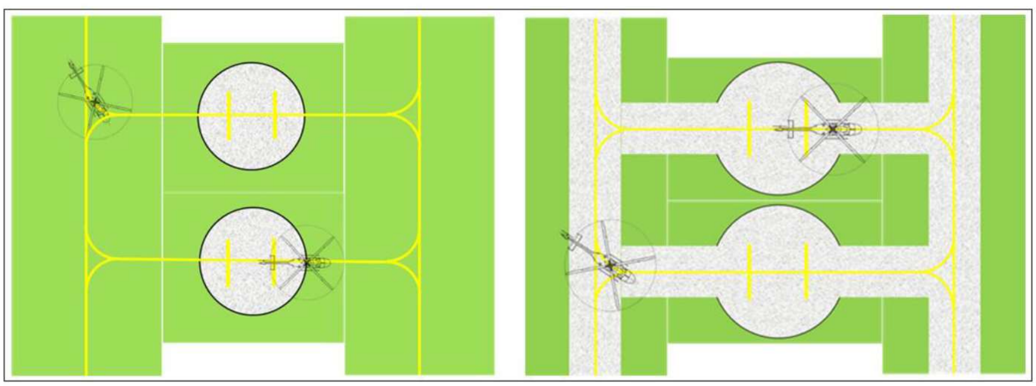


Figure CS-D- 13: Helicopter stand markings Helicopter stand markings at a stand designated for hover turning

GM1 HPT-DSN.D.240 Helicopter stand markings

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

(b) Helicopter stand identification markings may be provided where there is a need to identify individual stands.

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

(d) 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.

(e) Helicopter stand identification markings should be provided where there is a need to identify individual stands.

(f) 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.

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

CS HPT-DSN.D.245 Flight path alignment guidance marking

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

(b) Location: 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 the safety area.

(c) Characteristics:

(1) 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 CS-D-14. 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 CS-D-14, which includes the scheme for marking the 'heads of the arrows', which are always of the same size, regardless of the stroke length.

(2) In the case of a flight path limited to a single approach direction or a single departure direction, the arrow marking may be unidirectional. In the case of a heliport with only a single approach/departure path available, one bidirectional arrow is marked.

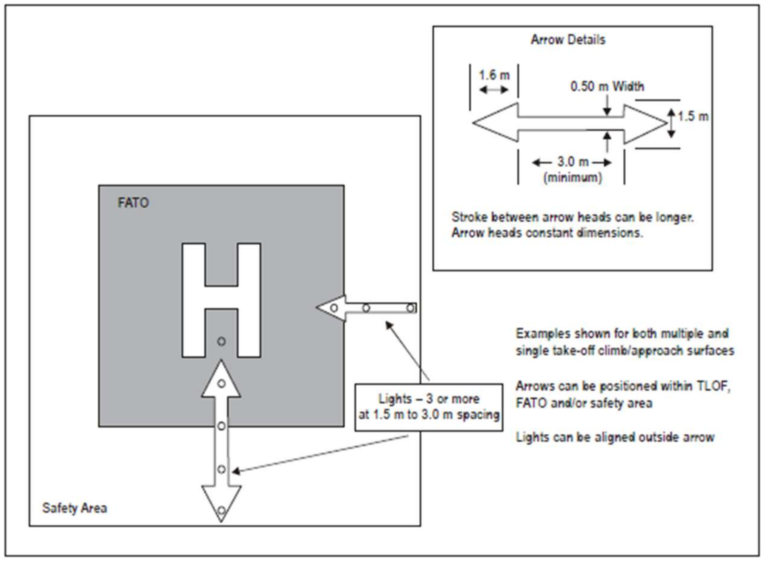


Figure CS-D-14: Flight path alignment guidance markings and lights

GM HPT-DSN.D.245 - Flight path alignment guidance marking

(a) Applicability: 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).

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

CS HPT-DSN.D.250 - Visual aids for denoting restricted use areas

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

(b) 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 to helicopter operators is provided.

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

(a) Objective: 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. Unserviceability markers and lights should be used 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.

(b) Applicability — closed markings

(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.

(2) A closed marking should be displayed on a temporarily closed FATO, TLOF, stand, taxiway or portion of taxiway, except that such marking may be omitted when the closing is of short duration and adequate warning by air traffic services is provided.

(c) Location — closed markings

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

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

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

(4) On a TLOF, a closed marking should be placed at the centre of the TLOF.

(5) On a stand, a closed marking should be placed at the centre of the stand.

(d) Characteristics — closed markings

(1) The closed marking should be of the form of a letter 'X'. See (Figure CS-D-15: Closed FATO, TLOF, stand or taxiway marking). 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.

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

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

(4) 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.

(e) Applicability — unserviceable areas

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

(f) Location — unserviceable areas

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

(g) Characteristics of unserviceability markers

(1) Unserviceability markers should consist of conspicuous upstanding devices such as cones or marker boards.

(2) 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.

(3) 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.

(h) Characteristics of unserviceability lights

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.

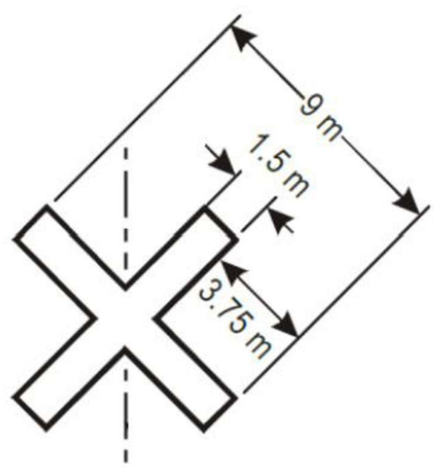


Figure CS-D-15: Closed FATO, TLOF, stand or taxiway marking

GM1 HPT-DSN.D.260 Aeronautical lights - General

(a) CAR AGA Part ADR requirements concerning specifications on screening of non-aeronautical ground lights, and design of elevated and inset lights should be used.

(b) In the case of helidecks and heliports located near navigable waters, consideration needs to be given to ensuring that aeronautical ground lights do not cause confusion to mariners.

(c) 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.

(d) Systems addressed in sections CS HPT-DSN.D.275, CS HPT-DSN.D.280, CS HPT-DSN.D.290 and CS HPT-DSN.D.295 are designed to provide effective lighting 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.

(e) The specifications for marking and lighting of obstacles included in CAR AGA PART ADR are equally applicable to heliports and winching areas.

(f) In cases where operations into a heliport are to be conducted at night with night vision imaging systems (NVIS), it is important to ensure all heliport lighting are compatible with the NVIS such as through the addition of infrared emitters to the heliport lighting. Where such additional measures are not practicable, helicopter operators using NVIS are to be made aware of it.

GM2 CS HPT-DSN.D.260 Aeronautical lights - General

(a) The technical specifications for the lights address issues for helicopter operations at night:

  (1) distinguishing one defined area from another;

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

  (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 t when within the bounds of the heliports.

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

CS HPT-DSN.D.265 Heliport beacon

(a) The objective of a heliport beacon is to make a heliport more conspicuous to assist the pilot to locate and identify the heliport at night and/or by day in reduced visibility.

(b) A heliport beacon shall be provided at a heliport where:

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

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

(c) Location: 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.

(d) Characteristics:

(1) The heliport beacon shall emit repeated series of equispaced short duration white flashes in the format in Figure CS-D-16: Heliport beacon flash characteristics.

(2) The light from the beacon shall show at all angles of azimuth.

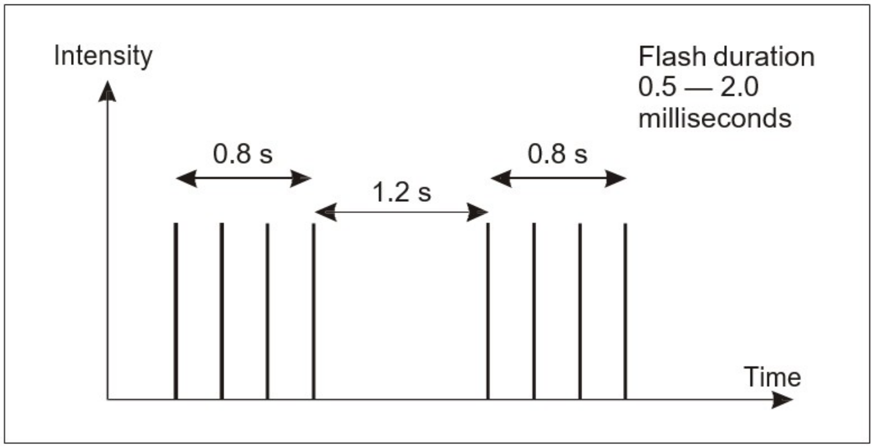


Figure CS-D- 16: Heliport beacon flash characteristics

GM1 HPT-DSN.D.265 - Heliport beacon

(1) 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.

(2) The effective light intensity distribution of each flash should be as shown in Figure CS-D-17, Illustration 1.

(3) 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.

CS HPT-DSN.D.270 Approach lighting system

(a) The objective of an approach lighting system is to allow the helicopter operator, by day and night, to visually identify the heliport and align the helicopter on the centreline of the FATO upon arriving at a prescribed point on the approach flight path

(b) Applicability: An approach lighting system should be provided at a heliport where it is desirable and practicable to indicate a preferred approach direction.

(c) Location: The approach lighting system shall be located in a straight line along the preferred direction of approach.

(d) Characteristics:

(1) The steady lights shall be omnidirectional white lights.

(2) Sequenced flashing lights shall be omnidirectional white lights.

GM1 HPT-DSN.D.270 - Approach lighting system

(a) 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 CS-D-18. 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.

(b) Where there is a 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. where identification of the approach lighting system is difficult due to surrounding lights.

(c) The flashing lights should have a flash frequency of one per second and their light distribution should be as shown in Figure CS-D-17, Illustration 3. The flash sequence should commence from the outermost light and progress towards the crossbar

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

(e) The following intensity settings have been found suitable:

(1) steady lights — 100 percent, 30 per cent and 10 per cent; and

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

(f) Where an approach lighting system is provided for a non-precision FATO, the system should not be less than 210 m in length.

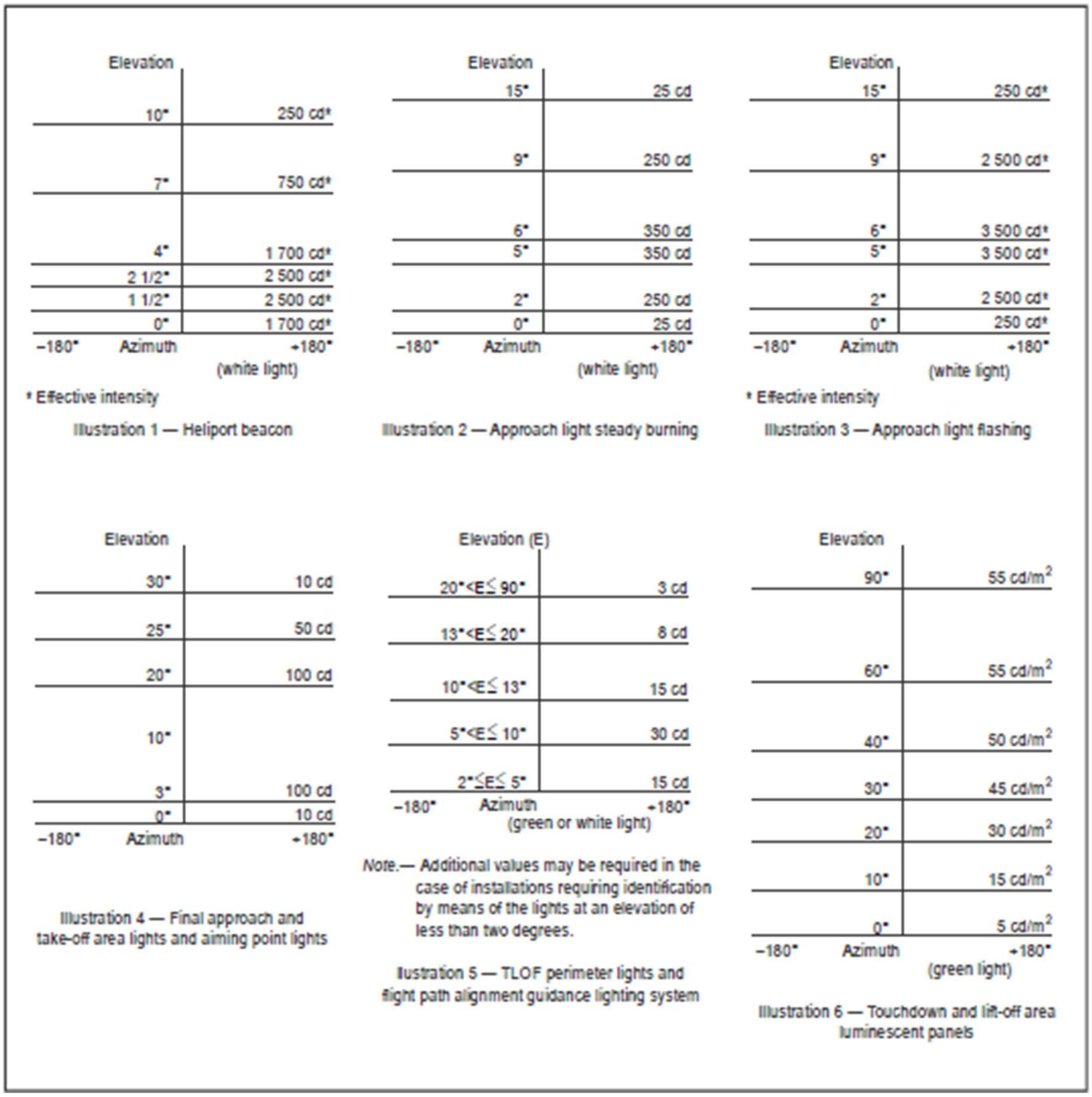


Figure CS-D-17: Isocandela diagrams

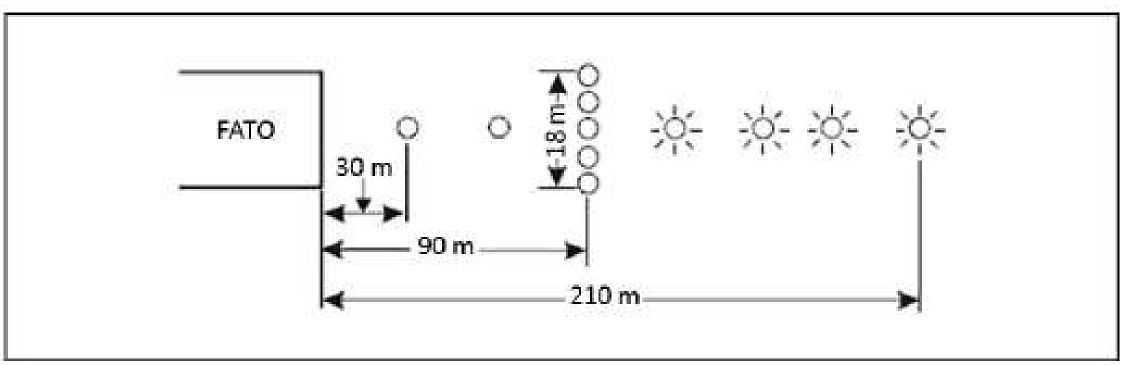


Figure CS-D- 18: Approach lighting system

CS HPT-DSN.D.275 - Flight path alignment guidance lighting system

(a) The objective of a flight path alignment guidance lighting system is to indicate, by day, night, and in reduced visibility, available approach and/or departure flight path direction(s).

(b) Applicability: 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).

(c) Location:

(1) 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.

(1) Characteristics: The lights should be steady omnidirectional inset white lights.

GM1 HPT-DSN.D.275 - Flight path alignment guidance lighting system

(a) The flight path alignment guidance lighting can be combined with a flight path alignment guidance marking (or markings).

(b) If combined with a flight path alignment guidance marking, then as far as is practicable, the lights should be located inside the ‘arrow’ markings.

(c) A flight path alignment guidance lighting system should consist of a row of three or more lights spaced uniformly over 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 CS-D-14)

(d) 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 CS-D-14)

(e) The distribution of the lights should be as indicated in Figure CS-D- 17, Illustration 5.

(f) 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.

CS-HPT-DSN.D.280 Visual alignment guidance system

(a) The objective of a visual alignment guidance system is to provide conspicuous and discrete cues to assist the pilot to attain and maintain a specified approach track to a heliport.

(b) Applicability: 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:

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

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

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

GM1 CS-HPT-DSN.D.280 - Visual alignment guidance system

Guidance on suitable visual alignment guidance systems is given in the Heliport Manual (Doc 9261).

CS- HPT-DSN.D.285 - Visual approach slope indicator

(a) The objective of a visual approach slope indicator is to provide conspicuous and discrete colour cues, within a specified elevation and azimuth, to assist the pilot to attain and maintain the approach slope to a desired position within a FATO.

(b) Applicability: 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:

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

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

  (3) the characteristics of the helicopter require a stabilized approach.

CS HPT-DSN.D.290 FATO perimeter lights for onshore - surface level heliports

(a) The objective of a FATO perimeter lights 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.

(b) Applicability: Where a FATO with a solid surface is established at a surface-level heliport intended for use at night, FATO perimeter 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.

(c) Location: FATO perimeter lights shall be placed along the edges of the FATO. The lights shall be uniformly spaced as follows:

  (1) 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

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

(d) Characteristics:

(1) FATO perimeter lights shall be fixed omnidirectional lights showing green or white with variable intensity. Green perimeter lights shall be permitted only when the FATO is a dynamic load-bearing surface.

GM1 CS HPT-DSN.D.290 - FATO lighting systems for onshore surface-level heliports

(a) The light distribution of FATO perimeter lights should be as shown in Figure CS-D-12, Illustration 4.

(b) 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.

(c) Where a FATO is not meant for lift-off or touchdown, the lights should not exceed a height of 25 cm above ground level.

(d) Further guidance on colour selection of FATO perimeter lights is provided in the Heliport Manual (Doc 9261)

CS HPT-DSN.D.295 Aiming point lights

(a) 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 a hover before positioning to a TLOF where a touchdown can be made, and that the surface of the FATO is not intended for touchdown.

(b) Applicability: Where an aiming point marking is provided at a heliport intended for use at night, aiming point lights should be provided.

(c) Location: Aiming point lights shall be collocated with the aiming point marking.

(d) Characteristics:

(1) Aiming point lights shall form a pattern of at least six omnidirectional white lights (Figure CS-D- 9). The lights shall be arranged equidistantly with a light at the apex and at both corners.

(2) The lights shall be inset when a light extending above the surface could endanger helicopter operations.

(3) The light distribution of aiming point lights should be as shown in Figure CS-D- 17, illustration 4.

CS HPT-DSN.D.300 TLOF lighting system

(a) The objective of a TLOF 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, shipboard heliport or helideck, the objective is visual acquisition from a defined range and to provide sufficient shape cues to permit an appropriate approach angle to be established.

(b) Applicability:

(1) A TLOF lighting system shall be provided at a heliport intended for use at night.

(2) For a surface-level heliport, lighting for the TLOF in a FATO shall consist of either of the following:

(i) perimeter lights; or

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

(3) For an elevated heliport, shipboard heliport or helideck, lighting for the TLOF in a FATO shall consist of:

(i) perimeter lights; and

(ii) ASPSL and/or LPs to identify the TDPC and/or floodlighting to illuminate the TLOF.

(c) Location:

(1) 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 outer edge. TLOF perimeter lights shall be uniformly spaced at intervals of not more than 3 m for elevated heliports, helidecks and shipboard heliports and not more than 5 m for surface-level heliports

(2) The TLOF perimeter lights shall be installed at an elevated heliport or fixed helideck such that the pattern cannot be seen by the pilot from below the elevation of the TLOF.

(3) The TLOF perimeter lights shall be installed on a moving helideck or shipboard heliport such that the pattern cannot be seen by the pilot from below the elevation of the TLOF when the helideck or shipboard heliport is level.

(4) 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.

(5) TLOF floodlights where provided shall be arranged so as to avoid glare to pilots in flight and to personnel working on the area.

(d) Characteristics:

(1) The TLOF perimeter lights shall be fixed omnidirectional lights showing green.

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

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

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

(5) For a helideck or shipboard heliport, the TLOF perimeter lights shall not exceed a height of 5 cm, or for a FATO/TLOF, 15 cm.

(6) For a helideck or shipboard heliport, the TLOF floodlights shall not exceed a height of 5 cm, or for a FATO/TLOF, 15 cm.

(7) The ASPSL and LPs shall not extend above the surface by more than 2.5 cm.

(8) The spectral distribution of TLOF floodlights shall be such that the surface and obstacle markings can be correctly identified.

GM1 HPT-DSN.D.300 - TLOF lighting system

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

(b) Guidance on suitable systems is contained in the Heliport Manual (Doc 9261).

(c) Where the TLOF is circular, drift of the helicopter may be difficult to discern by the pilot. Guidance on lighting patterns to counter drift displacement over the TLOF this issue is contained in the Heliport Manual (Doc 9261).

(d) When enhanced surface texture cues are required at a TLOF ASPSL and/or LPs to identify the TDPC and/or floodlighting should be provided at a surface-level heliport intended for use at night.

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

(f) If utilized, the heliport identification marking lighting, or cross marking lighting at a hospital, should be omnidirectional showing green.

(g) The chromaticity and luminance of colours of LPs should conform to CAR AGA, Part ADR requirements.

(h) Guidance on CS HPT-DSN.D.300(c)(3) is contained in the Heliport Manual (Doc 9261).

(i) The light distribution of the ASPSL and/or LPs used to illuminate the TDPC and heliport identification marking, or cross (chevron) markings at a hospital, are detailed in the Heliport Manual (Doc 9261).

(j) Detailed specifications on the number of lights to be provided, based on the shape and size of the TLOF are contained in the Heliport Manual (Doc 9261).

CS HPT-DSN.D.302 Helicopter stand floodlighting

(a) 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.

(b) Helicopter stand floodlighting should be provided on a helicopter stand intended to be used at night.

(c) Location : 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.

(d) Characteristics :

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

(2) 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.

GM1 CS HPT-DSN.D.302 Helicopter stand floodlighting

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

CS HPT-DSN.D.303 Winching area floodlighting

(a) Objective: The objective of winching area floodlighting is to provide illumination of the surface and obstacles, and visual cues to assist a helicopter to be positioned over, and retained within, an area from which a passenger or equipment can be lowered or raised.

(b) Application:

Winching area floodlighting shall be provided at a winching area intended for use at night.

(c) Location:

(1) Winching area floodlights shall be located so as to avoid glare to pilots in flight or to personnel working on

(2) the area. The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.

(3) Characteristics: The spectral distribution of winching area floodlights shall be such that the surface and obstacle markings can be correctly identified.

GM1 CS HPT-DSN.D.303 Winching area floodlighting

The average horizontal illuminance should be at least 10 lux, measured on the surface of the winching area.

CS HPT-DSN.D.305 Taxiway lights

The specifications of taxiway center line lights and taxiway edge lights in CAR AGA PART ADR, CS ADR-DSN are applicable to taxiways intended for ground taxiing of helicopters.

CS HPT-DSN.D.310 Visual aids for denoting obstacles outside and below the obstacle limitation surface

(a) Arrangements for an aeronautical study of objects outside the obstacle limitation surface and for other objects are addressed in CAR AGA PART ADR.

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

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

CS HPT-DSN.D.315 Floodlighting of obstacles

(a) The objective of obstacle floodlighting is to highlight the shape and location of obstacles in the vicinity of the heliport, to assist a pilot flying at night to avoid all obstacles by a safe margin.

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

(c) 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 pilots.

(d) Characteristics: Obstacle floodlighting should produce a luminance of at least 10 cd/m2.

SECTION B - HELIDECKS (HDC-DSN)

Note :

(a) The requirements in this section are specific to helidecks, in addition to the requirements as mentioned in this PART VFI where applicable.

(b) 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'.

(c) 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.

(d) 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).

(e) 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.

(f) 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.

(g) The below types of helidecks 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:

(1) Fixed Platforms: Permanently Attended (PAI);

(2) Fixed Platforms: Not Permanently Attended (NPAI);

(3) Mobile Off-Shore Drilling Units: Semi-Submersible;

(4) Mobile Off-Shore Drilling Units: Self-Elevating Unit (Jack-Up);

(5) Floating Production Storage and Off-Loading (FPSO) and Tankers.

(h) The below types of shipboard helidecks 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.:

(1) Drill Ships;

(2) Small Vessels;

(3) Non-Purpose-Built Landing Area on Ship's Side –Tanker Port and Starboard.

(i) For details on (g) and (h), refer to ICAO Doc 9261, Heliport Manual.

CS HDC-DSN.B.010 Final approach and take-off areas (FATOs) and TLOF

(a) Applicability: A helideck shall be provided with one FATO and one coincident or collocated TLOF.

(b) Characteristics:

(1) 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;

(2) A helideck shall be arranged to ensure that a sufficient and unobstructed air-gap is provided which encompasses the full dimensions of the FATO;

(3) A TLOF may be any shape but, subject to an appropriate risk assessment, shall be of sufficient size to contain 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.

(4) The TLOF shall be dynamic load-bearing.

(5) The TLOF shall provide ground effect.

(6) No fixed object shall be permitted around the edge of the TLOF except for objects, which, because of their function, must be located thereon.

(7) 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.

(8) 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.

(9) 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.

(10) 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.

(11) The surface of the TLOF shall be skid-resistant to both helicopters and persons and be sloped to prevent pooling of water.

GM1 CS HDC-DSN.B.010 Final approach and take-off areas (FATOs) and TLOF

(a) 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.

(b) 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.

(c) 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.

(d) Lighting that is mounted at a height of less than 25 cm is typically assessed for adequacy of visual cues before and after installation.

(e) Examples of potential hazards include nets or raised fittings on the deck that might induce dynamic rollover for helicopters equipped with skids.

(f) Guidance on rendering the surface of the TLOF skid-resistant is contained in the Heliport Manual (Doc 9261).

(g) Guidance on the effects of airflow direction and turbulence, prevailing wind velocity and high temperatures from gas turbine exhausts or flare-radiated heat on the location of the FATO is given in the Heliport Manual (Doc 9261).

(h) Guidance on the design and markings for helideck parking areas is given in the Heliport Manual (Doc 9261).

(i) Specific guidance on the characteristics of an air-gap is given in the Heliport Manual (Doc 9261). As a general rule, except for shallow superstructures of three stories or less, a sufficient air-gap will be at least 3 m.

(j) Further guidance on factors to inform the risk assessment are given in the Heliport Manual (Doc 9261).

CS HDC-DSN.B.025 Helideck obstacle-free sector (Chevron) marking

(a) The objective of helideck obstacle-free sector (chevron) marking is to indicate the direction and limits of a sector that is free of obstacles above the level of the helideck for the preferred approach and departure directions.

(b) Application: A helideck with adjacent obstacles that penetrate above the level of the helideck shall have an obstacle-free sector marking.

(c) Location: 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.

(d) Characteristics

(1) The helideck obstacle-free sector marking shall indicate the location of the obstacle-free sector and the directions of the limits of the sector.

(2) The height of the chevron shall not be less than 30 cm.

(3) The chevron shall be marked in a conspicuous colour.

GM1 CS HDC-DSN.B.025 - Helideck obstacle-free sector (Chevron) marking

(a) The colour of the chevron should be black.

(b) Where the point of origin is outside the TLOF, and it is not practicable to physically paint the chevron, the chevron is relocated to the TLOF perimeter on the bisector of the obstacle-free sector. In this case, the distance and direction of displacement, along with the attention-getting “WARNING DISPLACED CHEVRON”, is marked in a box beneath the chevron in black characters not less than 10 cm high. (An example figure is given in the Heliport Manual (Doc 9261).)

(c) Further guidance on Helideck obstacle-free sector (Chevron) marking are provided in the Heliport Manual (Doc 9261).

GM1 CS HDC-DSN.B.030 - Helideck Surface marking

(a) The objective of helideck and shipboard heliport surface marking is to provide to the pilot, by colour and conspicuity, the location of the TLOF on a helideck or shipboard heliport.

(b) Application: A surface marking should be provided to assist the pilot to identify the location of the helideck or shipboard heliport during an approach by day.

(c) Location: A surface marking should be applied to the dynamic load-bearing area bounded by the TLOF perimeter marking.

(d) Characteristics: The helideck or shipboard heliport surface bounded by the TLOF perimeter marking should be of dark green using a high friction coating.

GM2 CS HDC-DSN.B.030 - Helideck Surface marking

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.

SECTION C - VERTIPORTS (VPT-DSN)

CHAPTER A - PHYSICAL CHARACTERISTICS (VPT-DSN.A)

Note:

(a) 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.

(b) 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.

(c) 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.

(d) The provisions given in this section are common for surface-level vertiports and elevated vertiports unless otherwise specified.

(e) When designing VCA stands, the location and dimensions of the charging facility should be taken into consideration.

CS VPT-DSN.A.010 Final-approach and take-off areas (FATOs)

(a) An FATO shall:

(1) provide:

(i) 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 the approach and at the commencement of the take-off in accordance with the intended procedures;

Note: Essential objects are visual aids (e.g. lighting) or other aids (e.g. firefighting systems) necessary for safety purposes; and

(ii) when solid, a surface resistant to the effects of downwash, which:

(A) when collocated with a TLOF, is contiguous and flush with the TLOF, has a bearing strength capable of withstanding the intended loads, and ensures effective drainage; or

(B) when not collocated with a TLOF, is free of hazards, should a forced landing be required;

Note: 'Resistant' implies that downwash effects neither cause a degradation of the surface nor result in flying debris; and

(2) be associated with a Safety Area.

(b) A vertiport shall be provided with at least one FATO, which need not be solid.

Note: An FATO may be located on or near an aerodrome runway strip or taxiway strip.

(c) The minimum dimensions of an FATO shall be:

(1) 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

(2) the width for the required procedure that is prescribed in the AFM of the VTOL-capable aircraft 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.

(d) Essential objects that are located within an FATO shall not penetrate the horizontal plane at the FATO elevation by more than 5 cm.

Note: At vertiports that are elevated, roll-over protection may be provided.

(e) When the FATO is solid, its overall slope shall not exceed 2 per cent (to horizontal) in any direction. Higher slopes are possible, according to the AFM.

(f) The FATO shall be located so as to minimise the influence of the surrounding environment, including turbulence, which could adversely affect VCA operations.

(g) A FATO shall be surrounded by a safety area that need not be solid.

CS VPT-DSN.A.015 Safety areas

(a) The objective of the safety area is to provide a free-of-obstacles area that extends beyond the FATO, to compensate for manoeuvring errors under challenging environmental conditions.

(b) A safety area shall provide:

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

(2) when solid, a surface that is contiguous and flush with the FATO, is resistant to downwash effects, and ensures effective drainage.

(c) The safety area surrounding an 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.

(d) No mobile object shall be permitted in safety area during VCA operations.

(e) Essential objects that are located within the Safety Area shall not penetrate a surface that starts at the edge of the FATO at a height of 25 cm above the plane of the FATO sloping upwards and outwards with a gradient of 5 per cent.

(f) When solid, the slope of the Safety Area should not exceed an upward slope of 4 per cent outwards from the edge of the FATO.

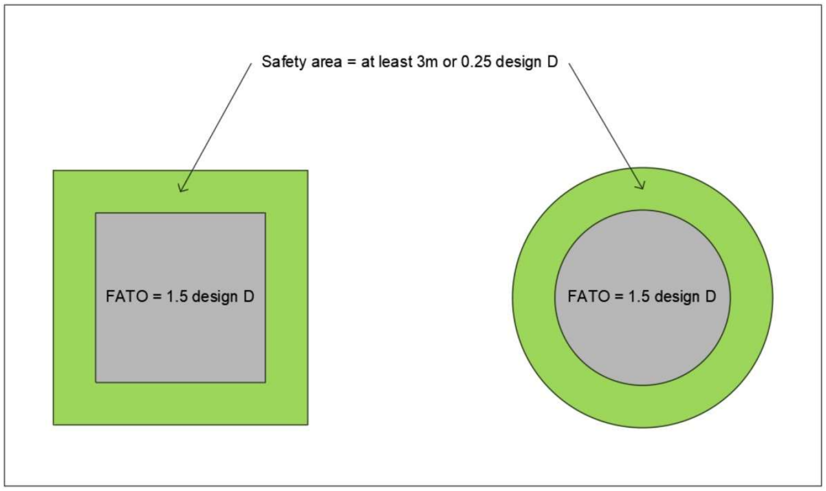


Figure VPT-A- 1: FATO and associated safety area

GM1 CS VPT-DSN.A.020 - Downwash protection

DOWNWASH PROTECTION

(a) 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.

(b) 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 VPT-A-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, local regulations, etc.).

(c) larger areas need to be assessed along the flight path, as well as taking into account the hover height, additional power or wind effects.

Table VPT-A-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

(d) If the AFM value of the downwash on the 2D 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 (CS VPT-DSN.A.025: Protected side slope) 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.

(e) 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.

(f) 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.

(g) For vertiports that are elevated, the downwash protection area may need to be extended below the level of the FATO as illustrated in Figure VPT-A-2. A safety assessment should be conducted to determine whether such an extension is necessary.

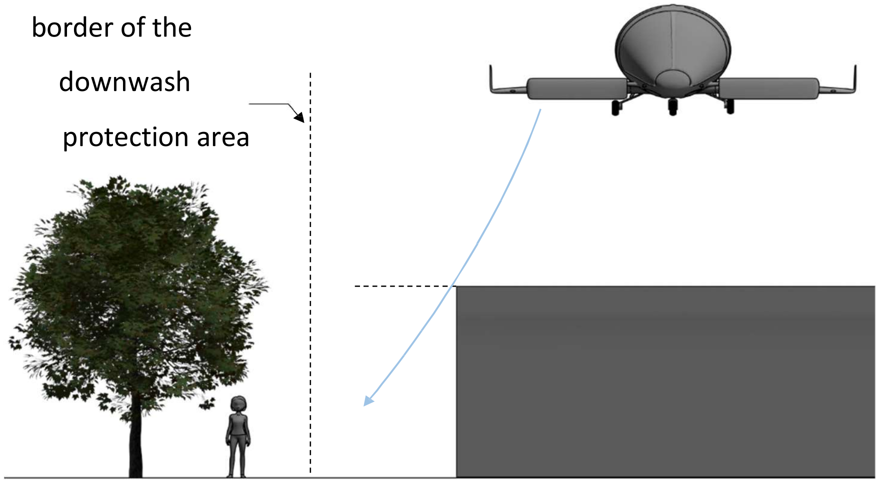


Figure VPT-A-2: Downwash protection area extended below the vertiport that is elevated

CS VPT-DSN.A.025 - Protected side slope

(a) A vertiport shall be provided with at least one protected side slope, rising at 45 degrees outward from the edge of the SA and extending to a distance of 10 m (see Figure VPT-A-3).

(b) The surface of a protected side slope shall not be penetrated by obstacles.

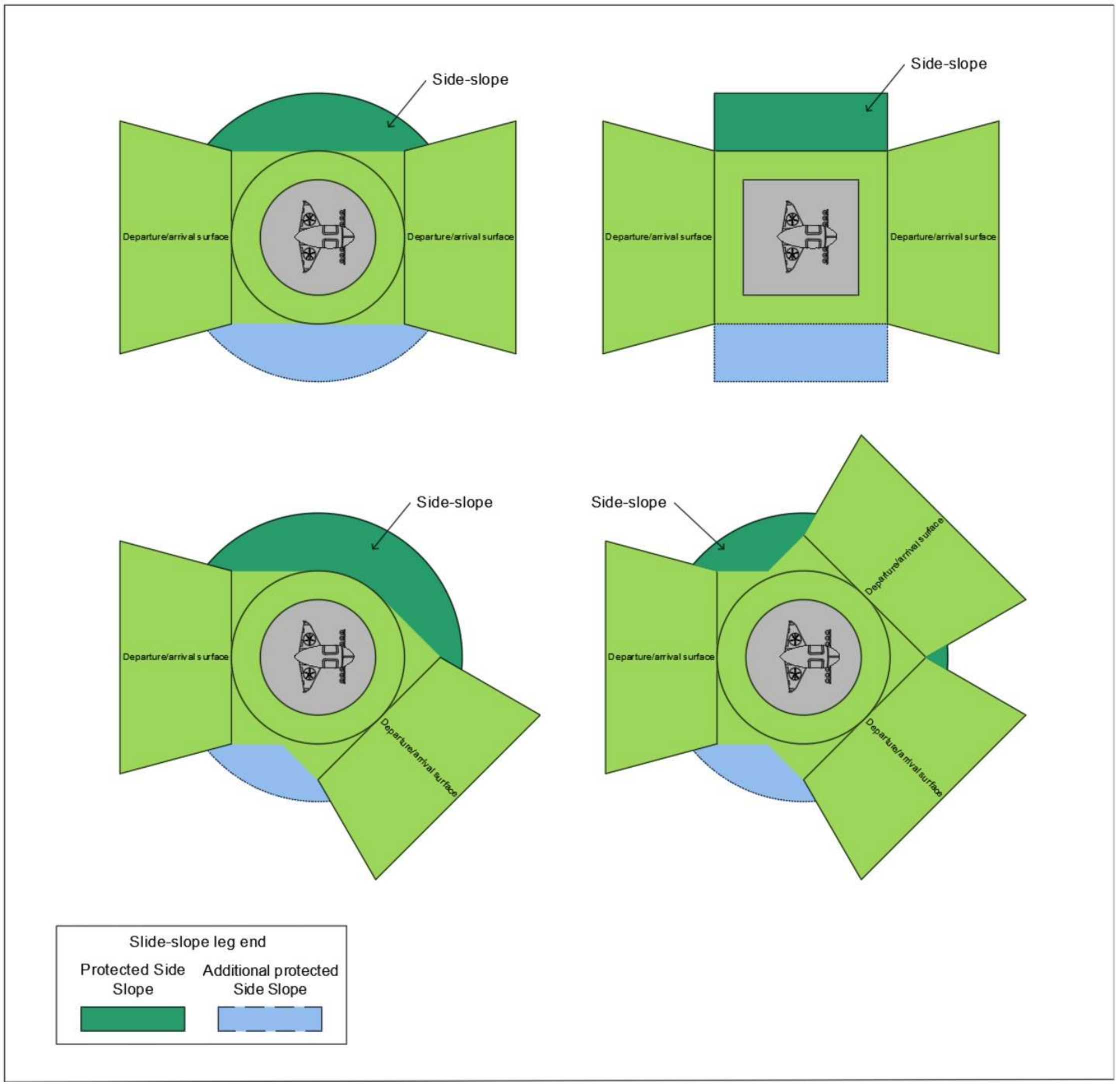


Figure VPT-A- 3:FATO simple/complex SA and side slope protection

Note: These diagrams show a number of configurations of FATO/SA/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 no obstacles between the FATO and/or SA and the arrival/departure surfaces.

CS VPT-DSN.A.030 - VCA clearway

The inclusion of detailed specifications for VCA clearways is not intended to imply that a clearway has to be provided.

(a) A VCA clearway shall 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 the design

VCA when it is accelerating, to achieve its take-off safety speed;

(2) when solid, a surface which: is contiguous and flush with the FATO and Safety Area; is resistant to the effects of downwash; and is free of hazards if a forced landing is required; or

(3) when elevated, clearance above all obstacles.

(b) When a VCA clearway is provided, the inner edge should be located:

(4) at the outer edge of the Safety Area; or

(5) when elevated, directly above, or directly below, the outer edge of the Safety Area.

(c) The width of a VCA clearway should not be less than the width of the FATO and associated safety area (see Figure VPT-A- 1).

(d) When solid, the ground in a VCA clearway should not project above a plane having an overall 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.

(e) An object situated in a VCA clearway which may endanger VCAs in the air should be regarded as an obstacle and should be removed.

CS VPT-DSN.A.035 - Touchdown and lift-off area (TLOF)

(f) A vertiport shall be provided with at least one TLOF.

(g) 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.

(h) A TLOF shall:

(1) provide:

(i) 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;

(ii) 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 VCA;

(C) has sufficient friction to avoid skidding of VCA or slipping of persons;

(D) is resistant to the effects of downwash; 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

(2) be associated with a FATO, or a stand.

(i) 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.

(j) For a vertiport that is elevated, 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.

(k) Slopes on a TLOF shall not exceed 2 per cent in any direction.

(l) When a TLOF is within a FATO it should be:

(1) centred on the FATO; or

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

(m) when a TLOF is within a VCA stand ,it shall be centred on the stand.

(n) 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 touchdown positioning marking (TDPM) (not the TLOF) may be offset while ensuring containment of the undercarriage within the TLOF and the VCA within the FATO.

(o) Where more than one TDPMs are provided, they shall be placed to ensure containment of the undercarriage within the TLOF and the aircraft 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.

(p) Safety devices such as safety nets or safety shelves shall be located around the edge of a vertiport that is elevated but shall not exceed the height of the TLOF.

(q) 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.

CS VPT-DSN.A.040 - VCA taxiways and taxi-routes

(a) The objectives of ground taxi-routes and air taxi-routes are intended for the safety of simultaneous operations during the manoeuvring of VCA. The effect of wind velocity/turbulence induced by the downwash would need to be considered.

(b) The defined areas addressed in this chapter are taxiways and ground/air taxi-routes:

(1) Taxiways may be associated either with air taxi-routes or ground taxi-routes.

(2) Ground taxi-routes are meant for use by ground taxiing of VCA under their own power or by means of ground movement equipment.

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

CS VPT-DSN.A.045 - VCA taxiways

(a) A VCA taxiway shall:

(1) provide:

i. 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;

ii. a surface which:

(A) has bearing strength to accommodate the taxiing loads of the VCA that the taxiway is intended to serve;

(B) is free of irregularities that would adversely affect the ground taxiing or movement of VCA;

(C) where relevant, is resistant to the effects of downwash; 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

(2) be associated with a taxi-route.

(b) The minimum width of a VCA taxiway shall be the lesser of:

(1) Two times the undercarriage width (UCW) of the most demanding VCA the taxiway is intended to serve; or

(2) a width meeting the requirements of (a), above.

(c) The transverse slope of a VCA taxiway shall not exceed 2 per cent and the longitudinal slope shall not exceed 3 per cent.

(d) When defining the minimum distance between a ground taxiway and another ground taxiway, fixed or movable object, the following should be considered:

(1) 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

(2) 1.25 maximum width of the aircraft intending to use the ground taxiway when defining the separation between parallel ground taxiway centre lines.

(e) 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.

GM1 CS VPT-DSN C.045 - VCA taxiways

(a) A VCA taxiway is intended to permit the surface movement of a VTOL- capable aircraft either under its own power or by means of ground movement equipment.

(b) A VCA taxiway should be designed to accommodate the undercarriage width (UCW) of the most demanding VCA that it is intended to serve, as well as the width of the required ground movement equipment, whichever is greater.

(c) A VCA taxiway can be used by a VCA for air taxi if associated with a VCA air taxi-route.

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

CS VPT-DSN.A.050 - VCA taxi routes

(b) A VCA taxi-route shall provide:

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

(2) when solid, and where relevant, a surface which is resistant to the effects of rotor downwash and,

(i) when collocated with a taxiway:

(A) is contiguous and flush with the taxiway;

(B) does not present a hazard to operations; and

(C) ensures effective drainage; and

(ii) when not collocated with a taxiway, is free of hazards if a forced landing is required.

(c) No mobile object should be permitted on a taxi-route during VCA operations.

(d) When solid and collocated with a taxiway, the taxi-route should not exceed an upward transverse slope of 4 per cent outwards from the edge of the taxiway.

CS VPT-DSN.A.055 - VCA ground taxi-routes

(a) 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.(See Figure VPT-A- 4: VCA taxiway/ground taxi-route).

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.

(b) Essential objects located in a VCA ground taxi-route shall not:

(1) be located at a distance of less than 50 cm outwards from the edge of the VCA ground 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 up to the outer edge of the ground taxi-route.

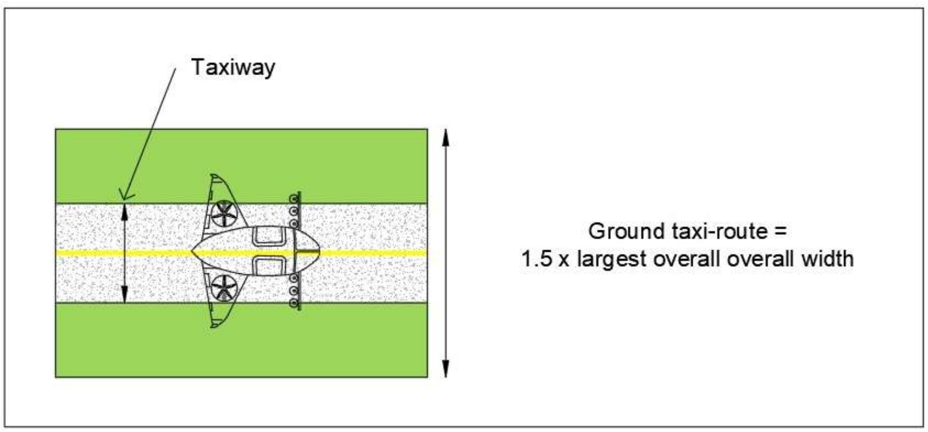


Figure VPT-A- 4 : VCA taxiway/ground taxi-route

CS VPT-DSN.A.060 - 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 kt).

(a) 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.

(b) If collocated with a taxiway for the purpose of permitting both ground and air taxi operations (see Figure VPT-A-5: VCA air taxi route and combined air taxi- route/taxiway):

(1) the VCA air taxi-route should be centred on the taxiway; and

(2) the essential objects located in the VCA air taxi-route should not:

i. be located at a distance of less than 50 cm outwards from the edge of the VCA taxiway; and

ii. 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.

(c) When not collocated with a taxiway, the slopes of the surface of an air taxi-route should not exceed the slope landing limitations of the VCA the 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.

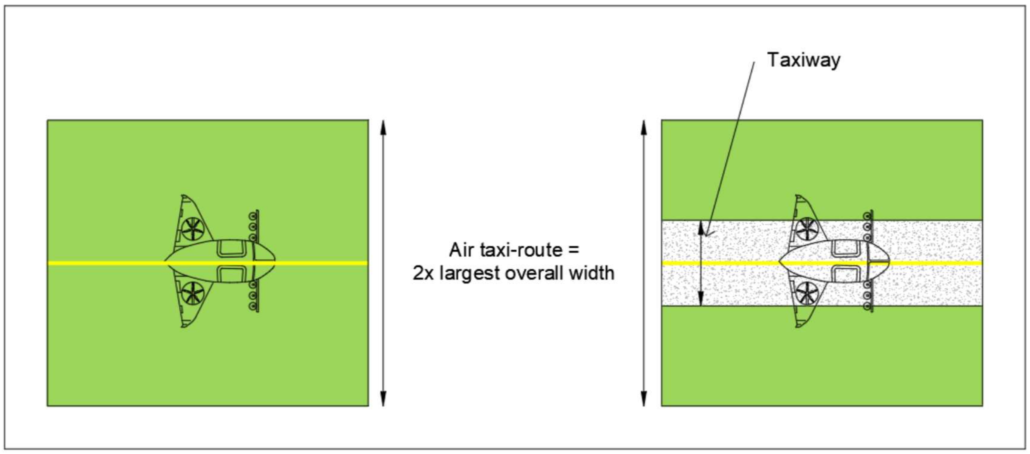


Figure VPT-A-5 :VCA air taxi route and combined air taxi-route/taxiway

CS VPT-DSN.A.065 - VCA stands

(a) Where provided, a VCA stands and aprons shall permit the safe loading and off-loading 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 VTOL-capable aircraft stand design. In the case of a geometry-based stand, where appropriate, a tail clearance should be also provided (see Figure VPT-A-7).

(b) A VCA stand shall:

(1) provide an area and its associated volume 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) provide a surface which:

i. is resistant to the effects of downwash, where required;

ii. is free of irregularities that would adversely affect the manoeuvring of VCA;

iii. has bearing strength of static aircraft loads, loads of people and ground movement and handling equipment, intended to be used or, if collocated with TLOF, dynamic loads should be considered;

iv. has sufficient friction to avoid skidding of VCA or slipping of persons;

and

(3) ensures effective drainage while having no adverse effect on the control or stability of a VCA when being manoeuvred under its own power, when being moved by means of ground movement equipment, or when stationary; and

(4) be associated with a protection area.

Note: 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 VPT-A-6.

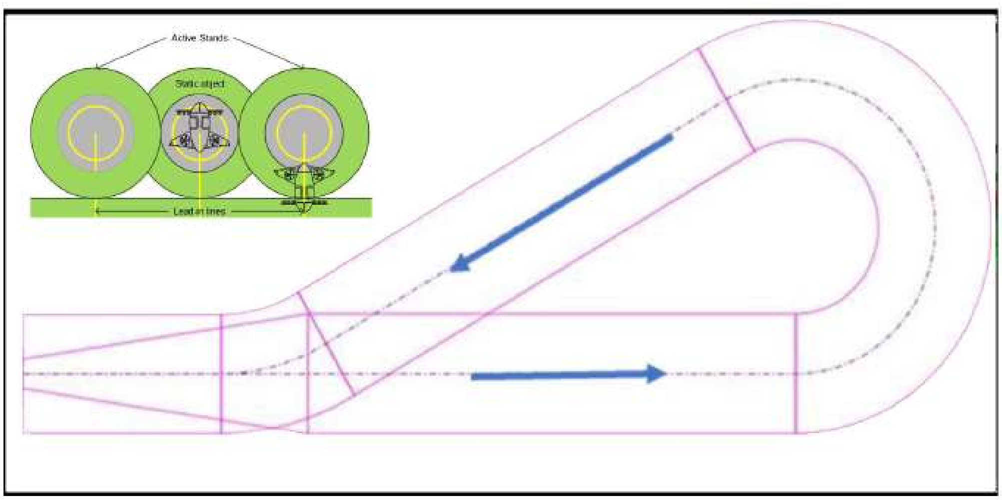


Figure VPT-A-6: Example of not providing parking stands under a flight path

(c) The mean slope of a VCA stand in any direction should not exceed 2 per cent.

(d) 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.

(e) 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:

(1) the size and manoeuvrability characteristics of the aircraft intending to use the VCA stand;

(2) clearance requirements;

(3) type of ingress and egress to the VCA stand;

(4) vertiport layout;

(5) VCA ground equipment and servicing requirements;

(6) taxiway access;

(7) intended use of the VCA stand (such a turning or taxi-through).

D-value-based VCA stand

(a) When the VCA stand design is based on D-value, the minimum dimensions should be:

(1) a circle of diameter of 1.2 D of the largest VCA the stand is intended to serve; or

(2) when there is a limitation on manoeuvring and positioning, of sufficient width to meet the requirement CS VPT-DSN.A.065(b)(1) but not less than 1.2 times overall width of largest VCA the stand is intended to serve.

(b) A D-value-based VCA stand should be surrounded by a protection area which need not be solid.

Geometry-based VCA stands

(a) 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.

(b) 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 VPT-A-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

(c) 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).

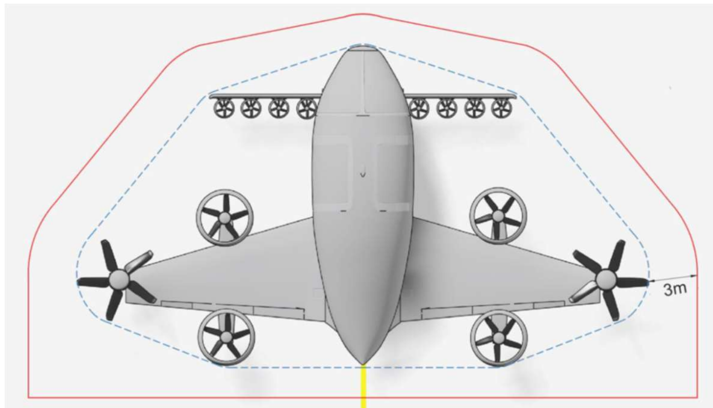


Figure VPT-A-7: VCA stand with a protection area based on VTOL geometry showing unshrouded rotors not turning

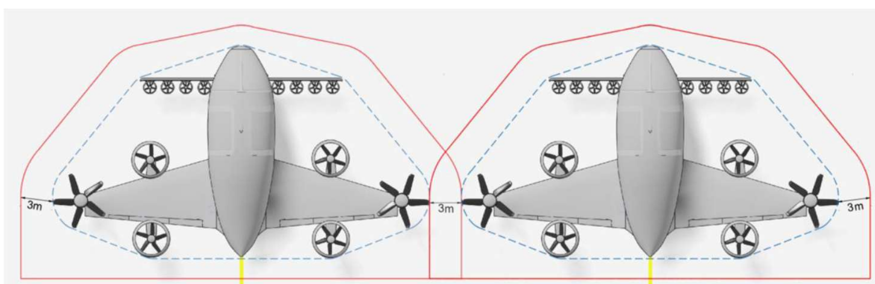


Figure VPT-A-8: VCA stands with a minimum clearance between an aircraft entering or exiting the stand and any adjacent building and aircraft of another stand

GM1 CS VPT-DSN.A.065 - VCA stands

(a) 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, 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.

(b) 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.

(c) 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 AGA PART ADR – ADR.DSN - Size of aprons).

(d) Stands designed for turning or associated with a TLOF should be defined and sized based on the D-value considerations.

GM2 CS VPT-DSN.A.065 - VCA stands

D-VALUE-BASED VCA STAND

(a) 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 CS VPT-DSN.A.065(a) above.

(b) 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.

GM3 CS VPT-DSN.A.065 - VCA stands

GEOMETRY-BASED VCA STANDS

(a) 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.

(b) 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.

(c) With the minimum clearance ensured as per the table above, the geometry-based stand does not require an additional protection area surrounding it.

CS VPT-DSN.A.070 - VCA stand protection area

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

(b) A protection area should be provided when the VCA stand is designed in accordance with the D-value-based VCA stand principles described in CS VPT-DSN.A.065 - VCA stands.

(c) The protection area shall provide:

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

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

(d) When associated with a stand designed for turning, the protection area should extend outwards from the periphery of the stand for a distance of 0.4 D or rely on turning circle data provided in the AFM of VCA intending to use the stand (see Figure VPT-A- 9).

(e) When associated with a stand designed for taxi-through, the minimum width of the stand and protection area should not be less than the width of the associated taxi-route (see Figure VPT-A-10 and Figure VPT-A-11).

(f) When associated with a stand designed for non-simultaneous use (see Figure VPT-A- 12 and Figure VPT-A-13).

(6) 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

(7) 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, the instruction provided to pilots should make clear that a limitation on the use of the stands is in force.

(g) No mobile object shall be permitted in a protection area during VCA movement, unless the object is used to support the movement of the VCA (e.g. a towing vehicle).

(h) Essential objects located within the protection area shall not:

(1) 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

(2) 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.

(b) 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.

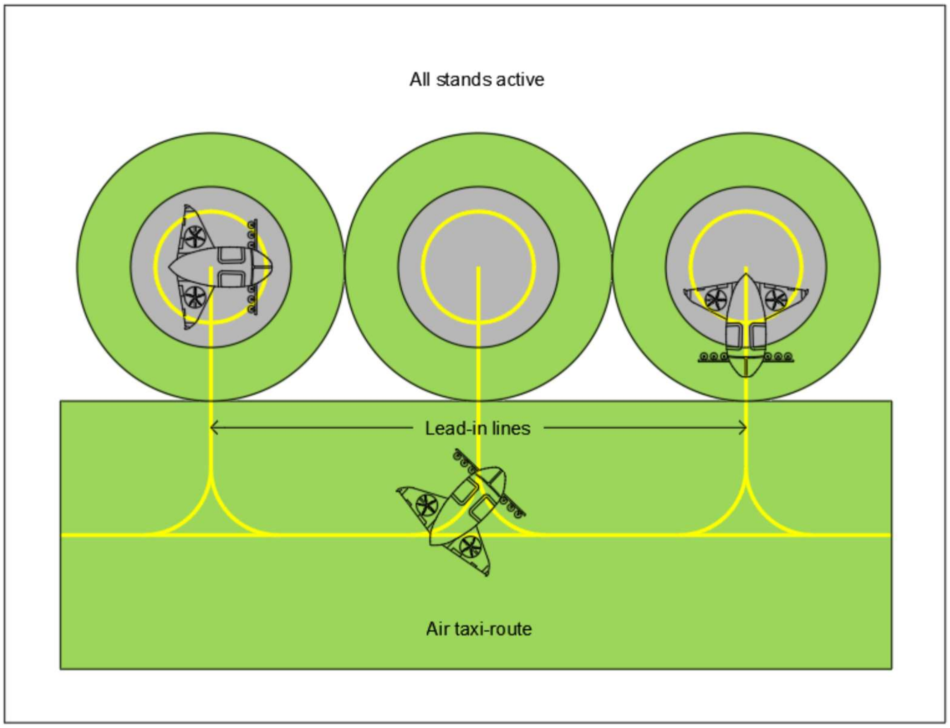


Figure VPT-A-9 : Turning VTOL-capable aircraft stands (with air taxi-routes) — simultaneous use

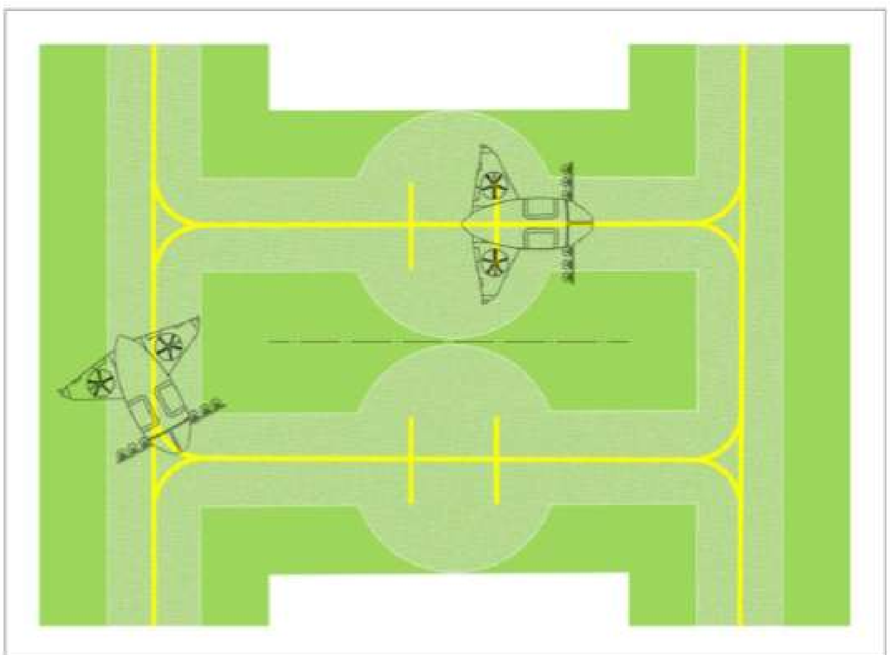


Figure VPT-A-10: Ground taxi-through stands (with taxiway/ground taxi-route) — simultaneous use

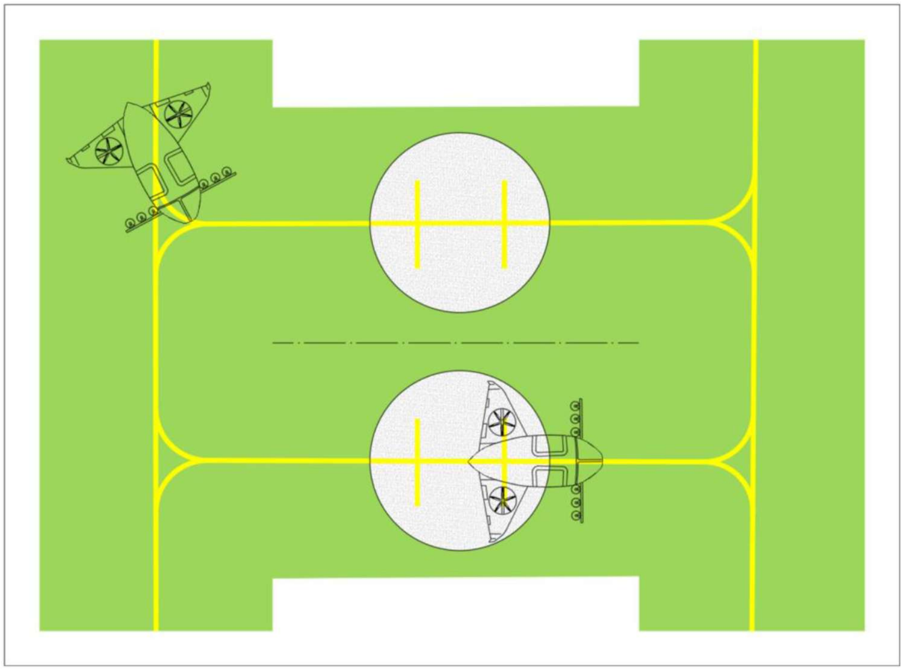


Figure VPT-A-11: Air taxi-through stands (with air taxi-route) — simultaneous use

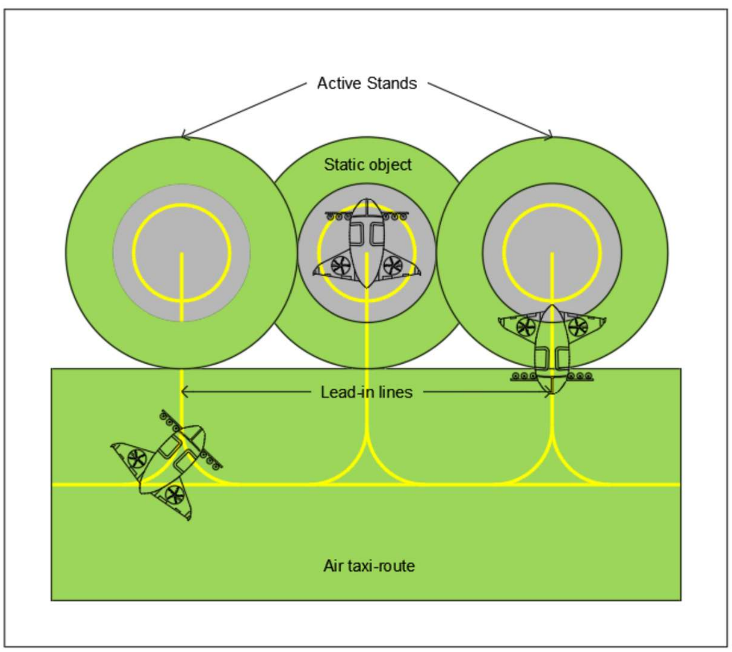


Figure VPT-A-12: Turning stands (with air taxi-routes) — non-simultaneous use — outer stands active

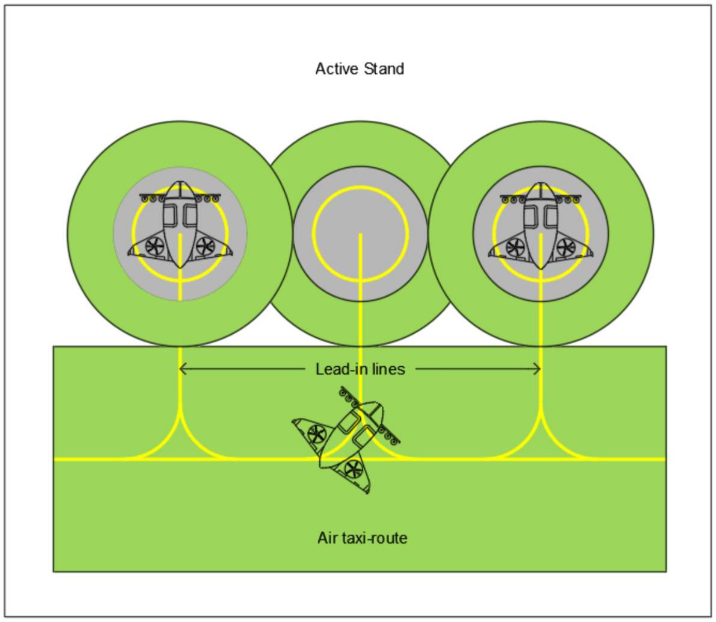


Figure VPT-A-13: Turning stands (with air taxi-route) — non-simultaneous use — inner stand active

CS VPT-DSN.A.075 - Location of a FATO in relation to another FATO

(a) 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.

(b) The safety assessment should take into consideration, at least the following aspects:

(1) type of operation;

(2) orientation of departure and approach flight path;

(3) balked landing procedure;

(4) the downwash data (provided in AFM);

(5) ensuring that Safety Areas do not overlap.

GM1 CS VPT-DSN.A.075 - Location of a FATO in relation to another FATO

(a) A 60-m separation distance between two FATOs has been recognised as a reference for simultaneous helicopter landings and take-offs where the courses to be flown do not conflict and where the MTOW of the helicopter 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.

(b) 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 CS VPT-DSN.A.080(b).

CS VPT-DSN.A.080 - Location of FATO in relation to an aerodrome runway or taxiway

(a) 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 VPT-A-2.

(b) A FATO shall not be located:

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

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

Table VPT-A-2 : FATO minimum separation distance

If aeroplane mass and/or VCA mass are	Distance between FATO edge and runway edge or taxiway edge
up to but not including 3 175 kg	60 m
3 175 kg up to but not including 5 760 kg	120 m
5 760 kg up to but not including 100 000 kg	180 m
100 000 kg and over	250 m
Note: The values specified in this table are primarily intended to mitigate risks of wake turbulence encounters. In addition to this table, when positioning a FATO intended to be used simultaneously with a nearby runway or taxiway, attention should be given to other CS ADR-DSN requirements such as the minimum runway strip width. Local environment should be taken into account when setting the separation between the FATO and nearby infrastructure elements to ensure the safety of simultaneous operations.	

CS VPT-DSN.A.085 - Safety Devices Around an Elevated Vertiport

(a) 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.

(b) 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:

   (1) 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;

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

   (3) 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.

(c) 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.

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

(e) 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).

(f) 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.

GM1 VPT-DSN.A.090 - Elevated Vertiports - Structural Design

Elevated vertiports may be designed for a specific VCA 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 VCA that it is anticipated will use the vertiport, and account taken of other types of loading such as personnel, freight, refuelling equipment, etc.

CS VPT-DSN.A.095 - Elevated Vertiports - Means of Escape

Elevated heliports and helidecks shall be provided with a main access and at least one additional means of escape.

GM1 CS VPT-DSN.A.095 - Elevated Vertiports - Means of Escape

Access points should be located as far apart from each other as is practicable.

CHAPTER B – OBSTACLE ENVIRONMENT (VPT-DSN.B)

This chapter provides details of

(a) Conventional OLS;

(b) Obstacle – free volume.

OBSTACLE LIMITATION SURFACES

GM1 CS VPT-DSN.B.105 - General

(a) 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 should be established for each approach and take-off climb path designated as serving the FATO.

(b) 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.

(c) 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 VPT-B-1: Dimensions and slopes of OLSs for all visual FATOs, 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.

(d) 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 VPT-B-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:

$S+R \geq 575$ m and $R \geq 270$ m where $S = 305$ 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.

(5) 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.

(6) 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.

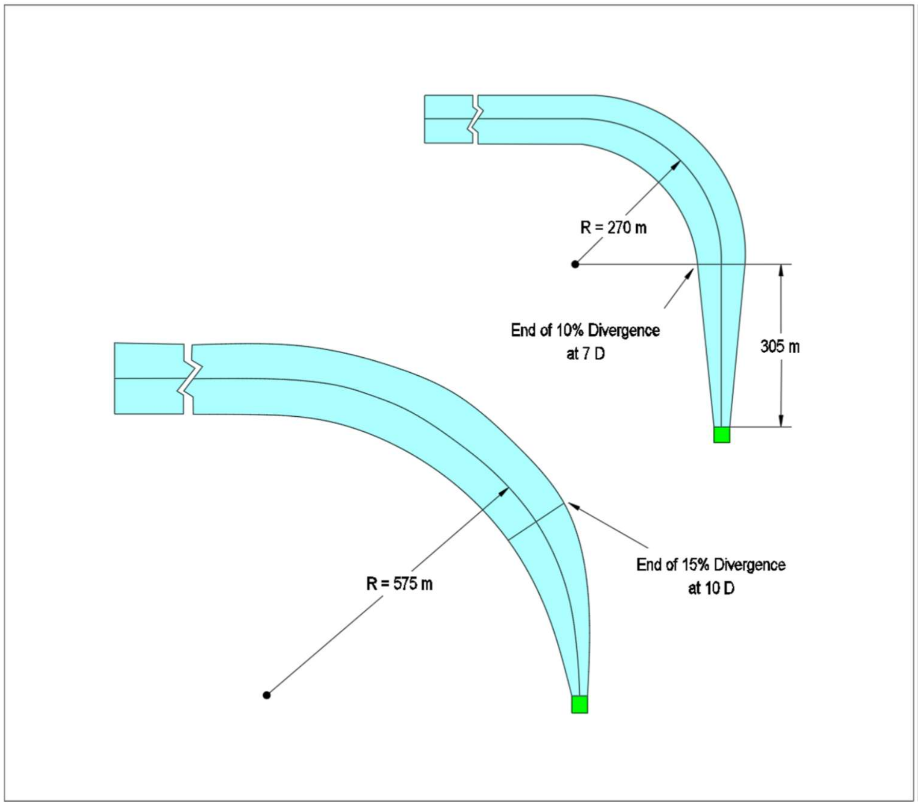


Figure VPT-B-1: Curved approach and take-off climb surface for all FATOs

Blending the spaces between the approach or take-off climb surface and SA

(e) The reference circle is an inscribed circle inside the FATO/SA that is used for orienting the approach/take-off and climb surface, transition area and VCA clearway.

(f) Areas between the inner edge of the approach or take-off climb surface and the SA, if any, should have the same characteristics as the SA, since it would be unacceptable for such areas to have characteristics that were below the standards of either of the adjoining surfaces.

Note: Figure VPT-B-2 to VPT-B-5 illustrate such areas by shading the relevant portions, but these are, of necessity, shown only for the basic configurations of FATO and SA 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 SA, may be of irregular shape or be much larger than one which can only just accommodate a circle of the minimum specified dimensions.

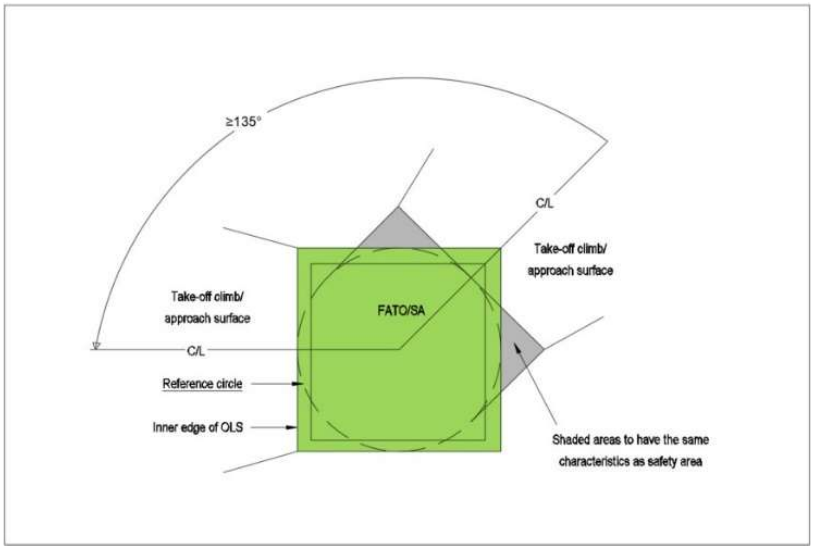


Figure VPT-B-2: Square FATO with reference circle and surfaces separated by 135°

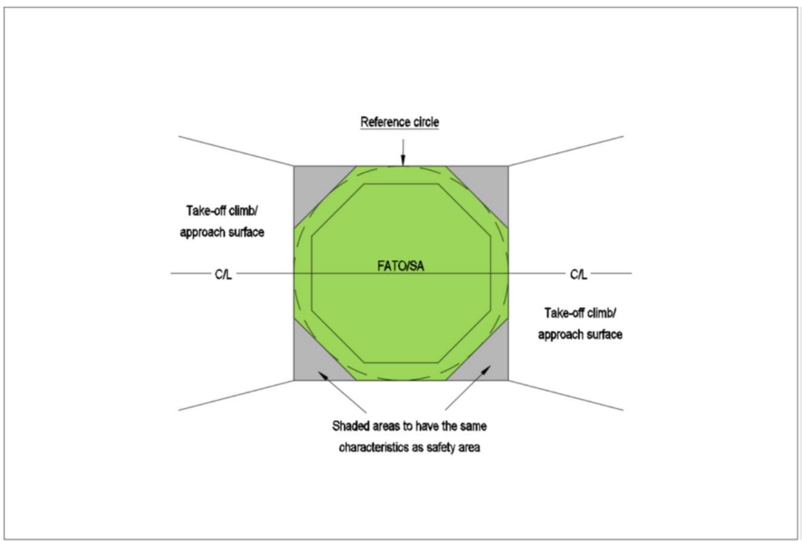


Figure VPT-B-3: Octagonal FATO with reference circle and diametrically opposed surfaces

(g) 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.

(h) 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 SA.

(i) Where the FATO is elongated, there should be two reference circles within the SA, each located at the appropriate approach end of the SA (see Figure VPT-B-4)

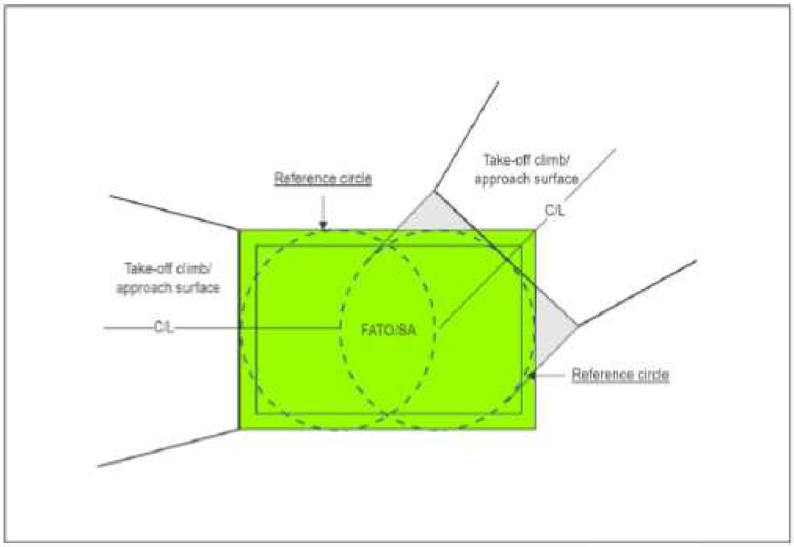


Figure VPT-B-4: Rectangular FATO with two reference circles and surfaces separated by 135°

(j) Where a clearway has been established, the shaded area should be between the FATO/SA and clearway (see Figure VPT-B-5); the inner edge of the approach or take-off climb surface will abut the clearway.

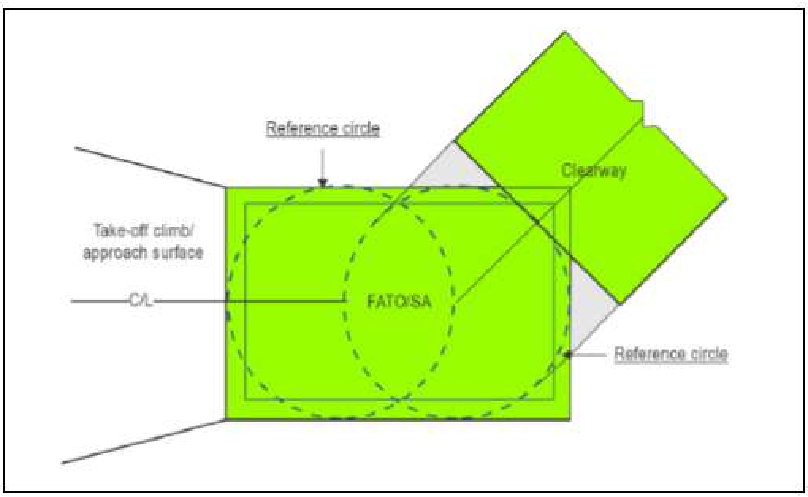


Figure VPT-B-5: Rectangular FATO with two reference circles and helicopter clearway

Number and separation of take-off and climb and approach surfaces

(k) 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.

(l) The vertiport should have at least two take-off and climb and approach surfaces with a recommend separation of at least 135^o (Figure VPT-B-2: Square FATO with reference circle and surfaces separated by 135^o) 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.

(m) Where these technical specifications, as above, 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.

(n) 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:

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

(2) the obstacle environment surrounding the vertiport; and the availability of at least one protected side slope;

(3) the performance and operating limitations of VCA intending to use the vertiport; and

(4) the local meteorological conditions including the prevailing winds.

Table VPT-B-1: Dimensions and slopes of OLSs for all visual FATOs

	SLOPE DESIGN CATEGORIES		
	A	B	C
APPROACH AND TAKE-OFF CLIMB SURFACE:			
Length of inner edge	Width of SA	Width of SA	Width of SA
Location of inner edge	boundary (Clearway boundary if provided)	SA boundary	SA 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
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.

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.

CS VPT-DSN.B.110 - Approach surface

(a) Applicability

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.

(b) Description

An inclined plane or a combination of planes or, when a turn is or turns are involved, a complex surface sloping upwards from the inner edge and centred on a line passing through the centre of the FATO.

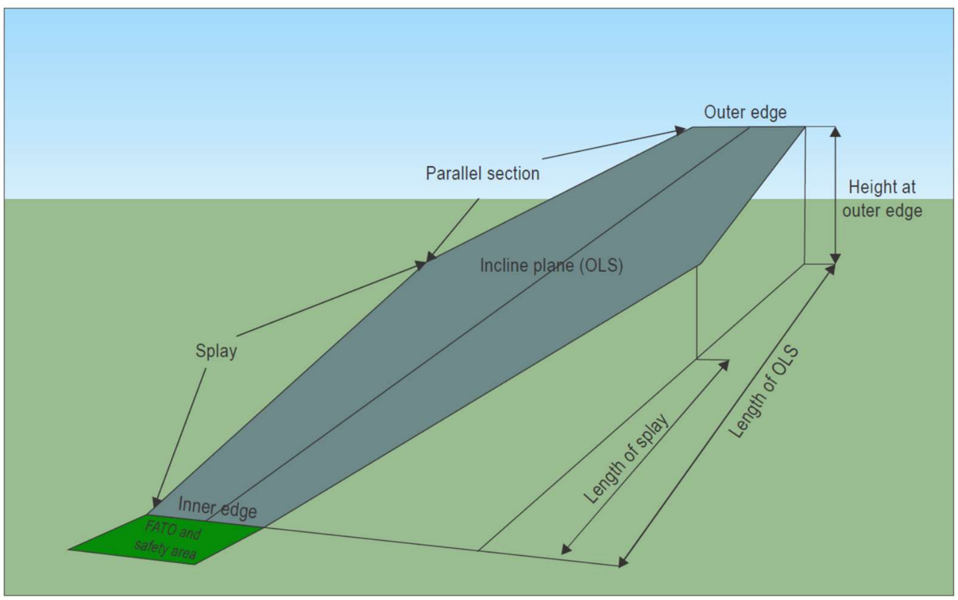


Figure VPT-B-6: Generic approach/take-off climb surface

(c) Characteristics

(1) The limits of an approach surface should comprise:

(i) an inner edge, horizontal and equal in length to the minimum specified width/diameter of the FATO plus the SA, perpendicular to the centre line of the approach surface and located at:

(A) for a runway-type FATO, the outer edge of the SA; or

(B) for other than a runway-type FATO, the outer edge of the reference circle;

(C) when vertical procedures are being utilized, directly above the outer edge of the safety area.

(ii) 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 width and continuing thereafter at that width for the remaining length of the approach surface; and

(iii) an outer edge horizontal and perpendicular to the centre line of the approach surface at:

(A) a height of 152 m above the elevation of the FATO; or

(B) when a PinS approach procedure with proceed visually instruction is defined, a specified height above the elevation of the FATO.

(2) The elevation of the inner edge should be:

(A) the elevation of the SA at the point on the inner edge that is intersected by the centre line of the approach surface; or

(B) when vertical procedures are being utilized; the level at which obstacle clearance is achieved, or

(C) When a 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.

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

(4) In the case of an approach surface involving a turn or 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.

(5) 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 should not be less than 575 m.

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

GM1 CS VPT-DSN.B.110 - Approach surface

Further guidance on elevating approach surface is provided in ICAO Document 9261, Heliport Manual.

CS VPT-DSN.B.115 - Transitional surface

(a) 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).

(b) Applicability: Where appropriate, a transitional surface may be provided at VFR vertiports for the safety of VCA when vertical procedures with lateral transit are planned.

(c) Description: A complex surface bounded by a lower and upper edge and sloping upwards and outwards from one to the other (see Figure VPT-B-7, Figure VPT-B-8, Figure VPT-B-9).

(d) Characteristics:

(1) The transitional surface shall comprise:

(i) a lower edge beginning at the point on the side of approach, 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 surface, or take-off climb surface to the inner edge and from there:

(A) where provided, along the side of the clearway; then

(B) for a runway-type FATO, along the length of the side of the SA parallel to the centre line of the FATO; or

(C) for other than a runway-type FATO, along the tangent of the reference circle parallel, and equal in length, to its diameter; and

(ii) an upper edge located at 45 m above the FATO, or

(iii) when vertical procedures are being utilized; 15 m (50 ft) above the elevation of the upper edge of the ascent/descent surface.

(2) The extended transitional surface and modified extended transitional surface should comprise:

(i) 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:

(A) for the take-off climb along the length of the clearway to the inner edge; then

(B) directly down to, and connecting with, the outer edge of the SA (see Figure VPT-B-10);

(C) along the tangent of the reference circle until level with the back edge of the SA; then

(D) up and along the outer edge of the backup obstacle surface until reaching the upper edge;

(ii) an upper edge located at 45 m (150 ft) plus the elevation of the OLS origin/clearway.

(3) The slope of the transitional surface should be measured in a vertical plane at right angles to the centre line of the FATO and should be:

(i) for a transitional surface and extended transitional surface 50 per cent (1:2) (see Table VPT-B-1: Dimensions and slopes of OLSs for all visual FATOs); or

(ii) for a modified extended transitional surface 1:1 (45°).

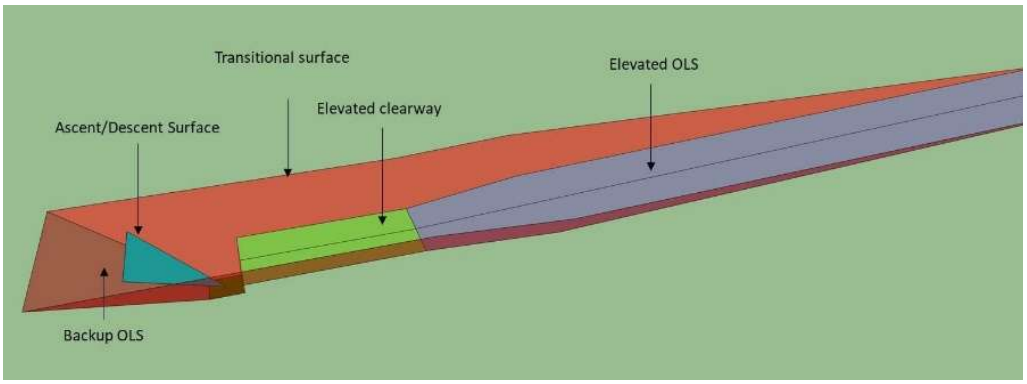


Figure VPT-B-7: Transitional, backup and take-off climb surface

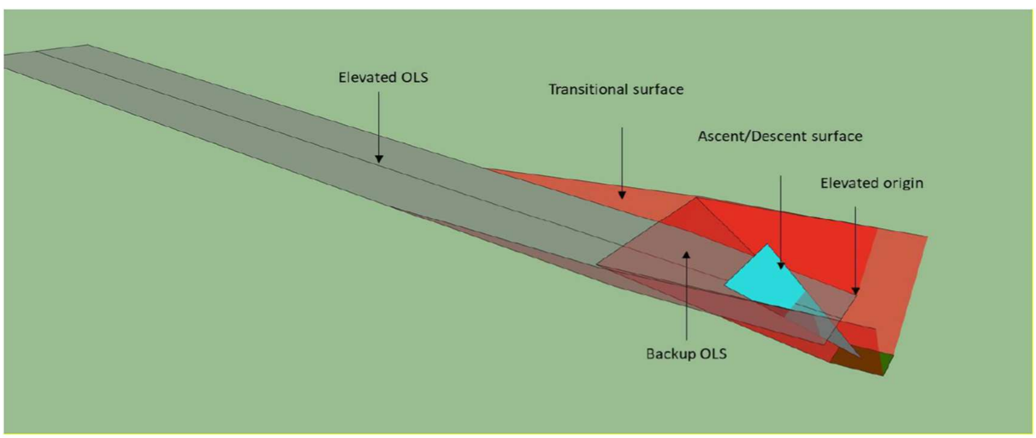


Figure VPT-B-8: Transitional, backup and take-off climb surface

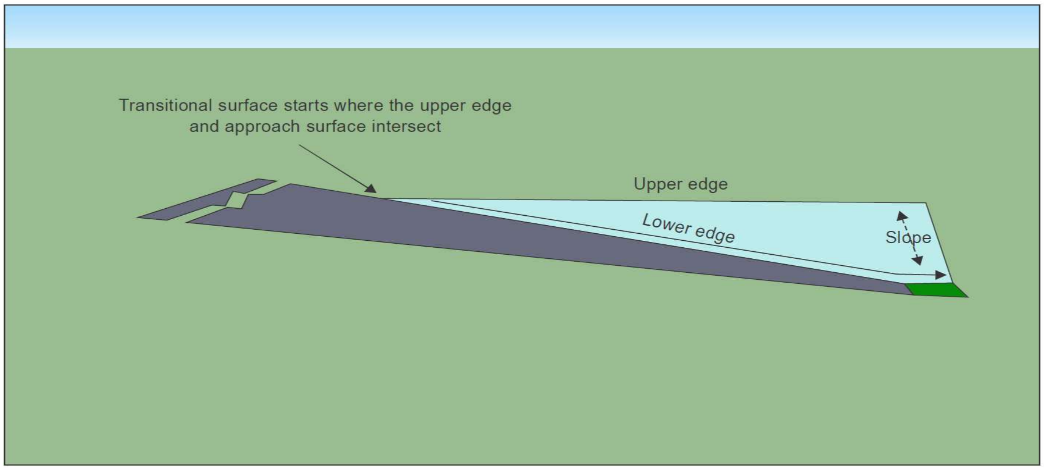


Figure VPT-B-9: Transitional surface

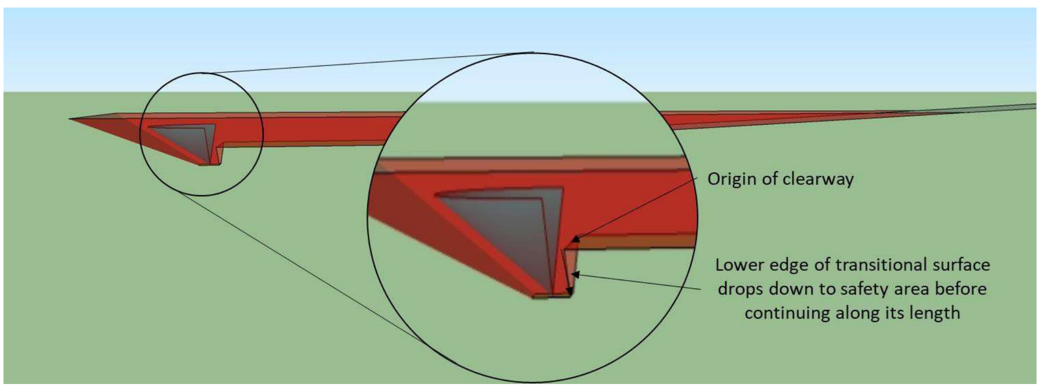


Figure VPT-B-10: Transitional surface (showing the drop from clearway to SA*)*

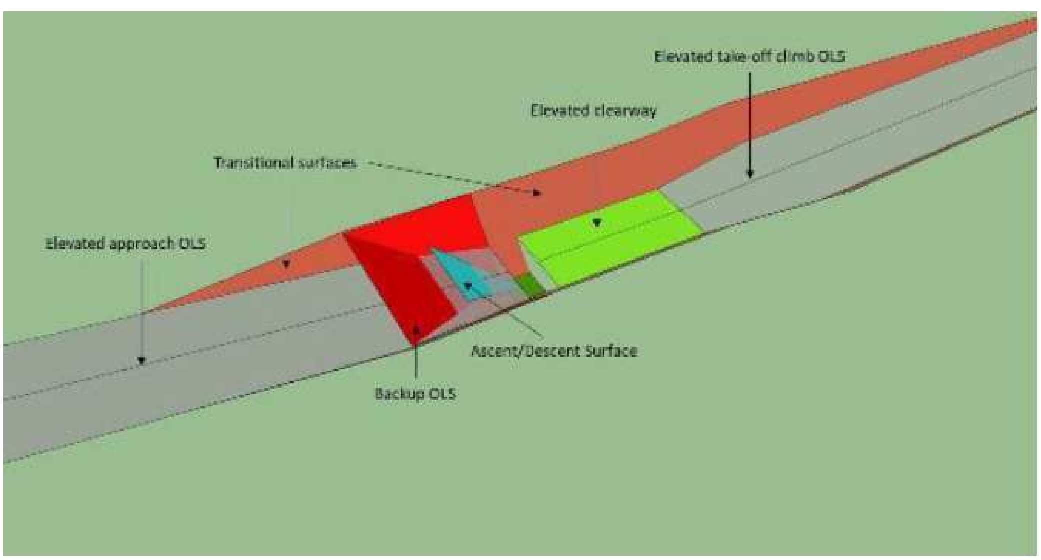


Figure VPT-B-11: Elevated OLS and transitional surface

GM1 CS VPT-DSN.B.115 - Transitional surface

(a) The modified extended transitional surface can be regarded as an extension to the protected side slope (see CS VPT-DSN.A.025 - Protected side slope).

(b) Further guidance on elevating an approach and take-off climb surface is provided in ICAO Document 9261, Heliport Manual.

(c) Further guidance on how to protect airspace during the backup procedure of VTOL-capable aircraft is provided in the Air OPS Regulation, in ICAO Document 9261, Heliport Manual, and in the AFM.

GM2 CS VPT-DSN.B.115 - Transitional surface

(a) Additional clarification on the transitional surface:

(1) Principles of the basic transitional surface:

(i) The upper edge is 45 m above the OLS origin.

(ii) The upper and lower edges commence at a point adjacent to the back edge of the SA.

(iii) The lower edge and upper edge meet on the side of the OLS.

(iv) 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.

(v) The slope of the transitional surface is 1:2.

(2) Principles of the extended transitional surface (in addition to those of the basic transitional surface):

(i) The upper edge is extended upwards by the elevation of the OLS origin.

(ii) The rear of the extended surface is attached to the outer edge of the backup surface.

(iii) The lower edge rises directly from the outer edge of the SA to the inner edge of the clearway or OLS.

(3) Principles of the modified extended transitional surface (in addition to/modification of those of the extended):

(i) The slope of the modified extended transitional surface is 1:1.

(4) The characteristics of the take-off climb surface are provided in CS VPT-DSN.B.120 and in Table VPT-B-1: Dimensions and slopes of OLSs for all visual FATOs.

(5) The characteristics of the extended clearway for the take-off climb:

(ii) The clearway is elevated to a level that permits clearance of obstacles in the take-off climb.

(iii) The width of the clearway is extended on each side, by twice its elevation, to meet the surface of the extended transitional surface.

(6) The characteristics of the modified extended clearway for take-off climb (in addition to/modification of those of the basic clearway):

(i) The width of the clearway is extended on each side, by its elevation, to meet the surface of the extended modified transitional surface.

(7) The origin of the extended the take-off climb surface:

(ii) The inner edge of the take-off climb surface is at the outer edge of the clearway.

(iii) The width of the inner edge of the take-off climb surface is the width of the clearway.

(i) The characteristics of the approach surface are provided VPT-DSN.B.110 and in Table VPT-B-1: Dimensions and slopes of OLSs for all visual FATOs. The origin of the approach surface is elevated to a level that permits clearance of obstacles in the approach.

(ii) The inner edge of the approach surface is extended on each side by:

(A) twice the amount of elevation, to meet the surface of the extended transitional surface; or

(B) the amount of elevation, to meet the surface of the extended modified transitional surface.

(8) The backup procedure may be of three types:

(i) pure backup procedure: it does not need lateral protection;

(ii) limited lateral procedure: the required lateral protection is ensured by a modified extended transitional surface; and

(iii) full lateral procedure: the required lateral protection is ensured by an extended transitional surface.

CS VPT-DSN.B.120 Take-off climb surface

(a) The purpose of the take-off climb surface is to protect a VCA on take-off and during climb-out.

(b) Description: An inclined plane, a combination of planes or, when a turn is or turns are involved, a complex surface, sloping upwards from the end of the SA, or of the clearway, when it is provided, and centred on a line passing through the centre of the FATO.

(c) Characteristics

(1) The limits of a take-off climb surface should comprise (see Figure VPT-B-6).

(i) an inner edge horizontal and equal in length to the minimum specified width of the FATO plus the SA, perpendicular to the centre line of the take-off climb surface and located at:

(A) for a runway-type FATO, the outer edge of the SA;

(B) for other than a runway-type FATO, the tangent of the outer edge of the reference circle; or

(C) the outer edge of the clearway;

(ii) 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

(iii) 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.

(2) The elevation of the inner edge should be the elevation of the SA 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).

(3) 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.

(4) In the case of a take-off climb surface involving a turn, the surface should not contain more than one curved portion.

(5) The slope should be measured in the vertical plane containing the centre line of the surface.

GM1 VPT-DSN.B.120 Take-off climb surface

(a) Further guidance on elevating take-off approach surface is provided in ICAO Document 9261, Heliport Manual.

CS VPT-DSN.B.125 Application of obstacle limitation surfaces

(a) 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.

(b) The following OLSs should be established for a FATO at a vertiport:

(i) take-off climb surface;

(ii) approach surface; and

(iii) where provided transitional surface.

(c) The dimensions of the take-off climb/approach surfaces should be considered in two parts.

(1) 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 Figure VPT-B-12). 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.

(2) 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.

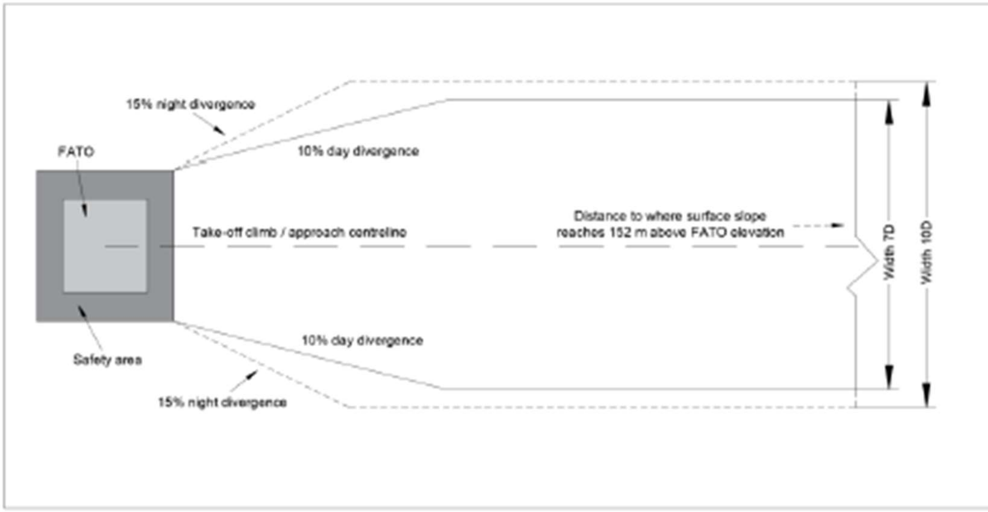


Figure VPT-B-12: Take-off climb/approach widths (schematic)

GM1 CS VPT-DSN.B.125 Application of obstacle limitation surfaces

(a) Further guidance for vertiports with elevated origin of an approach and take-off climb surfaces is provided in ICAO Document 9261, Heliport Manual, and in the AFM.

(b) Further guidance on how to protect airspace and surrounding during the backup procedure of VCA is provided in the CAR AIR OPS Regulation, and in the AFM.

CS VPT-DSN.B.130 - Obstacle limitation requirements

Note 1: The requirements for OLSs 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.

(a) The slopes of the OLSs should not be greater than, and their other dimensions not less than, those specified in Table VPT-B-1: Dimensions and slopes of OLSs for all visual FATOs, and should be located as shown in Figure VPT-B-1 to VPT-B-12.

(b) For vertiports that have an approach/take-off climb surface with a 4.5 per cent slope design, objects can be permitted to penetrate the OLS, if after a safety assessment, it is determined and approved by the appropriate authority that the object would not adversely affect the safety or significantly affect the regularity of operations of VCA.

(c) New objects or extensions of existing objects shall not be permitted above approach or take-off climb surfaces 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.

(d) Existing objects above approach or take-off climb surfaces 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.

(e) A 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:

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

(2) the obstacle environment surrounding the vertiport and the availability of at least one protected side slope;

(3) the performance and operating limitations of VCAs intending to use the vertiport; and

(4) the local meteorological conditions including the prevailing winds.

Note 2: Once such surfaces are established, it may become necessary to remove existing obstacles which project through the surface and restrict the erection of new structures which would become obstacles. Mobile or temporary objects such as cranes, lorries, boats and trains may be obstacles at times, in which case it might be necessary to delay VCA operations until the obstacle is moved clear, or temporary operational limits are temporarily established (e.g. reduction of take-off mass). For longer lasting temporary obstacles, supplementary take-off climb or approach surfaces might have to be developed and promulgated.

GM1 CS VPT-DSN.B.130 - Obstacle limitation requirements

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.

OBSTACLE-FREE VOLUME

CS VPT-DSN.B.135 General

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.

CS VPT-DSN.B.140 Generic volume

(a) Characteristics

(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 VPT-B-2 and depicted in Figure VPT-B-13 and Figure VPT-B-14.

Table VPT-B- 2 : Generic vertical take-off and landing procedure parameters

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

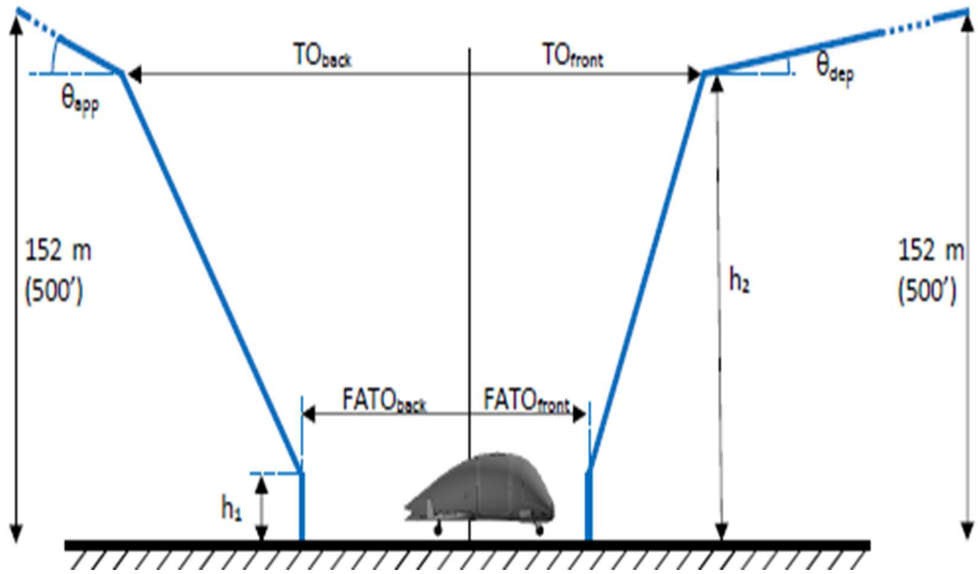


Figure VPT-B-13: Generic vertical take-off and landing procedure parameters

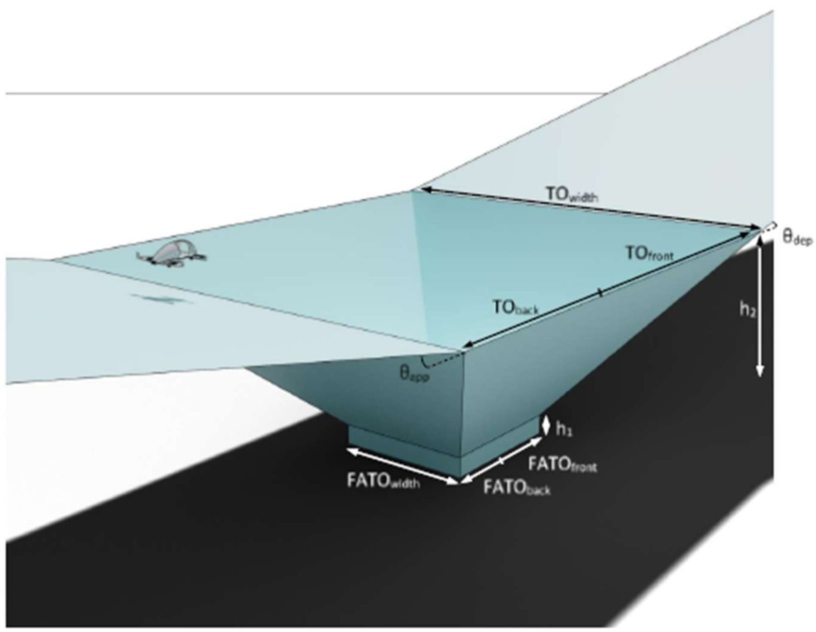


Figure VPT-B-14: Vertical take-off and landing procedure volume

(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. 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 TOwidth, while it extends to the back and to the front by the distances TOback and TOfront. 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.

(3) 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 VPT-B-3.

Table VPT-B-3: Vertical take-off and landing procedure parameters minima/maxima

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}	≥ 4.5%
θ_{dep}	≥ 4.5%

(b) A vertiport obstacle-free volume compatible with the aircraft vertical take-off and landing procedure can be established as described in the following paragraphs.

CS VPT-DSN.B.145 Final-approach and take-off area (FATO) and safety area (SA)

(a) The minimum dimensions of the FATO should be:

(1) 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

(2) the width $FATO_{width}$.

(b) All other characteristics should be as per CS VPT-DSN.A.010.

(c) The FATO should be surrounded by SA as per CS VPT-DSN.A.015.

Note: A larger SA may be warranted for specific local conditions, e.g. severe aerology.

CS VPT-DSN.B.150 Obstacle-free volume (OFV)

(a) The obstacle-free volume, as depicted in Figure VPT-B-15, is created by extending vertically upward the outside edges of the SA up to height h_1. The edges at height h1 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 VTOL procedure volume so that the dimensions of the obstacle-free volume at height h_2 are:

(1) 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

(2) the width (TO_{width}+1 D).

(b) The obstacle-free volume should not be penetrated by obstacles.

Note: A larger SA may be warranted for specific local conditions, e.g. severe aerology.

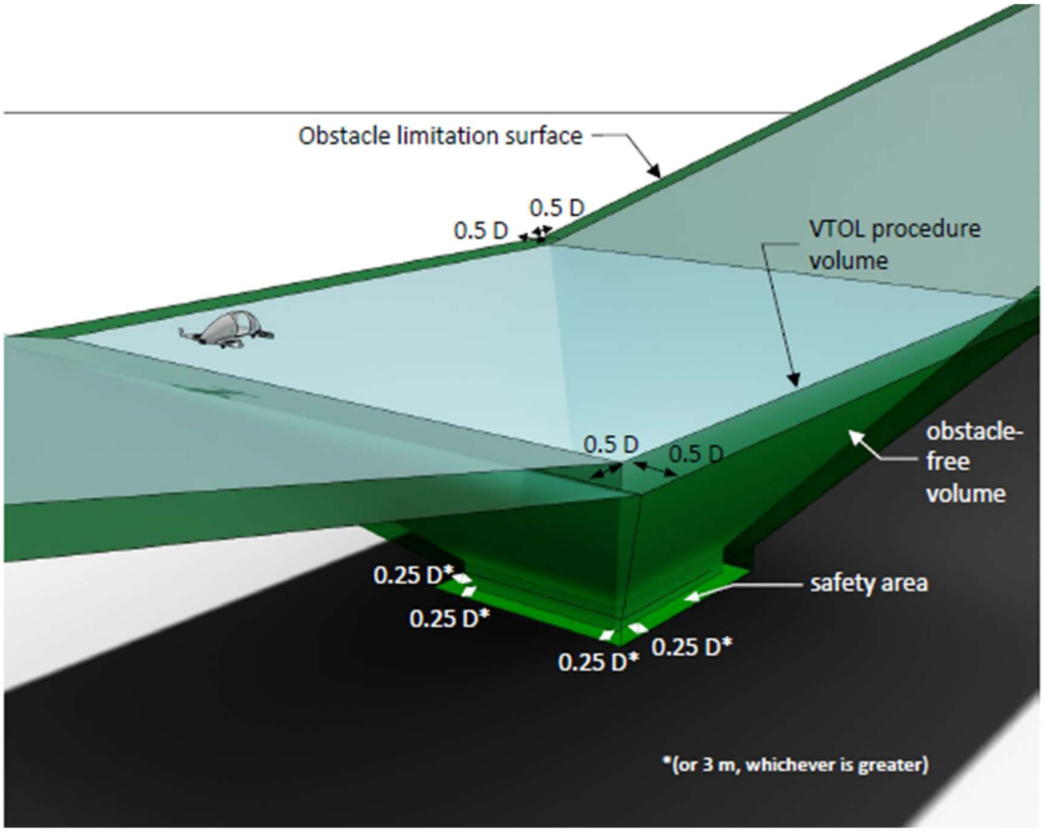


Figure VPT-B-15: Safety areas added to the vertical take-off and landing procedure parameters to establish the vertiport obstacle-free volume

CS VPT-DSN.B.155 Approach surface

(a) The limits of the OLS approach surface comprise:

(1) 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;

(2) 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;

(3) 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

(4) The slope of the approach surface is θ_{app} and should be measured in the vertical plane containing the centre line of the surface.

(b) All other characteristics should be as per CS VPT-DSN.B.110 - Approach surface.

CS VPT-DSN.B.160 Take-off climb surface

(a) The limits of the OLS take-off climb surface comprise:

(1) an inner edge, horizontal and equal in length to width (TO_{width}+1D) located at the front edge of the obstacle-free volume at height h_2;

(2) 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

(3) 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.

(4) 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.

(b) All other characteristics should be as per CS VPT-DSN.B.120 - Take-off climb surface.

(c) All other characteristics (e.g. transitional surface) as per CS VPT-DSN.

CS VPT-DSN.B.165 Bidirectional volume

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 VPT-B-4). To this volume the SAs should be added, and the obstacle-free volume derived as described in the preceding paragraphs.

Table VPT-B-4: Bidirectional VTOL procedure volume derived from vertical take-off and landing procedure parameters (without a SA*)*

Parameter	Bidirectional volume
TO_{front} bidirection = TO_{back} bidirection	$max(TO_{front},TO_{back})$
$FATO_{front}$ bidirection = $FATO_{back}$ bidirection	$max(FATO_{front},FATO_{back})$
θ_{app} bidirection = θ_{dep} bidirection	$min(\theta_{app},\theta_{dep})$

CS VPT-DSN.B.170 Omnidirectional volume

(a) 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 VPT-B-5 (see also Figure VPT-B-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 h2 as a SA. The OLS starts at height h2 on the circle with the added SA 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.

Table VPT-B-5: Omnidirectional VTOL procedure volume derived from vertical take-off and landing procedure parameters (without a SA)

Parameter	omnidirectional volume
Ø $TO_{omnidirection}$	$\sqrt{4 \times max(TO_{front},TO_{back})^2+TO^2_{width}}$
Ø $FATO_{omnidirection}$	$\sqrt{4 \times max(FATO_{front},FATO_{back})^2+FATO^2_{width}}$
$\theta_{omnidirection}$	$min(\theta_{app}, \theta_{dep})$

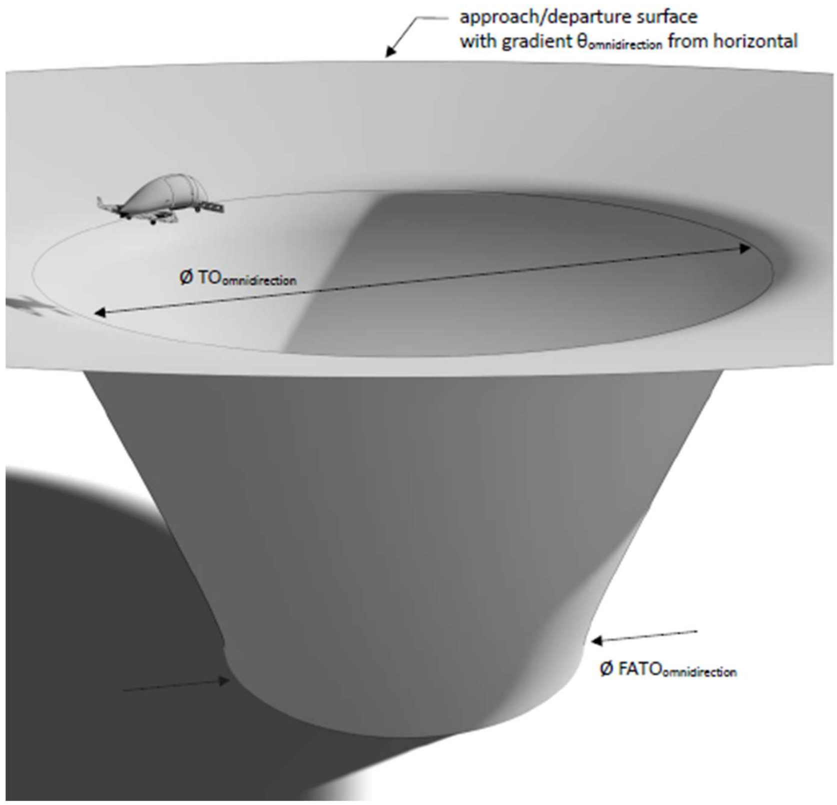


Figure VPT-B-16: VTOL procedure volume with omnidirectional approach and take-off climb surface (without SAs)

(b) 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.

(c) Instead of a conical OLS, discrete planar approach and take-off climb surfaces (see Figure VPT-B-17, Figure VPT-B-18), as per VPT-DSN.B.110 and VPT-DSN.B.120, can be created as follows:

(1) 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;

(2) an additional horizontal surface bridges the space between the circle of diameter ($TO_{omnidirection}$+1 D) and the inner edges of the OLS.

(d) 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.

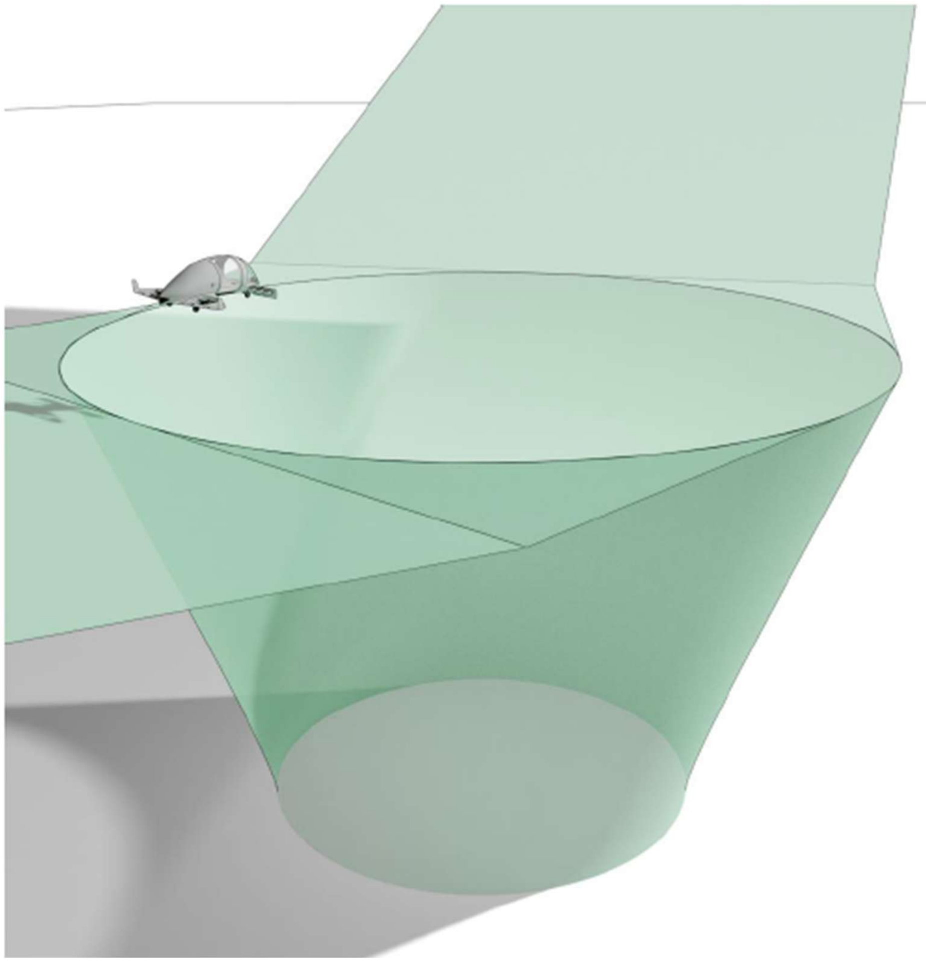


Figure VPT-B-17: Vertiport omnidirectional obstacle-free volume with discrete planar approach and take-off climb surfaces — perspective view

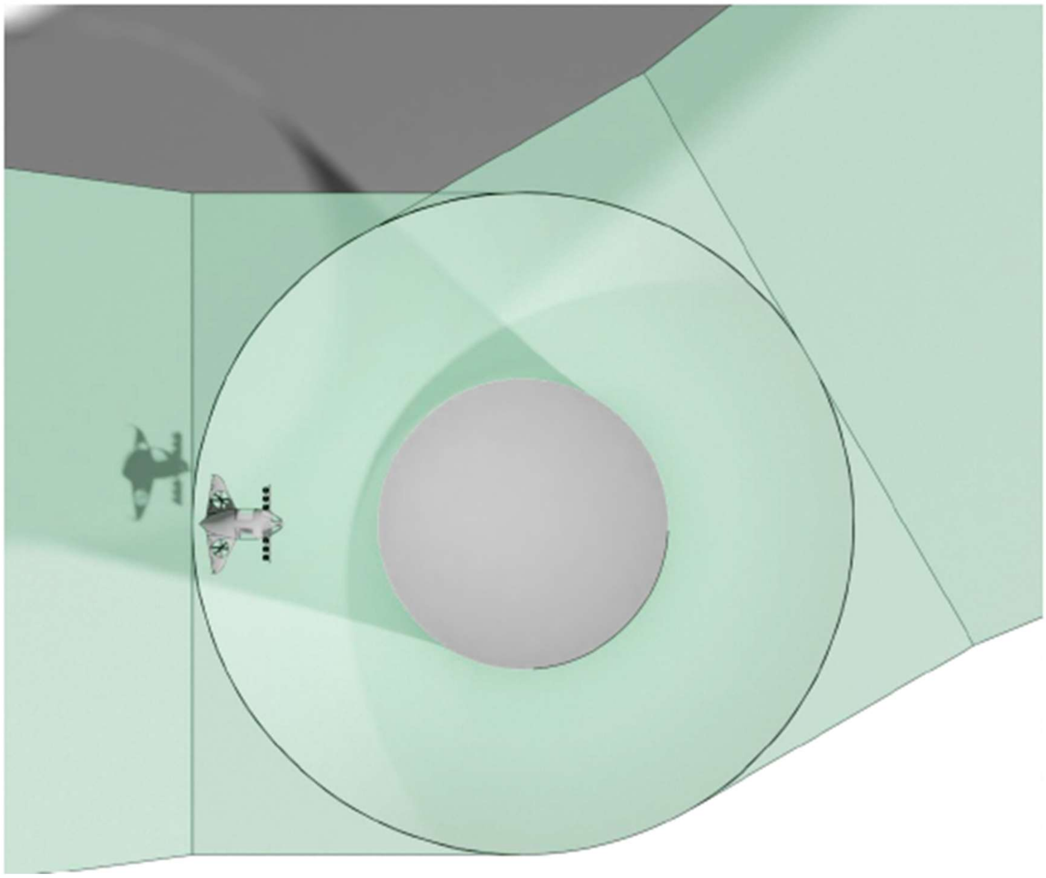


Figure VPT-B-18: Vertiport omnidirectional obstacle-free volume with discrete planar approach and take-off climb surfaces — top view

CS VPT-DSN.B.175 Omnidirectional obstacle-free volume with prohibited sector

(a) A sector of the omnidirectional obstacle-free volume with conical OLS can be declared prohibited, e.g. to avoid an obstacle (see Figure VPT-B-19, Figure VPT-B-20).

(b) The prohibited sector is defined as follows:

(1) 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;

(2) two side planes originating at the ends of the inner edge diverging radially;

(3) 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;

(4) 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.

(c) 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.

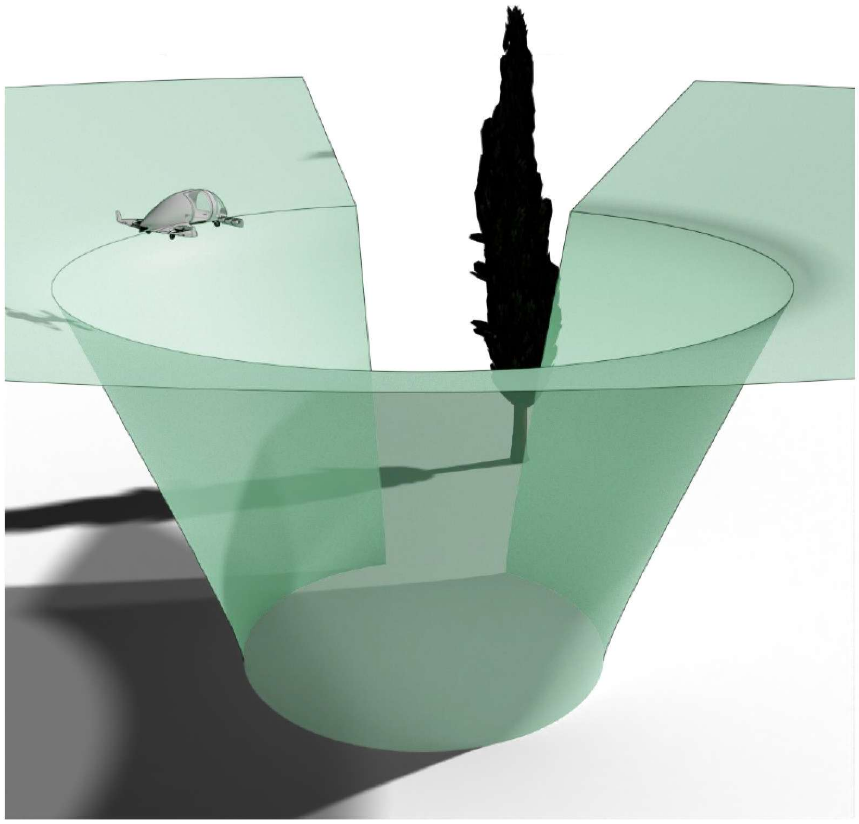


Figure VPT-B-19: Vertiport obstacle-free volume with omnidirectional approach and take-off climb surface and prohibited sector — perspective view

Figure VPT-B-20: Vertiport obstacle-free volume with omnidirectional approach and take-off climb surface and prohibited sector — top view

CS VPT-DSN.B.180 Reference volume Type 1

(a) The Reference volume Type 1 dimensions with the SAs included are depicted on Table VPT-B-6 and Figure VPT-B-21.

Table VPT-B-6: Reference volume Type 1 parameters (with the SAs)

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 %

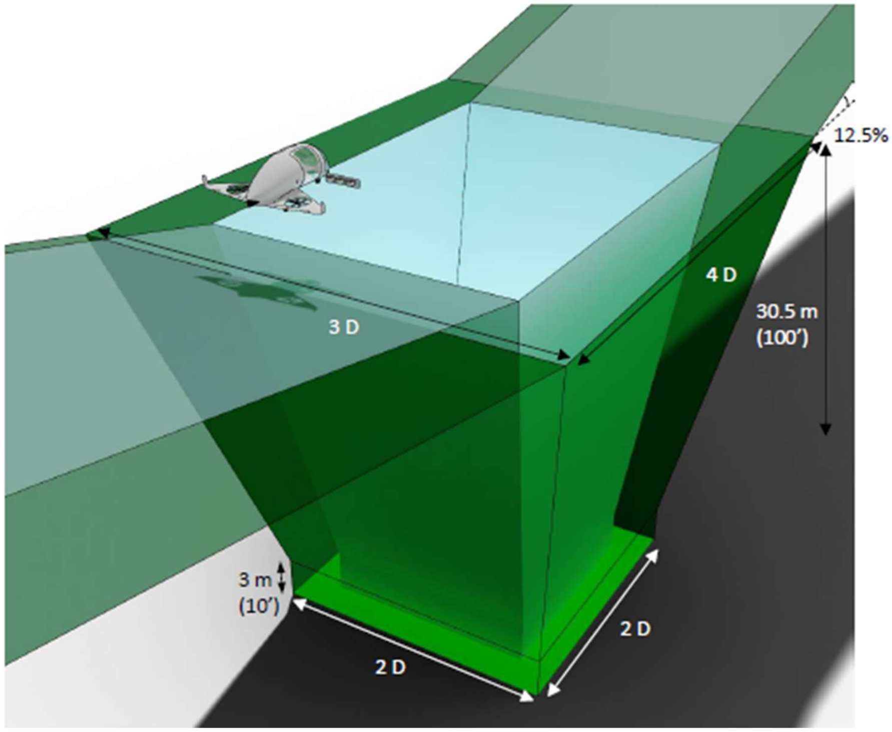


Figure VPT-B-21: Reference volume Type 1 dimensions (with the SAs)

(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

Table VPT-B-7: Omnidirectional vertiport obstacle-free volume derived from the Reference volume Type 1 (with the SAs)

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%

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 Table VPT-B-6.

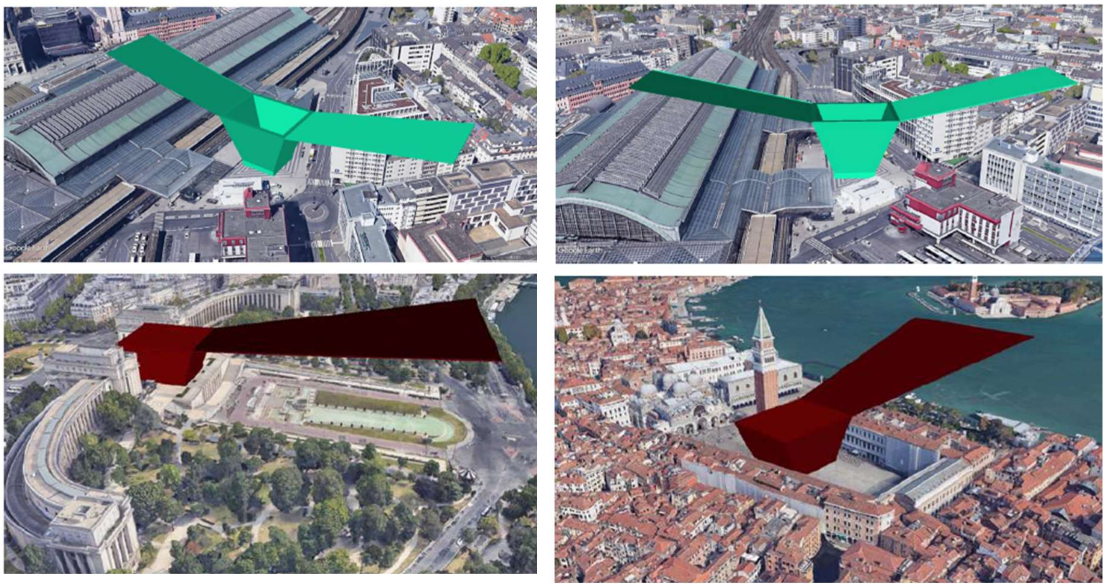


Figure VPT-B-22: Examples of potential vertiports with Reference volume Type 1 (for illustration purposes only; the actual suitability has not been assessed)

CS VPT-DSN.B.185 Link to VCA requirements

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 (Table VPT-B-23). Publish D in metres, rounded up to the next tenth. If the VCA changes dimension during taxi or parking (e.g. folding wings), a corresponding D_{taxi} and $D_{parking}$ should also be provided.

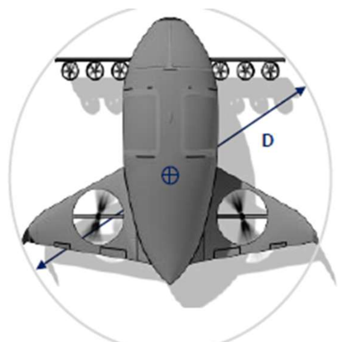


Figure VPT-B-23: Dimension 'D' and centre of the smallest enclosing circle

An example of difference between the largest overall dimension and the diameter of the smallest enclosing circle is provided in Figure VPT-B- 24 . For VCA, the dimension D used for obstacle protection and vertiport design is thus defined based on the smallest enclosing circle, as stated above.

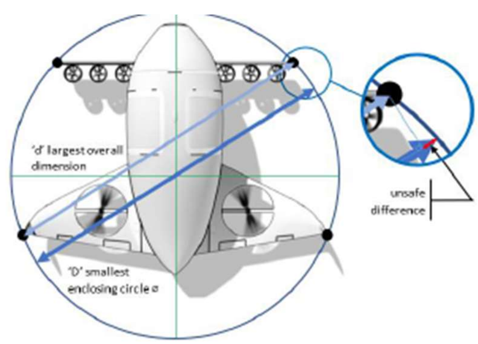


Figure VPT-B-24: Example of unsafe difference between the largest overall dimension and the diameter of the smallest enclosing circle

Undercarriage width (UCW)

'Undercarriage width' (UCW) means the maximum width of the undercarriage/landing gear projection on a horizontal plane (Figure VPT-B-25). The UCW should be published in metres, rounded up to the next tenth.

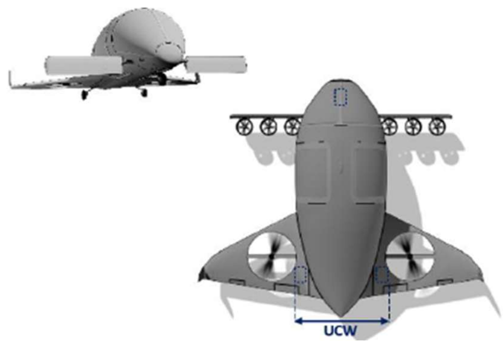


Figure VPT-B-25: Undercarriage width

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 VPT-B-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.

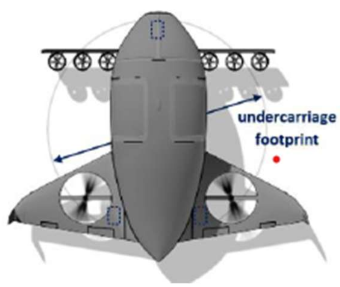


Figure VPT-B-26: Undercarriage footprint

Take-off performance

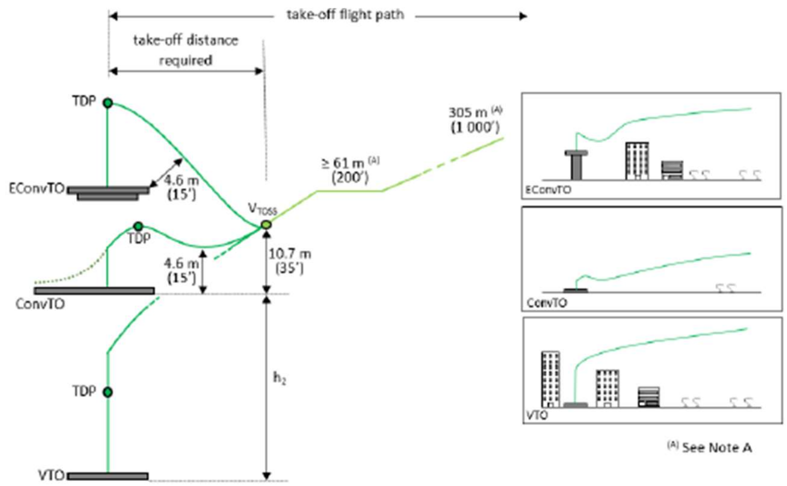


Figure VPT-B-27: Possible take-off paths

Note A: The altitudes of 200 ft and 1 000 ft are proposed in the development of the take-off flight path as currently used for Category A helicopters. Different take-off heights can be considered if compatible with the departure and en-route structure; in particular, accelerating from V_{TOSS} to V_{FTO} at a higher altitude allows to leave the obstacle environment faster.

Landing performance

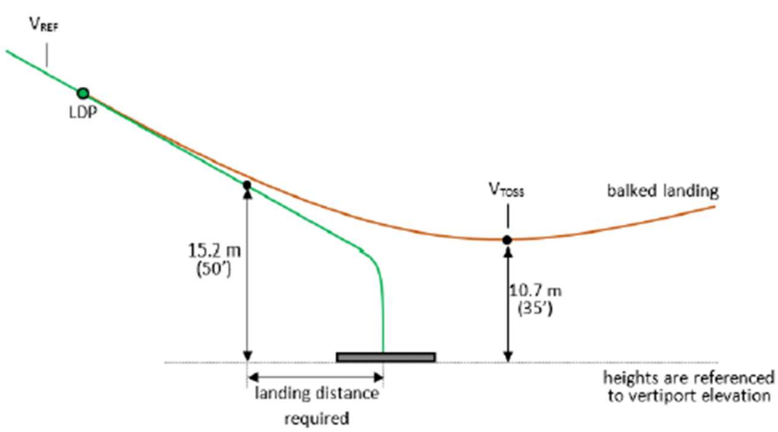


Figure VPT-B-28: Landing path

CHAPTER C – VISUAL AIDS (VPT-DSN.C)

GM1 VPT-DSN C.190 Visual aids - General

(a) The procedures used by some VCA require that they utilise a FATO having characteristics similar in shape to a runway for fixed wing aircraft. An FATO having characteristics similar in shape to a runway is considered to be 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 paragraph entitled 'Runway-type FATOs'. The requirements applicable to all other types of FATOs are given within paragraphs entitled 'All FATOs except runway-type FATOs'.

(b) Unless otherwise specified, the specifications for a colour referred to within CS-VPT-DSN should be those contained in CS-ADR-DSN.

(c) The FATO may contain additional markings that support vertical approach or take-off subject to the specifications in this part, provided they do not interfere with other markings within or near the FATO and their meanings.

Note 2: It has been found that, on vertiport surfaces of light colour, the conspicuity of white markings can be improved by outlining them in black.

CS VPT-DSN.C.195 Wind direction indicator

(a) 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.

(b) Applicability:

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

(c) Location:

(1) A wind direction indicator shall be located so as to indicate the wind conditions over the FATO and TLOF and in such a way as to be free from the effects of airflow disturbances caused by nearby objects or downwash from the lift/thrust units. It shall be visible from a VTOL aircraft in flight, in a hover or on the movement area.

(2) At vertiports that are elevated or where an obstacle-free volume is provided, the wind direction indicator may be located at a nearby structure.

(3) Where a TLOF and/or FATO may be subject to a disturbed airflow, additional wind direction indicators located close to the area should be provided to indicate the surface wind on the area.

(4) The indicator should be sited to avoid the effects of turbulence and should be of sufficient size to be visible from VTOL aircraft 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.

(d) Characteristics

(1) 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.

(2) A wind direction indicator should be a truncated cone made of lightweight fabric and should have the following minimum dimensions:

	Surface level VPT	VPT that is elevated
Length	2.4 m	1.2 m
Diameter (larger end)	0.6 m	0.3 m
Diameter (smaller end)	0.3 m	0.15 m

(3) 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.

(4) A wind direction indicator at a vertiport intended for use at night should be illuminated.

GM VPT-DSN.C.195 Wind direction indicator

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.

CS VPT-DSN.C.200 Vertiport identification marking

(a) 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.

(b) Applicability: A vertiport identification marking shall be provided at a vertiport.

(c) Location — all FATOs except runway-type FATOs:

(1) A vertiport identification marking shall be located at or near the centre of the FATO.

(2) Where a vertiport that is elevated or an obstacle-free volume is provided, the vertiport identification marking shall be located within the FATO or TLOF.

(3) If the TDPM is offset, the vertiport identification marking should be established in the centre of the TDPM.

(4) 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 should be established in the centre of the aiming point marking as shown in Figure VPT-C-1 and Figure VPT-C-2.

(5) On a FATO which contains a TLOF, a vertiport identification marking shall be located within the FATO so the position of it coincides with the centre of the TLOF.

(d) Location — runway-type FATOs

A vertiport identification marking shall be located within the FATO and when used in conjunction with FATO designation markings, shall be displayed at each end of the FATO as shown in Figure VPT-C-3.

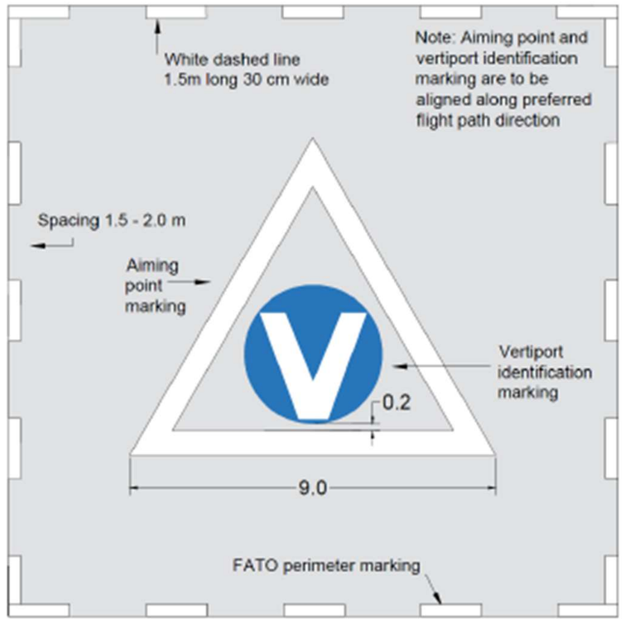
(e) Characteristics

(1) A vertiport identification marking, except for a vertiport at a hospital, shall consist of a letter 'V' in white inside a blue circle. The dimensions of the 'V' and the blue circle markings should be no less than those shown in Figure VPT-C-4.

Note: The colour conspicuity of the blue circle and the dimensions should be tested and confirmed in simulators.

(2) A vertiport identification marking for a vertiport at a hospital should consist of a letter 'V' in red inside a blue circle, on a white cross made of squares adjacent to each of the sides of a square containing the 'V' as shown in Figure VPT-C-2, Figure VPT-C-4.

(3) A vertiport identification marking should be oriented with its symmetry axis aligned with the preferred final approach direction and so arranged as to be readable from the preferred final approach direction.



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 VPT-C-1: Combined vertiport identification, aiming point and FATO perimeter marking

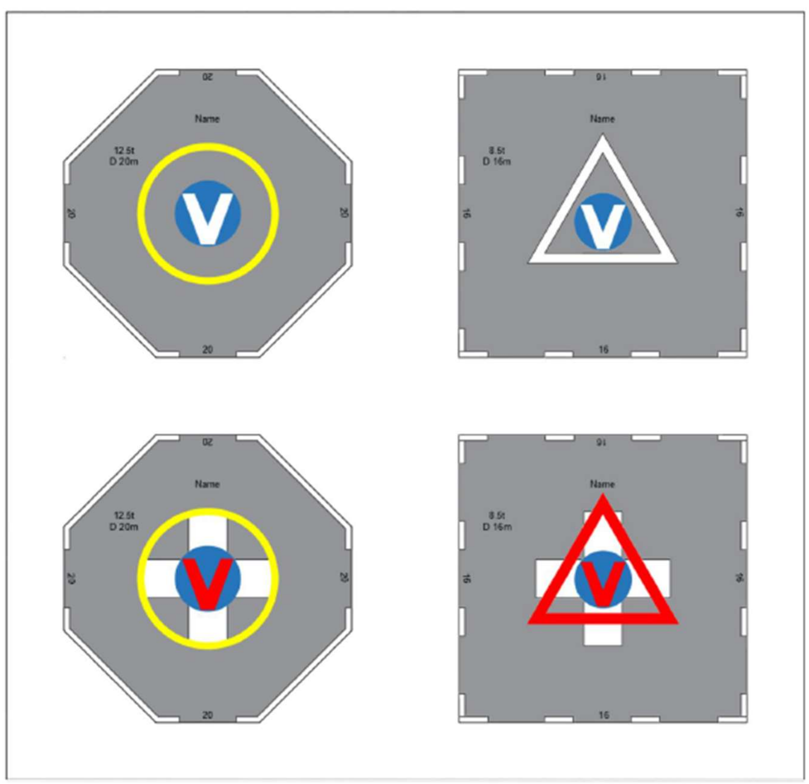


Figure VPT-C-2*:* Vertiport identification markings with TLOF and aiming markings for vertiport and hospital vertiport

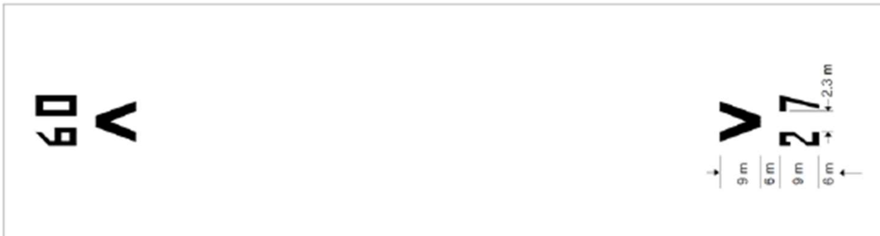


Figure VPT-C-3: FATO designation marking and vertiport identification marking for a runway-type FATO

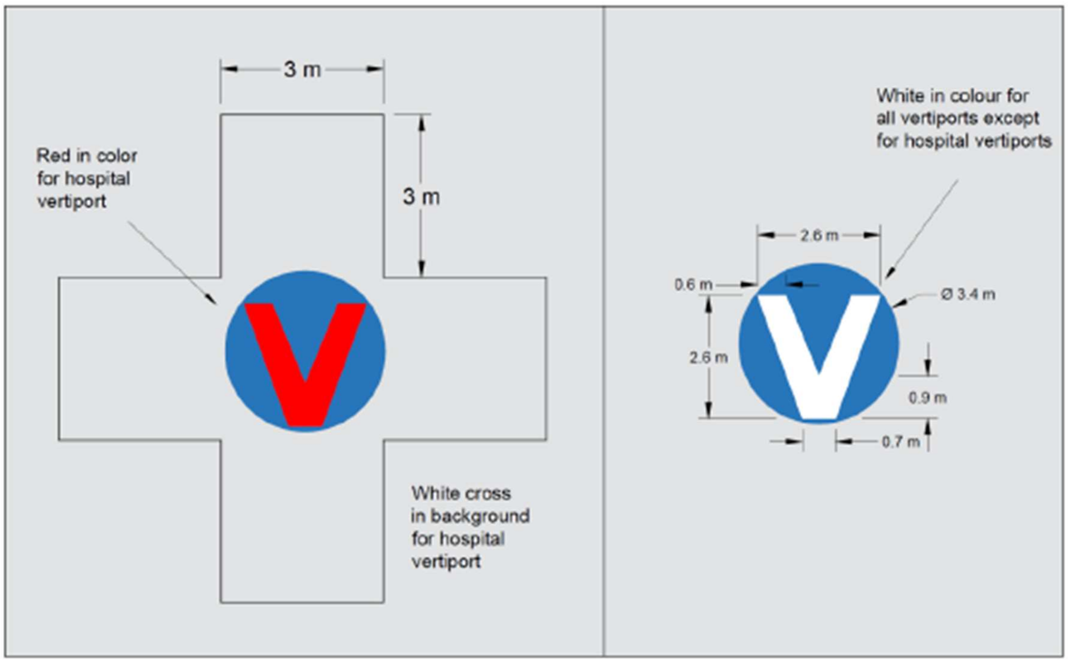


Figure VPT-C- 4:Hospital vertiport identification and vertiport identification marking

CS VPT-DSN.C.205 FATO identification marking

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

(b) Applicability

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

(c) Location

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

(e) Characteristics

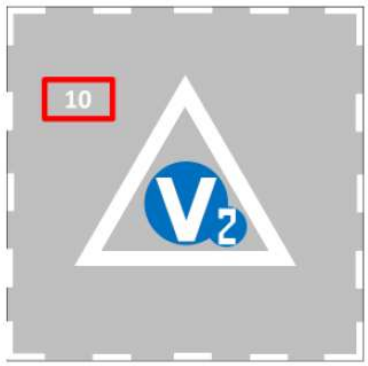
(1) Each FATO identification marking should consist of an ordinal number, beginning with 1 and ending in the last of the numbered FATOs (see Figure VPT-C-5).

(2) The numbers will have the size and proportions shown in Figure VPT-C-6.

(3) The FATO identification number will be inside a blue circle with diameter 175 cm as shown in Figure VPT-C-5.

V height 260 cm
V width 260 cm
V base 70 cm
V line width 60 cm
V vertex height 90 cm
Blue circle ∅ 340 cm

FATO/TLOF 15x15 m
TLOF perimeter line width 30 cm
TDPM inner circle ∅ 6,2 m
TDPM line width 0,5 m



V height 260 cm
V width 260 cm
V base 70 cm
V line width 60 cm
V vertex height 90 cm
Blue circle ∅ 340 cm

FATO 15x15 m
FATO dashed line 150x30 cm

Aiming point marking 9 m side triangle

Number height 150 cm
Number width 30-100 cm
Separation V – Number 30 cm
Small blue circle ∅ 175 cm

V height 260 cm
V width 260 cm
Blue circle ∅ 340 cm
Number height 150 cm
Number width 30-100 cm
Separation V – Number 30 cm
Small blue circle ∅ 175 cm

FATO/TLOF 15x15 m
TLOF perimeter line width 30 cm

Hospital cross height 9 m
Hospital cross width 9 m

Figure VPT-C- 5: Vertiport identification, FATO identification, maximum allowable mass and D-value markings

CS VPT-DSN.C.210 Maximum allowable mass marking

(a) 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.

(b) Applicability

When required ,a maximum allowable mass marking shall be displayed at a vertiport.

(c) Location

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.

(d) Characteristics

(1) A maximum allowable mass marking shall consist of a two- or three-digit number.

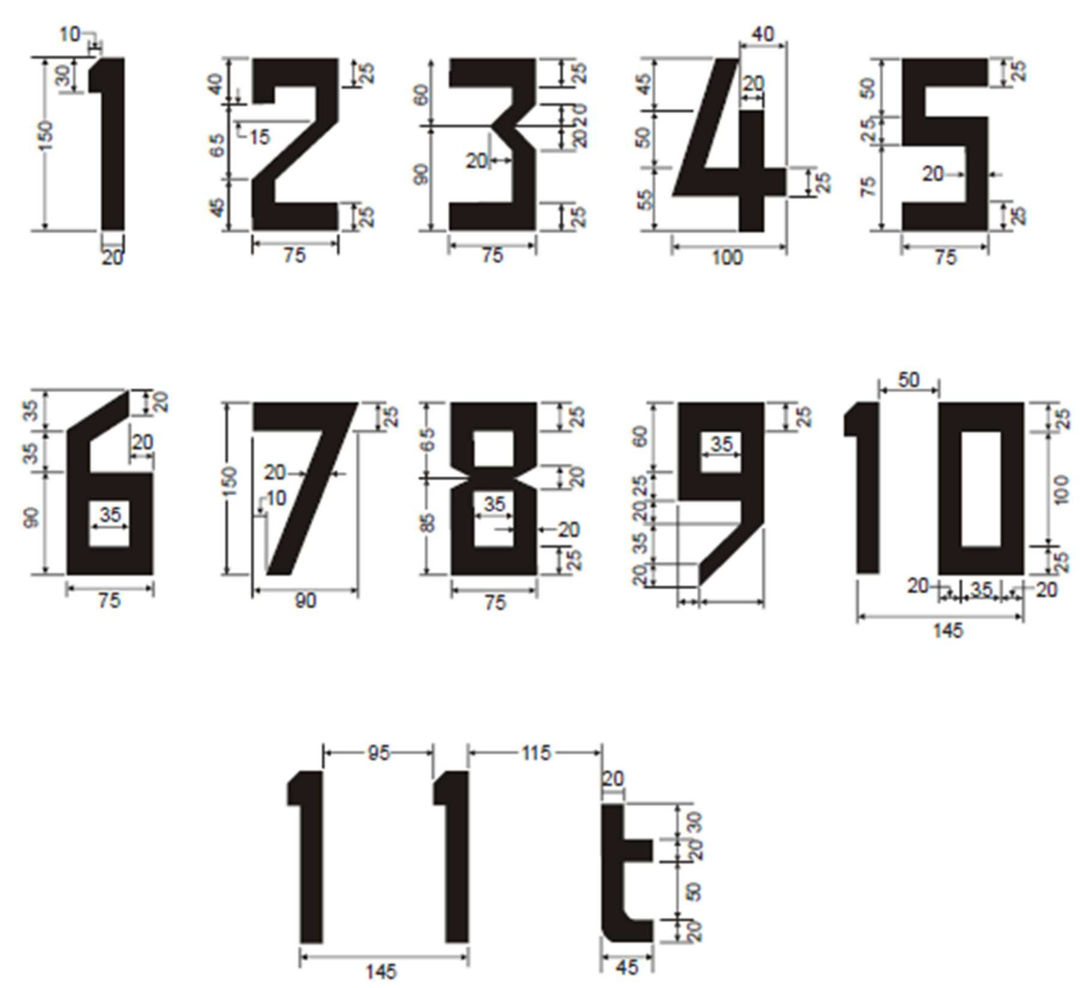
(2) The maximum allowable mass shall be expressed to the nearest 100 kg. The marking shall be presented to one decimal place and rounded to the nearest 100 kg followed by the letter ‘t’. The decimal place should be preceded with a decimal point marked with a 30-cm square.

(3) All FATOs except runway-type FATOs

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 VPT-C-6 for a D-value of more than 30 m. For a D-value between 15 m and 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.

(4) Runway-type FATOs

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 Figure VPT-C-6.



Note.— All units are expressed in centimetres.

Figure VPT-C-6: Form and proportions of numbers and letters

CS VPT-DSN.C.215 D-value marking

(a) The objective of D-value marking is to provide the pilot with 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 A – PHYSCIAL CHARACTERISTICS (VPT-DSN.A).

(b) Applicability:

A D-value marking shall be displayed at a surface level and elevated vertiports.

(c) Location:

(1) 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.

(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 direction.

(d) Characteristics:

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

(2) Where the D-value marking is located within a TLOF or TDPC, it should represent the D of the largest VTOL aircraft admitted, regardless of the configuration and dimensions of the VTOL aircraft during taxiing (D_{taxi}) or parking ($D_{parking}$).

(3) The numbers of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure VPT-C-6 for a D-value of more than 30 m. For a D-value between 15 m and 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.

GM1 CS VPT-DSN.C.215 D-value marking

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

CS VPT-DSN.C.220 FATO perimeter marking or markers

(a) The objective of FATO perimeter marking or markers is to provide the pilot, where the perimeter of the FATO is not self-evident, with an indication of the area that is free of obstacles, and in which intended procedures or permitted manoeuvring may take place.

(b) Applicability:

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

(c) Location:

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

(d) Characteristics — runway-type FATOs:

(1) 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.

(2) 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.

(3) FATO perimeter markings shall be white.

(4) A FATO perimeter marker shall have dimensional characteristics as shown in Figure VPT-C-7.

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

(6) 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.

(e) Characteristics — all FATOs except runway-type FATOs

(1) For an unpaved FATO, the perimeter shall be defined with flush in-ground markers. The FATO perimeter markers should 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.

(2) For a paved FATO, the perimeter shall be defined with a dashed line. The FATO perimeter marking segments should 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.

(3) FATO perimeter markings and flush in-ground markers shall be white.

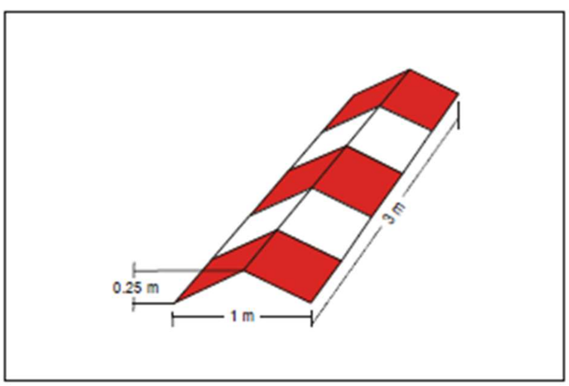


Figure VPT-C- 7 : Runway-type FATO edge marker

CS VPT-DSN.C.225 FATO designation markings for runway-type FATOs

(a) The objective of FATO designation markings for runway-type FATOs is to provide the pilot with an indication of the magnetic heading of the runway.

(b) Applicability:

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

(c) Location:

A FATO designation marking should be located at the beginning of the FATO as shown Figure VPT-C-3.

(d) Characteristics:

A FATO designation marking should consist of a two-digit number. The two-digit number should be the whole number nearest to one-tenth of the magnetic North when viewed from the direction of approach. When this rule would give a single-digit number, it should be preceded by a zero. The marking, as shown in Figure VPT-C-3, should be supplemented by the vertiport identification marking 'V'.

CS VPT-DSN.C.230 Aiming point marking

(a) The objective of the aiming point marking is to provide the pilot with a visual cue indicating the preferred approach/departure direction, the point to which the aircraft with VTOL capability 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.

(b) The aiming point marking is not required to be marked on FATOs elevated over the surface of the vertiport or obstacle-free volume FATOs.

(c) Applicability

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.

(d) Location — runway-type FATOs

The aiming point marking should be located within the FATO.

(e) Location — all FATOs except runway-type FATOs

The aiming point marking should be located at the centre of the FATO as shown in Figure VPT-C-1.

(f) Characteristics

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 should consist of continuous lines providing a contrast with the background colour, and the dimensions of the marking should conform to those shown in Figure VPT-C-8.

GM1 CS VPT-DSN.C.230 Aiming point marking

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

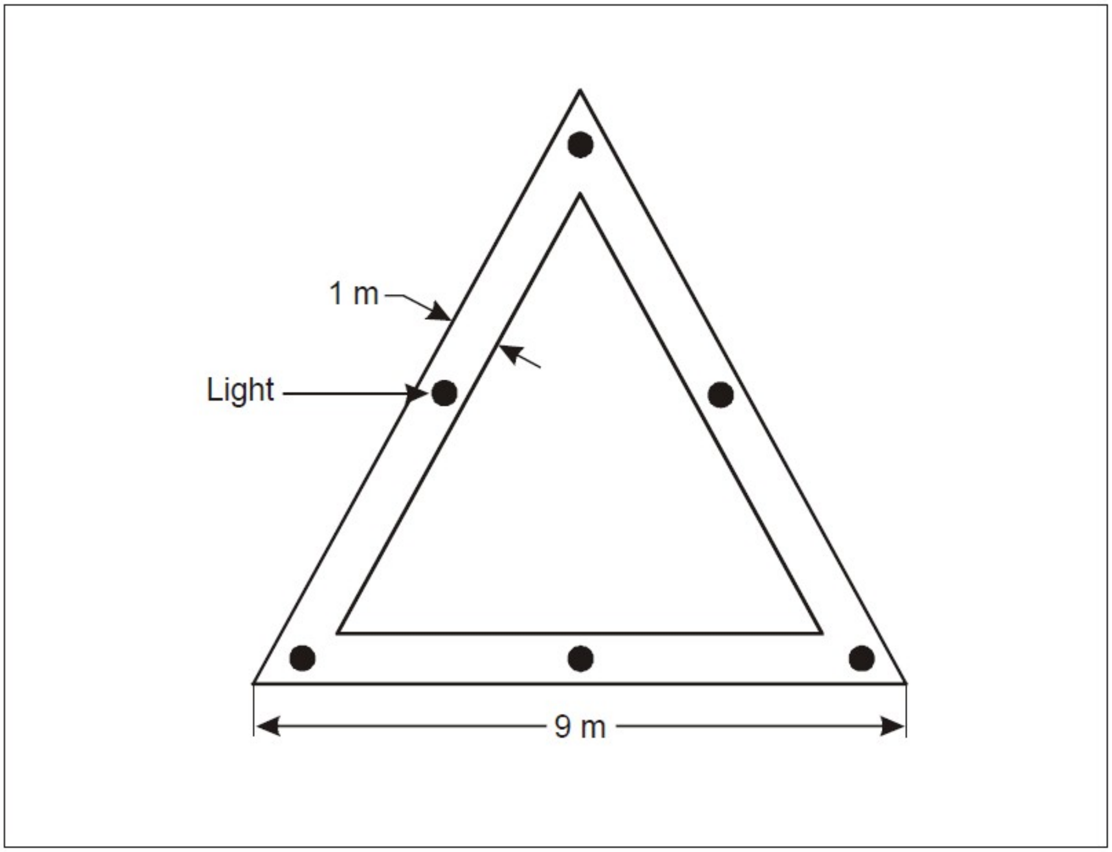


Figure VPT-C- 8: Aiming point marking

CS VPT-DSN.C.235 TLOF perimeter marking

(a) The objective of a TLOF perimeter marking is to provide the pilot with 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.

(b) Applicability:

  (1) A TLOF perimeter marking shall be displayed on a TLOF located within a FATO at a surface-level vertiport if the perimeter of the TLOF is not self-evident.

  (2) A TLOF perimeter marking shall be displayed on a vertiport that is elevated.

(c) Location:

A TLOF perimeter marking shall be located along the edge of the TLOF.

(d) Characteristics:

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

CS VPT-DSN.C.240 Touchdown positioning marking (TDPM)

(a) The objective of 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.

(b) Applicability:

(1) A TDPM shall be provided for a VCA to touchdown or be accurately placed in a specific position.

(2) The TDPM shall be:

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

(ii) when there is a limitation on the direction of touchdown/positioning in the form of unidirectional applications, a shoulder line with an associated centre line or for multidirectional applications, a TDPC marking with prohibited landing sector(s) marked

(c) Location:

(1) The inner edge/inner circumference of the TDPM shall be at a distance of 0.25 D from the centre of the area in which the VCA is to be positioned.

(2) 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.

(d) Characteristics:

(1) The inner diameter of the TDPC should be 0.5 D of the largest VCA the area is intended to serve.

(2) A TDPM shall have a line with a width of at least 0.5 m.

(3) The length of a shoulder line shall be 0.5 D of the largest VCA the area is intended to serve.

(4) The prohibited landing sector markings, when provided, shall be indicated by white and red hatched markings as shown Figure VPT-C-9.

(5) The TDPM shall take precedence when used in conjunction with other markings on the TLOF. Except for the prohibited sector marking.

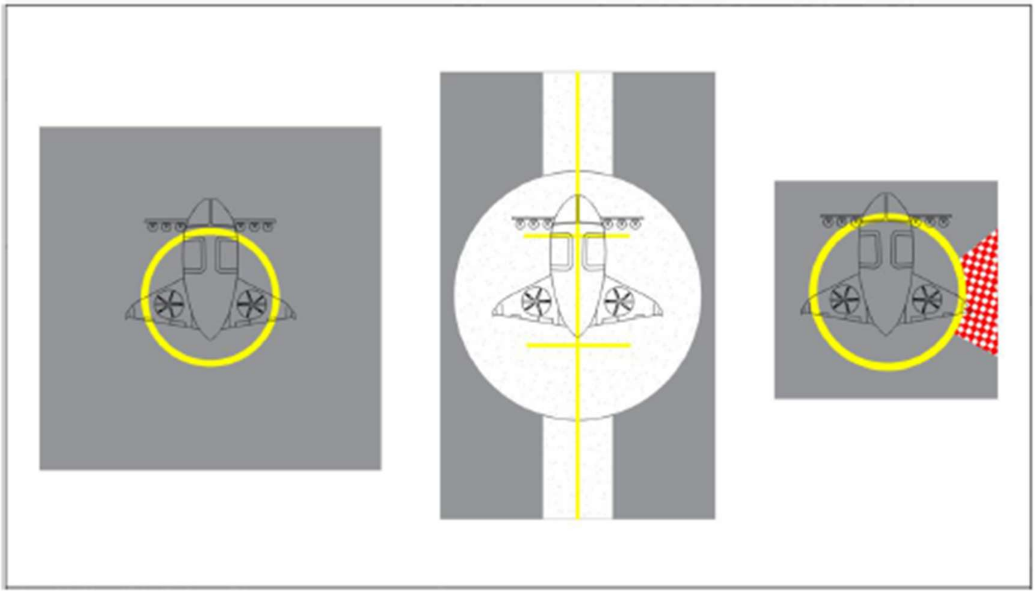


Figure VPT-C-9: Multidirectional TDPC with no limitations (left) Unidirectional marking shoulder line with associated centre line (centre)

CS VPT-DSN.C.245 Obstacle sector marking

(a) 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.

(b) Applicability:

An obstacle sector marking should be provided at a vertiport where there are obstacles above the omnidirectional obstacle-free volume that cannot be removed.

(c) Location:

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.

(d) Characteristics:

(1) The prohibited sector marking should be indicated by white and red chequered markings as shown in Figure VPT-C-9.

(2) FATO, TLOF TDPM and vertiport identification markings shall take precedence over obstacle sector markings.

(3) 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.

CS VPT-DSN.C.250 Vertiport name marking

(a) The objective of vertiport name marking is to provide the pilot with a means of identifying a vertiport which can be seen, and read, from all directions of approach.

(b) Applicability

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

(c) Location

The vertiport name marking should be located at a position such as it can be seen and read from all directions of approach.

(d) Characteristics

(1) A vertiport name marking should consist of the name or the alphanumeric designator of the vertiport as used in the radio (R/T) communications.

(2) A vertiport name marking intended for use at night or during conditions of poor visibility should be illuminated, either internally or externally.

(3) Runway-type FATOs: The characters of the marking should be not less than 3 m in height.

(4) All FATOs except runway-type FATOs: 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 vertiports that are elevated. The colour of the marking should contrast with the background and preferably be white.

CS VPT-DSN.C.255 VCA taxiway markings and markers

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

(b) The specifications for runway-holding position markings in certification specifications for aerodrome design are equally applicable as guidance material to taxiways intended for ground taxiing of VCA.

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

(d) Unless otherwise indicated, it may be assumed that a VCA taxiway is suitable for ground taxiing, air taxiing and taxiing by means of ground movement equipment of VCA.

(e) Signage may be required on an aerodrome where it is necessary to indicate that a VCA taxiway is suitable only for the use of VCA.

(f) Applicability:

(1) The centre line of a VCA taxiway shall be identified with a marking.

(2) The edges of a VCA taxiway, if not self-evident, should be identified with markers or markings.

(g) Location:

(1) VCA taxiway markings shall be along the centre line and, if required, along the edges of a VCA taxiway.

(2) VCA taxiway edge markers shall be located at a distance of 1 m to 3 m beyond the edge of the VCA taxiway.

(3) 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.

(h) Characteristics:

(1) On a paved taxiway, a VCA taxiway centre line marking shall be a continuous yellow line 15 cm in width.

(2) On an unpaved taxiway that will not accommodate painted markings, a VCA taxiway centre line 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.

(3) 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).

(4) A VCA taxiway edge marker shall be lightweight and frangible to the undercarriage of a VCA.

(5) 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) A VCA taxiway edge marker shall be blue.

Note: If blue markers are used on an aerodrome, signage may be required to indicate that the VCA taxiway is suitable only for VCA.

(7) If the VCA taxiway is to be used at night, the edge markers shall be internally illuminated or retroreflective.

(8) 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 VPT-C-10. Markers commonly used are cylindrical in shape.

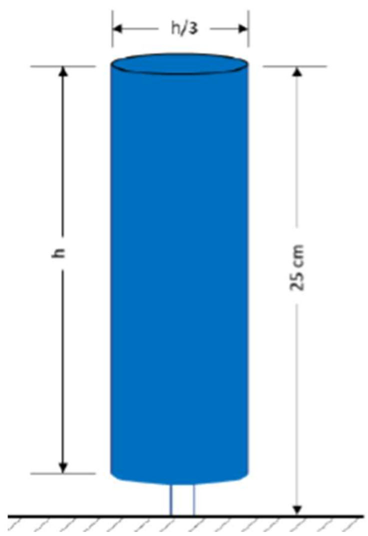


Figure VPT-C-10: VCA taxiway edge marker

CS VPT-DSN.C.260 VCA air taxi-route markings and markers

(a) The objective of VCA air taxi-route markings and markers is to provide the pilot by day and, if necessary, by night, with visual cues to guide movement along the air taxi-route.

(b) Applicability:

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

(c) Location:

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 taxi-route.

(d) Characteristics:

(1) Where an air taxi-route is collocated with a taxiway, the centre line markings will be those of the taxiway.

(2) Where an air taxi-route is not collocated with a taxiway:

(i) when on a paved surface, the air taxi-route centre line shall be marked with a continuous yellow line 15 cm in width;

(ii) when on an unpaved surface that will not accommodate painted markings, the air taxi-route centre line 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.

(3) If the VCA air taxi-route is to be used at night, markers shall be either internally illuminated or retroreflective.

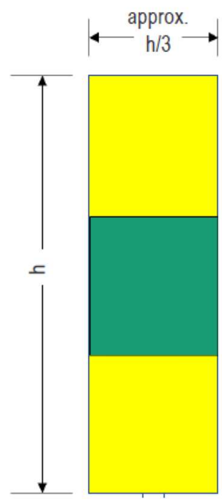


Figure VPT-C- 11: Air taxi route marker

CS VPT-DSN.C.265 VCA stand markings

(a) The objective of VCA stand markings is to provide the pilot with a visual indication of: an area that is free of obstacles and in which manoeuvring is permitted, and all necessary ground functions, may take place: identification, mass and D-value limitations, when required; and guidance for manoeuvring and positioning of the VCA within the stand.

(b) VCA stand identification markings may be provided where there is a need to identify individual stands.

(c) See CS for TLOF perimeter marking and Touchdown position marking and Figure VPT-C-13 regarding TLOF perimeter markings, TDPMs and lead-in/lead-out lines.

(d) Applicability:

(1) A VCA stand perimeter marking should be provided when the stand is designed according to CS VPT-DSN.A.065 (a) (1)(2).

(2) A VCA stand perimeter marking should be provided when the stand is designed according to CS VPT-DSN.A.065 – geometry-based stand, 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.

(3) A VCA stand shall be provided with the appropriate TDPM, see Figure VPT-C-13.

(4) If appropriate, alignment lines and lead-in/lead-out lines should be provided on a VCA stand, see Figure VPT-C-13.

(5) 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 VPT-C-12. A box containing the maximum allowable mass may be added if required.

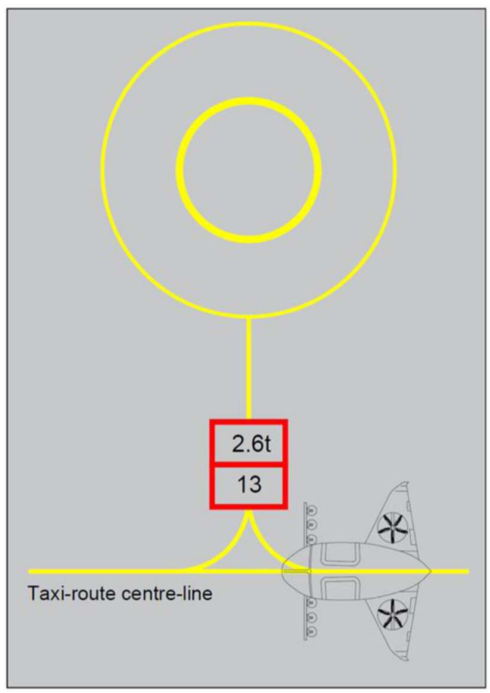


Figure VPT-C- 12: Restricted-size stand

(e) Location:

(1) 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.

(2) Alignment lines and lead-in/lead-out lines shall be located as shown in Figure VPT-C-12.

(f) Characteristics:

(1) A VCA stand perimeter marking shall consist of a continuous yellow line and have a line width of 15 cm.

(2) The TDPM shall have the characteristics described in CS VPT-DSN.C.240 - Touchdown positioning marking (TDPM).

(3) Alignment lines and lead-in/lead-out 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 VPT-C-13.

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

Note: The most demanding VCA in terms of turning radius may be different from the most demanding VCA in terms of D-value.

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

(6) When unpaved, the stand perimeter should be marked with flush in-ground markers.

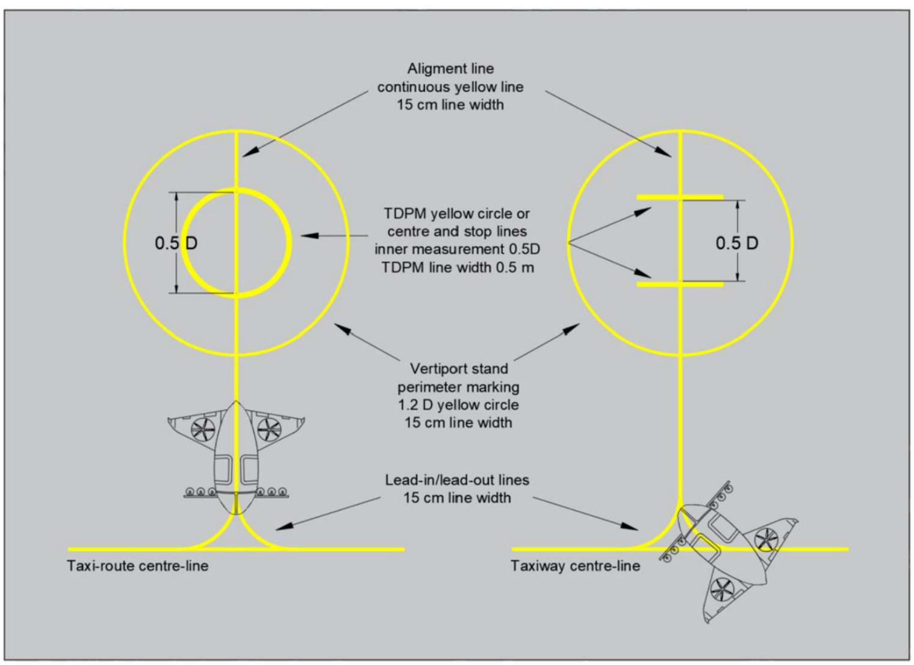


Figure VPT-C- 13: VCA stand markings

CS VPT-DSN.C.270 Apron safety lines

(a) 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. VCA clearance lines are used to delineate the safety zone clear of the path of the critical VCA.

(b) Applicability:

Apron safety lines should be provided on an apron as required by the parking configurations and ground facilities.

(c) Location

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 VTOL aircraft.

(d) Characteristics:

(1) 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.

(2) Apron safety lines should be of a conspicuous colour, preferably red, which should contrast with that used for VCA stand markings.

(3) An apron safety line should be continuous in length and at least 10 cm in width.

GM1 CS VPT-DSN.C.270 Apron safety lines

(a) 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.

(b) Passenger path lines are used to keep passengers, when walking on the apron, clear of hazards.

CS VPT-DSN.C.275 Flight path alignment guidance marking

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

(b) Applicability:

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).

(c) Location:

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, SA or any other suitable surface in the immediate vicinity of the FATO or SA.

(d) Characteristics:

(1) A flight path alignment guidance marking shall consist of one or more arrows marked on the TLOF, FATO and/or SA surface as shown in Figure VPT-C-14. 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 VPT-C-14 ,which includes the scheme for marking 'heads of the arrows' which are constant regardless of stroke length.

(2) 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.

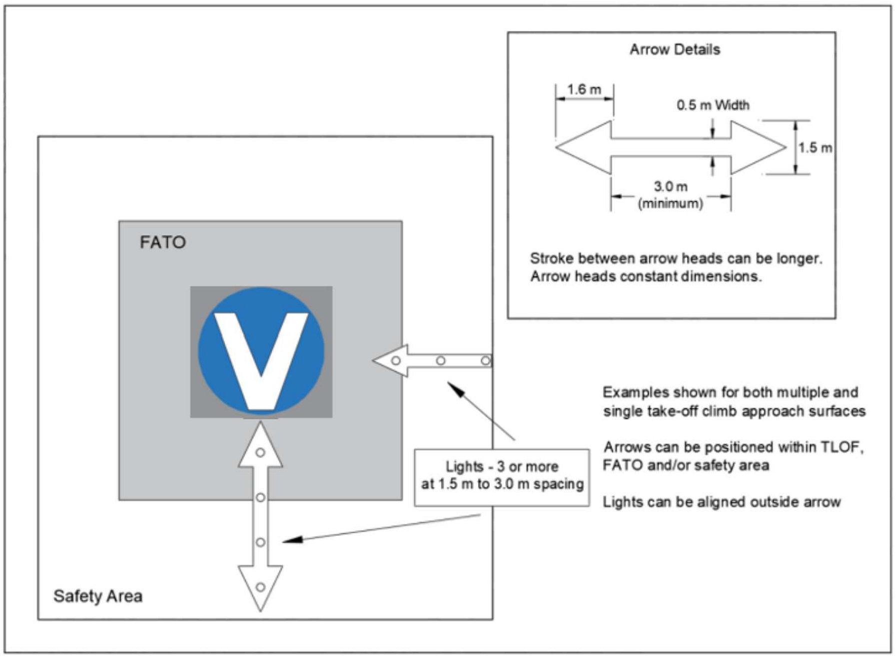


Figure VPT-C-14: Flight path alignment guidance markings and lights

GM1 CS VPT-DSN.C.275 Flight path alignment guidance marking

(a) The flight path alignment guidance marking can be combined with a flight path alignment guidance lighting system as described in CS VPT-DSN.C.300 - Flight path alignment guidance lighting system.

(b) In the case of a flight path limited to a single approach direction or single departure direction, the arrow marking may be unidirectional. In the case of a vertiport with only a single approach/departure path available, one bidirectional arrow is marked.

CS VPT-DSN.C.280 Visual aids for denoting restricted-use areas

Refer CS HPT-DSN.D.250 - Visual aids for denoting restricted-use areas.

GM1 CS VPT-DSN.C.285 Lights — general

(a) 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.

(b) Lights and lighting systems installed at vertiports should be dimmable in order to reduce intensity, if needed.

GM2 CS VPT-DSN.C.285 Lights — General

(a) See CAR AGA PART ADR concerning specifications on screening of non-aeronautical ground lights, and design of elevated and inset lights.

(b) 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.

(c) As VCA 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.

(d) Systems addressed in paragraphs CS VPT-DSN C.300, CS VPT-DSN C.310, CS VPT-DSN C.315 and , CS VPT-DSN C.315 are designed to provide effective lighting 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.

(e) The specifications for marking and lighting of obstacles included in CAR AGA , PART ADR , are equally applicable to vertiports.

(f) 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.

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

(h) Guidance is provided in the Aerodrome Design Manual (Doc 9157), Part 4 Visual Aids, Chapter 5 Light Intensity Settings.

CS VPT-DSN.C.290 Vertiport beacon

(a) 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.

(b) Applicability

a vertiport beacon should be provided at a vertiport where:

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

(2) identification of the vertiport is difficult due to surrounding lights.

(c) Location

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.

(d) Characteristics

(1) The vertiport beacon shall emit repeated series of equally spaced short-duration white flashes in the format shown in Figure VPT-C-15.

(2) The light from the beacon shall show at all angles of azimuth. To ensure that pilots are not dazzled during the final stages of the approach and landing, especially at night, brilliancy control (with 10 per cent and 3 per cent settings) or shielding should be provided.

(3) The effective light intensity distribution of each flash should be as shown in Figure VPT-C-18, Illustration 1.

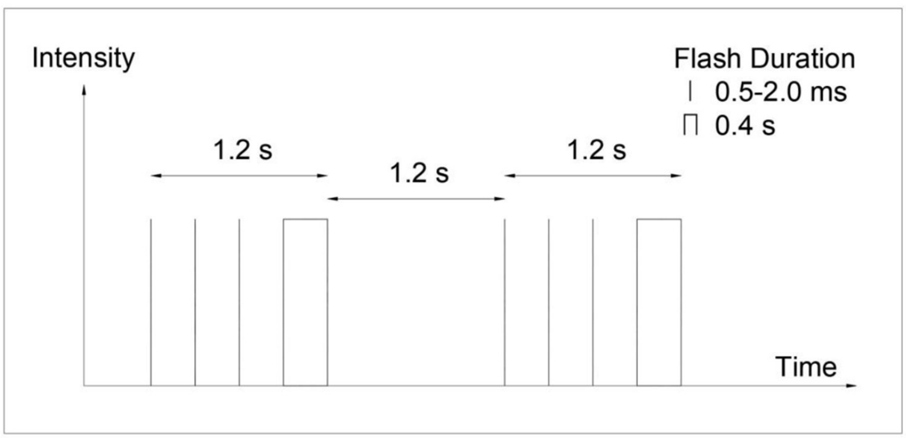


Figure VPT-C-15 :Vertiport beacon flash characteristics

GM1 CS VPT-DSN.C.290 Vertiport beacon

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.

CS VPT-DSN.C.295 Approach lighting system

(a) 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.

(b) Applicability:

Where provided, an approach lighting system should indicate a preferred approach direction. An approach lighting system should be provided at a vertiport where it is desirable and practicable to indicate a preferred approach direction.

(c) Location:

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

(d) Characteristics:

(1) 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 VPT-C-16 and VPT-C-17. 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.

(2) The lights shall be omnidirectional steady white lights except that beyond the crossbar either omnidirectional steady or flashing white lights may be used.

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

(4) The following intensity settings should be provided:

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

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

GM1 CS VPT-DSN.C.295 Approach lighting system

(a) Sequenced flashing lights may be provided where identification of the approach lighting system is difficult due to surrounding lights.

(b) The flashing lights should have a flash frequency of one per second and their light distribution should be as shown in Figure VPT-C-18, Illustration 3. The flash sequence should commence from the outermost light and progress towards the crossbar.

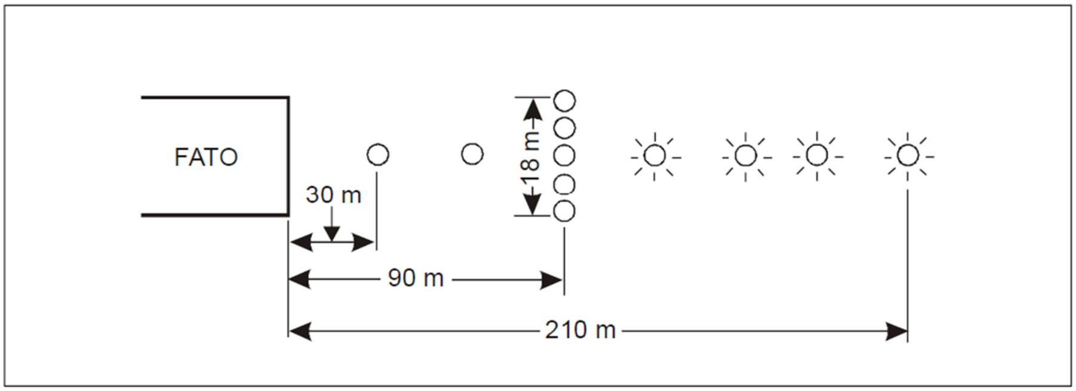


Figure VPT-C-16 :Approach lighting system

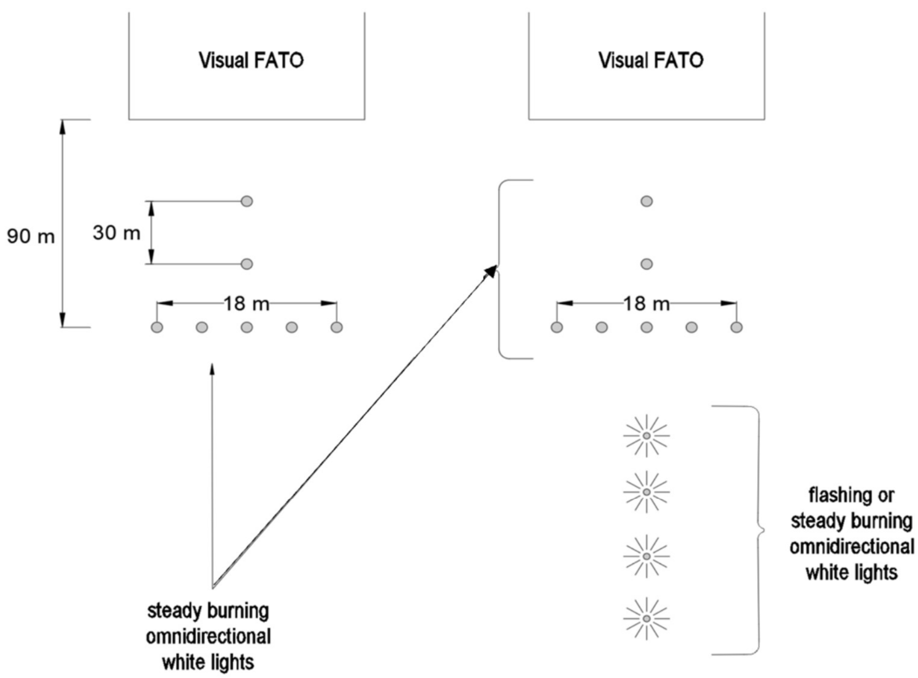


Figure VPT-C-17: Two different configurations of an approach lighting system

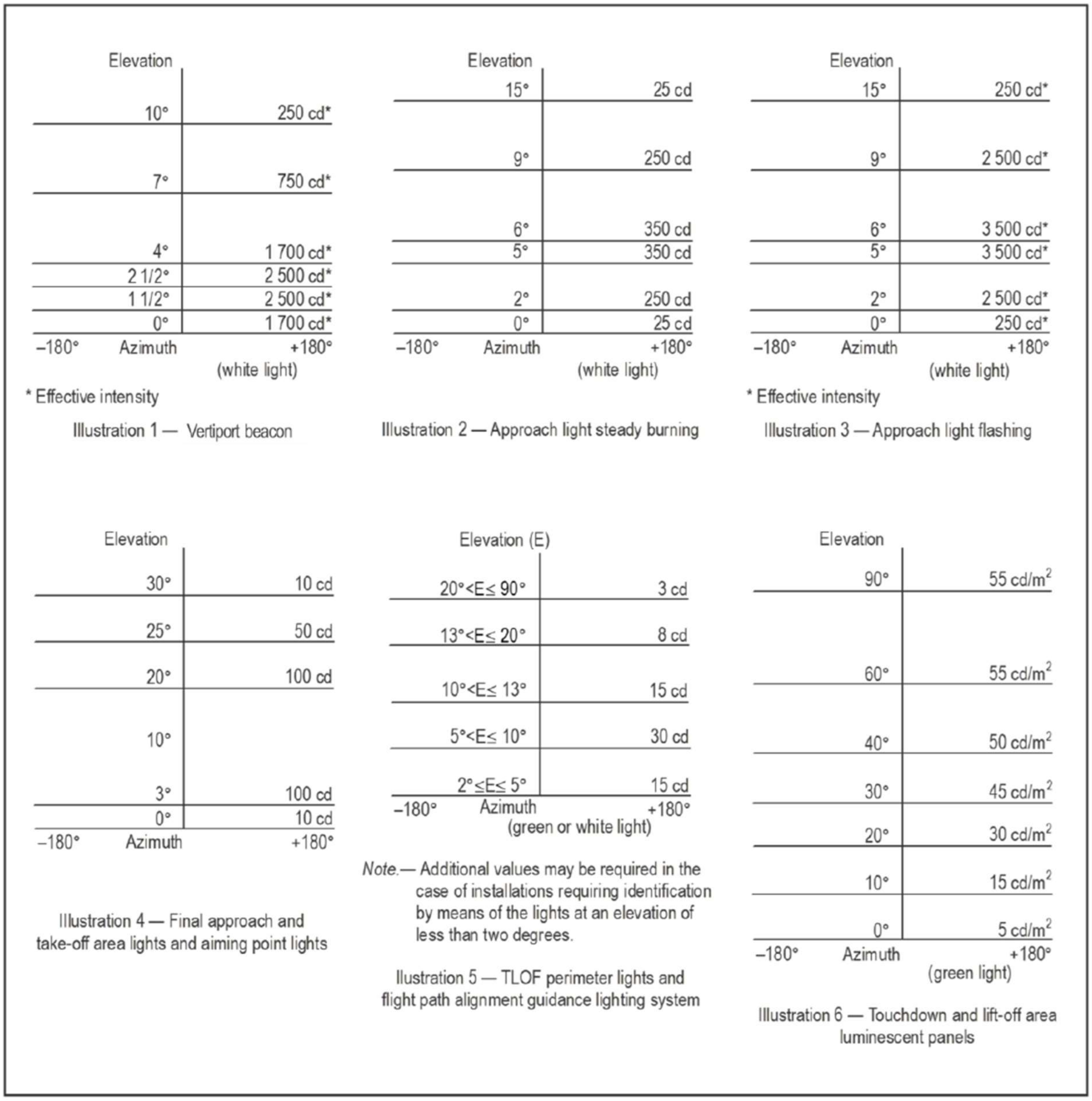


Figure VPT-C-18: Isocandela diagrams

CS VPT-DSN.C.300 Flight path alignment guidance lighting system

(a) 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.

(b) Applicability: 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).

Location:

(1) 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, SA or any other suitable surface in the immediate vicinity of the FATO, TLOF or SA.

(2) When combined with a flight path alignment guidance marking, as far as is practicable, the lights should be located inside the ‘arrow’ markings.

(c) Characteristics:

(1) A flight path alignment guidance lighting system should consist of a row of three or more lights spaced uniformly with 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 five lights, see Figure VPT-C-19.

(2) 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 VPT-C-19.

(3) The lights shall be steady omnidirectional inset white lights.

(4) The distribution of the lights should be as indicated in Figure VPT-C-18 Illustration 5.

(5) The system should allow an 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.

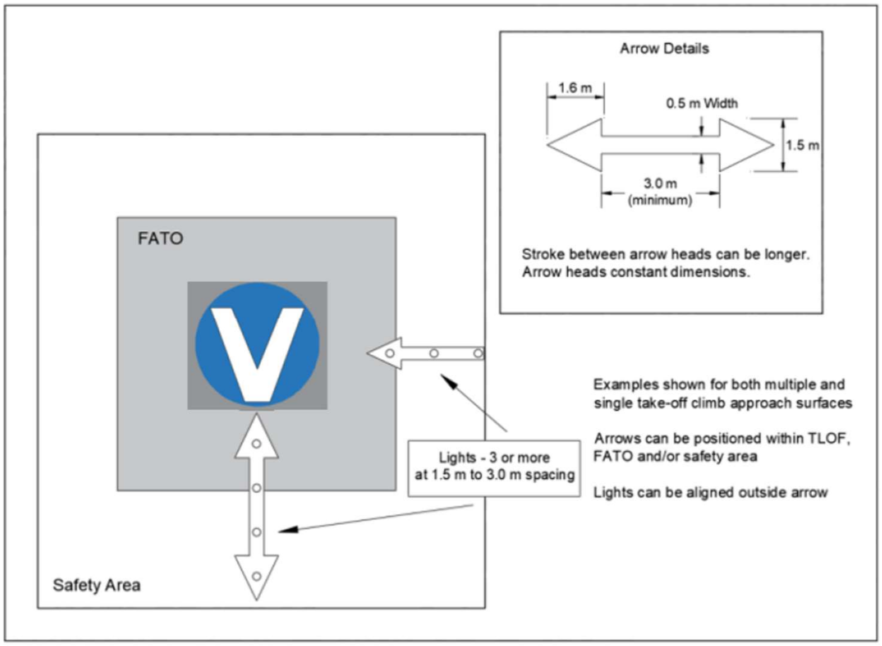


Figure VPT-C- 19: Flight path alignment guidance markings and lights

GM1 CS VPT-DSN.C.300 Flight path alignment guidance lighting system

(a) The flight path alignment guidance lighting system can be combined with the flight path alignment guidance markings.

(b) 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.

CS VPT-DSN.C.305 Visual alignment guidance system

(a) The objective of a visual alignment guidance system is to provide conspicuous and discrete cues to assist the pilot in attaining and maintaining a specified approach track to a vertiport and a safe lateral clearance from obstacles when on final approach.

(b) Applicability:

Visual alignment guidance system should be installed to serve the approach to a vertiport where one or more of the following conditions exist, especially at night:

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

(2) the environment of the vertiport provides few visual surface cues; and

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

(c) 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.

(d) Characteristics:

(1) 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.

(2) The signal format should be unique and conspicuous in all operational environments for which it is intended to use the visual alignment guidance system.

(3) The system provides a minimum of three discrete signal sectors giving ‘offset to the right’, ‘on track’ and ‘offset to the left’ indications.

(4) The system should be capable of adjustment in azimuth to within ±5 minutes of arc of the desired approach track.

(5) 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 kilometer of viewing range.

(6) The divergence of the ‘on track’ sector of the system should be 1° on either side of the centre line, see Figure VPT-C-20: Divergence of the ‘on track’ sector.

(7) 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.

(8) 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 CS VPT-DSN.C.310 - Visual approach slope indicator and Figure VPT-C-21: (Siting of the visual alignment guidance system) for visual approach indicators should equally apply to the visual alignment guidance system.

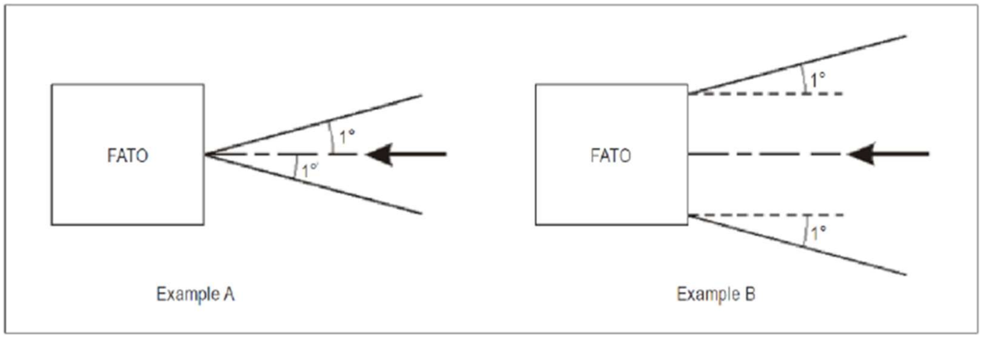


Figure VPT-C-20: Divergence of the 'on track' sector

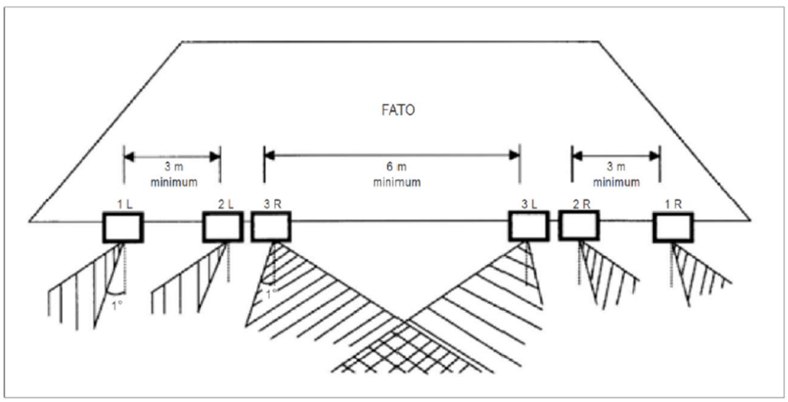


Figure VPT-C-21: Siting of the visual alignment guidance system

GM1 CS VPT-DSN.C.305 Visual alignment guidance system

Further guidance on visual alignment guidance systems is given in ICAO Document 9261, Heliport Manual.

CS VPT-DSN.C.310 Visual approach slope indicator

(a) The objective of a visual approach slope indicator is to provide conspicuous and discrete colour cues, within a specified elevation and azimuth, to assist the pilot in attaining and maintaining 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.

(b) Applicability:

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, where one or more of the following conditions exist, especially at night:

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

(2) the environment of the vertiport provides few visual surface cues; and

(3) the characteristics of the vertiport require a stabilised approach.

(c) Location:

(1) The HAPI system should be mounted and sited as low as possible so as not to constitute a hazard to VCA.

(2) The Helicopter Approach Path Indicator (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.

(d) Characteristics:

(1) 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).

(2) The characteristics of the PAPI and APAPI system should correspond to those specified in CAR AGA PART ADR, except that the angular size of the on-slope sector should be increased to 45 minutes.

(3) 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.

(4) The characteristics of the HAPI should be as follows:

(i) A HAPI, defined this CAR, is designed to give visual indications of the desired approach slope and any vertical deviation from it.

(ii) 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.

(iii) The HAPI is a single unit device providing one normal approach path and three discrete deviation indications.

(5) Type of signal

(i) 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.

(ii) 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.

(iii) The light distribution of the HAPI in red and green colours should be as shown in Figure VPT-C-18, Illustration 4.

(6) Setting angles

(i) 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 VPT-C-22. The unit setting angle and the centre of the on-course sector are not the same.

(ii) 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.

(iii) 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.

(iv) The HAPI system should maintain its setting angle when exposed to downwash and environmental conditions.

(7) 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.

Sector	Format
Above	Flashing green
On slope	Green
Slightly below	Red
Below	Flashing red

Illustration A

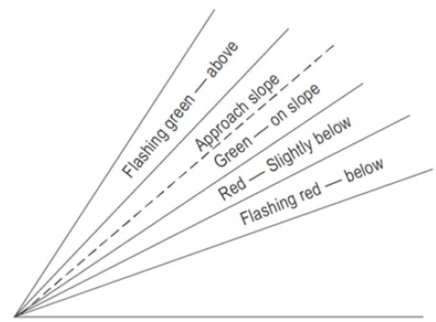


Illustration B

Figure VPT-C-22: HAPI signal format

(8) Obstacle considerations

(i) The HAPI unit should not penetrate any OLS.

(ii) 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 VPT-C-1 and Figure VPT-C-23. 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.

Table VPT-C-1: Dimensions of the obstacle protection surface

Surface and dimensions		FATO
Length of inner edge		Width of SA
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 CS-ADR -DSN. b. The angle of the upper boundary of the 'below slope' signal.		

(9) 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:

- (i) suitably raise the approach slope of the system;
- (ii) reduce the azimuth spread of the system so that the object is outside the confines of the beam;
- (iii) displace the axis of the system and its associated obstacle protection surface by no more than 5 degrees; and/or
- (iv) suitably displace the FATO and install a visual alignment guidance system.

(10) 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 VPT-C-1 and Figure VPT-C- 23.

(11) 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.

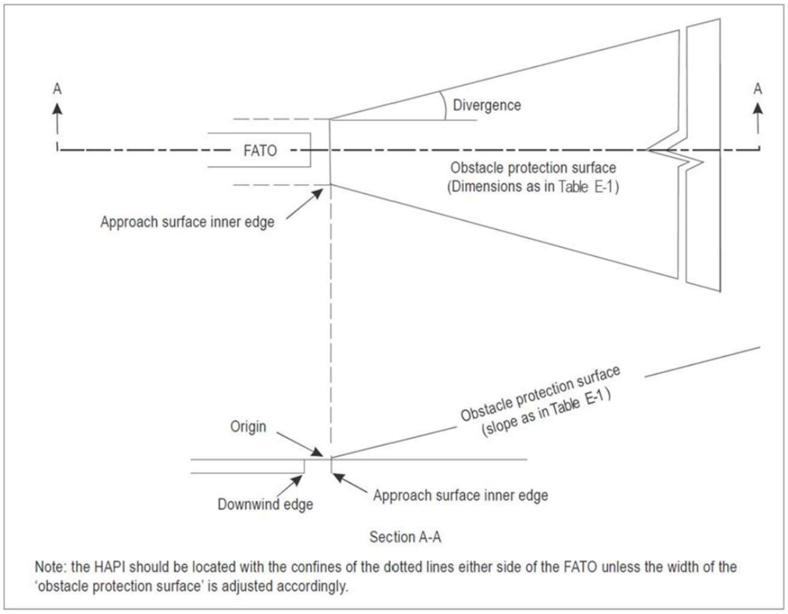


Figure VPT-C-23*:* Obstacle protection surface

GM1 CS VPT-DSN.C.310 Visual approach slope indicator

(a) 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 (where traditional OLS are provided) when on final approach. The HAPI may be installed on vertiports with different physical characteristics.

(b) Other systems meeting the objective of the PAPI, APAPI or HAPI may be used at vertiports.

(c) 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.

(d) The characteristics of the lights are specified in CAR AGA PART ADR.

CS VPT-DSN.C.315 FATO lighting systems

(a) The objective of a FATO lighting system on vertiports is to provide the pilot operating at night with an indication of the shape, location and extent of the FATO.

(b) Applicability

Where a FATO with a solid surface is established at a 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.

(c) Location

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

(1) 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

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

(d) Characteristics

(1) FATO lights shall be fixed omnidirectional lights showing white. Where the intensity of the lights is to be varied, the lights should show variable white or green. See Figure VPT-C-24: Lighting system for FATO at surface level.

(2) The light distribution of FATO lights should be as shown in, Illustration 4. Figure VPT-C-18.

(3) 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 level.

Figure VPT-C- 24*:* Lighting system for FATO at surface level

CS VPT-DSN.C.320 Aiming point lights

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

(b) Applicability

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

(c) Location

Aiming point lights shall be collocated with the aiming point marking.

(d) Characteristics

(1) Aiming point lights should form a pattern of at least six omnidirectional white lights as shown in Figure VPT-C-8. The lights shall be inset when a light extending above the surface could endanger VCA operations.

(2) The light distribution of aiming point lights should be as shown in Figure VPT-C- 18, Illustration 4.

GM1 CS VPT-DSN.C.320 Aiming point lights

(e) Solid state lights and filament light sources should conform to the chromaticity specifications in CAR AGA PART ADR.

CS VPT-DSN.C.325 TLOF lighting system

(a) The objective of a TLOF lighting system is to provide illumination of the TLOF and required elements within. For a TLOF located within 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 a vertiport that is elevated, the objective is visual acquisition from a defined range and to provide sufficient shape cues to permit an appropriate approach angle to be established.

(b) Applicability

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

(c) Location

(1) TLOF perimeter lights should 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 should be:

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

(ii) where (i) 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 should be spaced at half spacing.

(2) TLOF perimeter lights should be uniformly spaced at intervals of not more than 3 m for vertiports that are elevated and not more than 5 m for vertiports at surface level. There should 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 (ii) above, there should be a minimum of fourteen lights.

(3) The TLOF perimeter lights should be installed at a vertiport that is elevated such that the pattern cannot be seen by the pilot from below the elevation of the TLOF.

(4) On a vertiport at surface level, arrays of segmented point source lighting (ASPSL) or luminescent panels (LPs), if provided to identify the TLOF, should be placed along the marking designating the edge of the TLOF. Where the TLOF is a circle, they should be located on straight lines circumscribing the area.

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

(6) When LPs are used on vertiports that are elevated to enhance surface texture cues, the LPs should not be placed adjacent to the perimeter lights. They should be placed around a TDPM or coincident with vertiport identification marking.

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

(8) ASPSL and LPs when used to designate the TDPM and/or heliport identification marking, should provide enhanced surface texture cues when compared to low-level floodlights.

(d) Characteristics

(1) The lighting for the TLOF in a surface level FATO should consist of one or more of the following:

(i) perimeter lights;

(ii) floodlighting (for vertiports that are elevated, floodlighting should be omitted);

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

(2) For an elevated vertiport and shipboard vertiport, lighting of the TLOF in a FATO shall consist of:

(i) perimeter lights; and

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

At vertiports that are elevated, 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. Combination of perimeter lights and ASPSL may be used in the form of encapsulated strips of light-emitting diodes (LEDs) and inset lights to identify the TDPM and vertiport identification markings.

(3) 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.

(4) The TLOF perimeter lights should be fixed omnidirectional lights showing green.

(5) At a surface-level vertiport, ASPSL or LPs should emit green light when used to define the perimeter of the TLOF.

(6) The chromaticity and luminance of colours of ASPSL/LPs should conform to CAR AGA PART ADR, CS ADR-DSN.

(7) An LP should have a minimum width of 6 cm. The panel housing should be the same colour as the marking it defines.

(8) The TLOF perimeter lights located within 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. The intensity and beam spread of the perimeter lights should comply with those in Figure VPT-C-18, Illustration 5. Solid state lights and filament light sources should conform to the chromaticity of CAR AGA PART ADR, CS ADR-DSN.

(9) TLOF perimeter light segments: ASPSL/LPs should be evenly spaced and emit green light when they are used to define the boundary of the area. The light distribution should be as shown in Figure VPT-C-18, Illustration 6.

(10) When the ASPSL/LPs are within the TLOF and to avoid a trip hazard, the height of the lighting segments and any associated cabling should be as low as possible and not exceed 25 mm above the surface of the TLOF. The segments should not present any vertical outside edge greater than 6 mm without chamfering at an angle not exceeding 30° from the horizontal.

(11) When located within the SA, the TLOF floodlights should not exceed a height of 25 cm.

(12) The LPs shall not extend above the surface by more than 2.5 cm.

(13) The light distribution of the perimeter lights should be as shown in Figure VPT-C-18, Illustration 5.

(14) The light distribution of the LPs should be as shown in Figure VPT-C-18, Illustration 6.

(15) The spectral distribution of TLOF floodlights should be such that the surface and obstacle markings can be correctly identified.

(16) 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.

(17) Lighting used to identify the TDPC 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.

(18) If utilised, the vertiport identification marking lighting should be omnidirectional showing green.

(19) 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.

(20) 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.

GM1 CS VPT-DSN.C.325 TLOF lighting system

(a) Where a TLOF is located in a stand, ambient lighting or stand floodlighting may be used.

(b) Further guidance on TLOF lighting system is given in ICAO Document 9261, Heliport Manual.

CS VPT-DSN.C.330 Vertiport identification marking lighting

(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.

(b) Applicability

Where provided, the vertiport identification marking, letter 'V', should be outlined with edge lighting.

(c) Characteristics

(1) The 'V' should be outlined with green edge lighting consisting of subsections between 80 mm and 100 mm wide as shown in Figure VPT-C-25. The mechanical housing should be coloured white.

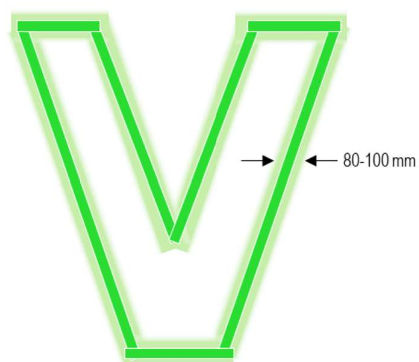


Figure VPT-C-25:'V' lighting

(2) 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.

(3) 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.

(4) 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 VPT-C-26.

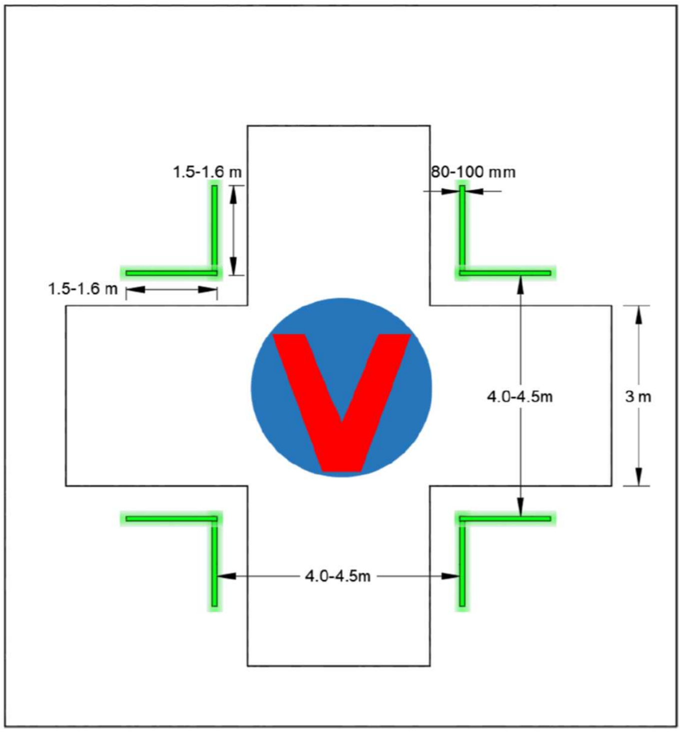


Figure VPT-C-26: Vertiport cross lighting

(5) 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.

(6) The vertiport identification marking lighting should be flush with the surrounding surface to protect accumulation of small fractions.

CS VPT-DSN.C.335 The TLOF in a FATO lighting

LIGHTING OF THE TLOF IN A FATO AT A VERTIPORT AT A SURFACE LEVEL

(a) The objective of a TLOF in a FATO lighting is to provide additional information to the pilot with an indication of a TLOF in an FATO.

(b) Applicability:

Where provided, the lighting system should consist of one or more of the following:

(1) perimeter lighting;

(2) floodlighting (see Figure VPT-C-27)

(3) ASPSLs or LPs (on their own only when FATO lights are available, Figure VPT-C- 28).

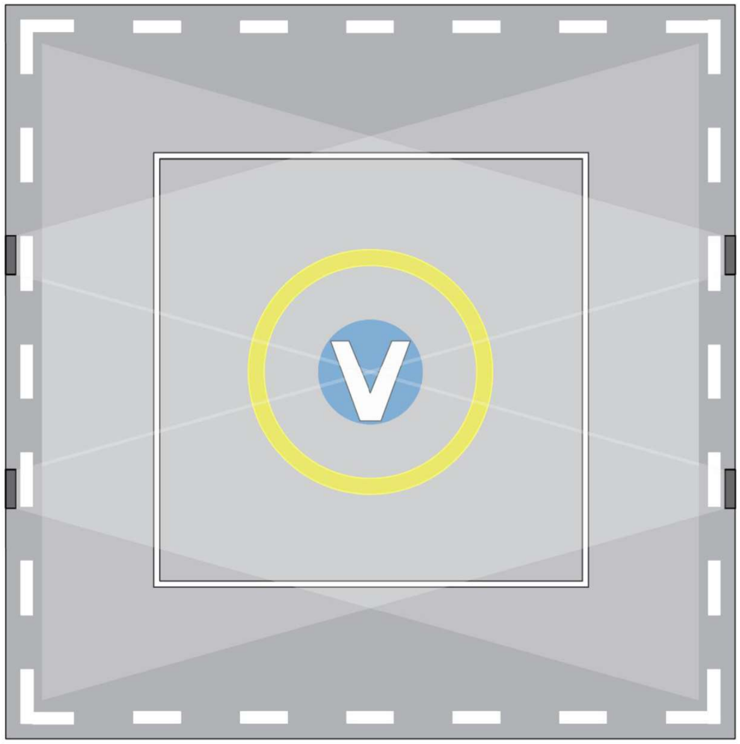


Figure VPT-C-27: Surface level FATO and TLOF with floodlighting

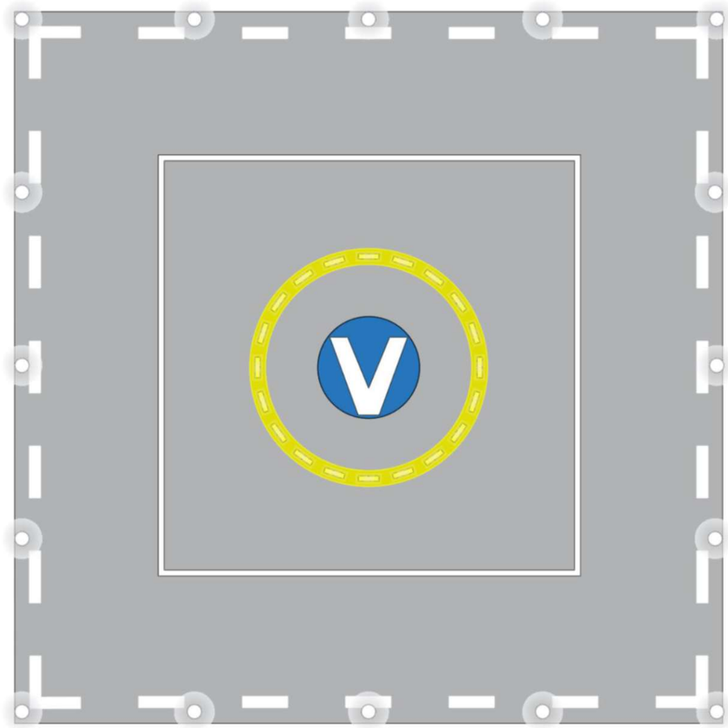


Figure VPT-C-28: Surface level FATO with perimeter and TDPC lighting

(c) Characteristics:

(1) ASPSL/LPs to identify the TDPM, vertiport identification marking and/or floodlighting (or perimeter lighting, where appropriate) should be provided for vertiport intended for use at night when enhanced surface texture cues are required.

(2) Perimeter lights

(i) Perimeter lights should be placed along the boundary of the TLOF or within a distance of 1.5 m from the outer edge and uniformly spaced at intervals of not more than 5 m.

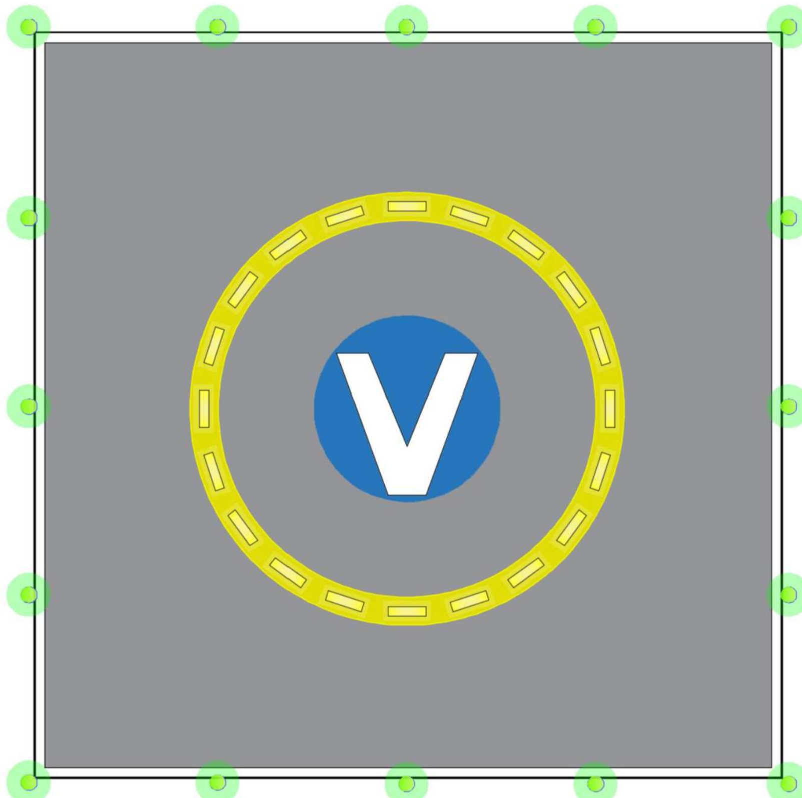


Figure VPT-C-29*:* Surface level vertiport perimeter and TDPC lighting (square TLOF)

(ii) Where the TLOF is rectangular or square, there should be a minimum of four lights on each side including a light at each corner; this will result in a minimum of twelve lights (Figure VPT-C-29 shows a TLOF of 20 m which, because of minimum spacing requirements, has five lights on each side).

(iii) Where the TLOF has more than four sides, there should be a minimum of three lights on each side including a light at each corner; this will result, for an octagonal TLOF, in sixteen lights as shown in Figure VPT-C-30.

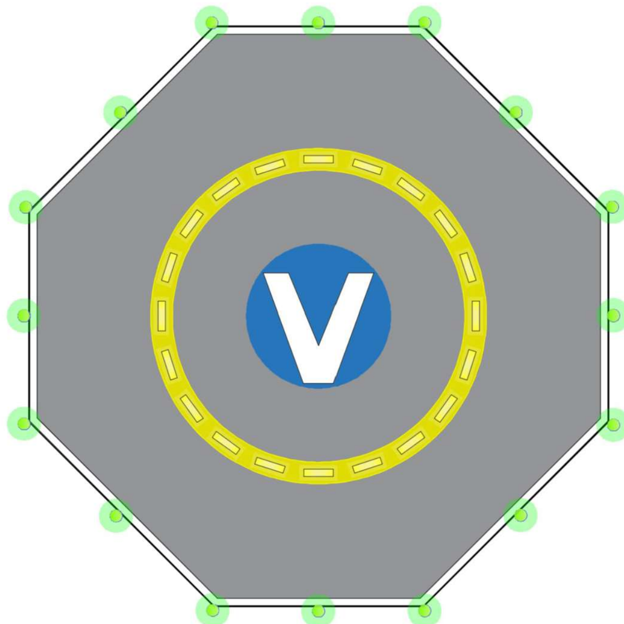


Figure VPT-C-30: Vertiport at surface level perimeter and TDPC lighting (octagonal TLOF)

(iv) Where the TLOF is circular, the perimeter lights should be located on straight lines in a pattern which will provide information to pilots on drift displacement. Where it is not practicable to so locate the lights, they should be evenly spaced around the perimeter of the area at the appropriate interval except that over a sector of 45° the lights should be placed at half spacing as in Figure VPT-C-31 (where flight path alignment guidance lighting is provided, additional lights should not be necessary). There should be a minimum of fourteen lights.

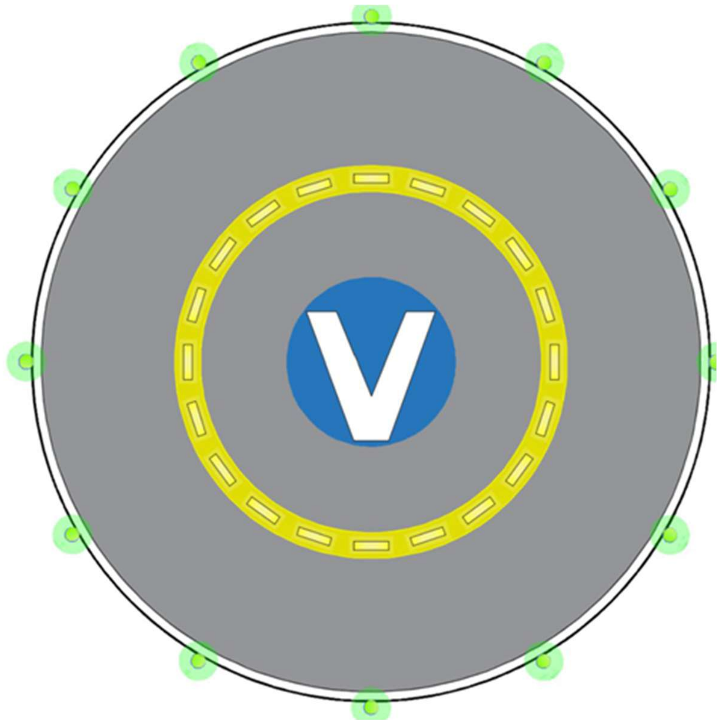


Figure VPT-C-31: Vertiport at surface level and TDPC lighting (circular TLOF)

(v) Perimeter lights should be fixed omnidirectional lights showing green. The light distribution of perimeter lights should conform to that specified in Illustration 5 - of Figure VPT-C-18.

(3) Perimeter light segments

(i) ASPSL/LPs should be placed along the marking designating the edge of the TLOF and be equally spaced with a distance between adjacent panel ends of not more than 5 m. The total length of ASPSL/LPs in a pattern should not be less than 50 per cent of the length of the pattern.

(ii) Where the TLOF is a rectangle or square, there should be a minimum of three ASPSL/LPs on each side of the TLOF with one at each corner as in Figure VPT-C-32.

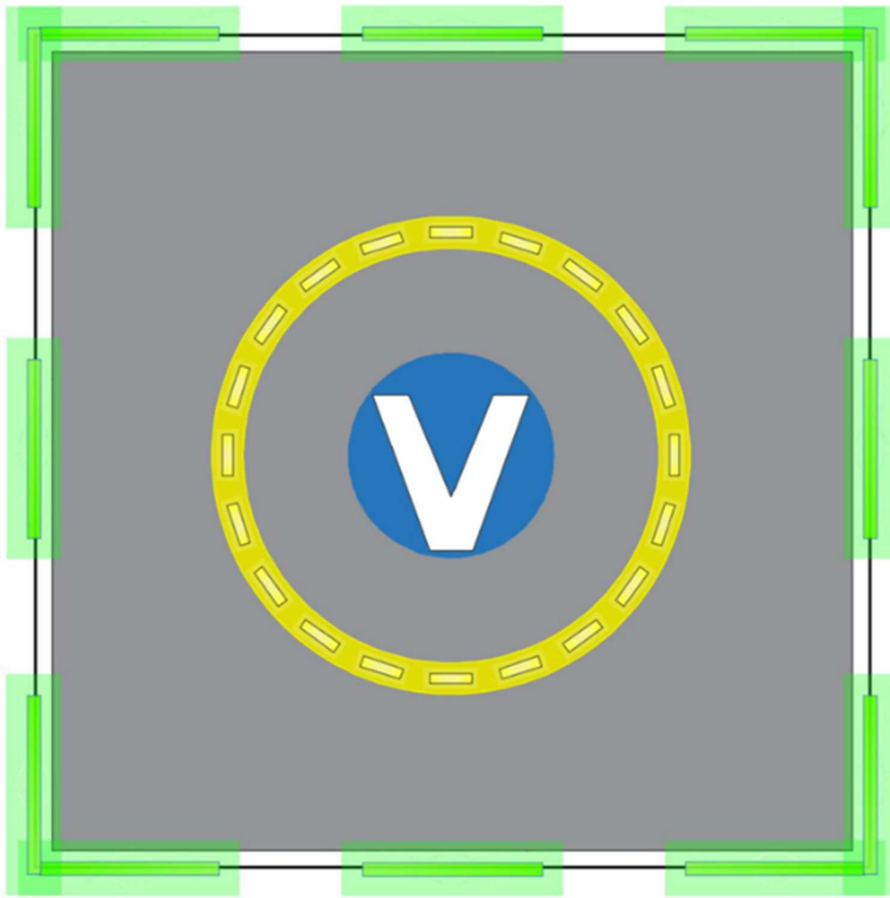


Figure VPT-C- 32: Vertiport at surface level ASPSL/LPs (square TLOF)

(iii) Where the TLOF is a circle, the panels should be located on straight lines circumscribing the area as in Figure VPT-C- 33. There should be a minimum of nine ASPSL/LPs.

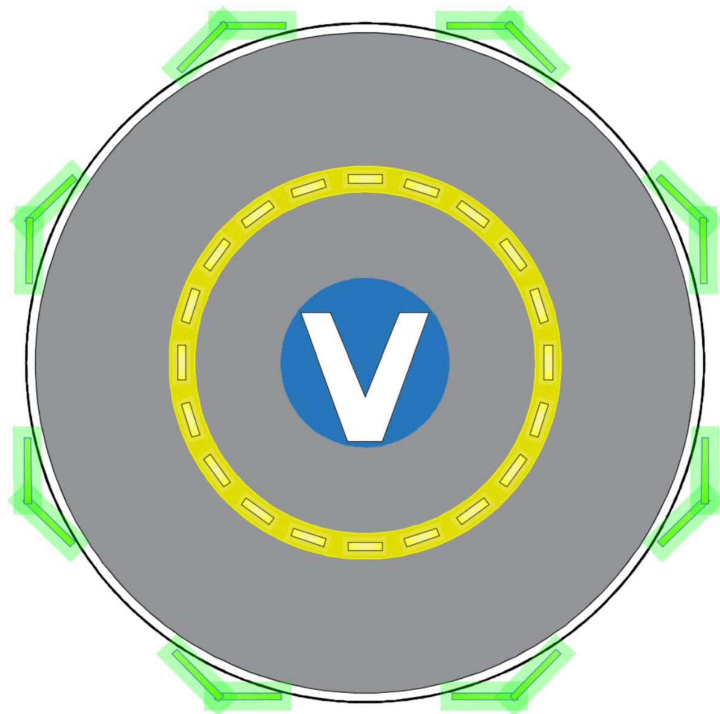


Figure VPT-C- 33: Vertiport at surface level ASPSL/LPs (circular TLOF)

(iv) ASPSL/LPs should emit green light when they are used to define the boundary of the area, and the light distribution should be as shown in Figure VPT-C-18, Illustration 6.

(4) Enhanced texture cue lighting

(i) Floodlights should be located so as to avoid glare to pilots at the final stages of approach and landing and the arrangement and aiming of the lights should be such that shadows are kept to a minimum.

(ii) The TDPM and/or the vertiport identification marking should be provided in accordance with CS VPT-DSN.C.325(d)(3)- TLOF lighting system and CS VPT-DSN.C.330 - Vertiport identification marking lighting above.

Lighting of the TLOF in a FATO at a vertiport that is elevated

(d) The objective of the TLOF lighting system at a vertiport that is elevated is to provide visual acquisition from a defined range and to provide sufficient shape cues to permit an appropriate approach angle to be established.

(e) Applicability:

Where provided, the lighting should consist of:

(1) perimeter lights; and

(2) (i) ASPL/LPs, to identify the TDPM; or

(ii) floodlighting, to illuminate the TLOF.

Note: Perimeter light segments may not be suitable for vertiports that are elevated because of limited conspicuity compared to perimeter lights.

(f) Characteristics:

(1) Perimeter lights should be as specified in the TLOF in a FATO lighting, except that they should be installed at a spacing of not more than 3 m (see Figure VPT-C- 34).

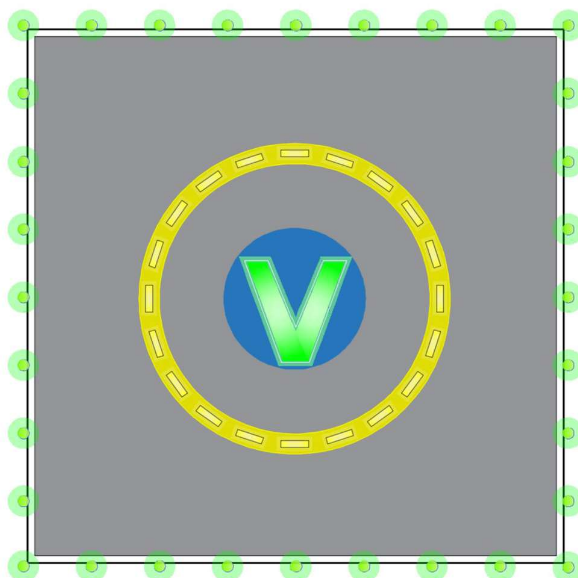


Figure VPT-C- 34: Perimeter of a vertiport that is elevated, vertiport identification and TDPC lighting

(2) ASPSL/LPs or floodlighting should be provided at vertiports that are elevated to offer surface texture cues within the TLOF. These cues are essential to ensure accuracy of positioning for the VCA during the final approach and hover to landing.

(3) When ASPSL/LPs are used on a vertiport that is elevated to enhance the surface texture cues, they should not be placed adjacent to the perimeter lights. Suitable locations

include around a TDPM circle or coincident with the vertiport identification 'V' marking or cross marking (see Figure VPT-C-34).

CS VPT-DSN.C.340 VCA stand floodlighting

(a) 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 VTOL aircraft, and to facilitate essential operations around the VCA.

(b) Applicability:

VCA stand floodlighting should be provided on a stand intended to be used at night by VCA.

(c) Location:

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 minimise shadows.

(d) Characteristics:

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

(2) 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.

GM1 VPT-DSN.C.340 VCA stand floodlighting

Further guidance on stand floodlighting is given in ICAO Document 9157, Aerodrome Design Manual, Part 4, Visual Aids.

CS VPT-DSN.C.342 VCA stand lighting

(a) The objective of the VCA stand lighting is to provide illumination of the stand surface and associated markings, assist the manoeuvring and positioning of a VCA, and allow essential operations around the VCA to be conducted safely.

(b) Applicability:

VCA stand lighting should be provided with apron floodlighting or ambient lighting.

(c) Location:

VCA stand floodlights should 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. Floodlights should be arranged and aimed such that a VCA stand receives light from two or more directions to minimise shadows.

(d) Characteristics:

(1) The spectral distribution of stand floodlights should be such that the colours used for surface and obstacle marking can be correctly identified.

(2) Horizontal and vertical illuminance should 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.

GM1 CS VPT-DSN.C.342 VCA stand lighting

Further guidance on apron floodlighting is given in ICAO Document 9157, Aerodrome Design Manual, Part 4, Visual Aids

CS VPT-DSN.C.345 VCA taxiway / air taxi-route lighting

(a) Applicability:

The specifications for taxiway centre line lights and taxiway edge lights, provided in CS-ADR-DSN, are equally applicable to taxiways intended for ground taxiing of VCA.

(b) Characteristics:

(1) The taxiway/air taxi-route lighting provides illumination of the markings or markers.

(2) VCA taxiways should be lighted in the same manner as a taxiway meant for use by aeroplanes (see CS-ADR-DSN).

(3) When not collocated with a taxiway, air taxi-route markings should be lighted as for taxiways; air taxi-route markers should be internally illuminated or rendered retro-reflective.

CS VPT-DSN.C.350 Visual aids for denoting obstacles outside and below the obstacle limitation surface

Applicability:

(a) Where an aeronautical study indicates that obstacles in areas outside and below the boundaries of the OLSs and 'obstacle-free volume' characteristics established for a vertiport constitute a hazard to VCA, 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.

(b) Where an aeronautical study indicates that overhead wires or cables crossing a river, waterway, valley, or highway constitute a hazard to VCA, 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.

GM1 CS VPT-DSN.C.350 Visual aids for denoting obstacles outside and below the obstacle limitation surface

(a) Arrangements for a safety assessment of objects outside the OLSs (obstacle-free volume) and for other objects are addressed in CAR AGA PART ADR - ADR.OPS.

(b) For obstacle marking and lighting specifications, refer to CAR AGA PART ADR.

CS VPT-DSN.C.355 Floodlighting of obstacles

(a) Applicability:

(1) At a vertiport intended for use at night, obstacles should be floodlighted if it is not possible to display obstacle lights on them.

(2) An obstacle at a vertiport should be lit in the same manner as at an aerodrome; (see the certification specifications in CAR AGA PART ADR - CS-ADR-DSN).

(3) Where a vertiport is isolated or rarely used and to avoid unnecessary light pollution, obstacle lighting may be activated at the time of use.

(b) Location:

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.

(c) Characteristics:

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

GM1 CS VPT-DSN.C.355 Floodlighting of obstacles

It is preferable for some structures, such as trees 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 adequately illuminate the structure and do not dazzle the pilot.

CHAPTER D – CHARGING FACILITY AND ELECTRIC INFRASTRUCTURE (VPT-DSN.D)

CS VPT-DSN.D.360 Charging facility and electric infrastructure

Vertiport operator shall:

(A) Ensure that 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;

(b) 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;

(c) 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;

(d) 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.

GM1 CS VPT-DSN.D.360 Charging facility and electric infrastructure

(a) 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.

(b) 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

(c) The grid impact of high wattage charging stations needs to be considered when designing and adopting charging stations.

(d) 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.

SECTION D – RESERVED

SECTION E – GUIDANCE MATERIAL - EMERGENCY EVACUATION INFRASTRUCUTRE HELIPADS/VERTIPAD (EEI.DSN.E)

GM EEI.DSN.E.010 Emergency Evacuation infrastructure

GENERAL

(a) 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. 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 Defense.

(b) An emergency evacuation helipad shall not show the Heliport Identification Marking detailed in this part.

GM EEI.DSN.E.015 FATO Area

(a) An emergency evacuation helipad should be provided with a final approach and take-off area (FATO) that should be obstacle free.

(b) 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.

GM EEI.DSN.E.020 TLOF Area

(a) 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.

(b) The TLOF should be of sufficient size to contain a circle of diameter of at least 0.83 D.

(c) The TLOF should be dynamic load bearing.

(d) A TLOF perimeter marking should be displayed along the edge of the TLOF.

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

GM EEI.DSN.E.025 Helipad Identification Marking

(a) An emergency evacuation helipad should be provided with a helipad identification marking located at the centre of the TLOF.

(b) The helipad identification marking should consist of a yellow colored 'E' as depicted in Figure EEI-E- 1, with dimensions no less than those shown.

GM EEI.DSN.E.030 Maximum Allowable Mass

(a) A marking indicating the maximum allowable mass for which the helipad has been designed to accommodate should be displayed at an emergency evacuation helipad.

(b) A maximum allowable mass marking should be located within the TLOF and so arranged as to be readable from the preferred final approach direction.

(c) 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”.

GM EEI.DSN.E.035 D-Value Marking

(a) The D-value marking should be located within the TLOF and so arranged as to be readable from the preferred final approach direction.

(b) The D-value marking should be white. It should be rounded down to the nearest whole number, followed by the letter “m”.

GM EEI.DSN.E.035 Building Fire Protection

The buildings fire protection system shall be designed so as to afford fire protection for the evacuation helipad to support its operational function.

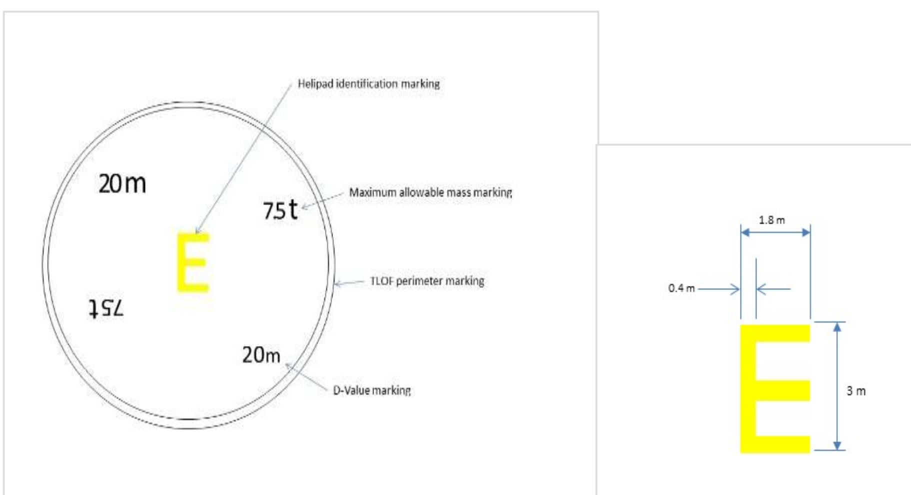


Figure EEI-E- 1 : helipad identification marking

SECTION F – RESERVED

SECTION G - RESERVED

SECTION H - HYBRID INFRASTRUCTURE – HELICOPTER AND VCA OPERATIONS (OR.HY /HVI-DSN)

This section includes the organisational requirements and certification specification for hybrid operations.

VFI OR.HY.010 Hybrid operations

AMENDMENT TO CERTIFICATE OR LANDING AREA ACCEPTANCE

(a) Operators of certified or Landing Area Accepted heliport/vertiport, when intending for hybrid operations (i.e., VCA operation on heliport or helicopter operation on a vertiport) shall :

(1) Notify the GCAA of their proposal; and

(2) Request the GCAA for an amendment to their Certificate / Landing Area Acceptance scope to incorporate hybrid operations.

(b) The request for amendment shall be supported by:

(1) Safety Assessment;

(2) Management of change;

(3) Compliance register.

(c) Heliport/vertiport operators shall permit hybrid operations only after the necessary amendments are accepted by the GCAA and incorporated in their certificate / landing area acceptance.

(d) Upon receipt of amended certificate, holders of heliport/vertiport certificate shall notify the AIS appropriately of the amended scope.

(e) Applicants should, prior to the commencement of aviation activity, obtain a security clearance from GCAA through the established means.

GM1 VFI.OR.HY.010 Hybrid operations

NEW APPLICANT

(a) Any new applicant for hybrid operations should ensure all certification specifications parameters for hybrid operations are met at the design stage.

(b) The applicant can make a reference to this requirement while expressing their scope of operations.

AMC1 VFI.OR.HY.010(b)(1) Hybrid operations

SAFETY ASSESSMENT AND MANAGEMENT OF CHANGE

The assessment carried out by the operators should *interalia* consider the following:

(a) overall length (D Value) of the largest helicopter / VCA that is planned to use the heliport/vertiport;

(b) design helicopter/VCA, having which represent the largest dimensions and the greatest maximum take-off mass (MTOM) the heliport/vertiport is intended to serve, is taken into account.

(c) maximum weight, contact area, single or multiple gears, undercarriage dimension;

(d) approach and departure surfaces/obstacle environment;

(e) separation / clearance distances;

(f) simultaneous fuelling and charging activities;

(g) emergency response requirements;

(h) additional training for heliport/vertiport staff.

AMC2 VFI.OR.HY.010(b)(3) Hybrid operations

COMPLIANCE REGISTER

While the physical characteristics and visual aids requirements may remain unchanged, operators should ensure that all applicable certification specification requirements are met and recorded in the compliance register, specifying the requirement for hybrid operations.

CS HVI-DSN.010 Hybrid operations - Requirements for largest planned helicopter/VCA

REQUIREMENTS FOR LARGEST PLANNED HELICOPTER/VCA

(a) A heliport operator holding a heliport certificate or a landing area acceptance should only permit VCA operations when the following condition are met:

  (1) the heliport meets the certification specification requirements for the largest VCA planned to be operated at the heliport.

  (2) the heliport is certified/accepted by the GCAA for VCA operations.

(b) A vertiport operator holding a vertiport certificate or a landing area acceptance should only permit helicopter operations when the following condition are met:

  (1) the vertiport meets the Certification Specification requirements for the largest helicopter planned to be operated at the vertiport.

  (2) the vertiport is certified/accepted by the GCAA for helicopter operations.

GM1 HVI-DSN.010 Hybrid operations - Requirements for largest planned helicopter/VCA

REQUIREMENTS FOR LARGEST PLANNED HELICOPTER/VCA

Operations of VCAs on D value-based heliports might not provide full airframe containment based on the actual VCA geometry in reference to the original design helicopter geometry. For example, the use of a D value based (0.5D TDPM) to position a VCA might not ensure landing gear containment in a 0.83 D TLOF and therefore, for amending heliports into hybrid operations, the operator should include assessment of TDPM and landing gear containment inside TLOF.

CS HVI-DSN.015 Hybrid operations - Parking requirements

(a) The parking configuration shall ensure sufficient clearance between aircraft to aircraft and aircraft to object are met.

(b) Following conditions shall be taken into consideration, while parking helicopter(s) or VCA(s):

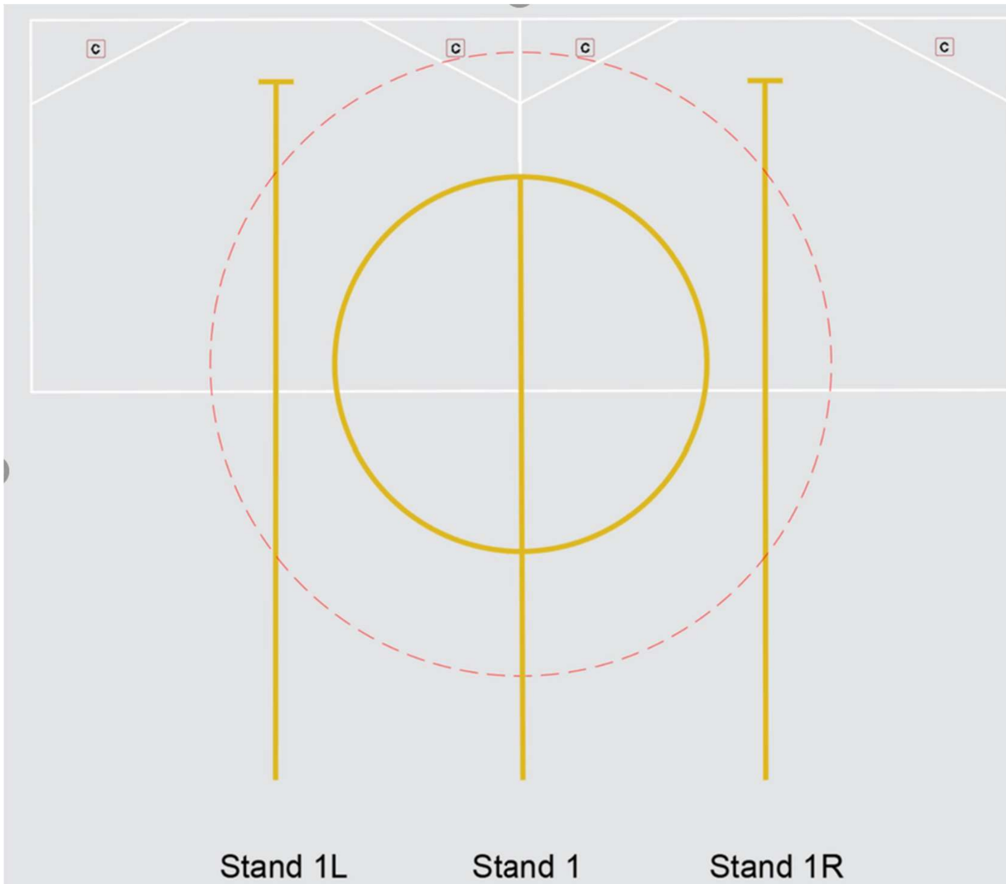
   (1) heliports that do not have geometry-based VCA stands, may accept VCA's on those stands as long as the stand is of sufficient size and shape to ensure containment of every part of the VCA intending to use the stand.

   (2) vertiports that are provided with only geometry-based VCA stands shall ensure that adjacent stands are not occupied, in order to park the helicopter of appropriate size, within these stands, in a manner that ensures sufficient clearance between aircraft to aircraft and aircraft to object is achieved.

   (3) no fixed objects shall penetrate the stand protection areas.

GM1 CS.HVI-DSN.015 Hybrid operations- Parking requirements

Figure below is an example of stand arrangement for helicopter at a vertiport with geometric stands.



CS HVI- 1: example of helicopter parking arrangement at a vertiport with geometric stands

CS.HVI-DSN.016 Hybrid operations on runways primarily used fixed wing aircraft

(a) When it is planned to operate both helicopter(s) and VCA(s) on a runway primarily designed for fixed wing aircraft, then the operator should ensure that the physical / operational parameters of the helicopter(s)/VCA(s) do not exceed the requirements of the largest aircraft that the runway is designed for as required in CAR AGA PART ADR.

(b) In such cases, the aerodrome operator shall conduct a compatibility study.

GM1 CS.HVI-DSN.016 Hybrid operations on runways used fixed wing aircraft

COMPATIBILITY STUDY

(a) Where a RWY type FATO is being considered for both helicopter and VCA operations, then the applicable certification specification (CS) for the largest planned helicopter/VCA shall be taken into consideration.

(b) In such cases, the aerodrome operator shall conduct a compatibility study.

(c) For further guidance refer CAR AGA PART ADR - GM1 ADR.OR.H. 065 (h) Changes.

GM1 CS.HVI-DSN.017 Hybrid operations on Runway type FATO

COMPATIBILITY STUDY

(a) The operator should carry out a compatibility study to assess the feasibility of helicopter(s)/VCA(s) operations on the runway type FATO.

(b) Where a runway type FATO is provided on a taxiway in an aerodrome primarily meant fixed wing aircraft, this area should be so protected by sufficient means (including navigational aids and procedures) to prevent any incursion.

(c) For further guidance refer CAR AGA PART ADR - GM1 ADR.OR.H. 065 (h) Changes.

CS HVI-DSN.025 Hybrid operations - Obstacle environment

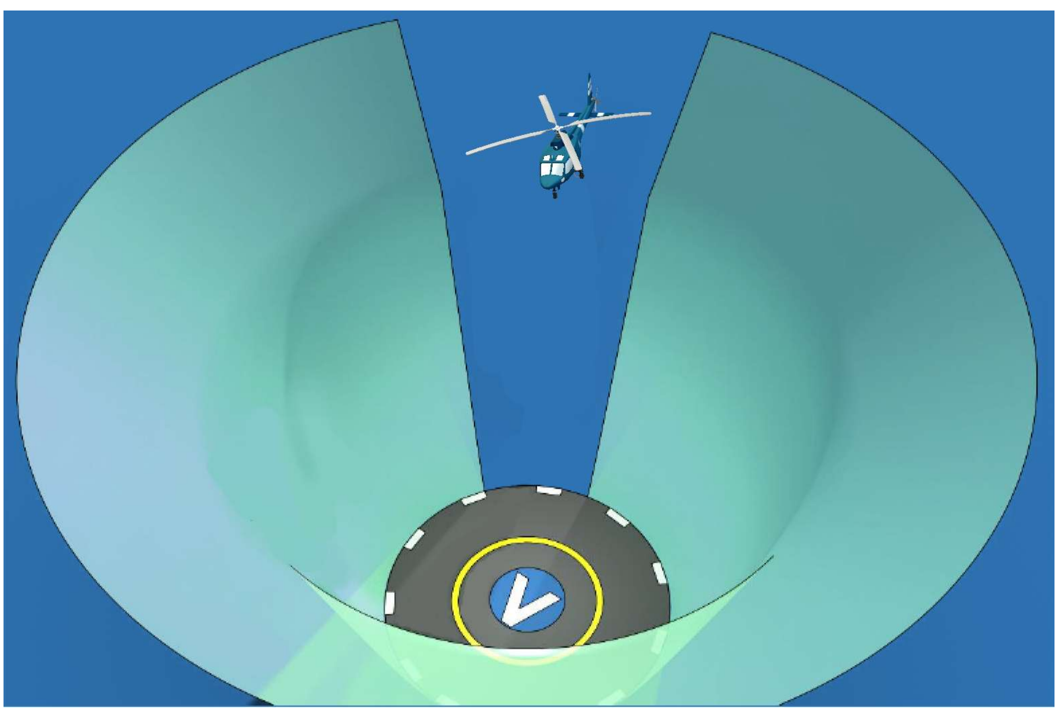
(a) To demonstrate a safe helicopter operation on a vertiport with an established OFV an aeronautical study shall be conducted taking into consideration:

  (1) the capability of the helicopter to perform vertical landing and take-off only; or

  (2) in case of helicopter operation with Uni-directional take-off and landing.

(b) The aeronautical study shall be accepted by GCAA.

(c) Where a heliport obstacle limitation surfaces are established, no other changes are required for VCA operations. However, the existing obstacles if any penetrating the OLS should be considered for VCA operations.



CS HVI- 2: Uni-directional take-off and landing on Vertiport or Hybrid Operation Infrastructure

GM1 CS.HVI-DSN.025(b) Hybrid operations- Obstacle environment

(a) The OLS requirements when established for a heliport encompasses such area to ensure safety of helicopters operating in them, this OLS requirement is therefore considered sufficient for VCA operations also.

(b) Operators while conducting a safety assessment as required in AMC1 VFI.OR.HY.010(b) Hybrid operations, to support their request for hybrid operations, must take into considers all such infringement into the OLS.