SOUTH AFRICAN CIVIL AVIATION AUTHORITY

CIVIL AVIATION ACT, 2009 (ACT NO. 13 OF 2009)

AMENDMENT SA CATS 2/2022

The Director of Civil Aviation has, in terms of section 163 (1) of the Civil Aviation Act, 2009 (Act No. 13 of 2009) amended South African-Civil Aviation Technical Standards as reflected in the Schedule hereto. The Amendments as contained in the Schedule shall come into operation on the date of publication.

Poppy Khoza
Director of Civil Aviation
Date: 05 MAY 2022

GENERAL EXPLANATORY NOTE:

[ ] Words in bold type in square brackets indicate omissions from existing technical standards.

________ Words underlined with a solid line indicate insertions in existing technical standards.

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AMENDMENT OF SA CATS 66

1.Document SA CATS 66 is hereby amended by:

(a) the deletion in technical standard 66.02.3 section 2.1 of subparagraph (i) of the following subparagraph:

"2.1 Aircraft Maintenance Engineer licence (Category A rating)

(1) Category A (aeroplanes)

(a) An applicant accepted for examination in Category A to cover aeroplanes will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects, according to the construction of the type for which accepted:

[(i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-2B, so far as they affect an aircraft maintenance engineer licensed in Category A.]

(b) the deletion in technical standard 66.02.3 subsection (2) of subparagraph (i) of the following subparagraph:

(2) Categories A (rotorcraft)

(a) An applicant accepted for examination in Categories A for the certification before flight of rotorcraft, excluding engines, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects, according to the construction of the type for which accepted:

[(i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-2B, so far as they affect an aircraft maintenance engineer licensed in Categories A]

(c) the deletion in section 2.2 of subparagraph (i) of the following subparagraph:

2.2 Aircraft Maintenance Engineer licence (Category C rating)

(1) Category C (engines: piston and gas turbine jet)

(a) An applicant accepted for examination in Category C to cover aircraft engines will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects, according to the construction of the type for which accepted:

(i) [British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category C]

(d) the deletion in technical standard 66.02.3 section 2.3 of subparagraph (i) of the following subparagraph:

2.3 Aircraft Maintenance Engineer licence (Category W rating)

(1) Category W: Avionic Equipment (Installations/Servicing)

(a) An applicant accepted for examination in Category W for the certification of the installation, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of Radio Communication Equipment, Radio Navigational Equipment (Pulse and Non-Pulse), and Electronically Operated Systems, i.e. amplifiers, computers, recorders, flight management and entertainment systems, will be required to answer, in written examinations, questions to demonstrate his knowledge of the following:

(i) **[British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the American Advisory Circular 43.13-1A & B so far as they affect an aircraft maintenance engineer's licence in Category W.]**

(2) Category W: Electrical Equipment (Installations/Servicing)

(a) An applicant accepted for examination in Category W for the certification if the installations, modification, troubleshooting, rectification of defects, repair and system checks in aircraft of all types of electrical equipment, will be required to answer in written examinations, questions to demonstrate his knowledge of the following:

(i) **[British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the American Advisory Circular 43.13-1A & B so far as they affect an aircraft maintenance engineer licensed in Category W.]**

3. Category W: Instrument Equipment Installations/Servicing

(a) An applicant accepted for examination in category W for the certification of the installation, modification, troubleshooting, rectification of defects, repair an system checks in aircraft of all types of instrument equipment, will be required to answer, in written examinations, questions to demonstrate his knowledge of the following:

[(i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the American Advisory Circular 43.13-1A & B so far as they affect an aircraft maintenance engineer licensed in Category W.]

(e) the deletion in technical standard 66.02.3 in section 2.4 of the following subparagraphs:

2.4 Aircraft Maintenance Engineer licence (Category B rating)

(1) Category B (aircraft)

(a) An applicant accepted for examination in Category B for the certification of the repair and overhaul of aircraft, incorporating the use and replacement of approved parts and components only, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects, according to the construction of the type for which accepted:

(i) **[British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far**

as they affect an aircraft maintenance engineer licensed in Category B.]

(3)Category B (Structure Worker)

(a) An applicant accepted for the examination in Category X (aircraft structures) will be required to answer in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (iii) to (xii):

(i) [British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, in so far as these affect an aircraft maintenance engineer licensed in Category X (aircraft structures)]

(f) the deletion in technical standard 66.02.3 section 2.5 of subparagraph (i) of the following subparagraph:

2.5 Aircraft Maintenance Engineer licence (Category D rating)

(1) D (engines)

(a) An applicant accepted for examination in Category D for the certification of the overhaul and repair of engines, incorporating the use and replacement of approved parts and components only, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects, according to the construction of the type for which accepted:

[(i) [British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category D.]

(g) the deletion in section 2.6 of the following subparagraphs:

2.6 Aircraft Maintenance Engineer licence (Category X rating)

(1) Category X (automatic pilots)

An applicant accepted for examination in Category X for the certification of the repair and overhaul of automatic pilots will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (a) to (d) and, in addition, according to the class of automatic pilot for which accepted, questions to demonstrate his or her knowledge of the subjects prescribed in sub-paragraphs (b) to (d):

(a) General

(i) [British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category X.]

2) Category X (Compasses)

(a) An applicant accepted for examination in Category X for the certification of the installation and compensation of direct-reading compasses will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (i) to (x). An applicant for examination in remote reading compasses will be required in addition to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (xi) to (xiii) according to the form of construction applicable to the type of remote reading compass for which the application is accepted:

(i) [British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category X.]

(3) Category X (Electrical Equipment)

(a) An applicant accepted for examination in Category X for the certification of the overhaul, repair and modification of aircraft electrical equipment, including installations in aircraft with main power supply systems, the nominal tension of which does not exceed 30 volts, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects:

(i) **[British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category X.]**

(3) Category X (Ignition Equipment)

(a) An applicant accepted for examination in Category X for the certification of the repair and overhaul of aircraft engine ignition equipment will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the following subjects:

(i) **[British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1, so far as they affect an aircraft maintenance engineer licensed in Category X.]**

(4) Category X (Instruments)

(a) An applicant accepted for examination in Category X for the certification of the overhaul, repair and modification of aircraft and engine instruments, excluding electrically operated instruments, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (i) to (x). An applicant accepted for examination in Category X for the certification of the overhaul, repair or modification of aircraft and engine instruments, including electrically operated instruments, will be required in addition to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (xi) and (xii):

(i) British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, so far as they affect an aircraft maintenance engineer licensed in Category X.

(6) Category X (Variable-Pitch Propellers)

(a) An applicant accepted for examination in Category X for the certification of the overhaul, repair or modification of variable-pitch propellers, will be required to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (i) to (x), according to the form of construction applicable to the type of propeller for which application is accepted. An applicant accepted for examination in Category X for the certification of the overhaul, repair or modification of oil and electrically operated variable-pitch propellers will be required in addition to answer, in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in item (xii):

(i) [British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B so far as they affect an aircraft maintenance engineer licensed in Category X.]

(7) Category X (Avionic Equipment)

(a) An applicant accepted for examination in Category X for the certification of the overhaul, repair, modification and installation of avionic equipment in aircraft will be required to answer in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (i) to (vi), and in addition, according to the rating for which he has been accepted, questions to demonstrate his or her knowledge of the subjects prescribed in items (vii) to (x) or (xi) to (xx):

(i) [British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B so far as they affect an aircraft maintenance engineer licensed in Category X]

(8) Category X (aircraft welding)

(a) An applicant accepted for the examination in Category X (aircraft welding) will be required to answer in a written examination, questions to demonstrate his or her knowledge of the subjects prescribed in items (i) to (vi) and, in addition, shall pass practical tests to demonstrate his or her knowledge of the subjects prescribed in item (vii):

(i) [British Civil Airworthiness Requirements, British Civil Aircraft Inspection Procedures and the FAA Advisory Circular 43.13-1B, in so far as these affect an aircraft maintenance engineer licensed in Category X (aircraft welding).]

AMENDMENT OF SA CATS 91

2.Document SA CATS 91 is hereby amended by:

(a) the addition in technical standard 91.02.8 after paragraph (m) for subregulation 4 of the following paragraph:

" (n) report a runway braking action via an AIREP when the runway braking action encountered is not as good as reported"."

(b) the substitution for section 2 in technical standard 91.05.02 of the following section:

" 2. MNPS specifications

(1) An owner or operator of an aircraft may operate an aircraft in a defined portion of an airspace where MNPS are prescribed, based on Regional Air Navigation Agreements, if an aircraft is equipped with navigation equipment which:

(a) continuously provides indications to a flight crew member of adherence to or departure from track to the required degree of accuracy at any point along that track; and

(b) an owner or operator of an aircraft has been authorised by the Director for the MNPS operations concerned.

2.1 General

This section gives detailed guidance on the required content of operational practices and procedures. It also describes the steps in an operational and airworthiness approval process and the granting of approval to operate in MNPS airspace.

(1) A South African registered aircraft which intends to fly across the North Atlantic and Oceanic areas requires an approval by the Director for flights in MNPS airspace.

(2) In processing an application for approval, an owner or operator for each aircraft group and non-group aircraft, to be used in MNPS operations, the Director needs to be satisfied that-

(a) operational programmes are adequate, by evaluating flight crew training and the operations manuals; and

(b) airworthiness issues are addressed satisfactorily.

(3) If an approval is granted to an owner or operator of an aircraft, the OpSpec shall be amended to include MNPS.

2.2 The MNPS application and approval

(1) An owner or operator of an aircraft shall submit to the Director the following for approval:

(a) the aircraft flight manual or supplements, to show that an aircraft has been approved either for MNPS or to RNP by the State of Manufacture;

(b) description of aircraft navigation equipment appropriate to operations in an MNPS environment;

(c) aircraft navigation equipment which consists of two fully serviceable Long Range Navigation Systems (LRNs), which includes either;

(i) two Inertial Navigation Systems,

(ii) two FMS with two IRS,

(iii) two approved Global GPS,

(iv) one INS and one FMS/IRS,

(v) one INS and one approved GPS, or

(vi) one FMS or IRS and one approved GPS must be capable of providing a continuous indication to the flight crew of an aircraft position relative to track and should be coupled to an automatic pilot.

(d) a maintenance programme that includes, where applicable, items pertinent to operating in MNPS airspace;

(e) a MEL, adapted from the MMEL, shall include items pertinent to operating in MNPS airspace;

(f) training syllabi and other appropriate material showing that the operating practices, procedures and training items related to MNPS operations are incorporated in training programmes shall cover, as a minimum flight planning:

(i) pre-flight procedures,

(ii) aircraft procedures for entry,

(iii) in-flight and contingency procedures, and

(iv) flight crew training procedures.

(2) The content of the MNPS application and training programmes referred to in paragraph (f) may be sufficient to validate an aircraft.

(3) An approval process may require a demonstration flight through MNPS airspace at the

discretion of an authorised officer to verify that relevant procedures are applied effectively.

(4) Where the performance is satisfactory, operational approval for MNPS airspace may be granted by the Director."

(c) the insertion after technical standard 91.07.34 of the following technical standard:

"91.07.35 Additional EDTO requirements

1. General

(1) This technical standard defines provisions for a EDTO of an aircraft as follows:

(a) two-engine aircraft: This is a flight whose planned routing contains a point further than 60 minutes flying time from an adequate airport at an approved one-engine inoperative cruise speed under standard conditions in still air;

(b) more than two engines' aircraft: This is a flight whose planned routing contains a point further than 180 minutes flying time from an adequate airport at an approved all engine operating cruise speed under standard conditions in still air under standard conditions in still air; and

(c) a EDTO Type Design Assessment: An aircraft with two engines where EDTO certification is required and an aircraft with more than two engines where EDTO certification is not required.

(2) Review of time capabilities of the relevant EDTO time-limited systems (TLSs) on an aircraft with more than two engines shall be performed by an aircraft manufacturer. The objective of this review is to confirm whether:

(a) these time limitations have to be considered for the dispatch of a EDTO flights ;and

(b) if the corresponding time limitation is to be provided in relevant aircraft documentation.

(3) The specified aircraft-engine combination shall be certificated to airworthiness standards of transport-category aircraft and be approved for a EDTO.

(4) An owner or operator of an aircraft shall be approved for a EDTO and when requesting any route approval, an owner or operator shall first demonstrate that:

(a) an owner or an operator of an aircraft is able to satisfactorily conduct operations between each required airport as defined for that route or route segment, and any required en route alternate airport; and

(b) the facilities and services specified in their applicable Parts of the regulations are available and adequate for the proposed operation.

NOTE 1— EDTO requirements are not applicable to Part 91 and Part 93 aircraft.

NOTE 2 — Additional guidance is contained in TGM AC AOC-032

2. EDTO REQUIREMENTS APPLICABLE TO AIRCRAFT FLOWN IN OPERATIONS

(1) An aircraft needs a viable diversion airport in the case of onboard fire, medical emergency, or catastrophic decompression.

(2) An owner or operator of an aircraft shall ensure:

(a) availability of en route alternate airports;

(b) adequate firefighting coverage at the airports;

(c) fuel planning to account for depressurization; and

(d) that planning for the maximum allowable diversion and worst-case scenarios account for aircraft time-critical systems.

3. OPERATIONS BY AEROPLANE WITH TURBINE ENGINES BEYOND 60 MINUTES TO AN EN-ROUTE ALTERNATE AERODROME

3.1 General

(1) This section applies to operations of an aeroplane with turbine engines beyond 60 minutes to an en-route alternate aerodrome and to an EDTO.

(2) In applying the requirements for an aeroplane with turbine engines:

(a) operational control;

(b) flight dispatch procedures refer to the method of control and supervision of flight operations. This does not mean a specific requirement for licensed flight dispatchers or a full flight following system;

(c) operating procedures refer to a specification of organisation and methods established to exercise operational control and flight dispatch procedures in the appropriate manuals and shall cover at least a description of responsibilities concerning the initiation, continuation, termination or diversion of each flight as well as the method of control and supervision of flight operations; and

(d) training programme refers to the training for pilots and flight operations officers or flight dispatchers in operations covered by this and following sections.

3.2 Conditions to be used when converting diversion times to distances

(1) For the purpose of this technical standard, an approved one-engine-inoperative (OEI) speed or approved all-engines operative (AEO) speed is any speed within a certified flight envelope of an aeroplane.

(2) Determination of the 60-minute distance — aeroplanes with two turbine engines

(a) For determining whether a point on a route is beyond 60 minutes to an en-route alternate, an operator shall select an approved OEI speed. A distance is calculated from a point of a diversion followed by cruise for 60 minutes, in ISA and still-air conditions. For the purposes of computing distances, credit for drift down may be taken.

(3) Determination of the 60-minute distance — an aeroplane with more than two turbine engines.

(a) For determining whether a point on the route is beyond 60 minutes to an en-route alternate, an operator shall select an approved AEO speed. A distance is calculated from a point of a diversion followed by cruise for 60 minutes, in ISA and still-air conditions.

3.3 Training programmes

(1) Training programmes shall contain the following:

(a) route qualification;

(b) flight preparation;

(c) concept of extended diversion time operations; and

(d) criteria for diversions.

3.4 Flight dispatch and operational requirements

(1) Flight dispatch requirements shall ensure the following:

(a) identification of en-route alternate an aerodrome;

(b) prior to departure, a flight crew is provided with the most up-to-date information on an identified en-route alternate an aerodrome, including operational status and meteorological conditions and, in flight, make available means for a flight crew to obtain the most up-to-date weather information;

(c) methods to enable two-way communications between an aeroplane and an operator's operational control centre;

(d) that an operator has a means to monitor conditions along the planned route including an identified alternate aerodrome and those procedures are in place so that a flight crew are advised of any situation that may affect the safety of flight;

(e) that an intended route does not exceed the established aeroplane threshold time unless an operator is approved for an EDTO operations;

(f) pre-flight system serviceability including the status of items in the minimum equipment list;

(g) communication and navigation facilities and capabilities;

(h) fuel requirements;

(i) availability of relevant performance information for an identified en-route alternate aerodrome; and

(j) systems degradation and reduced flight altitude.

(2) In addition, operations conducted by an aeroplane with two turbine engines require that, prior to departure and in flight, a meteorological condition at identified en-route alternate aerodrome shall be at or above an aerodrome operating minimal required for the operation during the estimated time of use

(3) En-route alternate aerodrome, required by subsection (2) for EDTO by an aeroplane with two turbine engines, shall be selected and specified in an operational and ATS flight plans.

3.5 En-route alternate aerodrome

(1) A PIC shall ensure that an aerodrome to which an aircraft may proceed in the event that a diversion becomes necessary while en route:

(a) is identified and operational;

(b) the necessary services and facilities are available, and

(c) aircraft performance requirements can be met.

(2) En-route alternate aerodrome may also be used as a take-off or destination aerodrome.

4. EXTENDED DIVERSION TIME OPERATIONS (EDTO) REQUIREMENTS

4.1 General

(1) This section addresses the provisions that apply to operations by an aeroplane with two or

more turbine engines where the diversion time to an en-route alternate aerodrome is greater than the established threshold time.

4.1.1 EDTO significant system

(1) A EDTO significant system may be an aeroplane propulsion system and any other aeroplane systems whose failure or malfunctioning maybe adversely affect safety particular to a EDTO flight, or whose functioning is specifically important to continued safe flight and landing during an aeroplane EDTO diversion.

(2) The aeroplane systems that are essential for non-extended diversion time operations may need to be reconsidered to ensure that the redundancy level or reliability and shall be adequate to support the conduct of safe EDTO.

(3) The maximum diversion time shall not exceed the value of a EDTO significant system limitation, if any, for extended diversion time operations identified in an aeroplane flight manual, directly or by reference, reduced by an operational safety margin of 15 minutes.

(4) The required specific safety risk assessment to approve operations beyond the time limits of a EDTO significant time limited system shall be in accordance with provisions of Part 140 and shall consider the following:

(a) capabilities of an operator refers to an operator's quantifiable in-service experience, compliance record, aeroplane capability and overall operational reliability that:

(i) are sufficient to support operations beyond the time limits of a EDTO significant time-limited system;

(ii) demonstrate the ability of the operator to monitor and respond to changes in a timely manner; and

(iii) there is an expectation that an operator's established processes, necessary for successful and reliable extended diversion time operations, can be successfully applied to such operations.

(b) overall reliability of an aeroplane refers to:

(i) quantifiable standards of reliability considering the number of engines, aircraft EDTO significant systems and any other factors that may affect operations beyond the time limits of a particular EDTO significant time-limited system; and

(ii) relevant data from an aeroplane manufacturer and data from an operator reliability programme used as a basis to determine overall reliability of an aeroplane and its EDTO significant systems;

(c) reliability of each time-limited system refers to quantifiable standards of design, testing and monitoring that ensure the reliability of each particular EDTO significant time-limited system;

(d) relevant information from an aeroplane manufacturer refers to technical data and characteristics of an aeroplane and worldwide fleet operational data provided by such manufacturer and used as a basis to determine overall reliability of an aeroplane and its EDTO significant systems; and

(e) specific mitigation measures refer to a safety risk management mitigation strategy, which have manufacturer concurrence, that ensure an equivalent level of safety is maintained. These specific mitigations shall be based on:

(i) technical expertise such as data, evidence, proving an operator's eligibility for an approval of operations beyond the time limit of the relevant EDTO significant system; and

(ii) an assessment of relevant hazards, the probability and the severity of the consequences that may adversely impact the safety of the operation of an aeroplane operated beyond the limit of a particular EDTO significant time-limited system.

4.1.2 Threshold time

An established threshold time is not an operating limit. It is a flight time to an en-route alternate aerodrome, which is established as being a EDTO threshold beyond which particular consideration shall be given to an aeroplane capability as well as an operator's relevant operational experience, before granting a EDTO approval.

4.1.3 Maximum diversion time

An approved maximum diversion time shall take into consideration the most limiting EDTO significant system time limitation, if any, indicated in an aeroplane flight manual (directly or by reference) for a particular aeroplane type and an operator's operational and EDTO experience, if any, with an aeroplane type or, if relevant, with another aeroplane type or model.

4.2 EDTO for an aeroplane with more than two turbine engines

4.2.1 In addition to section 4.1 , this section addresses the provisions that apply to an aeroplane with more than two turbine engines.

4.2.2 Operational and diversion planning principles

4.2.2.1 (1) When planning or conducting EDTO, an operator and PIC shall ensure that:

(a) the minimum equipment list, the communications and navigation facilities, fuel and oil supply, en-route alternate an aerodrome and aeroplane performance are appropriately considered;

(b) if no more than one engine is shut down, a PIC may elect to continue beyond the nearest en-route alternate aerodrome in terms of time, if the PIC determines that it is safe to do so. In making this decision a PIC shall consider all relevant factors; and

(c) in the event of a single or multiple failure of a EDTO significant system excluding engine failure, an aircraft may proceed to and land at the nearest available en-route alternate aerodrome where a safe landing ,may be made unless it has been determined that no substantial degradation of safety will result from any decision made to continue the planned flight.

4.2.2.2 EDTO critical fuel

(1) An aeroplane with more than two engines engaged in EDTO operations shall carry enough fuel to fly to an en-route alternate aerodrome as described in section 4.2.6. A

EDTO critical fuel shall corresponds to the additional fuel that may be required to comply with regulation 91.07.35

(2) The following shall be considered, using the anticipated mass of an aeroplane, in determining the corresponding EDTO critical fuel:

(a) fuel sufficient to fly to an en-route alternate aerodrome, considering at the most critical point of the route, simultaneous engine failure and depressurization or depressurization alone, whichever is more limiting;

(i) the speed selected for the diversions such as depressurization, combined or not with an engine failure may be different from the approved AEO speed used to determine a EDTO threshold and maximum diversion distance;

(b) fuel to account for icing;

(c) fuel to account for errors in wind forecasting;

(d) fuel to account for holding an instrument approach and landing at the en- route alternate aerodrome;

(e) fuel to account for deterioration in cruise fuel-burn performance; and

(f) fuel to account for APU use if required.

(3) The following factors may be considered in determining if a landing at a given aerodrome is a more appropriate course of action:

(a) aeroplane configuration, mass, systems status and fuel remaining;

(b) wind and weather conditions en route at a diversion altitude, minimum altitudes en-route and fuel consumption to an en-route alternate aerodrome;

(c) runways available, runway surface condition and weather, wind and terrain in a proximity of an en-route alternate aerodrome;

(d) instrument approaches and approaches or runway lighting available and rescue and firefighting services (RFFS) at an en-route alternate aerodrome;

(e) a pilot's familiarity with that aerodrome and information about that aerodrome provided to by an operator; and

(f) facilities for passenger and crew disembarkation and accommodation.

4.2.3 Appropriate threshold time

(1) In establishing an appropriate threshold time and to maintain the required level of safety, the following shall be considered:

(a) an airworthiness certification of an aeroplane type does not restrict operations beyond the threshold time, taking into account an aeroplane system design and reliability aspects;

(b) specific flight dispatch requirements are met;

(c) necessary in-flight operational procedures are established; and

(d) an operator's previous experience on similar aircraft types and routes is satisfactory.

(2) For determining whether a point on a route is beyond a EDTO threshold to an en-route alternate aerodrome, an operator shall use an approved speed as described in this technical standard.

4.2.4 Maximum diversion time

(1) In approving a maximum diversion time, an aeroplane's EDTO significant systems including limiting time limitation, if any, and relevant to that particular operation for a particular aeroplane type and an operator's operational and EDTO experience with an aeroplane type or, if relevant, with another aeroplane type or model shall be considered.

(2) For determining the maximum diversion distance to an en-route alternate, an operator shall use an approved speed as described in this technical standard.

(3) An operator's approved maximum diversion time shall not exceed the most limiting EDTO significant system time limitation identified in an aeroplane flight manual, reduced by an operational safety margin of 15 minutes.

4.2.5 EDTO significant systems

(1) In addition to the provisions in section 4.1.1, this section addresses particular provisions for an aeroplane with more than two turbine engines.

(2) Consideration of time limitations:

(a) Operations beyond an EDTO threshold, an operator shall consider, at time of dispatch and as outlined below, the most limiting EDTO significant system time limitation, if any, indicated in an aeroplane flight manual directly or by reference and relevant to that particular operation.;

(b) an operator shall check that from any point on the route, the maximum diversion time does not exceed the most limiting EDTO significant system time limitation, reduced by an operational safety margin of 15 minutes;

(c) the maximum diversion time subject to cargo fire suppression time limitations are considered part of the most limiting EDTO significant time limitations; and

(d) an operator shall consider the approved speed as described in this technical standard or consider adjusting that speed with forecast wind and temperature conditions for operations with threshold times beyond 180 minutes.

4.2.6 En-route alternate an aerodrome

(1) The following shall apply on en-route alternate an aerodrome:

(a) for route planning purposes, an identified en-route alternate aerodrome, which could be used, if necessary, needs to be located at a distance within the maximum diversion time from the route;

(b) in extended diversion time operations, before an aeroplane crosses its threshold time during flight, the conditions at an en-route alternate aerodrome within the approved maximum diversion time will be at or above an operator's established aerodrome operating minimal for an operation during the estimated time of use;

(c) If any conditions, such as weather below landing minima, are identified that may preclude a safe approach and landing at that aerodrome during an estimated time of use, an alternative course of action shall be determined such as selecting another en-route alternate aerodrome within an operator's approved maximum diversion time; and

(d) an en route alternate aerodrome may also be the take-off or destination aerodrome.

4.2.7 Operational approval procedure

(1) In approving an operator with a particular aeroplane type for extended diversion time operations, an appropriate threshold time and maximum diversion time shall be established and, in addition to the requirements previously set forth in this technical standard, the Director must be satisfied that:

(a) an operator's past experience and compliance record is satisfactory, and an operator has established the processes necessary for successful and reliable extended diversion time operations and shown that such processes can be successfully applied throughout such operations;

(b) an operator's procedures are acceptable based on certified aeroplane capability and adequate to address continued safe operation in the event of degraded aeroplane systems;

(c) an operator's crew training programme is adequate for the proposed operation;

(d) documentation accompanying the authorization covers all relevant aspects; and

(e) it has been shown during a EDTO certification of an aeroplane that a flight can continue to a safe landing under the anticipated degraded operating conditions which may arise from:

(i) the most limiting EDTO significant system time limitation, if any, for extended diversion time operations is identified in an aeroplane flight manual, directly or by reference.

(2) Any other condition which the State of the Operator considers to be equivalent in airworthiness and performance risk.

4.2.8 Conditions to be used when converting diversion times to distances for the determination of the geographical area beyond threshold and within maximum diversion distances:

(1) An approved AEO speed is any all-engines-operative speed within a certified flight envelope of an aeroplane.

(2) Application for EDTO

(a) When applying for EDTO the operator shall identify the AEO speed(s), considering ISA and still-air conditions, that will be used to calculate the threshold and maximum diversion distances for approval by the Director.

(b) The speed that shall be used to calculate the maximum diversion distance may be different from the speed used to determine the 60-minute and EDTO thresholds.

(3) Determination of a EDTO threshold:

(a) for determining whether a point on a route is beyond a EDTO threshold to an en-route alternate, an operator shall use the approved speed as described in this technical standard; and

(b) the distance is calculated from the point of a diversion followed by cruise for the determined threshold time.

(4) Determination of the maximum diversion time distance:

(a) for determining the maximum diversion time distance to an en-route alternate, an operator shall use the approved speed as provided for in this technical standard; and

(b) the distance is calculated from the point of the diversion followed by cruise for an approved maximum diversion time.

4.2.9 Additional EDTO requirements

(1) There are no additional EDTO airworthiness certification requirements for an aeroplane with more than two engines.

(2) The most limiting EDTO significant system time limitation, if any, shall be indicated in an aircraft flight manual directly or by reference and relevant to that particular operation.

4.2.10 Maintaining operational approval

(1) In order to maintain the required level of safety on routes where an aeroplane is permitted to operate beyond the established threshold time, an operator shall ensure that:

(a) specific flight dispatch requirements are met;

(b) in-flight operational procedures are established; and

(c) specific operational approval is granted by the Director.

4.2.11 Airworthiness modifications and maintenance programme requirements

There are no additional EDTO airworthiness or maintenance requirements for an aeroplane with more than two engines.

4.3 EDTO for aeroplanes with two turbine engines

4.3.1 General

(1) This section addresses the provisions that apply in particular to an aeroplane with two turbine engines.

(2) EDTO provisions for an aeroplane with two turbine engines do not differ from the previous provisions for extended range operations by an aeroplane with two turbine engines (ETOPS). Therefore, EDTO may be referred to as ETOPS in some documents.

4.3.2 Operational and diversion planning principles

4.3.2.1 When planning or conducting extended diversion time operations, an operator and a PIC shall ensure that:

(1) the minimum equipment list, the communications and navigation facilities, fuel and oil supply, en-route alternate an aerodrome or aeroplane performance are appropriately considered.

(2) in the event of an aeroplane engine shutdown, an aircraft can proceed to and land at the nearest en-route alternate aerodrome, in terms of the least flying time, where a safe landing can be made.

(3) in the event of a single or multiple failure of an EDTO significant system or systems excluding engine failure, an aircraft may proceed to and land at the nearest available en-route alternate aerodrome where a safe landing may be made unless it has been determined that no substantial degradation of safety shall result from any decision made to continue the planned flight.

4.3.2.2 EDTO critical fuel

(1) An aeroplane with two engines engaged in EDTO operations shall carry enough fuel to fly to an en-route alternate aerodrome. This EDTO critical fuel corresponds to the additional fuel that may be required.

(2) The following shall be considered, using the anticipated mass of an aeroplane, in determining the corresponding EDTO critical fuel:

(a) fuel sufficient to fly to an en-route alternate aerodrome, considering at the most critical point of the route, failure of one engine or simultaneous engine failure and depressurization or depressurization alone, whichever is more limiting;

(i) the speed selected for the all-engines-operative diversion such as depressurization alone may be different from the approved OEI speed used to determine a EDTO threshold and maximum diversion distance;

(ii) the speed selected for an OEI diversion such as engine failure alone and combined engine failure and depressurization shall be an approved OEI speed used to determine a EDTO threshold and maximum diversion distance;

(b) fuel to account for icing;

(c) fuel to account for errors in wind forecasting;

(d) fuel to account for holding an instrument approach and landing at the en- route alternate aerodrome;

(e) fuel to account for deterioration in cruise fuel-burn performance; and

(f) fuel to account for APU use where required.

4.3.2.3 The following factors may be considered in determining if a landing at a given aerodrome is the more appropriate course of action:

(1) aeroplane configuration, mass, systems status and fuel remaining;

(2) wind and weather conditions en route at the diversion altitude, minimum altitudes en-route and fuel consumption to an en-route alternate aerodrome;

(3) runways available, runway surface condition and weather, wind and terrain in the proximity of an en-route alternate aerodrome;

(4) instrument approaches and approaches or runway lighting available and RFFS at the en-route alternate aerodrome;

(5) a pilot's familiarity with an aerodrome and information about such an aerodrome provided to a pilot by an operator; and

(6) facilities for passenger and crew disembarkation and accommodation.

4.3.3 Threshold time

(1) In establishing an appropriate threshold time and to maintain the required level of safety, the Director shall consider:

(a) an airworthiness certification of an aeroplane type specifically permits operations beyond a threshold time, taking into account an aeroplane system design and reliability aspects;

(b) the reliability of the propulsion system is such that the risk of double engine failure from independent causes is extremely remote;

(c) any necessary special maintenance requirements are fulfilled;

(d) specific flight dispatch requirements are met;

(e) necessary in-flight operational procedures are established; and

(f) an operator's previous experience on similar aircraft types and routes is satisfactory.

(2) For determining whether a point on a route is beyond a EDTO threshold to an en-route alternate aerodrome, an operator shall use an approved speed as described in this technical standard.

4.3.4 Maximum diversion time

(1) In approving the maximum diversion time, the Director shall consider an EDTO certified capability of an aeroplane, an aeroplane's EDTO significant systems such as limiting time limitation, if any, and relevant to that particular operation for a particular aeroplane type and an operator's operational and EDTO experience with an aeroplane type or, if relevant, with another aeroplane type or model.

(2) For determining the maximum diversion distance to an en-route alternate, an operator should use the approved speed as described in this technical standard.

(3) An operator's approved maximum diversion time shall not exceed a EDTO certified capability of an aeroplane or the most limiting EDTO significant system time limitation identified in an aeroplane flight manual, reduced by an operational safety margin of 15 minutes.

4.3.5 EDTO significant systems

This section applies to an aeroplane with two turbine engines.

4.3.5.1 The reliability of the propulsion system for an aeroplane or engine or combination of aeroplane and engine being certified is such that the risk of double engine failure from independent causes shall be assessed and found acceptable to support the diversion time being approved.

4.3.5.2 Consideration of time limitations

(1) For all operations beyond a EDTO threshold, as determined by the State of the Operator, an operator shall consider, at time of dispatch and as outlined below, a EDTO certified capability of an aeroplane and the most limiting EDTO significant system time limitation, if any, indicated in an aeroplane flight manual directly or by reference and relevant to that particular operation.

(2) An operator shall check that from any point on the route, the maximum diversion time at an approved speed as described in section 4.3.8 (2), does not exceed the most limiting EDTO significant system time limitation, other than the cargo fire suppression system, reduced by an operational safety margin, commonly 15 minutes, specified by the State of the Operator.

(3) An operator shall check that from any point on the route, the maximum diversion time at all-engines operating cruise speed, considering ISA and still-air conditions, does not exceed a cargo fire suppression system time limitation, reduced by an operational safety margin, commonly 15 minutes, specified by the State of the Operator.

(4) An operator shall consider an approved speed as described in section 4.3.5.2(2) and 4.3.4.2(3) or consider adjusting that speed with forecast wind and temperature conditions for operations with longer threshold times beyond 180 minutes as determined by the State of the Operator.

4.3.6 En-route alternate an aerodrome

(1) In addition to an en-route alternate aerodrome provisions described in subsection 2.5, the following apply:

(a) for route planning purposes, identified en-route alternate an aerodrome, which maybe be used, if necessary, need to be located at a distance within the maximum diversion time from the route;

(b) in a EDTO , before an aeroplane crosses its threshold time during flight, an en-route alternate aerodrome shall be nominated within the approved maximum diversion time whose conditions shall be at or above an operator's established aerodrome operating minima for an operation during the estimated time of use.

(c) If any conditions, such as weather below landing minima, are identified that may preclude a safe approach and landing at that aerodrome during the estimated time of use, an alternative course of action shall be determined such as selecting another en-route alternate aerodrome within an operator's approved maximum diversion time.

(2) During flight preparation and throughout a flight the most up-to-date information on an identified en-route alternate an aerodrome, including operational status and meteorological conditions, shall be provided to the flight crew.

(3) En route alternate an aerodrome may also be used as a take-off or destination an aerodrome.

4.3.7 Operational approval procedure

(1) In approving an operator with a particular aeroplane type for EDTO, an appropriate threshold time shall be established and a maximum diversion time shall be approved and, in addition to the requirements previously set forth in this technical standard, the Director must be satisfied that:

(a) an operator's past experience and compliance record is satisfactory;

(b) operator has established the processes necessary for successful and reliable extended diversion time operations and shown that such processes can be successfully applied throughout such operations;

(c) an operator's procedures are acceptable based on certified aeroplane capability and adequate to address continued safe operation in the event of degraded aeroplane systems;

(d) an operator's crew training programme is adequate for the proposed operation;

(e) documentation accompanying the authorization covers all relevant aspects; and

(f) it has been shown during a EDTO certification of an aeroplane that the flight can continue to a safe landing under the anticipated degraded operating conditions which may arise from:

(i) the most limiting EDTO significant system time limitation, if any, for extended diversion time operations identified in an aeroplane flight manual, directly or by reference; or

(ii) total loss of engine-generated electric power; or

(iii) total loss of thrust from one engine; or

(iv) any other condition which the Director considers to be equivalent in airworthiness and performance risk.

4.3.8 Conditions to be used when converting diversion times to distances for the determination of the geographical area beyond threshold and within maximum diversion distances

(1) For the purpose of this technical standard, an approved OEI speed is any one-engine-inoperative speed within the certified flight envelope of an aeroplane.

(2) Application for EDTO

(a) When applying for EDTO an operator shall identify, an OEI speed, considering ISA and still-air conditions, that shall be used to calculate a threshold and maximum diversion distances , and the Director shall approve.

(b) an identified speed that will be used to calculate the maximum diversion distance shall be the same one used to determine fuel reserves for OEI diversions.

(c) The speed may be different from the speed used to determine the 60-minute and EDTO thresholds.

(3) Determination of a EDTO threshold

(a) For determining whether a point on the route is beyond an EDTO threshold to an en-route alternate, an operator shall use the approved speed as described in this technical standard.

(b) The distance is calculated from the point of the diversion followed by cruise for the determined threshold time.

(c) For the purposes of computing distances, credit for driftdown may be taken.

(4) Determination of the maximum diversion time distance

(a) For determining the maximum diversion time distance to an en-route alternate, an operator should use an approved speed as described in this technical standard.

(b) The distance is calculated from a point of the diversion followed by cruise for an approved maximum diversion time.

(c) For the purposes of computing distances, credit for driftdown may be taken.

4.3.9 Airworthiness certification requirements for extended diversion time operations beyond a threshold time

(1) During an airworthiness certification procedure for an aeroplane type intended for extended diversion time operations, attention to detail shall be provided to ensure that the required level of safety shall be maintained under conditions which may be encountered during such operations, for example flight for extended periods following failure of an engine or an aeroplane's EDTO significant systems.

(2) Information or procedures specifically related to extended diversion time operations shall be incorporated into an aeroplane flight manual, the maintenance manual, EDTO configuration, maintenance and procedure (CMP) document or other appropriate document.

(3) An aeroplane manufacturer shall supply data specifying an aeroplane's EDTO significant systems and, where appropriate, any time-limiting factors associated with the systems.

4.3.10 Maintaining operational approval

(1) To maintain the required level of safety on routes where aeroplanes are permitted to operate beyond the established threshold time, an operator shall ensure that:

(a) an airworthiness certification of an aeroplane type specifically permits operations beyond the threshold time, taking into account an aeroplane's system design and reliability aspects;

(b) the reliability of a propulsion system is such that a risk of double engine failure from independent causes is extremely remote and found acceptable to support a diversion time being approved;

(c) any special maintenance requirements are fulfilled;

(d) specific flight dispatch requirements are met;

(e) the necessary in-flight operational procedures are established; and

(f) specific operational approval is granted by the State of the Operator.

(2)A determination shall be made of an operator's capability to achieve and maintain an acceptable level of propulsion system reliability based on an operator's past experience or a process review.

(a) For operators with past experience, this determination shall include trend comparisons of an operator's data with other operators as well as the world fleet average values and an application of a qualitative judgement that considers all of the relevant factors. An operator's past record of propulsion system reliability with related types of engines shall be reviewed, as well as its record of achieved systems reliability with an airframe-engine combination for which authorisation is sought to conduct EDTO.

(b) An operator without such experience shall establish a programme that results in a high degree of confidence that a propulsion system reliability appropriate to an EDTO shall be maintained.

(c) An operator shall develop a system for reporting the occurrences listed technical standard 43.02.19.

(d) Following EDTO operational approval, an operator shall continue to monitor a propulsion system reliability for an airplane-engine combination used in EDTO, and take action as required for the specified IFSD rates.

4.3.11 Airworthiness modifications and maintenance programme requirements

(1) Each operator's maintenance programme shall ensure that:

(a) the titles and numbers of an airworthiness modifications, additions and changes which were made to qualify aeroplane systems for extended diversion time operations are provided for;

(b) any changes to maintenance and training procedures, practices or limitations established in the qualification for extended diversion time operations shall be submitted to the Director before such changes are adopted;

(c) a reliability monitoring and reporting programme is developed and implemented prior to approval and continued after approval;

(d) prompt implementation of required modifications and inspections which may affect propulsion system reliability is undertaken;

(e) procedures are established which prevent an aeroplane from being dispatched for an extended diversion time operation after engine shutdown or EDTO significant system failure on a previous flight until the cause of such failure has been positively identified and the necessary corrective action has been completed. Confirmation that such corrective action has been effective may require the successful completion of a subsequent flight prior to dispatch on an extended diversion time operation;

(f) a procedure is established to ensure that an airborne equipment will continue to be maintained at the level of performance and reliability required for extended diversion time operations; and

(g) a procedure is established to minimize scheduled or unscheduled maintenance during the same maintenance visit on more than one parallel or similar EDTO significant system. Minimization can be accomplished by staggering maintenance tasks, performing and supervising maintenance by a different technician, or verifying maintenance correction actions prior to an aeroplane entering an EDTO threshold.

AMENDMENT OF SA CATS 93

3.Document SA CATS 93 is hereby amended by:

(a) the addition in technical standard 93.04.2 for subparagraph 2.1.10(3)(h) of the following subparagraph:

"93.04.2 OPERATIONS MANUAL

2.1.10 Operating procedures

(3) Flight procedures

(h) procedures for operating in, **[and/]**or avoiding, **[and/]**or recording and reporting of special, routine and non-routine meteorological observations during any phase of flight and potentially hazardous atmospheric conditions including –

(i) thunderstorms;
(ii) icing conditions;
(iii) turbulence;
(iv) windshear;
(v) jetstreams;
(vi) volcanic ash clouds;
(vii) heavy precipitation;
(viii) sand storms;
(ix) mountain waves;**[and]**
[(ix)] (x) significant temperature inversions;
(xi) space weather events; and
(xii) report the runway braking action through an AIREP when the runway braking action encountered is not as good as reported"."

AMENDMENT OF SA CATS 121

4. Document SA CATS 121 is hereby amended by:

(a) the deletion of a note after technical standard 121.03.4 of the following technical standard:

> **"4. PROPOSAL FOR AMENDMENT OF TECHNICAL STANDARD 121.03.4**
>
> **121.03.4 ADVANCED QUALIFICATION PROGRAMME**
>
> **[Note – *Guidance in meeting the requirements for an AQP approval may found in US FAA Advisory Circular AC 120-54a, Advanced Qualification Programme, as amended.]*".**"

(b) the addition in technical standard 91.02 for subparagraph 2.1.10(3)(h) of the following subparagraph:

"(3) Flight procedures

(h) procedures for operating in, or recording and reporting of special, routine and non-routine meteorological observations during any phase of flight and potentially hazardous atmospheric conditions including –

(i) thunderstorms;
(ii) icing conditions;
(iii) turbulence;
(iv) windshear;
(v) jetstreams;
(vi) volcanic ash clouds;
(vii) heavy precipitation;
(viii) sand storms;
(ix) mountain waves;
(x) significant temperature inversions; **[and]**
(xi) space weather events; and
(xii) report a runway braking action special air-report AIREP when the runway braking action encountered is not as good as reported"."

(c) the insertion after technical standard 121.06.3 of the following technical standard:

"**121.06.9** Demonstration Flights

(1) At least one successful demonstration flight shall be accomplished over a route typically operated by an operator under the following circumstances –

(a) for an applicant who is applying for an AOC, prior to conducting commercial operations; or

(b) for an existing AOC holder proposing to operate an aircraft type that an AOC holder has not previously used;

(c) prior to commencing any special operation which require approval and endorsement on an operation specification; and

(d) when an AOC holder is applying for a type of operation not authorised on an operator's current operations specifications.

(2) A demonstration flight for an applicant seeking an AOC shall be accomplished using an aeroplane intended for a proposed operation.

(3) An AOC holder shall be required to conduct a minimum of two flight sectors on intended routes or area of operations. A flight time shall be adequate to fully demonstrate an AOC holder's proposed OpSpec.

Notes -

A demonstration flight shall meet the recommendations contained in SACAA Technical Guidance Material for Demonstration and Special Demonstration Flights, as published on the website of the Authority"."

(d) the substitution in technical standard 121.07.1 of the following technical standard:

"2. Extended range twin-engine operations

2.1 Application

(1) Applications to the Director for an Operations Specification to operate flights in terms of the ETOPS provisions shall be made in a manner acceptable to the Director and that meets the requirements of this TS. **[Specific certification information is contained in Document TGM CA-AOC-AC-013 ETOPS, available on the SACAA website, which provides an acceptable method of ensuring all certification requirements have been met.]**".''

(e) the substitution of technical standard 121.07.19 of the following technical standard:

"121.07.19 REQUIREMENTS FOR MINIMUM EQUIPMENT LIST

[SACAA reviews an operator's proposed MEL in accordance with Technical Guidance Material TGM CA-AOC-008. It is recommended that an operator planning to present a MEL for review first becomes familiar with the procedures contained therein in order to interface with the SACAA operations and airworthiness processes.

TGM CA-AOC-008 is available on the SACAA Website.]

The operator's MEL should interface with SACAA regulatory requirements and the operator's procedures".''

(f) the deletion of a note after technical standard 121.07.30 of the following technical standard

"121.07.30 LOW VISIBILITY OPERATIONS

[Note – ***To assist an operator in the certification process and establishing operational procedures for CAT II/III operations, SACAA has placed TGM CA AOC-AC-FO-011 Category II and III Operations on its website.]***".''

AMENDMENT OF SA CATS 135

5. Document SA CATS 135 is hereby amended by:

(a) the deletion of a note after technical standard 135.03.3 of the following technical standard:

"135.03.3 FLIGHT CREW MEMBER TRAINING

1.. . . . .

[Note – *Refer to the technical guidance material (TGM) for course content for all of the following training programme elements]*"."

(b) the addition in technical standard 135.04.2 for subparagraph 2.1.10(3) of the following subparagraph:

(3) Flight procedures

(h) procedures for operating in, or recording and reporting of special, routine and non-routine meteorological observations during any phase of flight and potentially hazardous atmospheric conditions including –

(i) thunderstorms;

(ii) icing conditions;

(iii) turbulence;

(iv) windshear;

(v) jetstreams;

(vi) volcanic ash clouds;

(vii) heavy precipitation;

(viii) sand storms;

(ix) mountain waves; **[and]**

(x) significant temperature inversions; and

(xi) report the runway braking action via an (AIREP) when the runway braking action encountered is not as good as reported"."

(c) the deletion of a note after technical standard 135.06.9 of the following technical standard:

"DEMONSTRATION FLIGHTS

(3) A demonstration flight may be required in the event an aeroplane type is added to an existing AOC.

Notes –

1. Normally, the demonstration flight(s) will be accomplished using the most complex type of aeroplane having the greatest maximum certificated mass to be operated unless the Director determines that, due to the size and complexity of the proposed operations, additional demonstrations are required using other aeroplane types.

2. For the purposes of this TS, the complexity of the aeroplane is based on its method of propulsion, with the first named aeroplane being the least complex –

(*a*) *reciprocating engine aeroplanes;*
(*b*)*turbo-propeller aeroplanes; and*
(*c*)*turbojet or turbofan aeroplanes.*

[3.Technical guidance in the conduct of demonstration flights may be found in SACAA document CA AOC-FO-015 Demonstration and Special Demonstration Flights.]'."

(d) the deletion in technical standard 135.07.1 of the following technical standard:

"135.07.1 ROUTES AND AREAS OF OPERATION AND AERODROME FACILITIES

2. Extended Range Twin-Engine Operations

2.1 Application

(1) Applications to the Director for an operations specification (OpSpec) to operate flights in terms of the ETOPS provisions shall be made in a manner acceptable to the Director and that meet the requirements of this TS. **[Specific certification information is contained in Document TGM CA-AOC-AC-013 ETOPS, available on the SACAA website, which provides an acceptable method of ensuring all certification requirements have been met.]**"."

(e) the substitution for technical standard 135.07.5 of the following technical standard:

"135.07.5 **[SINGLE-ENGINE AEROPLANE IMC AND NIGHT OPERATIONS]** Additional requirements for operations of single engine turbine and piston powered aeroplanes at night or in IMC.

1.Transportation of passengers or cargo in single-engine turbine powered aeroplane IMC or night operations.

(1) The following technical standard prescribes the criteria and provisions for operating single-engine turbine powered aeroplanes in passenger-carrying and cargo-only operations under IMC or at night.

(2) An operator approved in its **[operations specifications (OpSpecs)]** OpSpecs to conduct passenger-carrying operations under IMC or at night is also approved to conduct cargo-only operations. The OpSpecs shall clearly specify the extent of the approval.

(3) An operator approved to conduct cargo-only operations under IMC or at night is not approved to conduct passenger-carrying operations unless authorised in its OpSpecs to do so.

2. Aeroplane requirements

2.1 Passenger-carrying operations

(1) A single-engine aeroplane approved to carry passengers shall meet the requirements of **[this subsection]** section 2.1 .

(2) The following requirements relate to an aeroplane engine and airframe combination

(a) in addition to the instruments and equipment specified in Subpart 5, as applicable, an aeroplane must be powered by a turbine engine **[and]**

[(b) the turbine-engine type and model must have demonstrated a service reliability factor equivalent to .01/1000 or less mean time between failure (MTBF) established over 100,000 operational hours.]

(3) **[The engine and associated systems must be equipped with –**

(a) an auto-ignition system, or alternatively, the operations manual referred to in CAR 135.04.2 must specify that continuous ignition shall be selected "ON" for take-off, landing and flight in heavy precipitation, notwithstanding the outside air temperature, or at such other time as deemed necessary by the Director;

(b) a chip detector system or other equivalent means to warn the pilot of excessive ferrous metal in the engine lubrication system in all regimes of flight; and

(c) a manual throttle which bypasses the governing section of the fuel control unit and permits continued unrestricted operation of the engine in the event of a fuel control unit failure.] Turbine engine reliability

(a) An operator's turbine engine reliability shall be shown to have a power loss rate of less than 1 per 100 000 engine hours.

(b) An operator shall be responsible for engine trend monitoring.

(c) To minimize the probability of in-flight engine failure, an engine shall be equipped with:

(i) an ignition system that activates automatically, or is capable of being operated manually, for take-off and landing, and during flight, in visible moisture;

(ii) a magnetic particle detection or equivalent system that monitors the engine, accessories gearbox, and reduction gearbox, and which includes a flight deck caution indication; and

(iii) an emergency engine power control device that permits continuing operation of an engine through a sufficient power range to safely complete the flight in the event of any reasonably probable failure of the fuel control unit.".

(4) **Systems and equipment**

(a) A Single-engine turbine-powered aeroplane approved to operate at night or in IMC shall be equipped with the following systems and equipment intended to ensure continued safe flight and to assist in achieving a safe forced landing after an engine failure, under all allowable operating conditions:

(i) two separate electrical generating systems, each one capable of supplying all probable combinations of continuous in-flight electrical loads for instruments, equipment and systems required at night or in IMC;

(ii) a radio altimeter;

(iii) an emergency electrical supply system of sufficient capacity and endurance, following loss of all generated power, to as a minimum:

(aa) maintain an operation of all essential flight instruments, communication and navigation systems during a descent from the maximum certificated altitude in a glide configuration to the completion of a landing;

(bb) lower the flaps and landing gear, if applicable;

(cc) provide power to one pitot heater, which must serve an air speed indicator clearly visible to a pilot;

(dd) provide for operation of the landing light specified in subparagraph (x);

(ee) provide for one engine restart, if applicable; and

(ff)) provide for the operation of the radio altimeter;

(iv) two attitude indicators, powered from independent sources;

(v) a means to provide for at least one attempt at engine re-start;

(vi) airborne weather radar;

(vii) a certified area navigation system capable of being programmed with the positions of an aerodrome and safe forced landing areas, and providing instantly available track and distance information to those locations;

(viii) for passenger operations, passenger seats and mounts which meet dynamically tested performance standards, and which are fitted with a shoulder harness or a safety belt with a diagonal shoulder strap for each passenger seat;

(ix) in pressurized aeroplane, sufficient supplemental oxygen for all occupants for descent following engine failure at the maximum glide performance from the maximum certificated altitude to an altitude at which supplemental oxygen is no longer required;

(x) a landing light that is independent of the landing gear and is capable of adequately illuminating the touchdown area in a night forced landing; and

(xi) an engine fire warning system.”.

(4) **[The]** An operator must establish and maintain an engine trend monitoring programme acceptable to the Director. An **[Aeroplane]** aeroplane for which the individual certificate of airworthiness was **[is first]** issued on or after 1 January 2005 shall have an automatic trend monitoring system.

2.2 Cargo-only operations

(1) A single-engine aeroplane approved to carry cargo only shall meet the requirements of this subsection.

(2) In addition to the instruments and equipment specified in Subpart 5 as applicable to IFR flight, the aeroplane shall be powered by –

(a) a turbine engine that meets the criteria prescribed by subsection 2.1 of this TS; or

(b) a piston engine that meets specific performance criteria and a preventative maintenance programme acceptable to the Director and be equipped with –

(i) a constant speed propeller equipped with an anti-icing or de-icing system; and

(ii) a fuel injection system.

2.3 Additional requirements for single-engine IMC or night operations

(1) Where an aeroplane will be operated in IMC or night flight conditions without a second-in-command, the instruments and equipment required for single-pilot IFR, as specified in CAR 135.07.8, shall also be met.

(2) **[The]** An aeroplane must be of a design or have approved warning systems that will allow for the easy identification of engine or airframe icing.

(3) **[The]** An aeroplane shall only be dispatched in accordance with an approved minimum equipment list or configuration deviation list, as applicable.

(4) **[The]** An aeroplane shall be equipped with –

[(a) two independent power generating sources, either of which is capable of sustaining essential flight instruments and electrical equipment including electrically operated de-icing or anti-icing systems;

(b)two attitude indicators which are powered from independent sources in the event of a primary electrical failure so that at least one attitude indicator will continue to function;

(c) a radio altimeter;

(d) weather radar or storm warning scope;

(e)a certified area navigation system capable of being programmed with the positions of aerodrome and safe forced landing areas and instantly providing available track and distance information to such locations;

(f)a landing light that is independent of the landing gear and is capable of adequately illuminating the touchdown area in a night forced landing;

(g) an engine fire warning system; and

(h) a means to provide for at least one attempt at engine re-start.]

(a) two separate electrical generating systems, each one capable of supplying all probable combinations of continuous in-flight electrical loads for instruments, equipment and systems required at night or in IMC or both at night in IMC;

(b) a radio altimeter;

(c) an emergency electrical supply system of sufficient capacity and endurance, following loss of all generated power, to as a minimum:

(i) maintain an operation of all essential flight instruments, communication and navigation systems during a descent from the maximum certificated altitude in a glide configuration to the completion of a landing;

(ii)lower the flaps and landing gear, if applicable;

(iii) provide power to one pitot heater, which must serve an air speed indicator clearly visible to a pilot;

(iv) provide for operation of the landing light specified in subparagraph (j);

(v) provide for one engine restart, if applicable; and

(vi) provide for the operation of the radio altimeter;

(d) two attitude indicators, powered from independent sources;

(e) a means to provide for at least one attempt at engine re-start;

(f) airborne weather radar;

(g) a certified area navigation system capable of being programmed with the positions of aerodrome and safe forced landing areas, and providing instantly available track and distance information to the locations;

(h) occupants' seats and mounts which meet dynamically tested performance standards and which are fitted with a shoulder harness or a safety belt with a diagonal shoulder strap for each seat;

(i) in pressurized aeroplane, sufficient supplemental oxygen for all occupants for descent following engine failure at the maximum glide performance from the maximum certificated altitude to an altitude at which supplemental oxygen is no longer required;

(j) a landing light that is independent of the landing gear and is capable of adequately illuminating the touchdown area in a night forced landing; and

(k) an engine fire warning system.

(5) **[The]** An aeroplane **[must]** shall carry an emergency electrical supply of sufficient capacity and endurance following loss of all generated power to –

(a) power essential electrical systems, including auto pilot, flight instruments and navigation systems, to allow for a descent at normal glide speed and configuration from an aeroplane's maximum certificated altitude to completion of a landing;

(b) lower the flaps and landing gear, if applicable;

(c) provide power to one pitot heater, which must serve an air speed indicator clearly visible to the pilot;

(d) provide for operation of the landing light specified in **[paragraph (6)(g)]** subsection (4);

(e) provide for one engine restart, if applicable; and

(f) provide for the operation of the radio altimeter.

3. Flight crew requirements

(1) **[The]** A PIC and, where **[the]** an aeroplane **[include]** includes a SIC, **[the]** a SIC shall possess, as a minimum, the following current licences and ratings and have acquired at least the flight experience indicated in Table 1.

(2) **[The]** A flight crew shall include a SIC in the event **[the]** a PIC does not meet the minimum total flight time specified in Table 1: Provided that **[the]** a PIC's total flight time shall not be less than 500 hours.

TABLE 1
Minimum flight crew licences, ratings and flight experience to operate a single-engine aeroplane in IFR or night flight

Type of Operation	PIC				SIC (if applicable)[1 and 2]	
	Licence	Min. Total Flight Time (hours)	Min Flight Time (hours)		Licence	Min. Total Flight Time (hours)
			IF	Night		
Passenger (with or without cargo) carriage	CPL/IFR	1000	100	100	CPL/IFR	200
Cargo only carriage	CPL/IFR	1000 including a minimum of 150 hrs as PIC	50	50	CPL/IFR	200

Notes –

1. Where an aeroplane type requires a type rating, each flight crew member shall have that type rating on his or her licence.

2. An SIC is required if an operator is approved for CAT II or III approaches.

3. An operator's flight crew training and checking shall be appropriate to night and/or IMC operations by single engine turbine-powered aeroplanes, covering normal, abnormal and *emergency procedures and, in particular, engine failure, including descent to a forced landing in night and/or in IMC conditions.*

(3) **[The]** An operator shall meet the training requirements specified in section 2, 2.9 of TS 135.03.3. The training programme shall be completed for each specific aeroplane type that a pilot flies and which is authorised to be operated in IMC or at night.

(4) In addition to the training prescribed TS 135.03.3, each person assigned to act as a flight crew member in single engine (SE) IMC or night flight shall undergo a pilot proficiency check (PPC), a portion of which shall be demonstrated in an approved synthetic training device, if available in the country, including all emergency procedures that cannot be safely demonstrated in an aeroplane. Where such device is not available in South Africa, the check shall be accomplished in an aeroplane in a manner acceptable to the Director.

(5) **[The]** A PPC referred to in paragraph (4) above shall be conducted by an authorised officer, DFE or Grade I or II flight instructor: Provided such person has, at least, accomplished the training required by this TS and a PPC on an aeroplane type.

(6) Each person who successfully passes a PPC shall receive certification in his or her training records that authorises them to operate SE aeroplanes in IMC or at night while transporting passengers or cargo, as applicable.

4. Special procedures requirements

(1) **[The]** An operator shall publish in its operations manual special procedures for the conduct of single-engine operations while transporting passengers in IMC or at night and such procedures shall include at least the provisions specified in paragraphs (2) through (4).

(2) A pilot shall operate an aeroplane as pilot flying for at least 50 flight hours under IFR and under the supervision of a PIC qualified on type prior to being authorised for solo flight in IMC: Provided that an operator shall not assign a pilot under supervision as a PIC for a flight until the 50 flight hours have been attained.

(3) **[Flight planning shall be accomplished to ensure each potential *en route* alternate is assessed for its potential use as an emergency aerodrome.]. <u>OPERATOR PLANNING</u>**

3.1 An operator route planning shall take account relevant information in the assessment of intended routes or areas of operations, including the following:

(a) the nature of the terrain to be overflown, including the potential for carrying out a safe forced landing in the event of an engine failure or major malfunction;

(b) weather information, including seasonal and other adverse meteorological influences that may affect the flight; and

(c) other criteria and limitations as specified by the Director.

3.2 An operator shall identify aerodrome or safe forced landing areas available for use in the event of engine failure, and the position of the aerodrome shall be programmed into the area navigation system.

3.3 An operator shall apply route limitation criteria for single-engine piston and turbine-powered aeroplane operating at night, in IMC or both at night and in IMC on over water operations if beyond gliding distance from an area suitable for a safe forced landing or ditching having regard to the characteristics of an aeroplane, seasonal weather influences, including likely sea state and temperature, and the availability of search and rescue services.".

(4) Special procedures shall be developed for –

(a) primary and secondary actions, including passenger briefing, to be taken in the event of loss of the power plant or other malfunctions that would necessitate an immediate emergency landing;

(b) immediate actions to be taken in the event of encountering moderate, heavy or severe icing conditions; and

(c) procedures for the quick and accurate diversion to an unplanned alternate including ATC and flight following procedures.

(5) The Director may require additional procedures, restrictions or conditions in the interests of safety.

(6) Event reporting

6.1 An operator approved for operations by single-engine piston and turbine-powered aeroplane at night or in IMC shall report all significant failures, malfunctions or defects to the Director who in turn will notify the State of Design.

6.2 The Director shall review the safety data and monitor the reliability information so as to be able to take any actions necessary to ensure that the intended safety level is achieved. The Director will notify major events or trends of particular concern to an appropriate Type Certificate Holder and the State of Design.

(7) Minimum list

An operator shall have an approved minimum equipment list based on the MMEL, where available to specify the operating equipment required for night, IMC operations or both night and IMC operations, and for day or VMC operations. A MEL shall account as per systems and equipment detailed in subsection 2.3 (4).

Where an operator does not have an approved MMEL, the provisions of POH or AFM shall be complied with.

(f) the substitution for technical standard 135.07.8 of the following technical standard:

"135.07.8 [IFR OR NIGHT FLIGHT WITHOUT A SECOND-IN-COMMAND] Additional requirements for single pilot operations under IFR or night VFR flight.

1.General

This technical standard states the provision for the operation of an aeroplane with passengers on board in IFR flight without a second-in-command.

Note – *The term "single-pilot IFR" will be used to denote a pilot authorised to fly in IMC or at night without a second-in-command.*

2. Aeroplane equipment requirements

In addition to the equipment required by Subpart 5 of this Part, an aeroplane involved in a single-pilot operation in IMC shall be equipped with –

(a) **[an autopilot that is capable of operating the aeroplane controls to maintain flight and manoeuvre the aeroplane about the lateral and longitudinal axes]** a serviceable autopilot that has at least an altitude hold and heading select modes;

(b) a headset with a boom microphone or equivalent and a transmit button on the control column; and

(c) **[a chart holder that is placed in an easily readable position and a means of illumination for the chart holder.]** means of displaying charts and enables the charts to be readable in all ambient light conditions.

3.Pilot qualification, training and proficiency requirements

(1) **[The]** A pilot shall have **[a]** the following experience and recency –

(a) for operations under IFR or at night, have accumulated at least 50 hours flight time on the class of aeroplane, of which at least 10 hours shall be as PIC;

(b) for operations under IFR, have accumulated at least 25 hours flight time under IFR on the class of aeroplane, which may form part of the 50 hours flight time in sub-paragraph (a); and

(c) for operations at night, have accumulated at least 15 hours flight time at night, which may form part of the 50 hours flight time in sub-paragraph (a).

(d) for single Pilot Operation IFR recency-

(i) at least three IFR flights, including three instrument approaches carried out during the preceding 90 days on the class of aeroplane in a single pilot role; or

(ii) an IFR instrument approach proficiency check carried out on the Class of an aeroplane such an aeroplane during the preceding 90 days;

(e) for single pilot operation night recency in terms of regulation 91.02.4.

(2) A pilot shall complete the training requirements specified in subsection **[2.10]** 3.10 of technical standard 135.03.3 and a single-pilot pilot proficiency check (PPC) prior to being assigned to single-pilot duties.

(3) A PPC shall be in the aeroplane type or variant flown unless an operator has been approved for aircraft grouping for training and PPC purposes, in which case the sequencing of a PPCs shall be as provided in such approval and shall be conducted so as to include at least the following –

(a) knowledge of the regulatory and company operating procedures relating to single-pilot IFR;

(b) knowledge of an autopilot operations and limitations;

(c) performance of normal and emergency procedures as a single pilot without assistance;

(d) passenger briefings as required by this Subpart including emergency briefings and cabin preparation for emergency evacuation; and

(e) demonstration of the use of the autopilot during appropriate phases of flight.

(4) Where a pilot successfully completes the PPC referred to in paragraph (2), a pilot's training records shall be endorsed for single-pilot IFR.

4.Special conditions and procedures

(1) All flights operated in IFR flight shall be restricted to the following altitudes or flight levels –

(a) in case of pressurised aeroplanes all flights shall be conducted at or below FL 250 unless an aeroplane manufacturer has established the conditions under which flight above such altitude may be undertaken without a second-in-command with respect to access to an emergency source of oxygen in the event an emergency descent is required and the pilot has trained for such an event at or near the highest altitude authorised for that aeroplane; and

(b)in the case of unpressurised aeroplanes, all flights shall be conducted at or below the altitude at which the pilot is not required by these regulations to be using continuous oxygen.

(2) A pilot's single-pilot IFR proficiency may be transferred to another operator: Provided –

(a) the proficiency validity has not yet expired;

(b) **[the]** an aeroplane**[s]** to be operated **[are]** is of the same type and variant on which the current PPC was conducted;

(c) a pilot has received training to ensure the pilot is familiar and competent in all procedures used by the other operator; and

(d) the other operator is authorised in its operations specification to transport persons in aeroplanes in IMC without a second-in-command.

(3) **Flight crew equipment**

A flight crew member assessed as fit to exercise the privileges of a license, subject to the use of suitable correcting lenses, shall have a spare set of the correcting lenses readily available when exercising those privileges"."

(f) the deletion of a note after technical standard 135.07.8 of the following technical standard:

" **1.Low visibility operations – certification overview**

(1) Low visibility operations (LVO) are comprised of lower-than-normal visibility minima take-off (LVTO) and lower-than-normal weather and visibility minima approach operations (CAT II/III approaches). An applicant for an operations specification (OpSpec) authorising low visibility operations shall meet the certification criteria contained in this TS.

[Note – *To assist an operator in the certification process and establishing operational procedures for CAT II/III operations, SACAA has placed TGM CA AOC-AC-FO-011 Category II and III Operations on its website.]*"."

AMENDMENT OF DOCUMENT SA-CATS 139

6. Document SA-CATS 139 is hereby amended by:

(a) the insertion in the definitions in SA CATS Documents 139 of the following definitions:

<u>**"D"** means the largest overall dimension of a helicopter when rotors 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;</u>

<u>**"Design D"** means the D of the design helicopter;</u>

<u>**"D-value"** A limiting dimension, in terms of "D", for a heliport, helideck or shipboard heliport, or for a defined area within;</u>

<u>**"Declared distances — heliports"** means:</u>

<u>(a) TODAH, the length of the FaTo plus the length of helicopter clearway if provided declared available and suitable for helicopters to complete the take-off;</u>

(b) RTODAH, the length of the FaTo declared available and suitable for helicopters operated in performance Class 1 to complete a rejected take-off;

(c) 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;"

"dynamic load-bearing surface means a surface capable of supporting the loads generated by a helicopter in motion;

"elongated" when used with TLOF or FaTo, means an area which has a length more than twice its width;

"Final approach and take-off area (FaTo)" means a defined area over which the final phase of the approach maneuver to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FaTo is to be used by helicopter operated in performance Class 1, the defined area includes the rejected take-off area available.

"helicopter clearway" means a defined area on the ground or water, selected and prepared as a suitable area over which a helicopter operated in performance Class 1 may accelerate and achieve a specific height;

"**helicopter stand**" means a defined area intended to accommodate a helicopter for purposes of loading or unloading passengers, mail or cargo; fueling, parking or maintenance and where air taxiing operations are contemplated, the TLOF;

"helicopter taxiway" means a defined path on a heliport intended for the ground movement of helicopters and that may be combined with an air taxi-route to permit both ground and air taxiing;

"helicopter taxi-route" means a defined path established for the movement of a helicopter from one part of a heliport to another:

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

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

"helideck" means a heliport located on a fixed or floating offshore facility such as an exploration and production unit used for the exploitation of oil or gas;

"heliport elevation means the elevation of the highest point of the FaTo;

"heliport manual" means the manual that forms part of the application for a heliport license pursuant to these regulations, including any amendments thereto accepted by the Authority;

"heliport reference point" means a designated location of a heliport;

"PinS approach" means the point-in-space approach based on GNSS and is an approach procedure designed for helicopters only. It is also aligned with a reference point located to permit subsequent flight manoeuvring or approach and landing using visual manoeuvring in adequate visual conditions to see and avoid obstacles;

"PinS visual segment" means a segment of a helicopter PinS approach procedure from the MAPt to the landing location for a PinS proceed visually" procedure. This visual segment connects the PinS to the landing location;

"protection area" means a defined area surrounding a stand intended to reduce the risk of damage from a helicopter accidentally diverging from the stand;

"rejected take-off area" means a defined area on a heliport suitable for helicopters operating in performance class 1 to complete a rejected take-off;

"runway-type FaTo" means a FaTo having characteristics similar in shape to a runway;

"safety area" means a defined area on a heliport 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" means a heliport located on a ship that may be purpose or non-purpose-built.

Note: 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" means a surface capable of supporting the mass of a helicopter situated upon it;

"station declination" means an alignment variation between the zero-degree radial of a VOR and true north, determined at the time the VOR station is calibrated;

"onshore heliport" means a heliport located on the ground or on a structure on the surface of the water;

"touchdown and lift-off area" means an area on which a helicopter may touch down or lift off;

"touchdown positioning circle" means a TDPM in the form of a circle used for omnidirectional positioning in a TLOF;

"touchdown positioning marking" means a marking or set of markings providing visual cues for the positioning of helicopters;

"winching area" means an area provided for the transfer by helicopter of personnel or stores to or from a ship."

(b) the insertion after the definitions of the following abbreviations-

"AIRAC means aeronautical information regulation and control;

APAPI means abbreviated precision approach path indicator;

ASPSL means arrays of segmented point source lighting;

CRC means cyclic redundancy check;

DIFFS means deck integrated firefighting system;

FAS means fixed application system;

FaTo means final approach and take-off area;

FFS means rescue and firefighting service;

FFAS means fixed foam application system;

FMS means fixed monitor system;

HAPI means helicopter approach path indicator;

HFM means helicopter flight manual;

LDAH means landing distance available;

L/min means litre per minute;

LOA means limited obstacle area;

LOS means limited obstacle sector;

LP means luminescent panel;

MAPt means missed approach point;

OFS means obstacle-free sector;

OLS means obstacle limitation surface;

PAPI means precision approach path indicator;

PFAS means portable foam application system;

PINS mean point-in-space;

R/T means radiotelephony or radio communications;

RTOD means rejected take-off distance;

RTODAH means rejected take-off distance available;

TLOF means touchdown and lift-off area;

TODAH means take-off distance available;

UCW means undercarriage width;

VSS means visual segment surface; and

WGS-84 means world geodetic system — 1984;";

(c) the substitution for technical standard 139.03.1 of the following technical standard:

"139.03. 1 REQUIREMENTS FOR HELIPORT LICENCE

1. HELIPORT LICENSING PROCESS

A heliport licensing process comprises of the following phases:

1.1. Phase 1 - Dealing with expressions of interest

(1) This phase shall include a flight operations assessment by the Director or the relevant authorities as well as National Airspace Committee referred to in regulation 11.05.1 to ensure that the operation of a heliport at the location specified in the application shall not endanger the safety of helicopter operations. If the result of this assessment is negative, then there is no need to proceed any further, and the applicant shall be advised accordingly.

(2) The flight operations assessment shall take into consideration the proximity of a heliport to other aerodrome and landing sites, including military heliports obstacles and terrain any excessive operational restriction requirements, any existing restrictions and controlled airspace and any existing instrument procedures.

(3) Part 139 of the regulations require that an application for a heliport license be accompanied by an environmental impact assessment report. The processing of the expression of interest shall therefore include referrals from the local authorities for necessary clearance.

(4) Where the results of the flight operations assessment are positive, the Director shall advise an applicant in writing to complete and submit a formal application for a heliport license in accordance with the requirement of Part 139 of the regulations.

1.2. Phase 2 - Assessing the formal application and heliport manual

(1) An applicant shall satisfy the Director that a heliport operator has the necessary competence and experience to comply with the relevant regulatory provisions and directives.

1.3. Phase 3 - Assessing a heliport facilities and equipment

(1) An on-site inspection shall be undertaken by an authorised person or inspector for the purpose of assessing a heliport facilities, services and equipment to verify and ensure that they comply with the specified standards and requirements.

1.4. Phase 4 - Issuing or refusing a heliport license

(1) The Director shall notify an applicant of the decision to issue or refuse a heliport license.

(a) The Director may impose operational restrictions, in the interest of safety, on a heliport license being issued –

(i) the refusal may be based on one or more of the following determinations, the inspection of heliport facilities and equipment revealed that they do not make satisfactory provision for the safety of helicopter operations;

(ii) the assessment of a heliport operating procedures reveals that they do not make satisfactory provision for the safety of helicopter operations;

(iii) the assessment of a heliport manual revealed that it does not contain the particulars provided in Part 139 of the regulations; and

(iv) the assessment of the above facts and other factors reveal that an applicant shall not be able to adequately operate and maintain a heliport as required by the regulations.

1.5. Phase 5 - Promulgating the licensed (certified) status of a heliport and the required details in the AIP

(1) Upon issuing of a heliport license, a heliport operator shall provide particulars of a heliport as stated in a heliport manual to the aeronautical information service for publication in the AIP"."

(d) the substitution for technical standard 139.03.2 of the following technical standard:

"139.03.2 HELIPORT DESIGN REQUIREMENTS

1. Heliport Data

1.1. Common reference systems

(1) Horizontal reference system- World Geodetic System — 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system. Reported aeronautical geographical coordinates indicating latitude and longitude shall be expressed in terms of the WGS-84 geodetic reference datum.

(2) Vertical reference system- Mean sea level (MSL) datum, which gives the relationship of gravity-related height elevation to a surface known as the geoid, shall be used as the vertical reference system.

(3) Temporal reference system- The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system.

1.2. Aeronautical data

(1) Determination and reporting of heliport-related aeronautical data shall be in accordance with the accuracy and integrity requirements set forth in Tables A1-1 to A1-5 contained in Appendix 1, while taking into account the established quality system procedures.

(2) Accuracy requirements for aeronautical data are based upon a 95% confidence level and in that respect; three types of positional data shall be identified: surveyed points such as FaTo threshold, calculated points and declared points such as flight information region boundary points.

(3) An applicant shall ensure that integrity of aeronautical data is maintained throughout the data process from survey or origin to the next intended user.

(4) Based on the applicable integrity classification, the validation and verification procedures shall:

(a) for routine data: avoid corruption throughout the processing of the data;

(b) for essential data: assure corruption does not occur at any stage of the entire process and may include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and

(c) for critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance procedures to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

(5) Protection of electronic aeronautical data while stored or in transit shall be totally monitored by the CRC.

(6) To achieve protection of the integrity level of critical and essential aeronautical data as classified in subsection (4), a 32- or 24-bit CRC algorithm shall apply respectively.

(7) To achieve protection of the integrity level of routine aeronautical data as classified in subsection (4), a 16-bit CRC algorithm shall apply.

(8) Geographical coordinates indicating latitude and longitude shall be determined and reported to the aeronautical information services authority in terms of the WGS-84 geodetic reference datum.

(9) The order of accuracy of the field work shall be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame.

(10) In addition to the elevation of the specific surveyed ground positions at heliports, geoid undulation for those positions shall be as indicated in Appendix 1, determined and reported to the aeronautical information services authority.

1.3. Heliport reference point

(1) A heliport reference point shall be established for a heliport not collocated with an aerodrome.

(2) A heliport reference point shall be located near the initial or planned geometric centre of a heliport and shall normally remain where first established.

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

1.4. Heliport elevation

(1) A heliport elevation and geoid undulation at a heliport elevation position shall be measured and reported to the aeronautical information services authority to the accuracy of one-half metre or foot.

(2) The elevation of the TLOF and the elevation and geoid undulation of each threshold of the FaTo shall be measured and reported to the aeronautical information services authority to the accuracy of one-half metre or foot.

1.5. Heliport dimensions and related information

(1) The following data shall be measured, as appropriate, for each facility provided on a heliport:

(a) heliport type — surface-level or elevated, shipboard or helideck;

(b) TLOF — dimensions to the nearest metre, slope, surface type, bearing strength in tonnes (1 000 kg);

(c) final approach and take-off area — type of FaTo, true bearing to one-hundredth of a degree, length, width to the nearest metre, slope, surface type;

(d) safety area — length, width and surface type;

(e) helicopter taxiway and helicopter taxi route — designation, width, surface type;

(f) apron — surface type, helicopter stands;

(g) clearway — length, ground profile; and

(h) visual aids for approach procedures, marking and lighting of FaTo, TLOF, taxiways and aprons.

(2) The geographical coordinates of the geometric centre of the TLOF shall be measure and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.

(3) The geographical coordinates of appropriate centre line points of helicopter taxiways, and helicopter taxi routes shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.

(4) The geographical coordinates of each helicopter stand shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.

(5) The geographical coordinates of obstacles in Area 2 the part within a heliport boundary and in Area 3 shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and tenths of seconds. (refer to Appendix 1, Table A1-1)

(6) In addition, the top elevation, type, marking and lighting of obstacles shall be reported to the aeronautical information services authority.

1.6. Declared distances

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

(a) take-off distance available;

(b) rejected take-off distance available; and

(c) landing distance available.

1.7. Coordination between aeronautical information services and heliport authorities

(1) To ensure that aeronautical information services units obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, arrangements shall be made between aeronautical information services and heliport authorities responsible for heliport services to report to the responsible aeronautical information services unit, with a minimum of delay:

(a) information on heliport conditions;

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

(c) any other information considered to be of operational significance.

(2) Before introducing changes to the air navigation system, due account shall be taken by the services responsible for such changes of the time needed by the aeronautical information service for the preparation, production and issue of relevant material for promulgation.

(3) To ensure timely provision of the information to the aeronautical information service, close coordination between those services concerned is therefore required in accordance with Part 175.

(4) Of particular importance are changes to aeronautical information that affect charts and computer-based navigation systems which qualify to be notified by the AIRAC system, as specified in Part 175.

(5) The predetermined, internationally agreed AIRAC effective dates in addition to 14 days postage time shall be observed by the responsible heliport services when submitting the raw information or data to aeronautical information services.

(6) A heliport service responsible for the provision of raw aeronautical information or data to the aeronautical information services shall do so while taking into account accuracy and integrity requirements for aeronautical data as specified in Appendix 1.

1.8. Rescue and firefighting

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

(2) The level of protection available at a heliport shall be expressed in terms of the category of the rescue and firefighting service as prescribed in technical standard 139.03.7(1) and in accordance with the types and amounts of extinguishing agents available at a heliport.

(3) Changes in the level of protection available at a heliport 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 helicopter. When such a change has been corrected, the said units shall be advised accordingly.

(4) A change shall be expressed in terms of the new category of the rescue and firefighting service available at a heliport.

2. Physical characteristics

2.1. Onshore heliports

2.1.1. FaTo

(1) A FaTo 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 every part of the design helicopter in the final phase of approach and commencement of take-off in accordance with the intended procedures;

(b) 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 if a forced landing is required; and

(iii) can be associated with a safety area.

(2) A heliport shall be provided with at least one FaTo, which need not be solid.

(3) The minimum dimensions of a FaTo shall be:

(a) where intended to be used by a helicopter operated in performance of a 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 a helicopter 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 helicopter for which the FaTo is intended, or 1.5 Design D, whichever is greater.

(b) where intended to be used by helicopter 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 area of sufficient width to meet the requirements of section 2.1.1 but not less than 1.5 times the overall width of the design helicopter.

(4) Essential objects located in a FaTo shall not penetrate a horizontal plane at the FaTo elevation by more than 5cm.

(5) When the FaTo is solid, the slope shall not:

(a) exceed 2% in any direction except as provided for in subparagraph (b) or (c) ;

(b) when the FaTo is elongated and intended to be used by a helicopter operated in performance class 1, exceed 3% overall, or have a local slope exceeding 5%; and

(c) when the FaTo is elongated and intended to be used solely by a helicopter operated in performance class 2 or 3, exceed 3% overall, or have a local slope exceeding 7%.

(6) The FaTo shall be located to minimize the influence of the surrounding environment, including turbulence, which may have an adverse impact on helicopter operations.

(7) A FaTo shall be surrounded by a safety area which need not be solid.

2.1.2. Helicopter clearways

(1) A helicopter clearway shall provide:

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

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

(2) When a helicopter clearway is provided, it shall be located beyond the end of the rejected take-off area available.

(3) The width of a helicopter clearway shall not be less than that of the associated safety area (refer to figure 1).

(4) When solid, the ground in a helicopter clearway shall not project above a surface having an overall upward slope of 3% or having a local upward slope exceeding 5%, the lower limit of a helicopter being a horizontal line which is located on the periphery of the FaTo.

(5) An object situated on a helicopter clearway which may endanger a helicopter in the air shall be regarded as an obstacle and shall be removed.

Figure 1. FaTo and associated safety area

2.1.3. Touchdown and lift-off (TLOF) areas

(1) A TLOF shall provide:

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

(b) a surface which:

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

(ii) is free of irregularities that may adversely affect the touchdown or lift-off of a helicopter;

(iii) has sufficient friction to avoid skidding of a helicopter or slipping of persons;

(iv) is resistant to the effects of rotor downwash;

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

(vi) may be associated with a FaTo or a stand.

(2) A heliport shall be provided with at least one TLOF.

(3) A TLOF shall be provided whenever it is intended that the undercarriage of a helicopter shall touch down within a FaTo or stand or lift off from a FaTo or stand.

(4) The minimum dimensions of a TLOF shall be:

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

(b) when in a FaTo intended to be used by a helicopter operated in performance classes 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:

(aa) the design helicopter in a FaTo; or

(bb) in a stand, the largest helicopter the stand is intended to serve;

(ii) when there is a limitation on the direction of touchdown of sufficient width to meet the requirement of section 2.1.3 but not less than twice the undercarriage width (UCW) of:

(aa) a design helicopter in a FaTo; or,

(bb) in a stand, the most demanding helicopter the stand is intended to serve.

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

(6) Slopes on a TLOF shall not:

(a) except as provided in paragraph (b) or (c); exceed 2% in any direction;

(b) when the TLOF is elongated and intended to be used by a helicopter operated in performance class 1; exceed the 3% overall, or have a local slope exceeding five percent; and

(c) when the TLOF is elongated and intended to be used solely by a helicopter operated in performance class 2 or 3, exceed three percent overall, or have a local slope exceeding seven percent.

(7) When a TLOF is within a FaTo it shall be:

(a) centred on the FaTo; or

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

(8) When a TLOF is within a helicopter stand, it shall be centred on the stand.

(9) A TLOF shall be provided with markings which clearly indicate the touchdown position and by their form, any limitations on maneuvering.

(10) Where an elongated Performance Class 1 FaTo or TLOF contains more than one TDPM, measures shall be in place to ensure that only one can be used at a time.

(11) Where alternative TDPMs are provided they shall be placed to ensure containment of the undercarriage within the TLOF and a helicopter within the FaTo.

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

(13) When the TLOF is collocated with a helicopter stand, the TLOF shall be of sufficient size to contain a circle of diameter of at least 0.83 D of the largest helicopter the area is intended to serve.

(14) Slopes on a TLOF collocated with a helicopter stand shall be sufficient to prevent accumulation of water on the surface of the area but shall not exceed 2% in any direction.

(15) When the TLOF is collocated with a helicopter stand and intended to be used by ground taxiing a helicopter only, the TLOF shall at least be static load-bearing and be capable of withstanding the traffic of a helicopter the area is intended to serve.

(16) When the TLOF is collocated with a helicopter stand and intended to be used by air taxiing a helicopter, the TLOF shall have a dynamic load-bearing area.

2.1.4. Safety areas

(1) A safety area shall provide:

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

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

(2) A safety area surrounding a FaTo intended to be used by a helicopter operated in performance class 2 or 3 in VMC shall extend outwards from the periphery of the FaTo for a distance of at least 3 m or 0.25 Design D, whichever is the greater of the largest helicopter the FaTo is intended to serve.

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

(4) Essential objects located in the safety area shall not penetrate a surface originating at the edge of the FaTo at a height of 25cm above the plane of the FaTo sloping upwards and outwards at a gradient of 5 percent.

(5) When solid, the slope of the safety area shall not exceed an upward slope of 4 percent outwards from the edge of the FaTo.

2.1.5. Protected side slope

(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 10m (refer figure 2).

(2) The surface of a protected side slope shall not be penetrated by obstacles.

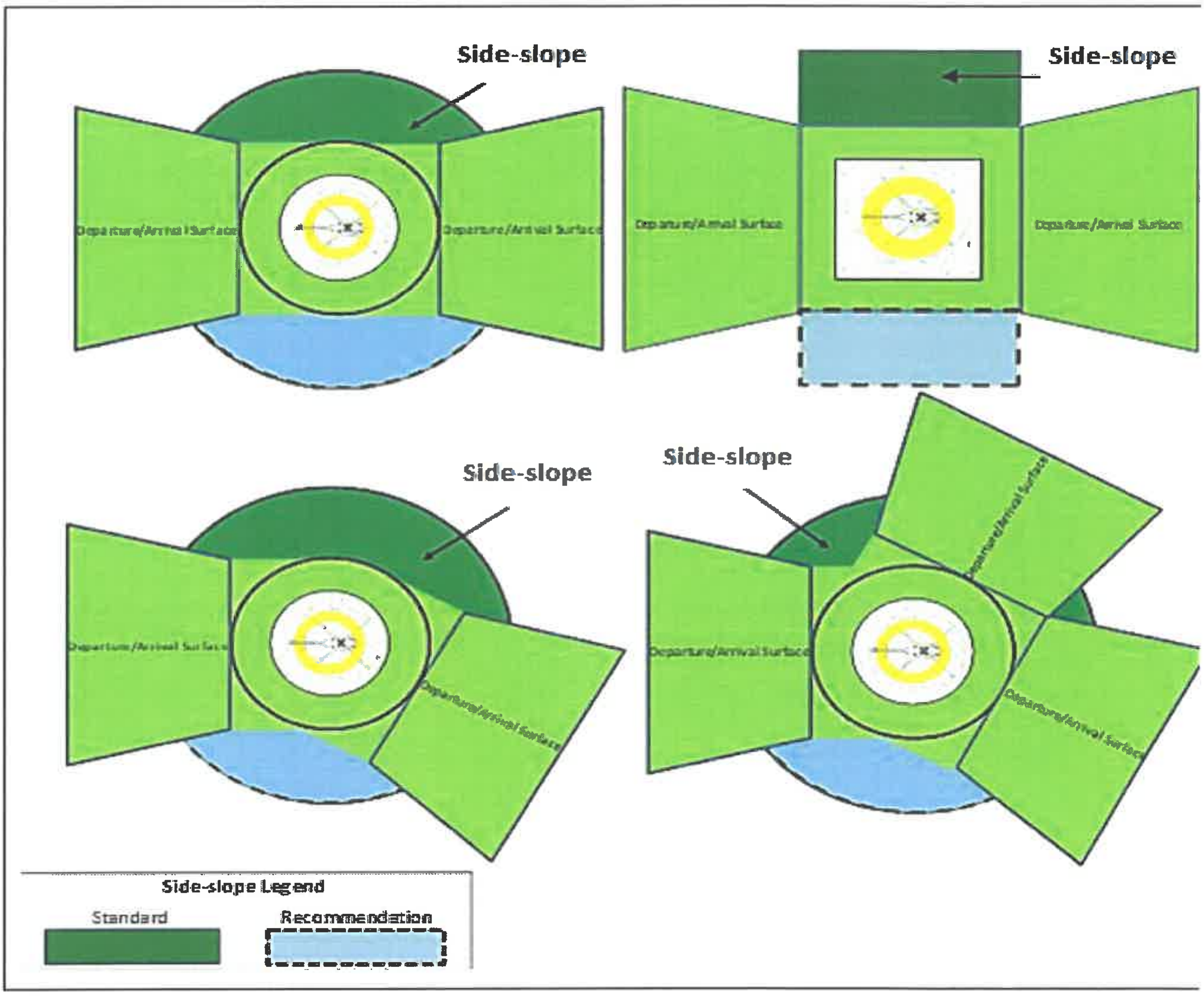


Figure 2. FaTo simple/complex safety area and side slope protection

2.1.6. Helicopter taxiways and taxi routes.

(1) The width of a helicopter ground taxiway shall not be less than 1.5 times the largest width of the undercarriage (UCW) of a helicopter the ground taxiway is intended to serve. (refer to figure 3)

(2) The transverse slope of a taxiway shall not exceed 2% and the longitudinal slope shall not exceed 3 %.

2.1.7. Helicopter taxiways

(1) A helicopter taxiway shall provide:

(a) 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;

(b) a surface which:

(i) has bearing strength to accommodate the taxiing loads of a helicopter the taxiway is intended to serve;

(ii) is free of irregularities that may adversely affect the ground taxiing of a helicopter;

(iii) is resistant to the effects of rotor downwash; and

(iv) 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; and

(v) may be associated with a taxi-route.

(2) The minimum width of a helicopter taxiway shall be the lesser of:

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

(b) a width meeting the requirements of 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.

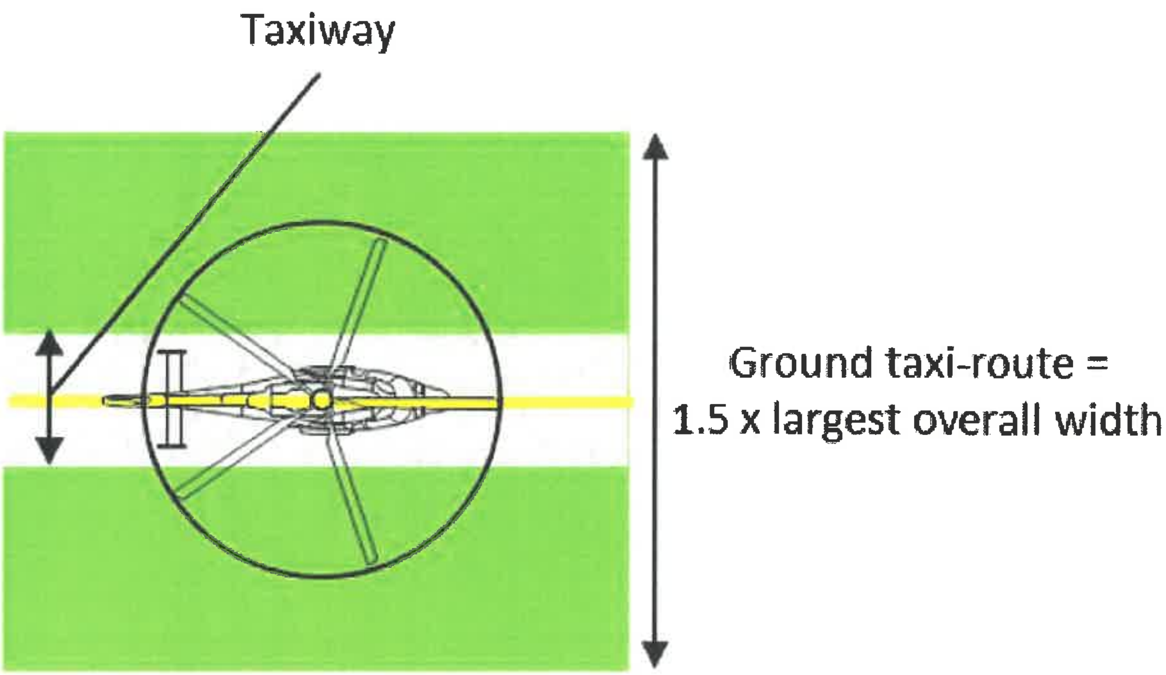


Figure 3. Helicopter taxiway and ground taxi route

2.1.8. Helicopter taxi-routes

(1) 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 helicopter with sufficient width to ensure containment of the largest helicopter the taxi-route is intended to serve;

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

(i) when collocated with a taxiway:

(aa) is contiguous and flush with the taxiway;

(bb) does not present a hazard to operations; and

(cc) ensures effective drainage; and

(ii) when not collocated with a taxiway:

(aa) is free of hazards if a forced landing is required.

(2) When solid and collocated with a taxiway, the taxi-route shall not exceed an upward transverse slope of 4% outwards from the edge of the taxiway.

(3) Mobile objects shall not be permitted on a taxi-route during helicopter operations.

2.1.9. Helicopter ground taxi-routes

(1) A helicopter ground taxi-route shall have a minimum width of 1.5 x the overall width of the largest helicopter it is intended to serve and be centred on a taxiway.

(2) Essential objects located in a helicopter ground taxi-route shall not:

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

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

2.1.10. Helicopter air taxi-routes

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

(2) If collocated with a taxiway for the purpose of permitting both ground and air taxi operations (refer to figure 4):

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

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

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

(ii) penetrate a surface originating 50cm outwards of the edge of the helicopter taxiway and a height of 25cm above the surface of the taxiway and sloping upwards and outwards at a gradient of percent.

(3) When not collocated with a taxiway, the slopes of the surface of an air taxi-route shall not exceed the slope landing limitations of a helicopter the taxi-route is intended to serve. In any event the transverse and longitudinal slopes shall not exceed 10% and 7% respectively.

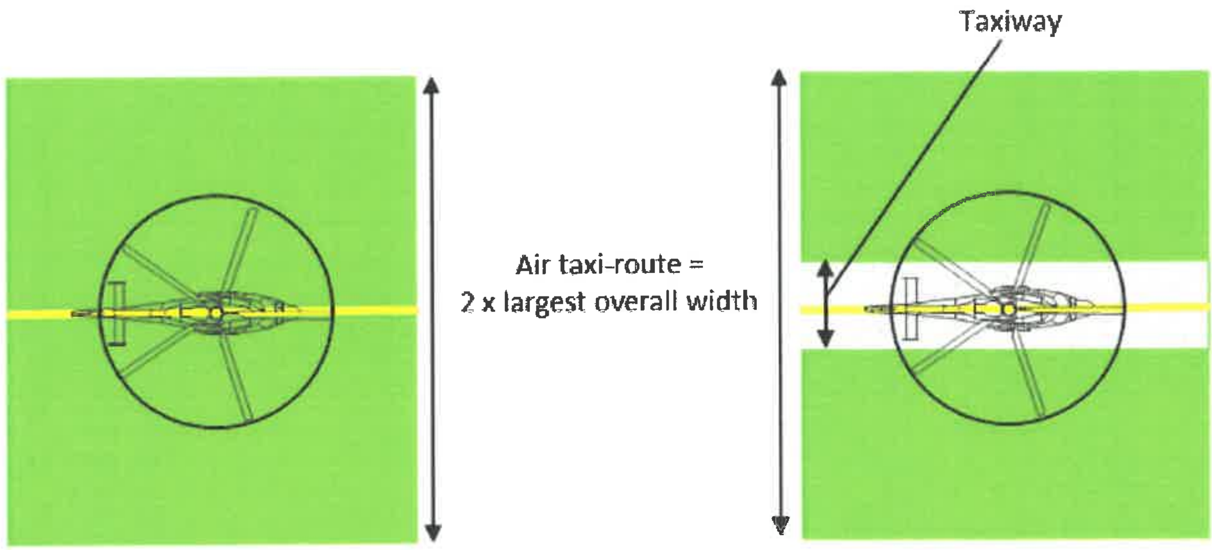


Figure 4. Helicopter air taxi-route and combined air taxi-route or taxiway

2.1.11. Helicopter stands

(1) A helicopter stand shall provide:

(a) 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;

(b) a surface which:

(i) is resistant to the effects of rotor downwash;

(ii) is free of irregularities that may adversely affect the maneuvering of helicopter;

(iii) has bearing strength capable of withstanding the intended loads;

(iv) has sufficient friction to avoid skidding of a helicopter or slipping of persons;

(v) 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; and

(vi) may be associated with a protection area.

(2) The minimum dimensions of a helicopter stand shall be:

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

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

(3) The mean slope of a helicopter stand in any direction shall not exceed 2 %.

(4) A helicopter stand shall be provided with positioning markings to clearly indicate where a helicopter is to be positioned and by their form, any limitations on maneuvering.

(5) A stand shall be surrounded by a protection area which need not be solid.

2.1.12. Protection areas

(1) A protection area shall provide:

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

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

(2) When associated with a stand designed for turning, the protection area shall extend outwards from the periphery of the stand for a distance of 0.4D. (refer to figure 5).

(3) 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 (refer to figure 6
and figure 7).

(4) When associated with a stand designed for non-simultaneous use (refer to figure 8 and
figure 9):

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

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

(5) Mobile object shall not be permitted in a protection area during helicopter operations.

(6) Essential objects located in the protection area shall not:

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

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

(7) When solid, the slope of a protection area shall not exceed an upward slope of 4% outwards from the edge of the stand.

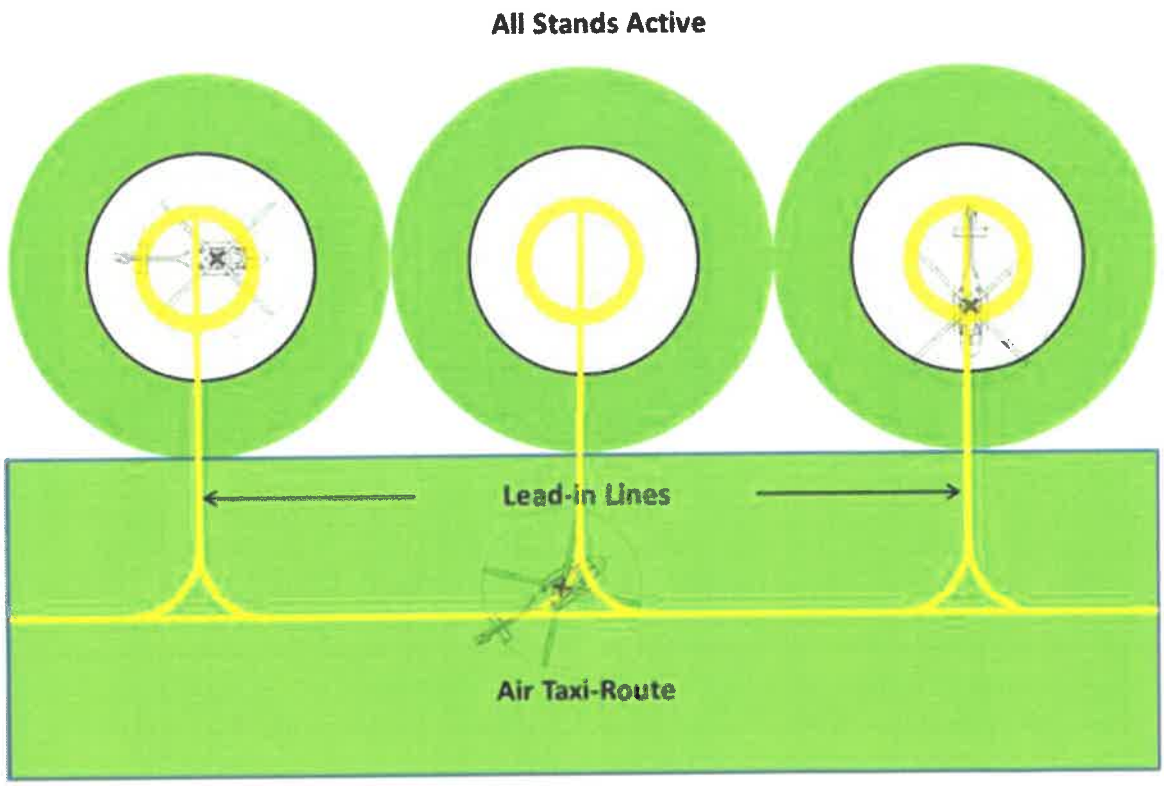


Figure 5. Turning stands (with air taxi-routes) — simultaneous use

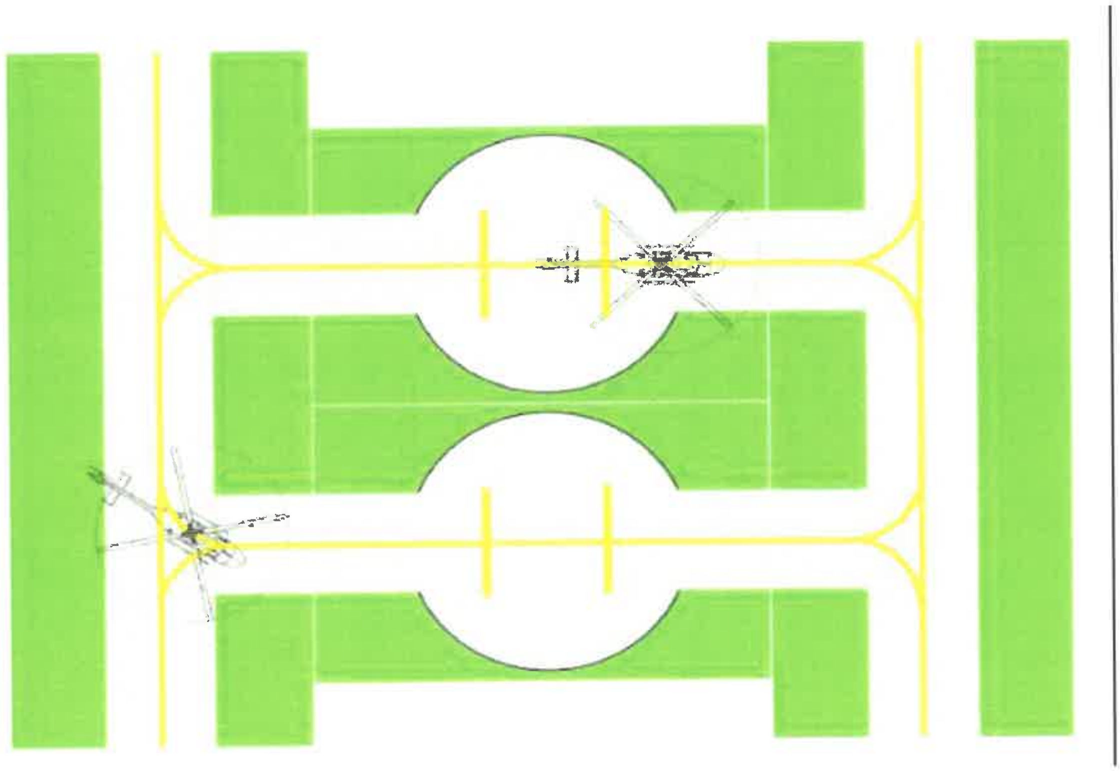


Figure 6. Ground taxi-through stands (with taxiway/ground taxi-route) simultaneous use

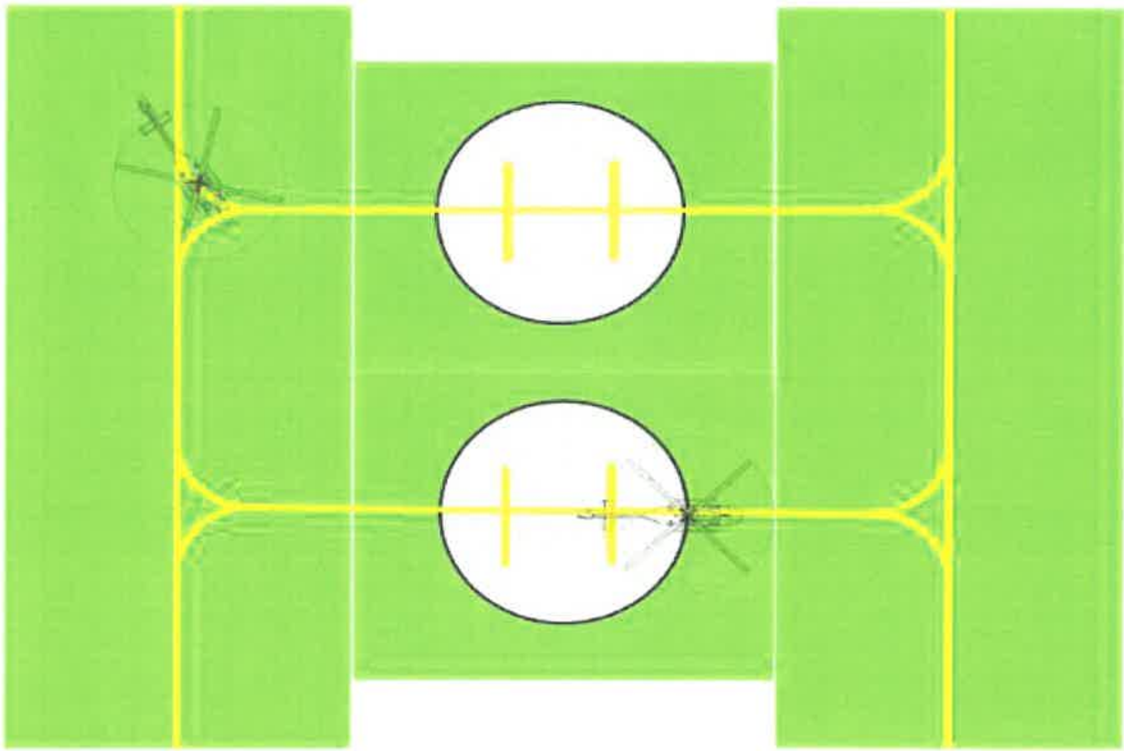


Figure 7. Air taxi-through stands (with air taxi-route) simultaneous use

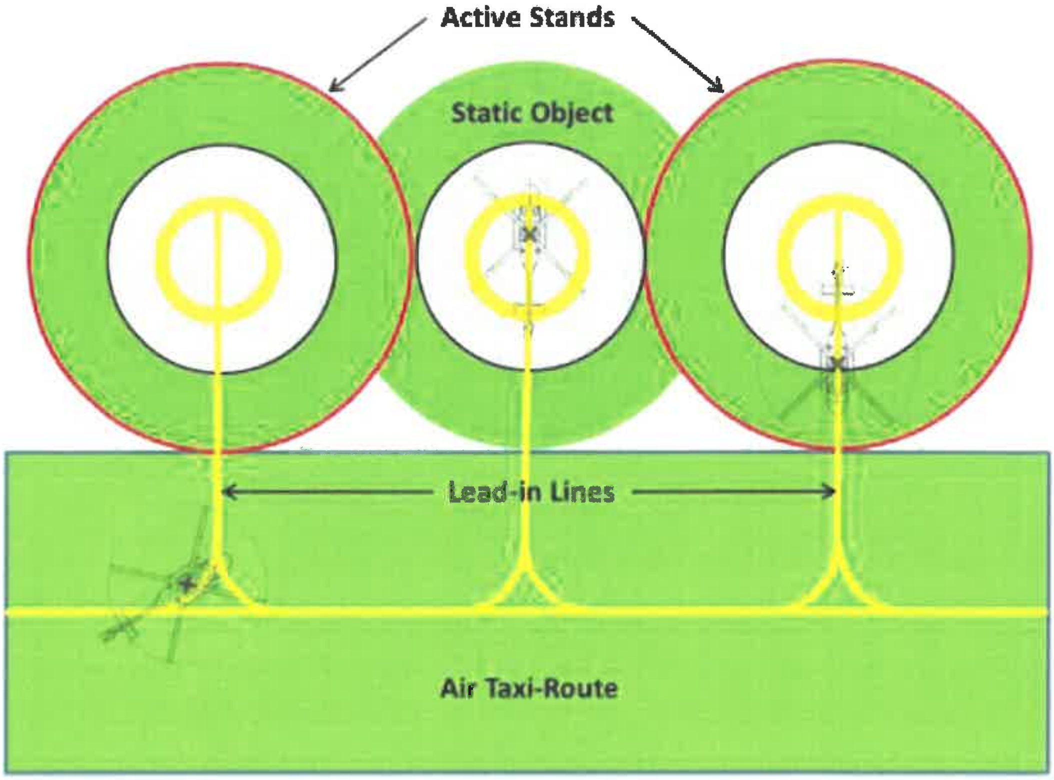


Figure 8. Turning stands (with air taxi-routes) non simultaneous — outer stands active

air taxi-routes/taxiways — non-simultaneous operations

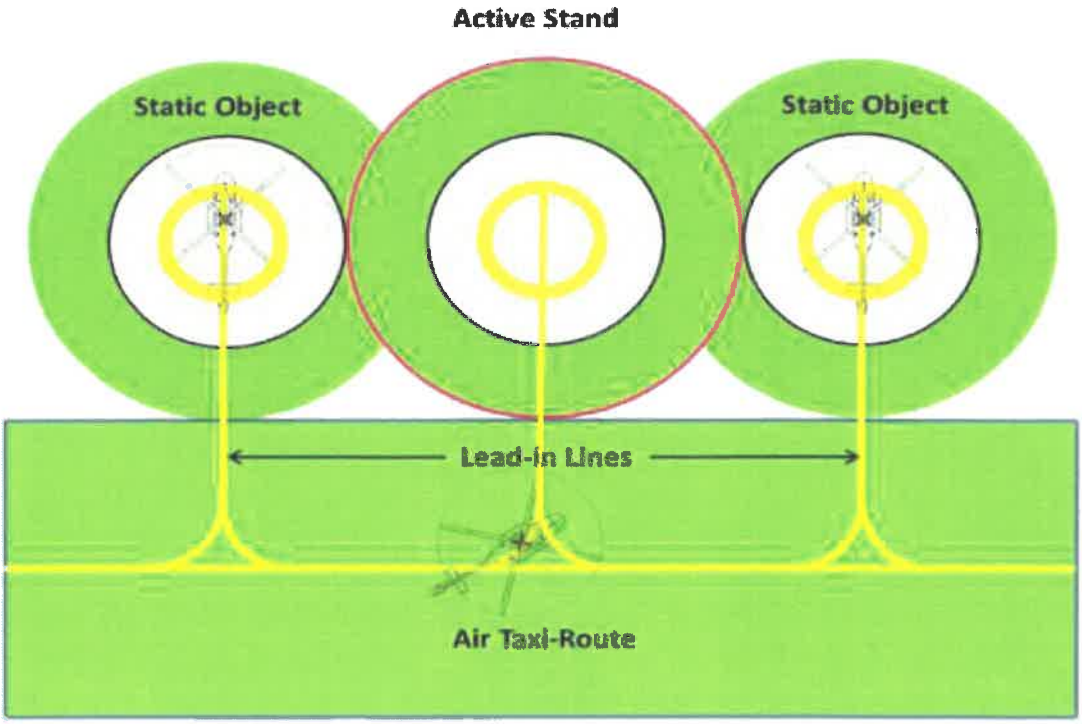


Figure 9. Turning stands (with air taxi-route) non-simultaneous use – inner stand active

2.1.13. Location of a final approach and take-off area in relation to a runway or taxiway

(1) Where a FaTo is located near a runway or taxiway and where simultaneous operations
are planned, the separation distance between the edge of a runway or taxiway and the edge of
a FaTo shall not be less than the appropriate dimensions in Table 1.

(2) A FaTo shall not be located:

(a) near taxiway intersections or holding points where jet engine efflux may cause high turbulence; or

(b) near areas where aircraft vortex wake generation may exist.

Table 1: FaTo minimum separation distance for simultaneous operations

Aeroplane or helicopter mass	Distance between FaTo, runway or taxiway edge.
Up to but not including 3175 Kg	60 m
3175 kg up to but not including 5760 kg	120 m
5760 kg up to but not including 100 000 kg	180 m
100 000 kg and over	250 m

2.2. Helidecks

2.2.1. Final approach and take-off areas and touchdown and lift-off areas.

(1) A helideck shall be provided with one FaTo and one coincident or collocated TLOF.

(2) A FaTo may be any shape but shall be of sufficient size to contain an area within which may be accommodated by a circle of diameter of not less than 1 D of the largest helicopter the helideck is intended to serve.

(3) A TLOF may be of any shape but shall be of sufficient size to contain:

(a) for a helicopter with an MTOM of more than 3 175 kg, an area within which may be accommodated a circle of diameter not less than 1 D of the largest helicopter the helideck is intended to serve; and

(b) for a helicopter with an MTOM of 3 175 kg or less, an area within which may be accommodated a circle of diameter not less than 0.83 D of the largest helicopter the helideck is intended to serve.

(4) A helideck shall be arranged to ensure that a sufficient and unobstructed air-gap is provided which encompasses the full dimensions of the FaTo.

(5) The FaTo shall be located to avoid the influence of environmental effects including turbulence over the FaTo which may have an adverse impact on helicopter operations.

(6) The TLOF shall be dynamic load-bearing.

(7) The TLOF shall provide ground effect.

(8) A fixed object shall not be permitted around the edge of the TLOF except for frangible objects which because of their function, must be located thereon.

(9) For any TLOF 1D or greater and any TLOF designed for use by a helicopter having a D-value of greater than 16m, objects installed in the obstacle-free sector whose function requires them to be located on the edge of the TLOF shall be as low as possible and in any case not exceed a height of 25cm.

(10) For any TLOF designed for use by a helicopter having a D-value of 16m or less, and any TLOF having dimensions of less than 1D, objects in the obstacle free sector, whose function requires them to be located on the edge of the TLOF, shall not exceed a height of 5cm.

(11) Objects whose function requires them to be located within the TLOF such as lighting or nets shall not exceed a height of 2.5cm and such objects shall only be present if they do not represent a hazard to a helicopter.

(12) 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.

(13) The surface of the TLOF shall be skid-resistant to both a helicopter and person and be sloped to prevent pooling of water.

2.3. Shipboard heliport

(1) When a helicopter operating area are provided in the bow or stern of a ship or are purpose-built above the ship's structure, they shall be regarded as purpose-built shipboard heliport.

(2) A shipboard heliport shall be provided with one FaTo and one coincidental or collocated TLOF.

(3) 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 1D of the largest helicopter a heliport is intended to serve.

(4) The TLOF of a shipboard heliport shall be dynamic load-bearing.

(5) The TLOF of a shipboard heliport shall provide ground effect.

(6) For purpose-built shipboard heliport provided in a location other than the bow or stern,

the TLOF shall be of sufficient size to contain a circle with a diameter not less than 1D of the largest helicopter a heliport is intended to serve.

(7) For purpose-built shipboard heliports provided in the bow or stern of a ship, the TLOF shall be of sufficient size to:

(a) contain a circle with a diameter not less than 1 D of the largest helicopter the heliport is intended to serve; or

(b) for operations with limited touchdown directions, contain an area within which can be accommodated two opposing arcs of a circle with a diameter of not less than 1 D in a helicopter's longitudinal direction.

(c) accommodate a minimum width of not less than 0.83 D (refer figure 10).

(8) For non-purpose-built shipboard heliport, the TLOF shall be of sufficient size to contain

a circle with a diameter not less than 1D of the largest helicopter a heliport is intended to serve.

(9) A shipboard heliport shall be arranged to ensure that a sufficient and unobstructed air-gap is provided which encompasses the full dimensions of the FaTo.

(10) The FaTo shall be located to avoid the influence of environmental effects, including turbulence over the FaTo which may have an adverse impact on a helicopter operation.

(11) A fixed object shall not be permitted around the edge of the TLOF except for frangible objects which, because of their function must be located thereon.

(12) For any TLOF designed for use by a helicopter having a D-value of greater than 16m, objects in the obstacle free sector whose function requires them to be located on the edge of the TLOF shall not exceed a height of 25cm.

(13) For any TLOF designed for use by a helicopter having a D-value of 16m or less and any TLOF having dimensions of less than 1D, objects in the obstacle-free sector, whose function requires them to be located on the edge of the TLOF shall not exceed a height of 5cm.

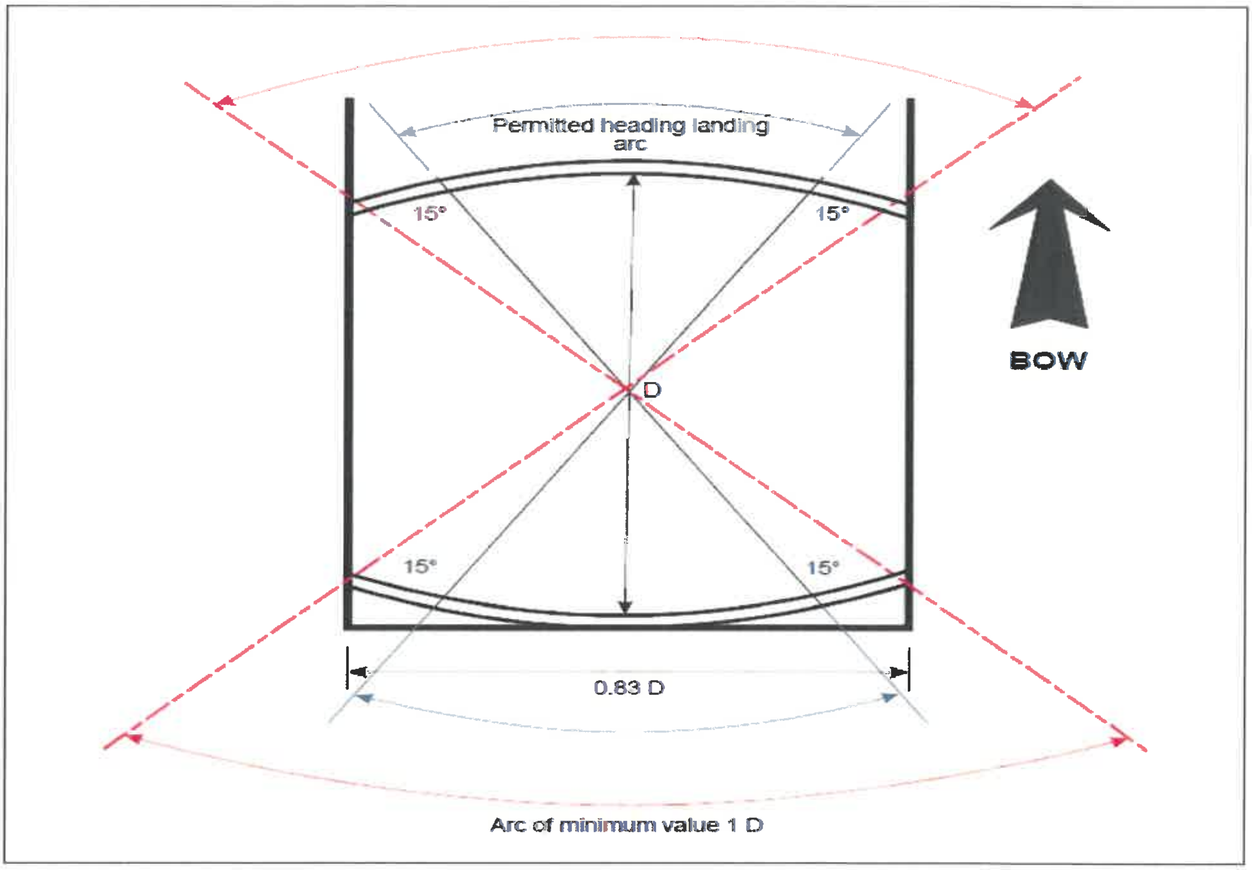


Figure 10. Shipboard permitted landing headings for limited heading operations

(14) Objects whose function requires them to be located within the TLOF such as lighting or nets shall not exceed a height of 2.5cm. Such objects shall only be present if they do not represent a hazard to a helicopter.

(15) Safety devices such as safety nets or safety shelves shall be located around the edge of a shipboard heliport, except where structural protection exists, but shall not exceed the height of the TLOF.

(16) The surface of the TLOF shall be skid-resistant to both a helicopter and person.

3. Obstacle Environment

3.1 Approach surface.

(1) The limits of an approach surface shall comprise:

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

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

(c) an outer edge horizontal and perpendicular to the centre line of the approach surface and at a specified height of 152 m above the elevation of the FaTo. (Refer to Table 2 for dimensions and slopes of surfaces).

(2) The elevation of the inner edge shall be the elevation of the FaTo at the point on the inner edge that is intersected by the centre line of the approach surface.

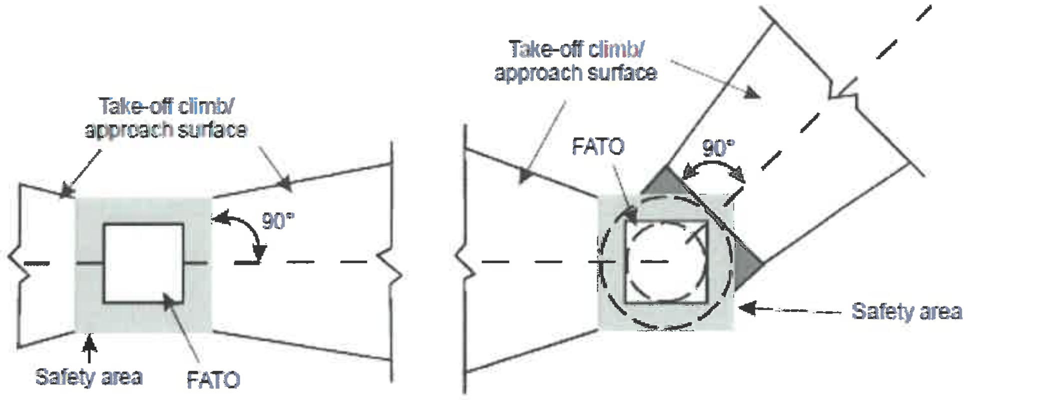
(3) For a heliport intended to be used by a helicopter operated in performance class 1 and when approved by an appropriate Authority, the origin of the inclined plane may be raised directly above the FaTo (refer to figure 14).

(4) The slopes of the approach surface shall be measured in the vertical plane containing the centre line of the surface.

(5) In the case of an approach surface involving a turn, the surface shall be a complex surface containing the horizontal normal to its centre line and the slope of the centre line shall be the same as that for a straight approach surface (refer to figure 15).

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

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



Note 1.— Dark grey shaded area requires the same characteristics as the safety area

Note 2.— Angle between take-off climb/approaches surfaces from centreline to centreline depicted for illustration purposes only

Note 3.— Offset take-off climb/approach surface rotated around centre point of FATO

Figure 11. Obstacle limitation surfaces — Take-off climb and approach surface

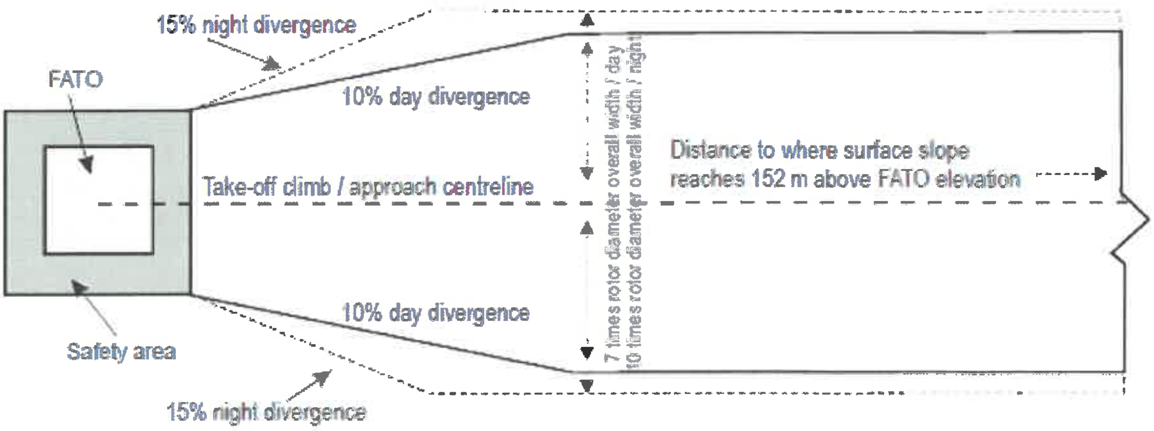


Figure 12. Take-off climb/Approach surface width

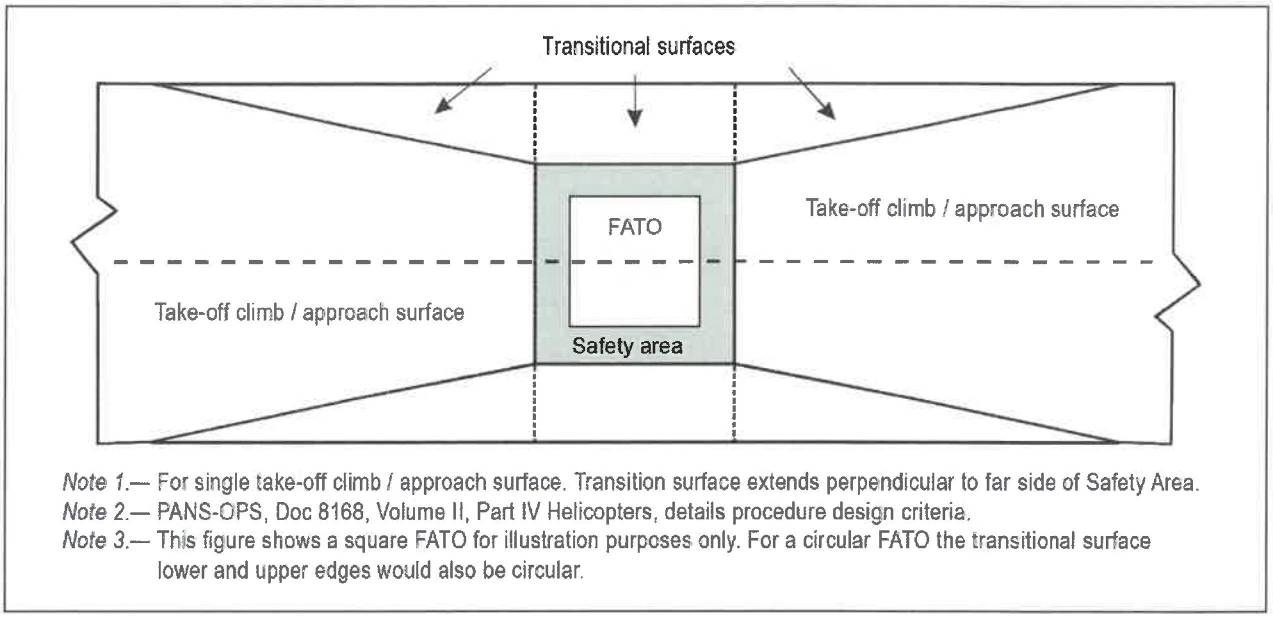


Figure 13. Transitional surface for a FATO with a PinS approach procedure with a VSS

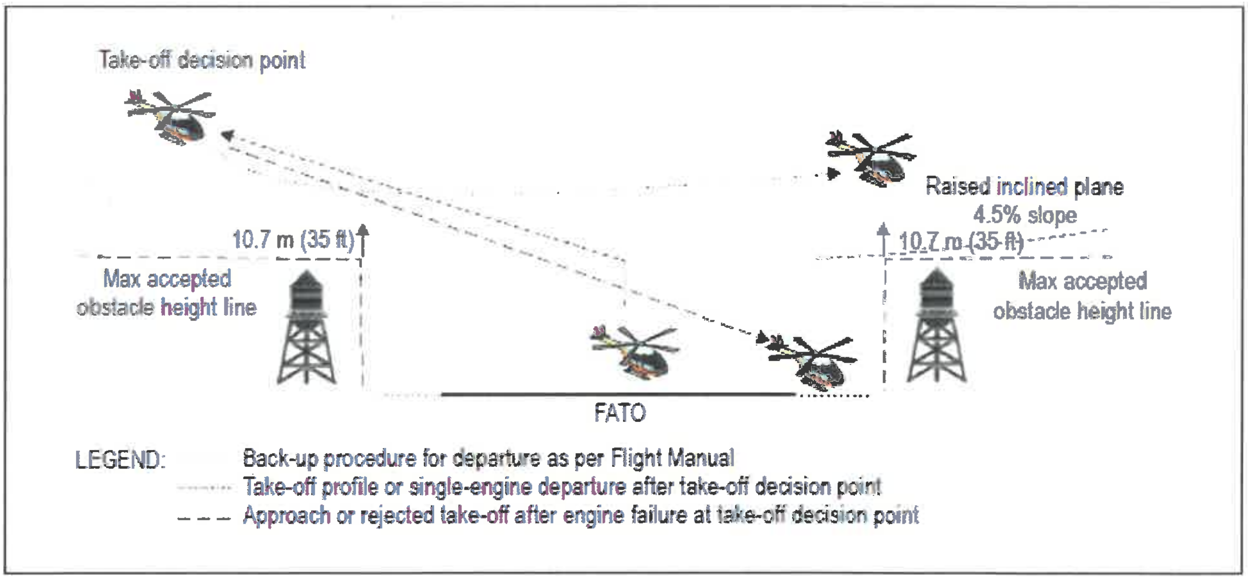
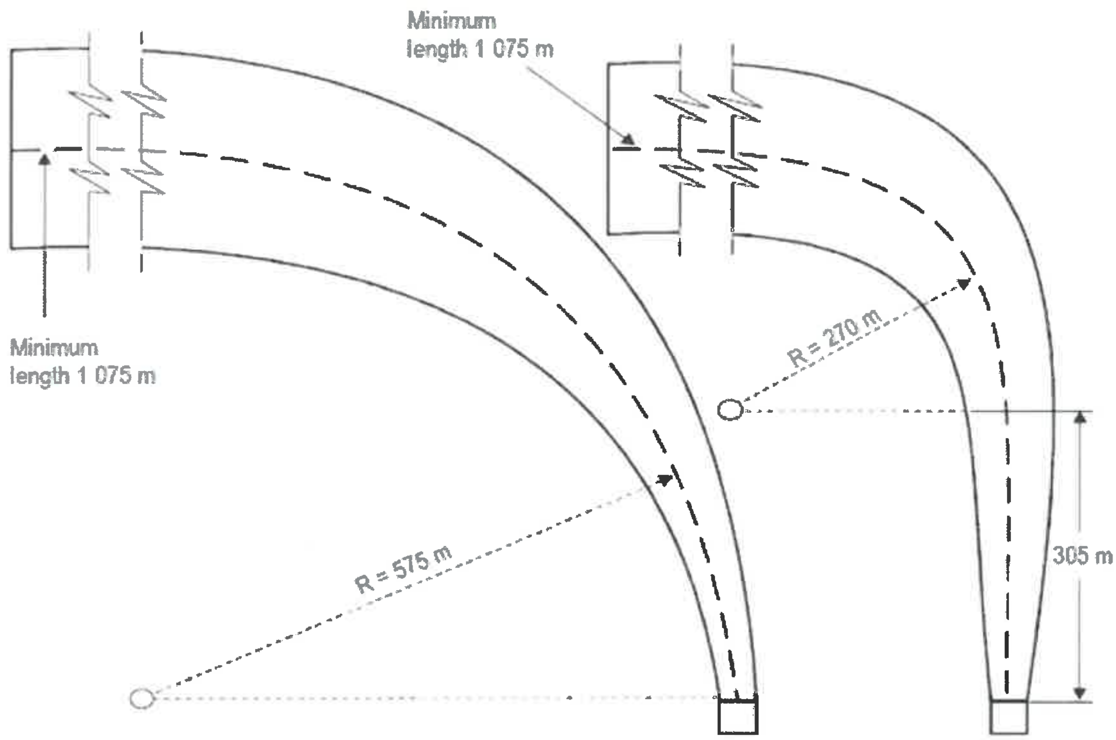


Figure 14. Example of raised inclined plane during operations in Performance Class 1



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 2 for longer lengths.

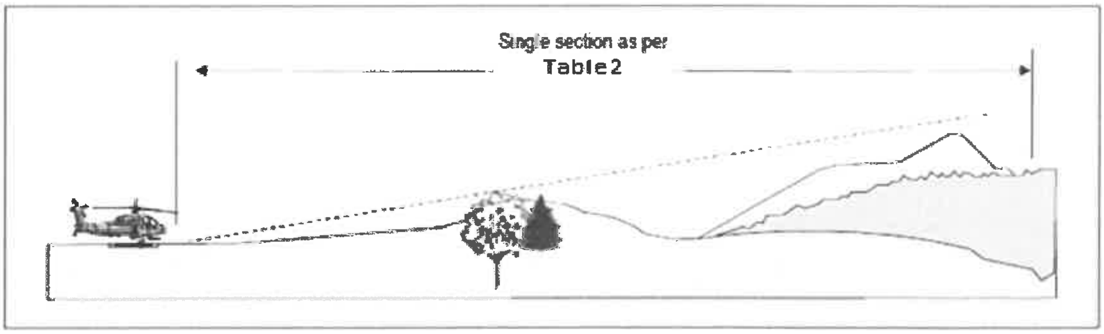
Note 3.— Helicopter take-off performance is reduced in a curve and as such a straight portion along the take-off climb surface prior to the start of the curve should be considered to allow for acceleration.

Figure 15. Curved approach and take-off climb surface for all FATOs

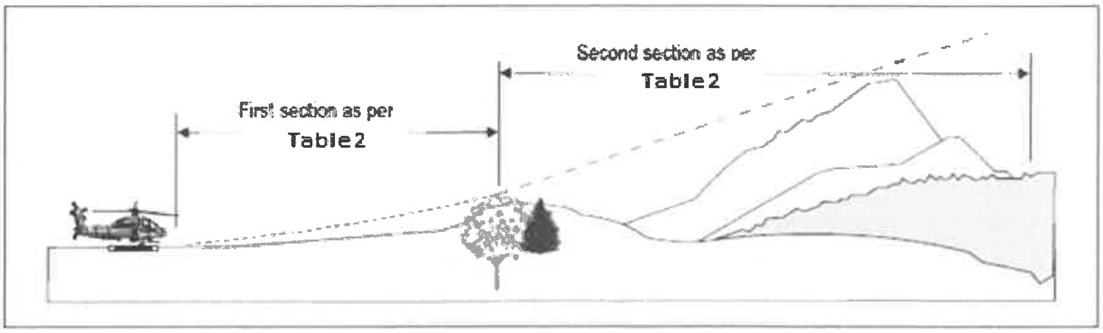
Table 2: Slopes of obstacle limitation surfaces for all visual FaTos.

SURFACE and DIMENSIONS	SLOPE DESIGN CATEGORIES		
	A	B	C
APPROACH and TAKE-OFF CLIMB SURFACE:			
Length of inner edge	Width of safety area	Width of safety area	Width of safety area
Location of inner edge	Safety area boundary (Clearway boundary if provided)	Safety area boundary	Safety area boundary
Divergence: (1st and 2nd section) Day use only Night use	 10% 15%	 10% 15%	 10% 15%
First Section: Length Slope Outer Width	 3 386 m 4.5% (1:22.2) (b)	 245 m 8% (1:12.5) N/A	 1 220 m 12.5% (1:8) (b)
Second Section: Length Slope Outer Width Total Length from inner edge (a)	 N/A N/A N/A 3 386 m	 830 m 16% (1:6.25) (b) 1 075 m	 N/A N/A N/A 1 220 m
Transitional Surface: (FaTos with a PinS approach procedure with a VSS) Slope	 50% (1:2)	 50% (1:2)	 50% (1:2)

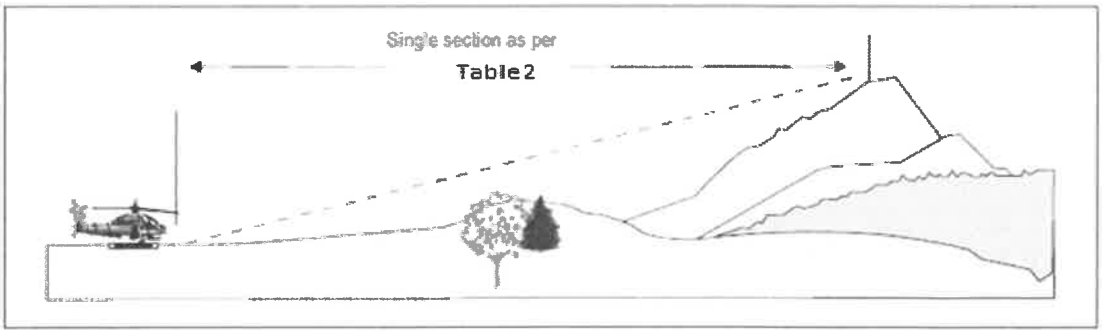
Height	45 m	45 m	45 m
(a) The approach and take-off climb surface lengths of 3 386 m, 1 075 m and 1 220m associated with the respective slopes, brings a helicopter to 152 m above the FaTo elevation.			
(b) Seven rotor diameters overall width for day operations or 10 rotor diameters overall width for night operations.			



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



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



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

Figure 16. Approach and take-off climb surfaces with different slope design categories

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

3.2. Transitional surface

(1) The limits of a transitional surface shall comprise:

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

(b) an upper edge located at a specified height above the lower edge as set out in Table 2.

(2) The elevation of a point on the lower edge shall be:

(a) 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; and

(b) along the safety area — equal to the elevation of the inner edge of the approach or take-off.

(3) The slope of the transitional surface shall be measured in a vertical plane at right angles to the centre line of the FaTo.

3.3. Take-off climb surface

(1) The limits of a take-off climb surface shall comprise:

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

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

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

(2) The elevation of the inner edge shall be the elevation of the FaTo at the point on the inner edge that is intersected by the centre line of the take-off climb surface.

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

(5) In the case of a take-off climb surface involving a turn, the surface shall be a complex surface containing the horizontal normal to its centre line and the slope of the centre line shall be the same as that for a straight take-off climb surface (refer to figure 15).

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

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

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

3.4. Obstacle-free sector— helidecks

(1) An obstacle-free sector shall subtend an arc of a specified angle.

(2) A helideck obstacle-free sector shall comprise two components, one above and one below helideck level:

(a) Above helideck level. The surface shall be a horizontal plane level with the elevation of the helideck surface that subtends an arc of at least 210 degrees with the apex located on the periphery of the D circle extending outwards to a distance that shall allow for an unobstructed departure path appropriate to a helicopter the helideck is intended to serve.

(b) Below helideck level. Within the minimum 210-degree arc, the surface shall additionally extend downward from the edge of the FaTo below the elevation of the helideck to water level for an arc of not less than 180 degrees that passes through the centre of the FaTo and outwards to a distance that shall allow for safe clearance from the obstacles below the helideck in the event of an engine failure for the type of a helicopter the helideck is intended to serve as referenced in figure 17.

3.5. Limited obstacle sector or surface — helidecks

(1) A limited obstacle sector shall not subtend an arc greater than 150 degrees.

(2) Its dimensions and location for a 1D FaTo with coincidental TLOF and for a 0.83 D TLOF shall be as indicated in figure 18.

3.6. Surface level heliport

(1) The following obstacle limitation surfaces shall be established for a FaTo at heliport with a point in space (PinS) approach procedure utilizing a visual segment surface (refer to figure 13):

(a) take-off climb surface;

(b) approach surface; and

(c) transitional surfaces.

(2) The following obstacle limitation surfaces shall be established for a FaTo at heliport other than specified in subsection (1), including heliport with a PinS approach procedure where a visual segment surface is not provided:

(a) take-off climb surface; and

(b) approach surface.

(3) The slopes of the obstacle limitation surfaces shall not be greater than, and the

dimensions not less than those specified in Table 2, the slopes shall be located as shown in
figures 11, 12 and 16.

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

(5) New objects or extensions of existing objects shall not be permitted above any of the
surfaces in subsections (1) and (2) except when shielded by an existing immovable object or
after an aeronautical study approved by an appropriate authority determines that the object shall not adversely affect the safety or significantly affect the regularity of a helicopter operations.

(6) Existing objects above any of the surfaces in subsections (1) and (2) shall be removed except when the object is shielded by an existing immovable object or after an aeronautical study approved by an appropriate authority determines that the object shall not adversely affect the safety or significantly affect the regularity of a helicopter operations.

(7) A surface-level heliport shall have at least one approach and take-off climb surface.

(8) An aeronautical study shall be undertaken by an appropriate authority when only a single approach and take-off climb surface is provided considering as a minimum, the following factors:

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

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

(c) the performance and operating limitations of a helicopter intending to use a heliport; and

(d) the local meteorological conditions including the prevailing winds.

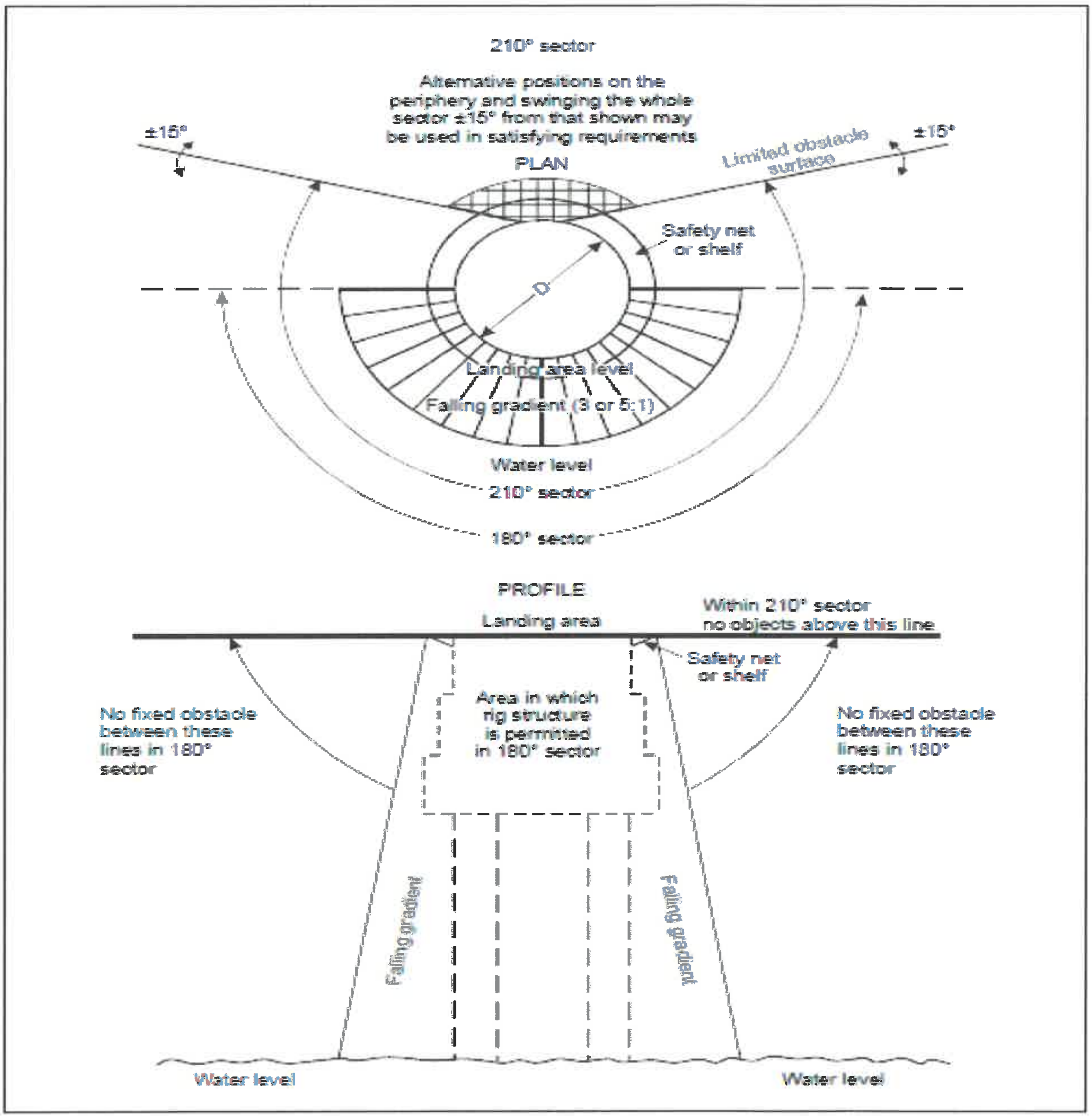


Figure 17. Helideck obstacle-free sector

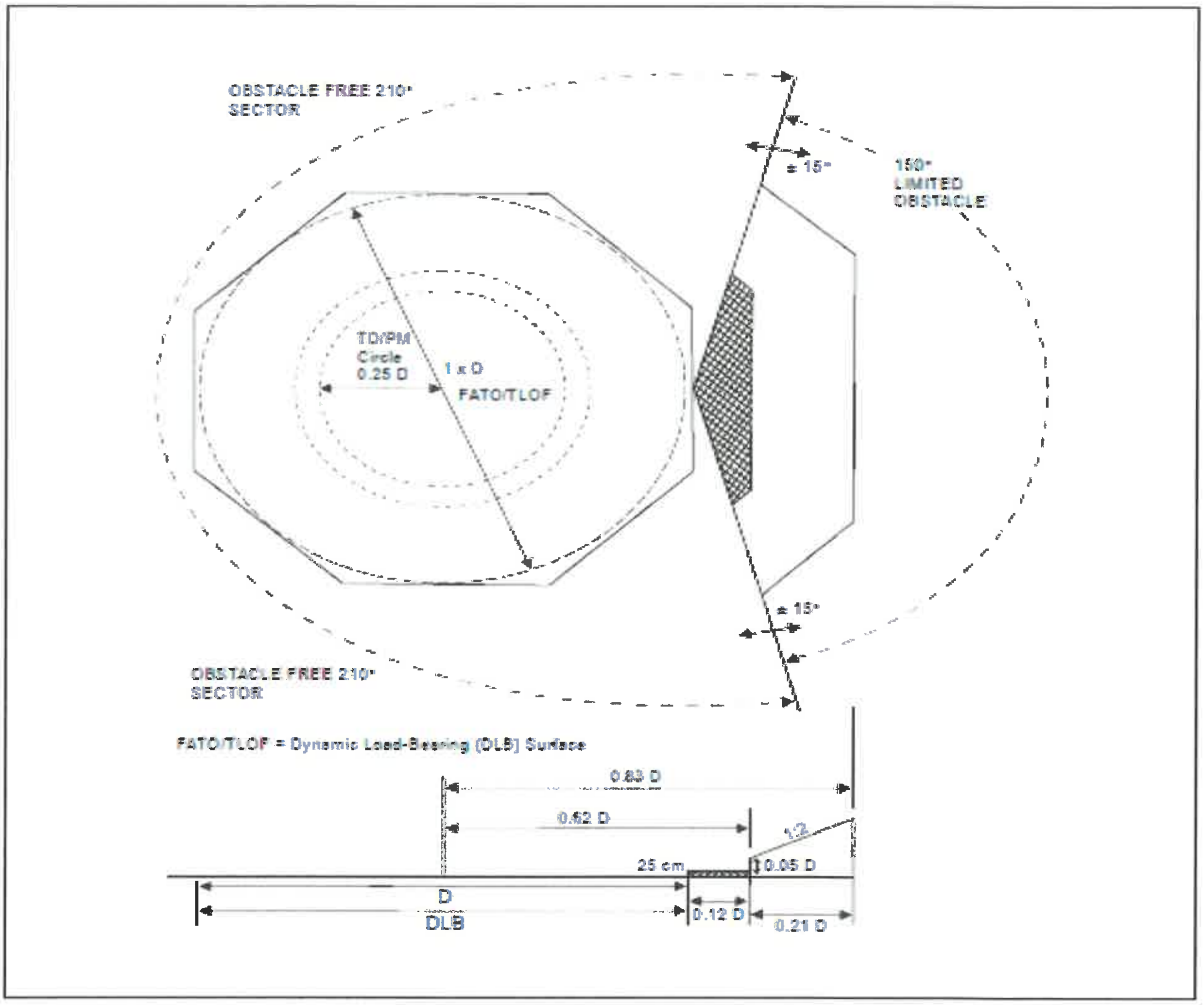


Figure 18. Helideck obstacle limitation sectors and surfaces for a FaTo and coincidental TLOF of 1 D and larger

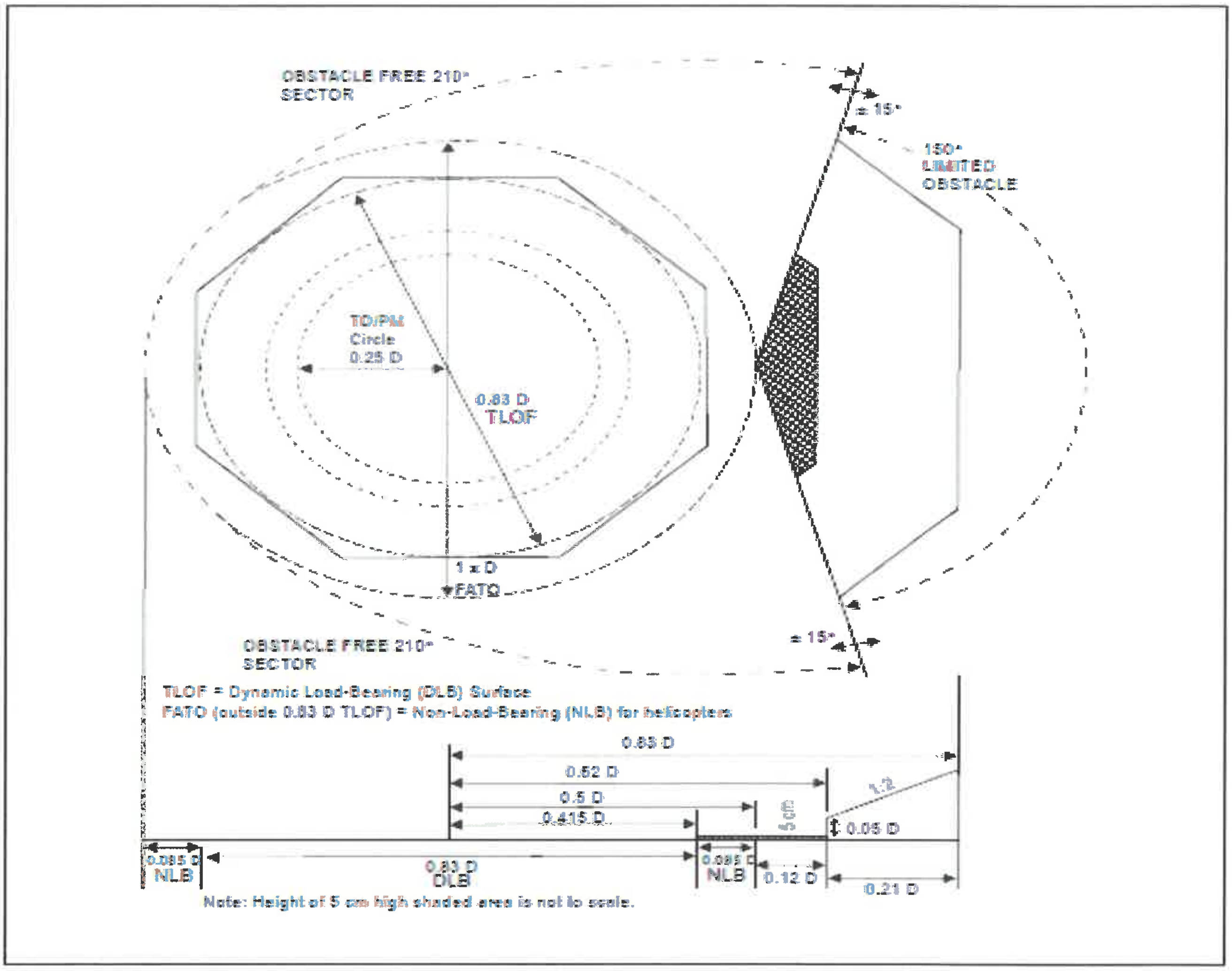


Figure 19. Helideck obstacle limitation sectors and surfaces for a TLOF of 0.83 D and larger

3.7. Elevated heliport

(1) The obstacle limitation surfaces for elevated heliports shall conform to the requirements for surface-level heliport.

(2) An elevated heliport shall have at least one approach and take-off climb surface.

(3) An aeronautical study shall be undertaken by an appropriate authority when only a single approach and take-off climb surface is provided considering as a minimum, the following factors:

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

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

(c) the performance and operating limitations of a helicopter intending to use a heliport; and

(d) the local meteorological conditions including the prevailing winds.

3.8. Helidecks

(1) A helideck shall have an obstacle-free sector.

(2) There shall be no fixed obstacles within the obstacle-free sector above the obstacle-free surface.

(3) In the immediate vicinity of the helideck, obstacle protection for a helicopter shall be provided below the helideck level.

(4) 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.

(5) For a TLOF of 1 D and larger within the 150-degree limited obstacle surface or sector out to a distance of 0.12 D measured from the point of origin of the limited obstacle sector, objects shall not exceed a height of 25cm above the TLOF.

(6) 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 5cm above the TLOF.

(7) 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 (refer to figure 19).

3.9. Purpose-built heliport located forward or aft

(1) When a helicopter operating area are provided in the bow or stern of a ship, they shall apply the obstacle criteria for helidecks.

3.10. Amidships location — purpose-built and non-purpose-built

(1) 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.

(2) 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 25cm.

(3) Objects whose function requires them to be located within the TLOF such as lighting or nets shall not exceed a height of 2.5cm.

(4) Such objects referred to subsection (3) shall only be present if they do not represent a hazard to a helicopter.

(5) 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.

(6) 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 (refer to figure 20).

3.11. Non-purpose-built heliport Ship's side location

(1) Objects shall not 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 2.5cm.

(2) Such objects shall only be present if they do not represent a hazard to a helicopter operation.

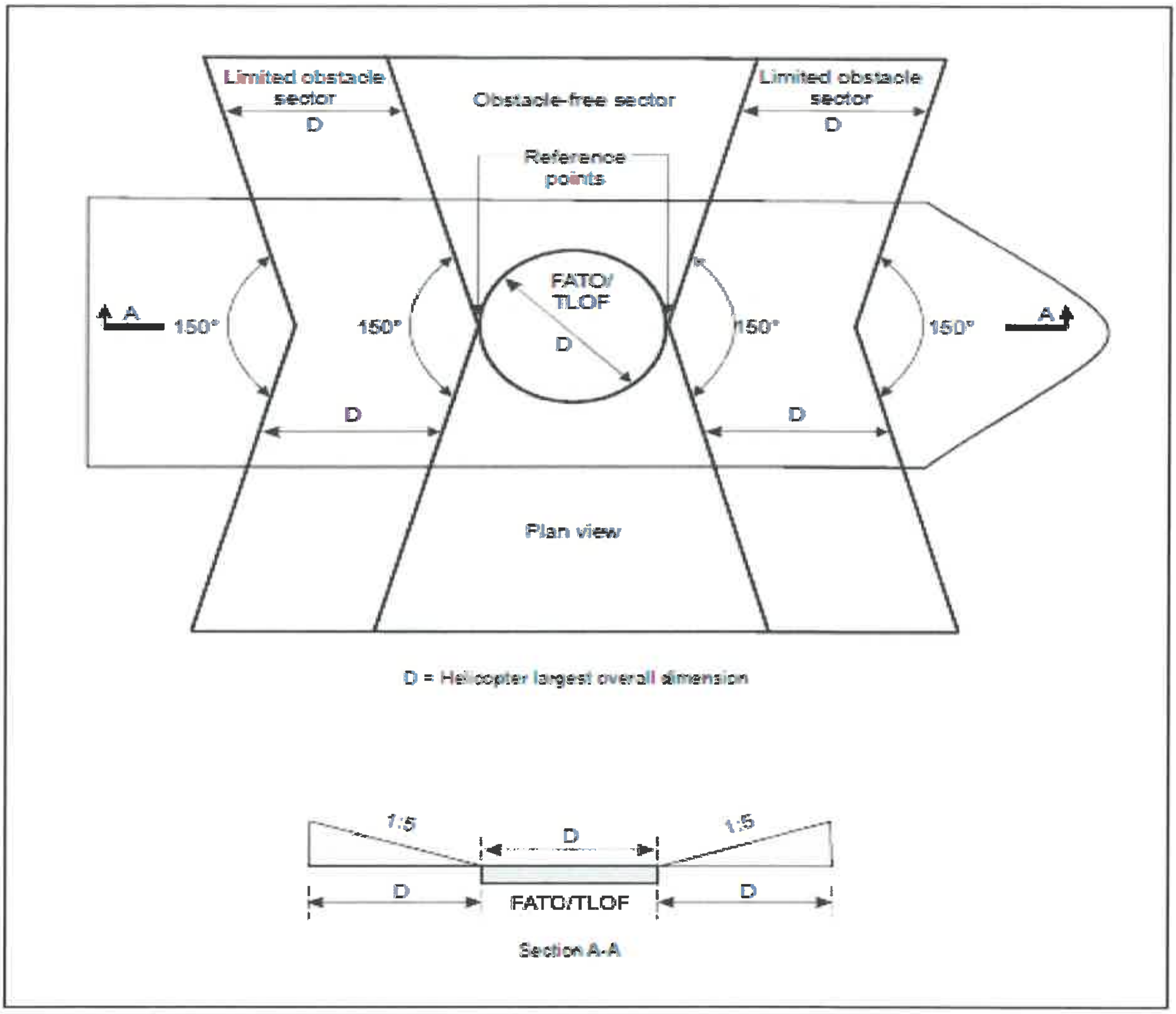


Figure 20. Amidship's location — Shipboard heliport obstacle limitation surfaces

(3) 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.

(4) Within these areas there shall be no objects rising above a maximum height of 25cm above the level of the TLOF (refer to figure 21). Such objects shall only be present if they do not represent a hazard to a helicopter operation.

(5) A limited obstacle sector (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.

(6) The limited obstacle sector shall continue to the ship's rail to a fore and aft distance of 2 times the fore-to-aft dimension of the TLOF, located symmetrically about the athwartships bisector of the D circle.

(7) Within this sector there shall be no objects rising above a maximum height of 25cm above the level of the TLOF.

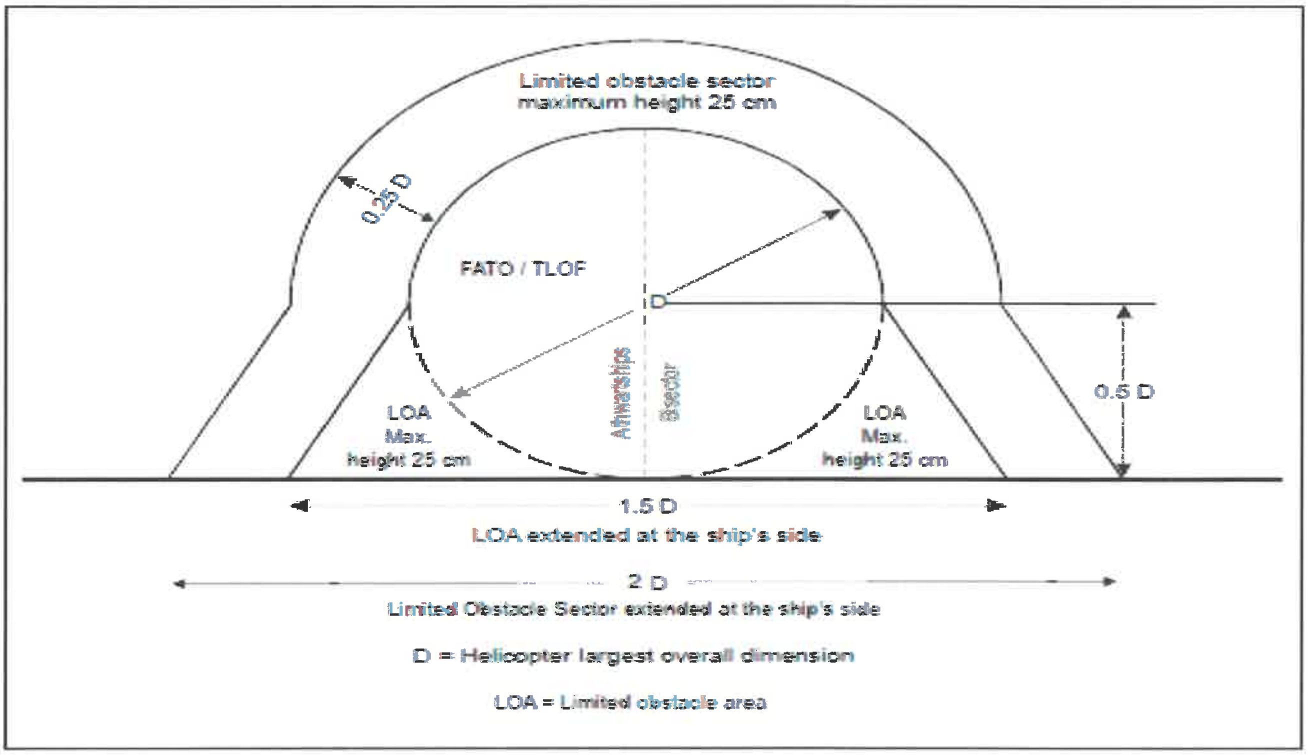


Figure 21. Ships-side non-purpose-built heliport obstacle limitation sectors and surfaces

3.12. Winching areas.

(1) An area designated for winching on-board ships shall be comprised of a circular clear zone of diameter 5m and extending from the perimeter of the clear zone, a concentric manoeuvring zone of diameter 2 D (refer to figure 22).

(2) The manoeuvring zone shall comprise of two areas:

(a) the inner maneuvering zone extending from the perimeter of the clear zone and of a circle of diameter not less than 1.5 D; and

(b) the outer maneuvering zone extending from the perimeter of the inner maneuvering zone and of a circle of diameter not less than 2 D.

(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 3m.

(5) Objects located within the outer manoeuvring zone of a designated winching area shall not exceed a height of 6m.

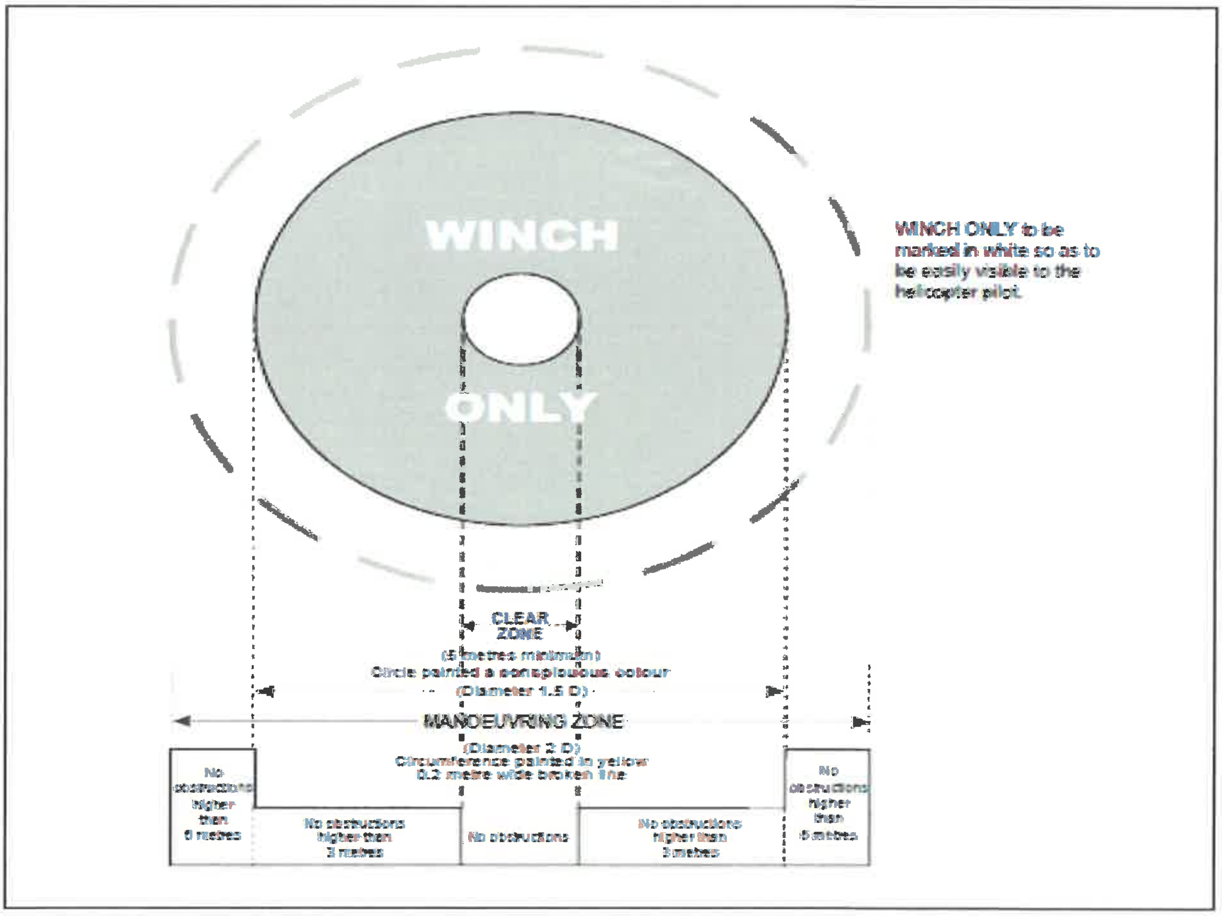


Figure 22. Winching area of a ship

4. Visual Aids

4.1. Wind direction indicator

(1) A heliport shall be equipped with at least one wind direction indicator.

(2) 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.

(3) It shall be visible from a helicopter in flight, in a hover or on the movement area.

(4) Where a TLOF or FaTo may be subject to a disturbed airflow, then additional wind direction indicators located close to the area shall be provided to indicate the surface wind on the area.

(5) A wind direction indicator shall be constructed so that it gives a clear indication of the direction of the wind and a general indication of the wind speed.

(6) An indicator shall be a truncated cone made of lightweight fabric and shall have the dimensions as indicated in Table 3.

Table 3: Wind direction indicator dimensions.

	Surface level Heliport	Elevated heliport and helideck
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

(7) 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 200m above a heliport having regard to background.

(8) Where practicable, a single colour, preferably white or orange shall be used.

(9) Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they shall preferably be orange and white, red and white,

or black and white and shall be arranged in five alternate bands the first and last band being the darker colour.

(10) A wind direction indicator at a heliport intended for use at night shall be illuminated.

4.2. Winching area markings

(1) Winching area markings shall be provided at a designated winching area as referenced in figure 22.

(2) Winching area markings shall be located so that their centres coincide with the centre of the clear zone of the winching area.

(3) Winching area markings shall comprise a winching area clear zone marking and a winching area maneuvering zone marking.

(4) A winching area clear zone marking shall consist of a solid circle of diameter not less than 5m and of a conspicuous colour.

(5) A winching area maneuvering zone marking shall consist of a broken circle line of 30cm 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.

4.3. Heliport identification marking

(1) On a FaTo, which does not contain a TLOF and which is marked with an aiming point marking, a heliport identification marking shall be established in the centre of the aiming point marking as shown in figure 23 and figure 24.

(2) Heliport identification markings shall be provided at a heliport.

(3) A heliport identification marking shall be located at or near the centre of the FaTo.

(4) On a FaTo which contains a TLOF, a heliport identification marking shall be located in the FaTo so the position of it coincides with the centre of the TLOF.

(5) A heliport identification marking shall be located in the FaTo and when used in conjunction with FaTo designation markings, shall be displayed at each end of the FaTo as referenced in figure 25.

(6) A heliport identification marking except for a heliport at a hospital, shall consist of a letter H white in colour.

(7) The dimensions of the H marking shall be no less than those referenced in figure 26.

(8) Where the marking is used for a runway-type FaTo, its dimensions shall be increased by a factor of 3 as referenced in figure 25.

(9) A heliport identification marking for a heliport at a hospital shall consist of a letter H, white in colour, on a red cross made of squares adjacent to each of the sides of a square containing the H as referenced in figure 26.

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

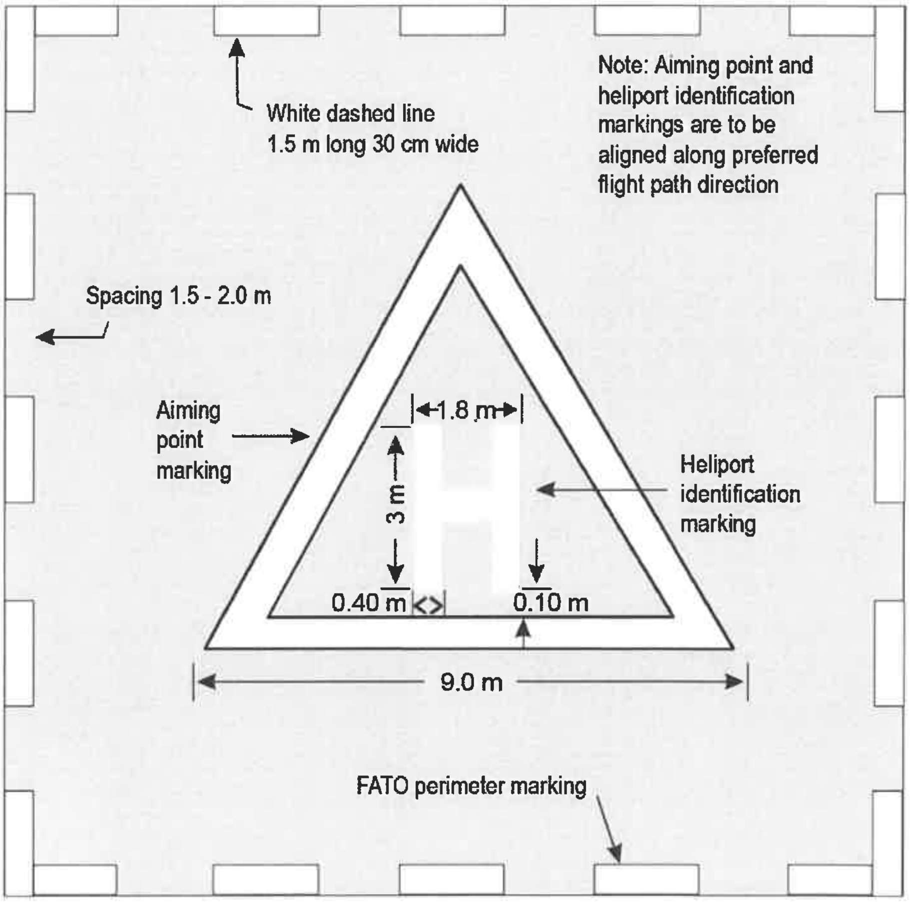
(11) For a helideck the cross arm shall be on or parallel to the bisector of the obstacle-free sector. For a non-purpose-built shipboard a heliport located on a ship's side, the cross arm shall be parallel with the side of the ship.

(12) On a helideck or a shipboard heliport where the D value is 16m or larger, the size of a heliport identification H marking shall have a height of 4m with an overall width not exceeding 3m and a stroke width not exceeding 0.75m.

(13) Where the D value is less than 16m, the size of a heliport identification H marking shall have a height of 3m with an overall width not exceeding 2.25m and a stroke width not exceeding 0.5m.

4.4. Maximum allowable mass marking

(1) A maximum allowable mass marking shall be displayed at an elevated heliport, a helideck and a shipboard heliport.



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

Figure 23. Combined heliport identification, aiming point and FaTo perimeter marking

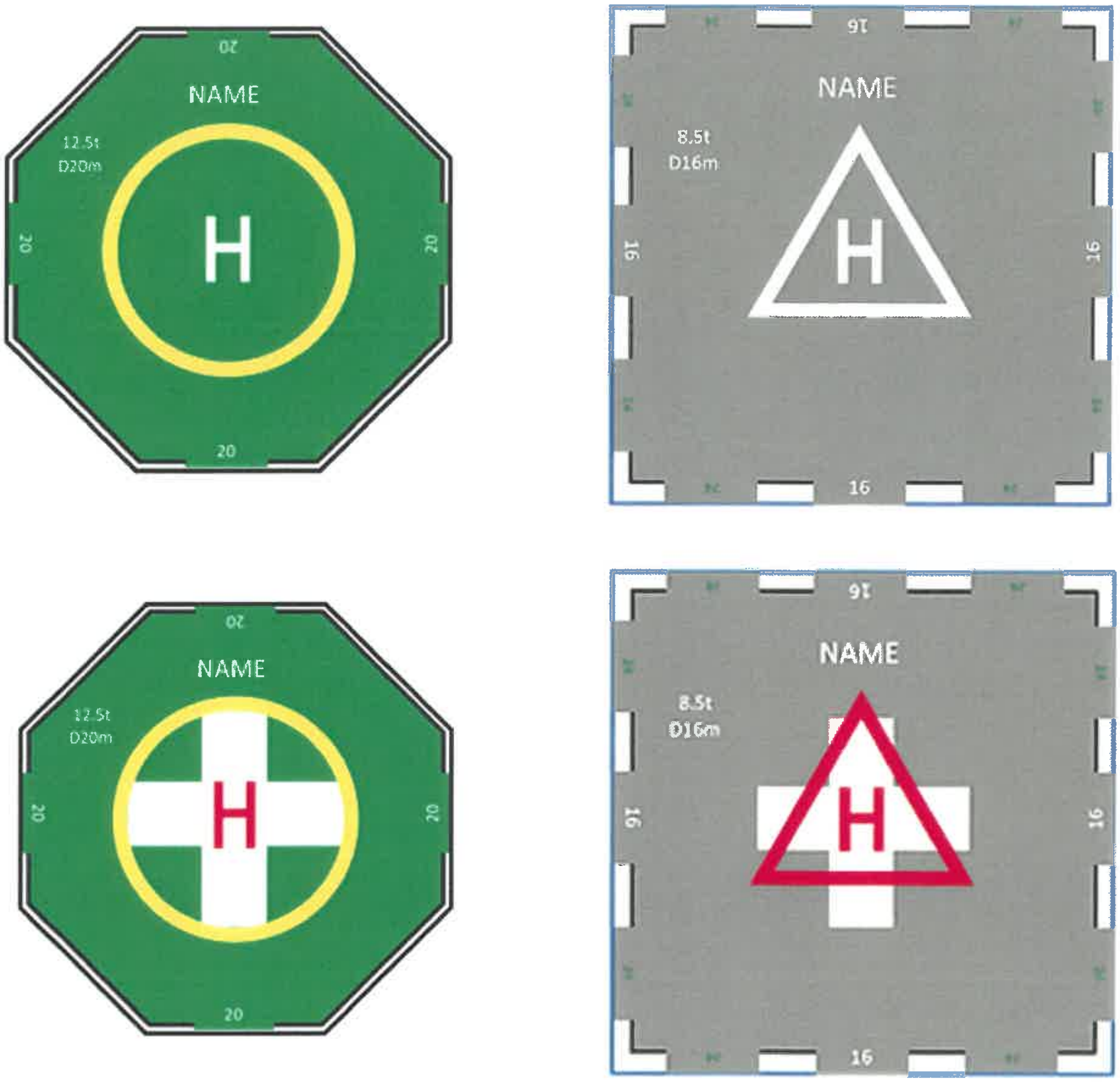


Figure 24. Heliport identification markings with TLOF and aiming markings for heliport and hospital heliport

(2) A maximum allowable mass marking shall be located within the TLOF or FaTo and to be readable from the preferred final approach direction.

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

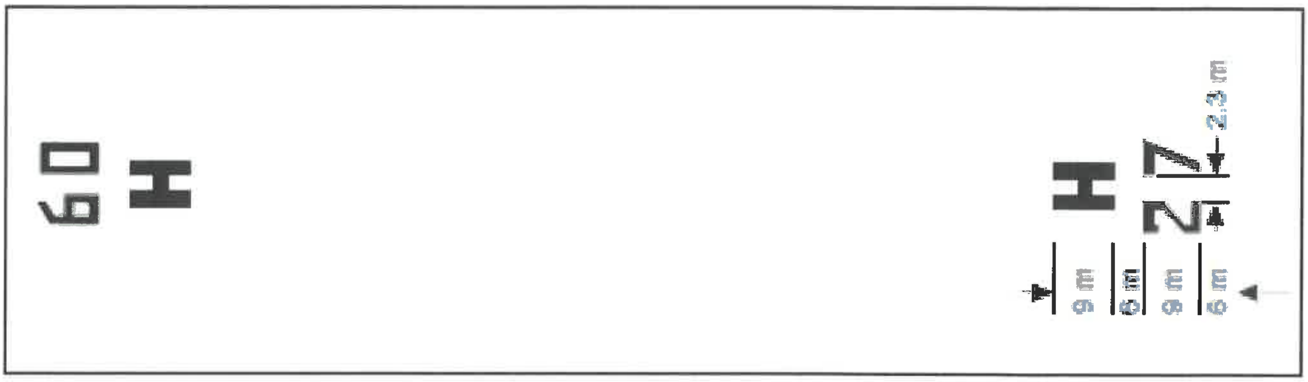


Figure 25. FaTo designation marking and heliport identification marking for a runway-type FaTo

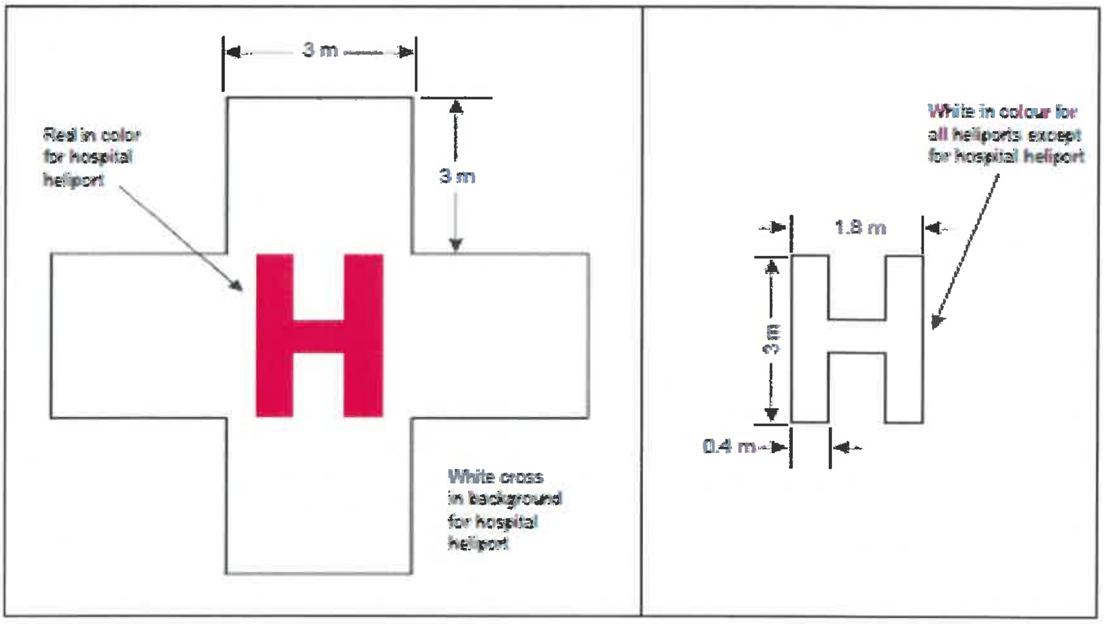


Figure 26. Hospital heliport identification and heliport identification marking

(4) The maximum allowable mass shall be expressed in tonnes (1 000 kg) rounded down to the nearest 1 000 kg followed by a letter “t”.

(5) The maximum allowable mass shall be expressed to the nearest 100 kg.

(6) The marking shall be presented to one decimal place and rounded to the nearest 100 kg followed by the letter “t”.

(7) When the maximum allowable mass is expressed to 100 kg, the decimal place shall be preceded with a decimal point marked with a 30cm square.

4.5. All FaTos except runway-type FaTos

(1) The numbers and the letter of the marking shall have a colour contrasting with the background and shall be in the form and proportion as referenced in figure 27 for a D value of
more than 30m.

(2) For a D-value of between 15m to 30m the height of the numbers and the letter of the marking shall be a minimum of 90cm and for a D-value of less than 15m the height of the numbers and the letter of the marking shall be a minimum of 60cm, each with a proportional reduction in width and thickness.

(3) The characters of the marking shall be not less than 1.5m in height at surface-level heliport and not less than 1.2m on elevated heliport, helidecks and shipboard heliport.

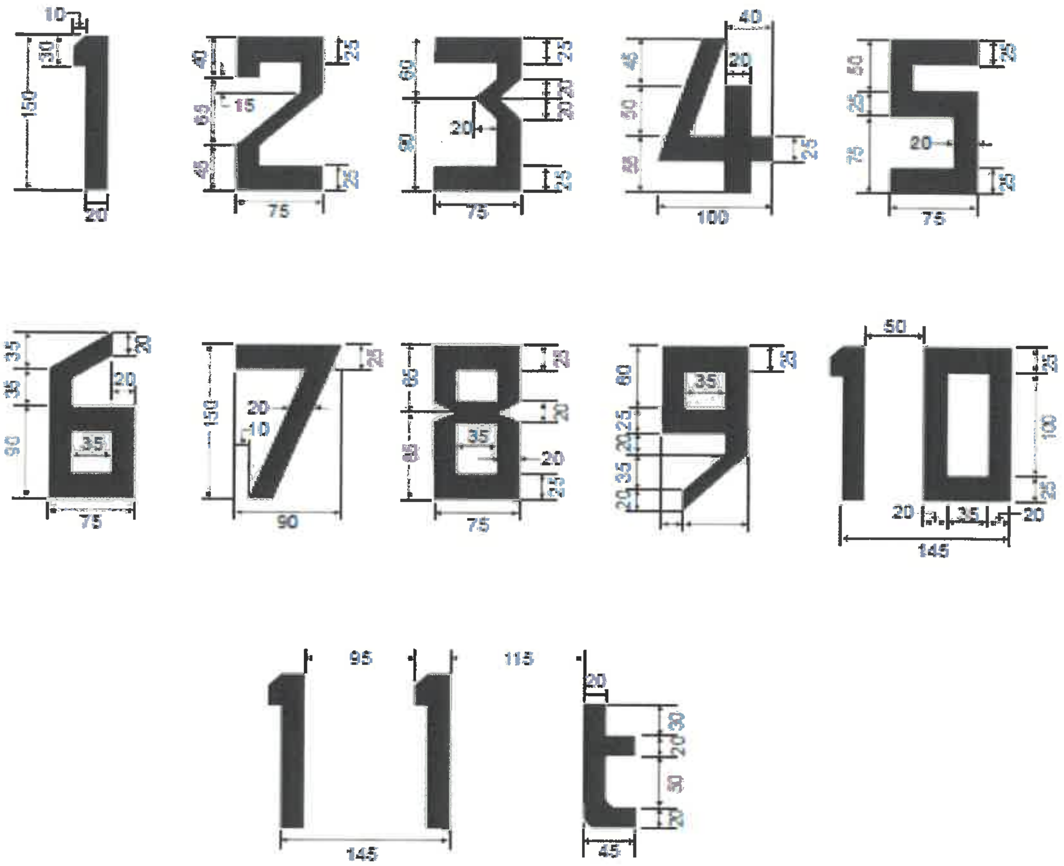
(4) The colour of the marking shall contrast with the background and preferably be white.

4.6. D-value marking

(1) The D-value marking shall be displayed at a helideck and at a shipboard heliport.

(2) The D-value marking shall be displayed at surface level and elevated heliport.

(3) A D-value marking shall be located within the TLOF or FaTo and to be readable from the preferred final approach direction.



Note.— All units are expressed in centimetres.

Figure 27. Form and proportions of numbers and letters

(4) Where there is more than one approach direction, additional D-value markings shall be provided such that at least one D-value marking is readable from the final approach direction.

(5) For a non-purpose-built heliport located on a ship's side, D-value markings shall 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.

(6) The D-value marking shall be white and shall be rounded to the nearest whole metre or foot with 0.5 rounded down.

(7) The numbers of the marking shall have a colour contrasting with the background and shall be in the form and proportion referenced in figure 27 for a D-value of more than 30m.

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

(9) The FaTo perimeter marking or markers shall be located on the edge of the FaTo.

4.7. Runway type- FaTo

(1) The numbers and the letter of the marking shall have a colour contrasting with the background and shall be in the form and proportion referenced in figure 27.

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

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

(4) FaTo perimeter markings shall be white.

(5) A FaTo perimeter marker shall have dimensional characteristics as referenced in figure 28.

(6) FaTo perimeter markers shall be of colours that contrast effectively against the operating background.

(7) FaTo perimeter markers shall be a single colour, orange or red, or two contrasting colours, orange and white or, alternatively, red and white shall be used except where such colours would merge with the background.

(8) For an unpaved FaTo the perimeter shall be defined with flush in-ground markers.

(9) The FaTo perimeter markers and segments shall be 30cm in width, 1.5m in length, and with end-to-end spacing of not less than 1.5m and not more than 2m with the corners of a square or rectangular FaTo clearly defined.

(10) For a paved FaTo the perimeter shall be defined with a dashed line.

(11) FaTo perimeter markings and flush in-ground markers shall be white.

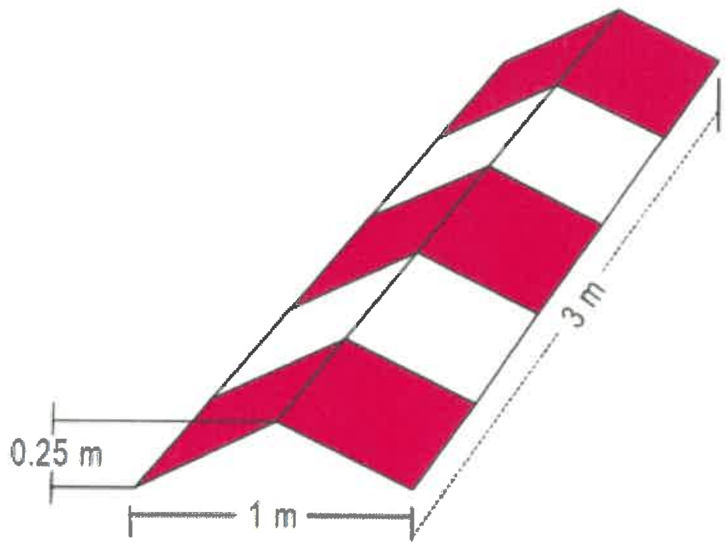


Figure 28. Runway-type FaTo edge marker

(12) A FaTo designation marking shall be provided at a heliport where it is necessary to designate the FaTo to a pilot.

(13) A FaTo designation marking shall be located at the beginning of the FaTo as referenced
in figure 25.

(14) A two-digit number shall be the whole number nearest the one-tenth of the magnetic North when viewed from the direction of approach, when this rule would give a single digit number, it shall be preceded by a zero.

(15) The marking shall be supplemented by a heliport identification marking as referenced in figure 25.

(16) The characters of the runway type- FaTo marking shall be not less than 3m in height.

4.8. Aiming point marking

(1) An aiming point marking shall 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.

(2) The aiming point marking shall be located within the FaTo.

(3) The aiming point marking shall be located at the centre of the FaTo as referenced in figure 23.

(4) The aiming point marking shall be an equilateral triangle with the bisector of one of the angles aligned with the preferred approach direction.

(5) The marking shall consist of continuous lines, providing a contrast with the background colour and the dimensions of the marking shall be as referenced in figure 29.

4.9. Touchdown and lift-off area perimeter marking

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

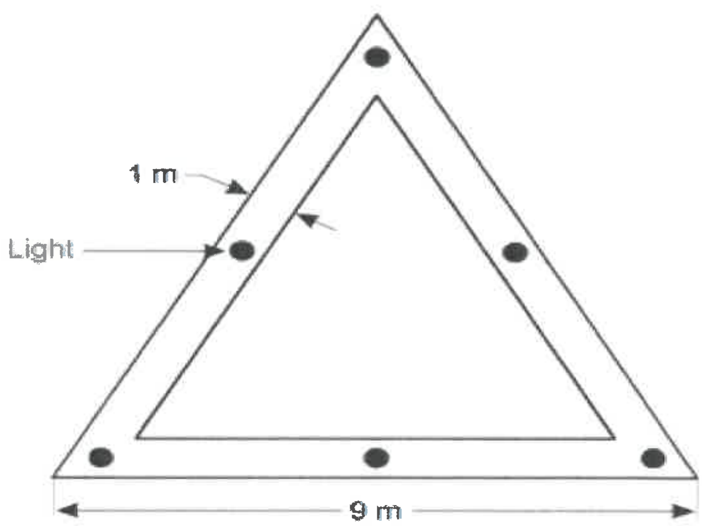


Figure 29. Aiming point marking

(2) A TLOF perimeter marking shall be displayed on an elevated heliport, a helideck and a shipboard heliport.

(3) The TLOF perimeter marking shall be located along the edge of the TLOF.

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

4.10. Touchdown/positioning marking

(1) A touchdown or positioning marking shall be provided for a helicopter to touch down or be accurately placed in a specific position.

(2) The touchdown or positioning marking shall be provided as referenced in figure 30:

- (a) when there is no limitation on the direction of touchdown/positioning, a touchdown or positioning circle (TDPC) marking; and
- (b) when there is a limitation on the direction of touchdown or positioning:
  - (i) for unidirectional applications, a shoulder line with an associated centreline; or
  - (ii) for multidirectional applications, a TDPC marking with prohibited landing sectors marked.

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

(4) 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.

(5) 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.

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

(7) A touchdown or positioning marking shall have a line width of at least 0.5m. For a helideck and a purpose-built shipboard heliport, the line width shall be at least 1m.

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

(9) The prohibited landing sector markings, when provided, shall be indicated by white and red hatched markings as shown in Figure 30.

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

4.11. Heliport name marking

(1) A heliport name marking shall be provided at a heliport and helideck where there is insufficient alternative means of visual identification.

(2) Where a limited obstacle sector (LOS) exists on a helideck the marking shall be located on that side of a "heliport identification marking."

(3) For a non-purpose-built heliport located on a ship's side the marking shall be located on the inboard side of a heliport identification marking in the area between the TLOF perimeter marking and the boundary of the limited obstacle sector (LOS).

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

(5) A heliport name marking intended for use at night or during conditions of poor visibility shall be illuminated, either internally or externally.

(6) For Runway-type FaTos, the characters of the marking shall not be less than 3 m in height.

(7) All FaTos except runway-type FaTos, the characters of the marking shall be not less than 1.5m in height at surface-level heliports and not less than 1.2m on elevated heliports, helidecks and shipboard heliports.

(8) The colour of the marking shall contrast with the background and preferably be white.

4.12. Helideck obstacle-free sector (chevron) marking.

(1) A helideck with adjacent obstacles that penetrate above the level of the helideck shall have an obstacle-free sector marking.

(2) A helideck obstacle-free sector marking shall be located, where practicable, at a distance from the centre of the TLOF equal to the radius of the largest circle that can be drawn in the TLOF or 0.5 D, whichever is greater.

(3) The helideck obstacle-free sector marking shall indicate the location of the obstacle-free sector and the directions of the limits of the sector.

(4) The height of the chevron shall not be less than 30cm.

(5) The chevron shall be marked in a conspicuous colour.

(6) The colour of the chevron shall be black.

4.13. Helideck and shipboard heliport surface marking.

(1) A surface marking shall be provided to assist the pilot to identify the location of the helideck or shipboard heliport during an approach by day.

(2) A surface marking shall be applied to the dynamic load bearing area bounded by the TLOF perimeter marking.

(3) The helideck or shipboard heliport surface bounded by the TLOF perimeter marking shall be of dark green using a high friction coating.

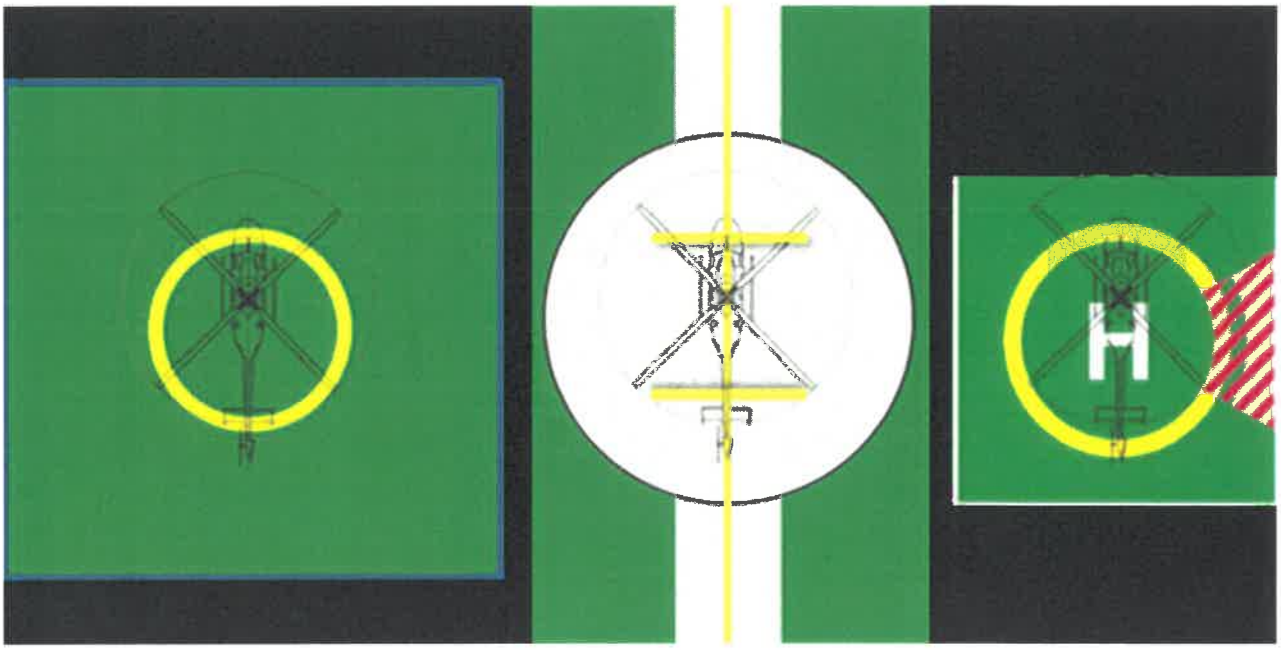


Figure 30. (Left) multidirectional TDPC with no limitations. (Centre) unidirectional marking shoulder line with associated centerline. (Right) multidirectional TDPC with prohibited landing sector marking

4.14. Helicopter taxiway markings and markers

(1) The centre line of a helicopter taxiway shall be identified with a marking.

(2) The edges of a helicopter taxiway, if not self-evident, shall be identified with markers or markings.

(3) Helicopter taxiway markings shall be along the centre line and along the edges of a helicopter taxiway.

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

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

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

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

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

(9) A helicopter taxiway edge marker shall be frangible to the wheeled undercarriage of a helicopter.

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

(11) A helicopter taxiway edge marker shall be blue.

(12) If a helicopter taxiway is to be used at night, the edge markers shall be internally illuminated or retro-reflective.

4.15. Helicopter air taxi-route markings and markers

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

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

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

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

(5) If a helicopter air taxi-route is to be used at night, a helicopter air taxiway edge marker shall be either internally illuminated or retro-reflective.

4.16. Helicopter stand markings

(1) A helicopter stand perimeter marking shall be provided.

(2) A helicopter stand shall be provided with the appropriate TDPM (refer to figure 30).

(3) Alignment lines and lead-in or lead-out lines shall be provided on a helicopter stand.

(4) The TDPM, alignment lines and lead-in or lead-out lines shall be located such that every part of a helicopter can be contained within a helicopter stand during positioning and permitted maneuvering.

(5) Alignment lines and lead-in or lead-out lines shall be located as referenced in figure 31.

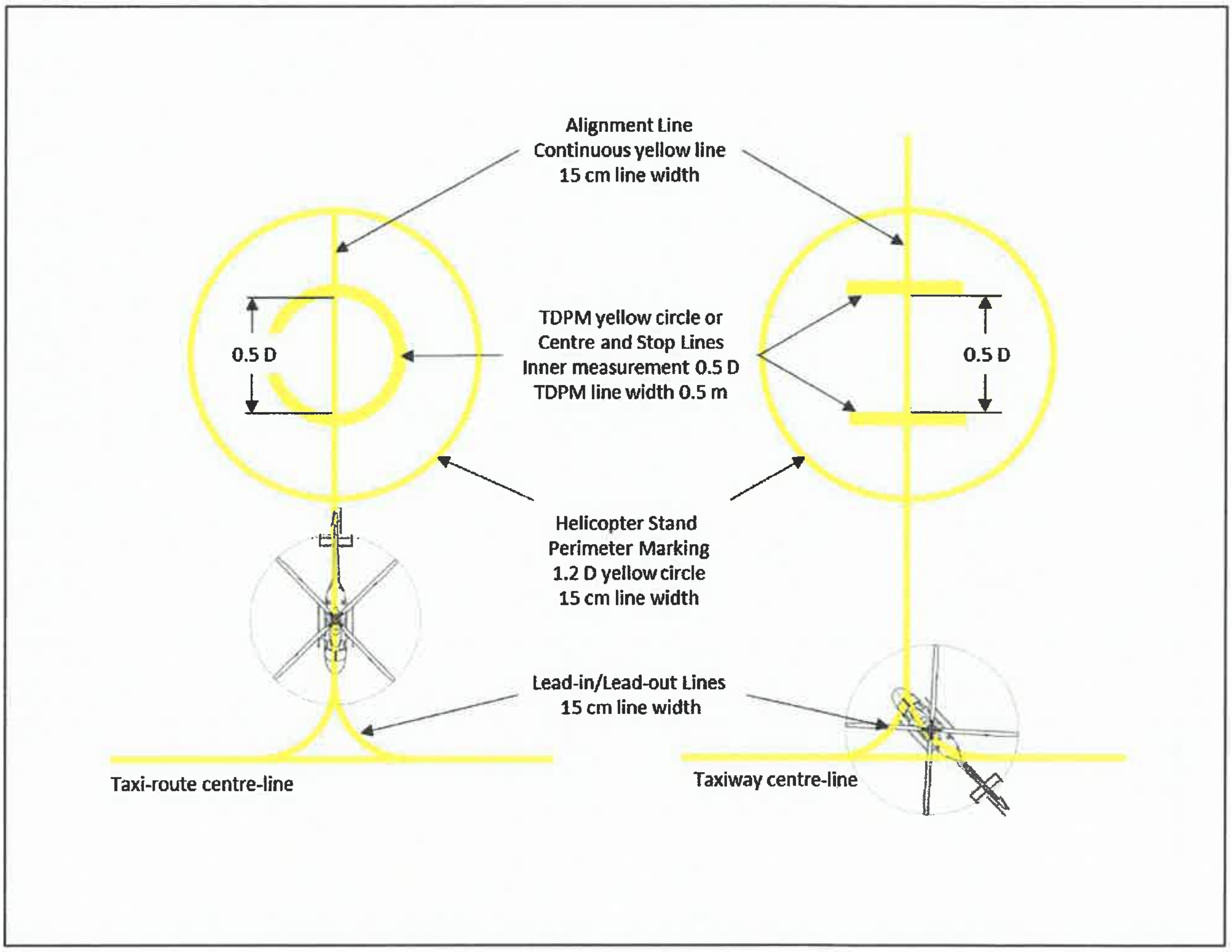


Figure 31. Helicopter stand markings

(6) A helicopter stand perimeter marking shall consist of a continuous yellow line and have a line width of 15cm.

(7) The TDPM shall have the characteristics described in 4.10 above.

(8) Alignment lines and lead-in or lead-out lines shall be continuous yellow lines and have a width of 15cm.

(9) Curved portions of alignment lines and lead-in or lead-out lines shall have radii appropriate to the most demanding helicopter type a helicopter stand is intended to serve.

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

4.17. Flight path alignment guidance marking

(1) Flight path alignment guidance markings shall be provided at a heliport where it is desirable and practicable to indicate an available approach and departure path direction.

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

(3) A flight path alignment guidance marking shall consist of one or more arrows marked on the TLOF, FaTo or safety area surface as referenced in figure 32.

(4) The stroke of the arrows shall be 50cm in width and at least 3m in length. When combined with a flight path alignment guidance lighting system it shall take the form shown in figure 32 which includes the scheme for marking "heads of the arrows" which are constant regardless of stroke length.

(5) The markings shall be in a colour which provides good contrast against the background colour of the surface on which they are marked, preferably white.

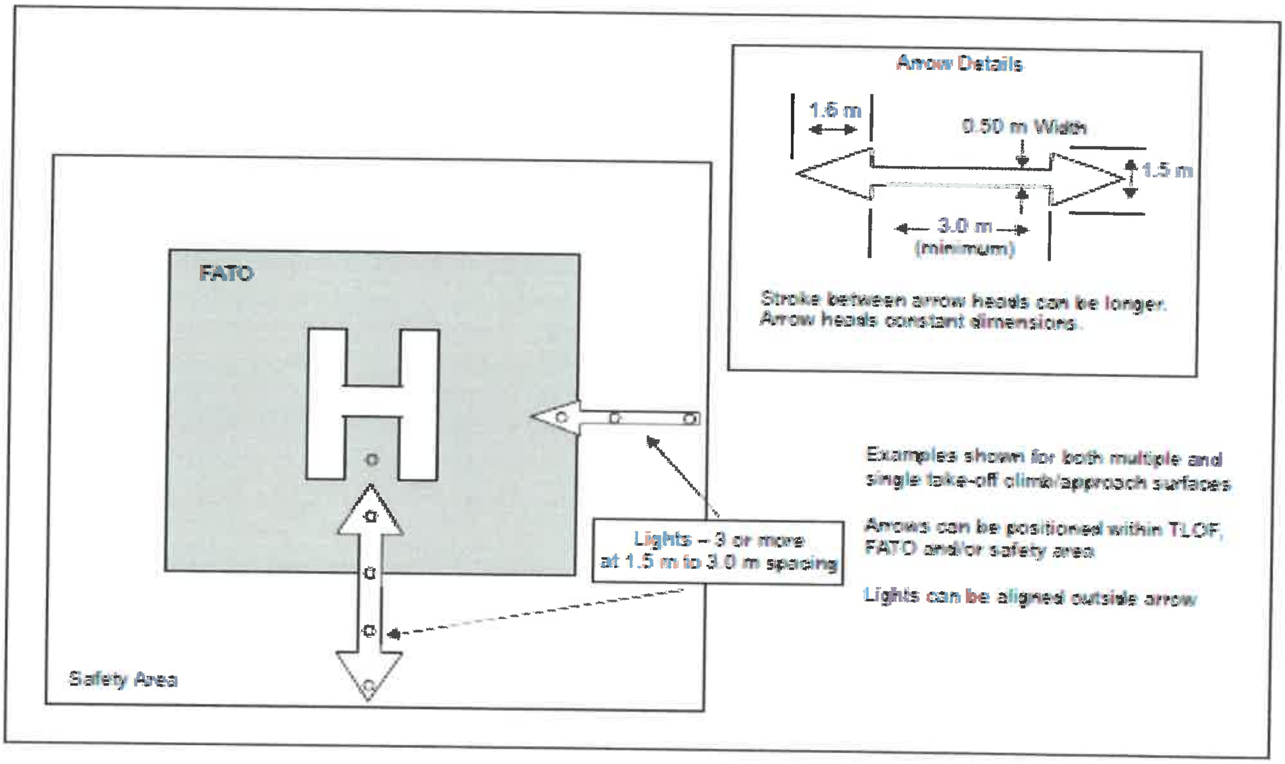


Figure 32. Flight path alignment guidance markings and lights

5. Lights.

5.1. Heliport beacon

(1) A heliport beacon shall be provided at a heliport where:

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

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

(2) A heliport beacon shall be located on or adjacent to a heliport preferably at an elevated position so that it does not dazzle a pilot at short range.

(3) A heliport beacon shall emit repeated series of equispaced short duration white flashes in the format referenced in figure 33.

(4) The light from the beacon shall show all angles of azimuth.

(5) The effective light intensity distribution of each flash shall be as referenced in figure 35, illustration 1.

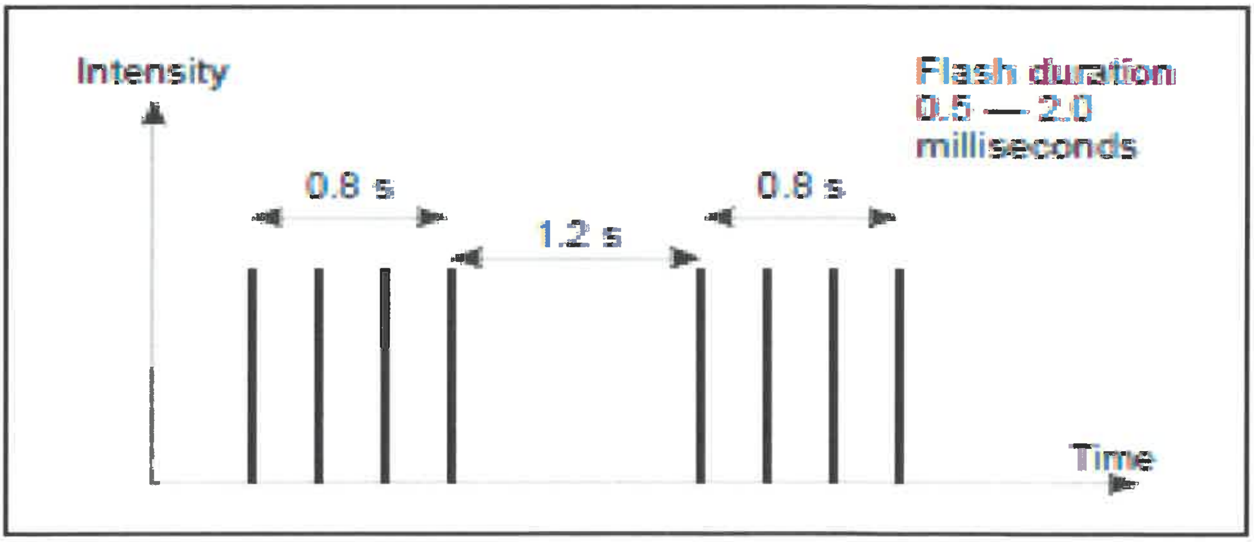


Figure 33. Heliport beacon flash characteristics

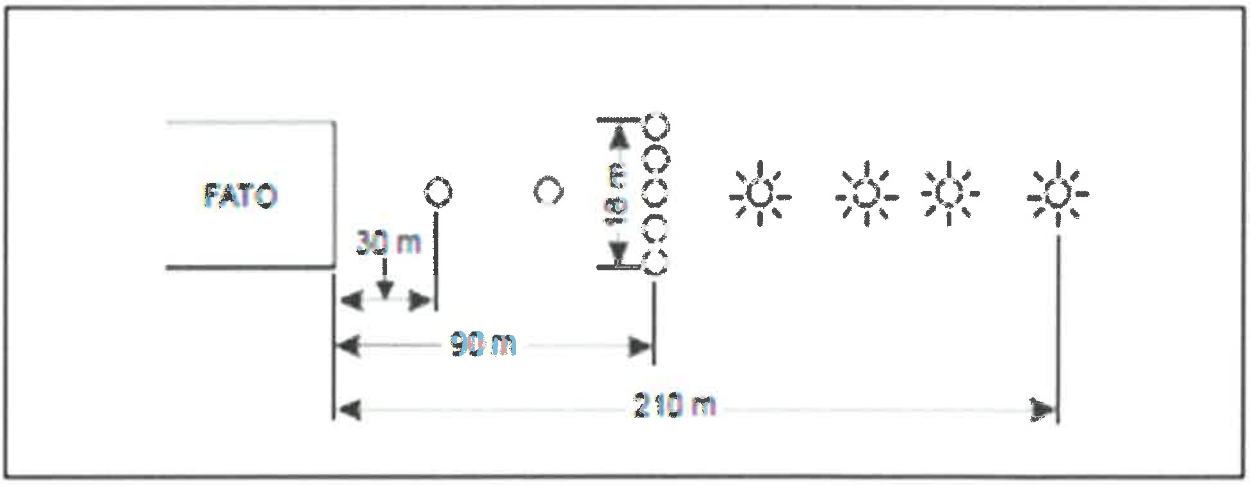


Figure 34. Approach lighting system

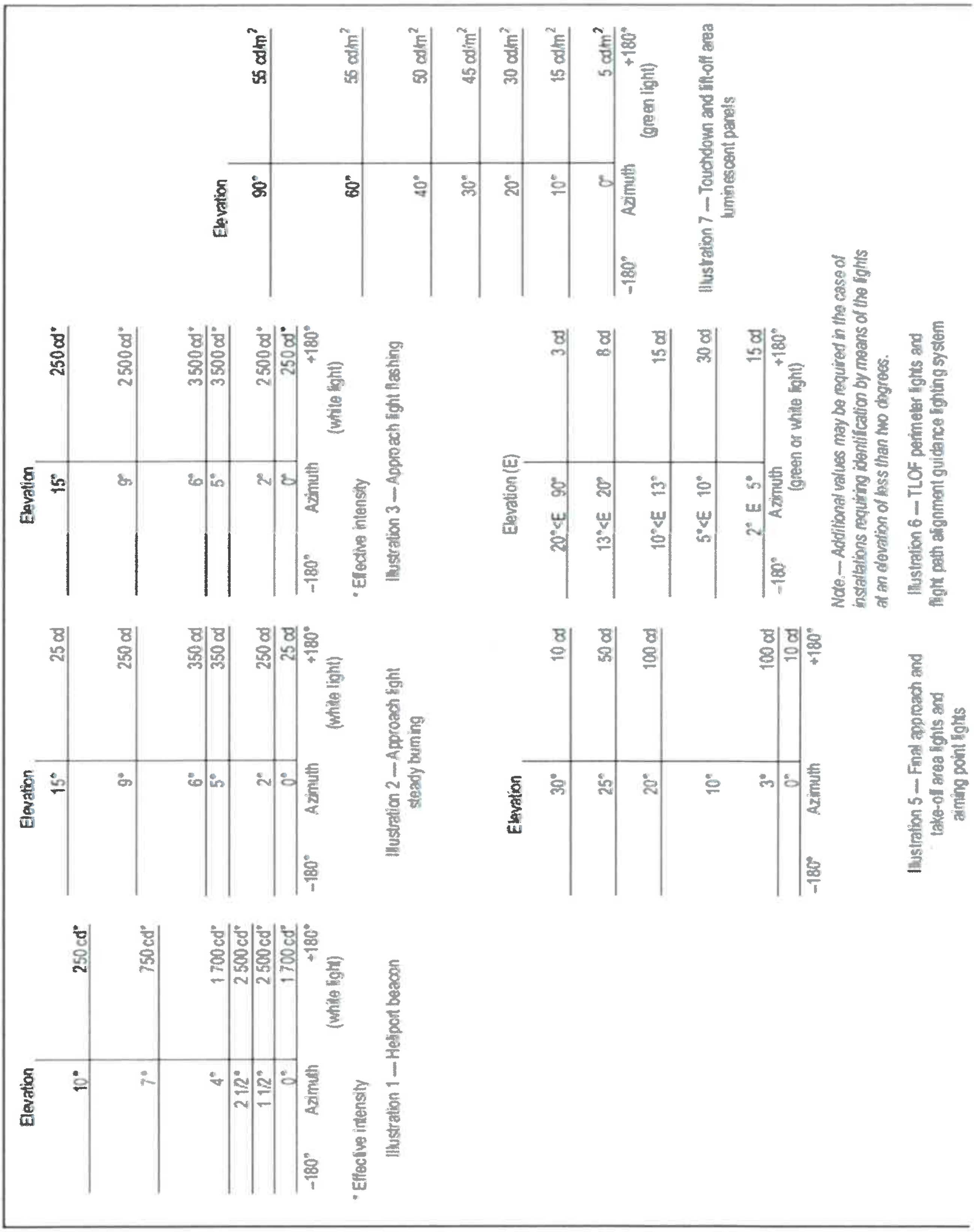


Figure 35. Isocandela diagrams

5.2. Approach lighting system

(1) An approach lighting system shall be provided at a heliport to indicate a preferred approach direction.

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

(3) The lighting system shall consist of a row of three lights spaced uniformly at 30m intervals and of a crossbar 18m in length at a distance of 90m from the perimeter of the FaTo, refer to figure 34.

(4) The lights forming the crossbar shall be as nearly as practicable in a horizontal straight line at right angles and bisected by the line of the centre line lights spaced at 4.5m intervals.

(5) The steady lights shall be omnidirectional white lights.

(6) Sequenced flashing lights shall be omnidirectional white lights.

(7) The flashing lights shall have a flash frequency of one per second and their light distribution shall be as referenced in figure 35, Illustration 3.

(8) The flash sequence shall commence from the outermost light and progress towards the crossbar.

(9) A suitable brilliancy control shall be incorporated to allow for adjustment of light intensity to meet the prevailing conditions.

(a) steady lights — 100% ;30% and 10% and

(b) flashing lights — 100%, 10% and 3%.

5.3. Flight path alignment guidance lighting system

(1) A flight path alignment guidance lighting system shall be provided at a heliport where it is desirable and practicable to indicate available approach and departure path direction.

(2) If combined with a flight path alignment guidance marking, as far as is practicable the lights shall be located inside the "arrow" markings.

(3) A flight path alignment guidance lighting system shall consist of a row of three or more lights spaced uniformly a total minimum distance of 6m. Intervals between

lights shall not be less than 1.5m and shall not exceed 3m. Where space permits there shall be 5 lights, refer to figure 32.

(4) The lights shall be steady omnidirectional inset white lights.

(5) The distribution of the lights shall be as indicated in figure 35, Illustration 6.

(6) A suitable control shall 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 a heliport.

5.4. Visual alignment guidance system

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

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

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

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

5.5. Visual approach slope indicator

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

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

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

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

5.6. FaTo area lighting systems for surface level heliports.

(1) Where a FaTo with a solid surface is established at a surface-level heliport intended for use at night, FaTo lights shall be provided except that they may be

omitted where the FaTo and the TLOF are nearly coincidental or the extent of the FaTo is self-evident.

(2) FaTo lights shall be placed along the edges of the FaTo. The lights shall be uniformly spaced as follows:

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

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

(3) FaTo lights shall be fixed omnidirectional lights showing white. Where the intensity of the lights is to be varied the lights shall show variable white.

(4) The light distribution of FaTo lights shall be as shown in figure 35, Illustration 5.

(5) The lights shall not exceed a height of 25cm and shall be inset when a light extending above the surface would endanger a helicopter operation.

(6) Where a FaTo is not meant for lift-off or touchdown, the lights shall not exceed a height of 25cm above ground level.

5.7. Aiming point lights

(1) Where an aiming point marking is provided at a heliport intended for use at night, aiming point lights shall be provided.

(2) Aiming point lights shall be collocated with the aiming point marking.

(3) Aiming point lights shall form a pattern of at least 6 omnidirectional white lights as shown in figure 29.

(4) The lights shall be inset when a light extending above the surface could endanger a helicopter operation.

(5) The light distribution of aiming point lights shall be as shown in figure 35, illustration 5.

5.8. TLOF area lighting system

(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 one or more of the following:

(a) perimeter lights;

(b) floodlighting;

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

(3) For an elevated heliport, shipboard heliport or helideck, lighting of the TLOF in a FaTo shall consist of:

(a) perimeter lights; and

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

(4) TLOF ASPSL or LPs to identify the TDPM or floodlighting shall be provided at a surface-level heliport intended for use at night when enhanced surface texture cues are required.

(5) TLOF perimeter lights shall be placed along the edge of the area designated for use as the TLOF or within a distance of 1.5m from the edge.

(6) Where the TLOF is a circle, the lights shall be:

(a) located on straight lines in a pattern which shall provide information to a pilot on drift displacement; and

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

(7) TLOF perimeter lights shall be uniformly spaced at intervals of not more than 3m for elevated heliports and helidecks and not more than 5m for surface level heliports. There shall be a minimum number of four lights on each side including a light at each corner.

(8) For a circular TLOF there shall be a minimum of 14 lights.

(9) The TLOF perimeter lights shall be installed at an elevated heliport or fixed helideck such that the pattern cannot be seen by a pilot from below the elevation of the TLOF.

(10) The TLOF perimeter lights shall be installed on a moving helideck or shipboard heliport, such that the pattern cannot be seen by a pilot from below the elevation of the TLOF when the helideck or shipboard heliport is level.

(11) 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.

(12) On surface level heliports the minimum number of LPs on a TLOF shall be nine.

(13) The total length of Luminescent Panels in a pattern shall not be less than 50% of the length of the pattern. There shall be an odd number with a minimum number of 3 panels on each side of the TLOF including a panel at each corner.

(14) LPs shall be uniformly spaced with a distance between adjacent panel ends of not more than 5m on each side of the TLOF.

(15) When Luminescent Panels are used on an elevated heliport or helideck to enhance surface texture cues, the panels shall not be placed adjacent to the perimeter lights but shall be placed around a touchdown marking or coincident with a heliport identification marking.

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

(17) The TLOF perimeter lights shall be fixed omnidirectional lights showing green.

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

(19) The chromaticity and luminance boundaries of colours of LPs shall be as indicated in Appendix 1, Table A1-6.

(20) A Luminescent Panel shall have a minimum width of 6cm and the panel housing shall be the same colour as the marking it defines.

(21) For a surface level or elevated a heliport, the TLOF perimeter lights located in a FaTo shall not exceed a height of 5cm and shall be inset when a light extending above the surface could endanger a helicopter operation.

(22) For a helideck or shipboard a heliport, the TLOF perimeter lights and floodlights shall not exceed a height of 5cm.

(23) For a coincidental FaTo or TLOF, the perimeter lights and floodlights shall not exceed
15cm.

(24) When located within the safety area of a surface level or elevated a heliport, the TLOF floodlights shall not exceed a height of 25cm.

(25) The Luminescent Panels shall not extend above the surface by more than 2.5cm.

(26) The light distribution of the perimeter lights shall be as shown in figure 35, illustration 6.

(27) The light distribution of the LPs shall be as shown in figure 35, illustration 7.

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

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

(30) Lighting used to identify the TDPC shall comprise a segmented circle of omnidirectional ASPSL strips showing yellow.

(31) The segments shall consist of ASPSL strips and the total length of the ASPSL strips shall not be less than 50 percent of the circumference of the circle.

(32) If utilized, a heliport identification marking lighting shall be omnidirectional showing green.

5.9. Helicopter stand floodlighting

(1) Floodlighting shall be provided on a helicopter stand intended to be used at night.

(2) A helicopter stand floodlights shall be located so as to provide adequate illumination, with a minimum of glare to a pilot of a helicopter in flight and on the ground, and to personnel on the stand.

(3) The arrangement and aiming of floodlights shall be such that a helicopter stand receives light from two or more directions to minimize shadows.

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

(5) Horizontal and vertical illuminance shall be sufficient to ensure that visual cues are discernible for required manoeuvring and positioning, and essential operations

around a helicopter can be performed expeditiously without endangering personnel or equipment.

5.10. Winching area floodlighting

(1) Winching area floodlighting shall be provided at a winching area intended for use at night.

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

(3) The spectral distribution of winching area floodlights shall be such that the surface and obstacle markings can be correctly identified.

(4) The average horizontal luminance shall be at least 10 lux, measured on the surface of the winching area.

5.11. Floodlighting of obstacles

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

(2) Obstacle floodlights shall be arranged so as to illuminate the entire obstacle and as far as practicable in a manner so as not to dazzle a helicopter pilot.

(3) Obstacle floodlighting shall be such as to produce a luminance of at least 10 cd/m2.

APPENDIX 1. AERONAUTICAL DATA QUALITY REQUIREMENTS

Table A1-1. Latitude and longitude

Latitude and longitude	Accuracy	Integrity

	Data type	**Classification**
Heliport reference point	30m surveyed/ calculated	routine
Navaids located at a heliport	3m surveyed	essential
Obstacles in Area 3	0.5 m surveyed	essential
Obstacles in Area 2 (the part within a heliport boundary)	5m surveyed	essential
Geometric centre of TLOF or FaTo thresholds	1m surveyed	critical

A helicopter ground taxiway centre line points and a helicopter air taxiway point	0.5 m surveyed/ calculated	essential
A helicopter ground taxiway intersection marking line	0.5 m surveyed	essential
Ground exit guidance line	0.5 m surveyed	essential
Apron boundaries (polygon)	1m surveyed	essential
De-icing/anti-icing facility (polygon)	1m surveyed	routine
A helicopter standpoints/INS checkpoints	0.5 m surv	routine

	eyed	

Table A1-2. Elevation/altitude/height

Elevation/altitude/height	**Accuracy Data type**	**Integrity Classification**
Heliport elevation	0.5 m surveyed	essential
WGS–84 geoid undulation at heliport elevation position	0.5 m surveyed	essential
Heliport crossing height, PinS approaches	0.5 m surveyed	essential

FATO threshold, for heliport with or without a PinS approach	0.5 m surveyed	essential
WGS–84 geoid undulation at FaTo threshold, TLOF geometric centre, for heliports with or without a PinS approach	0.5 m surveyed	essential
FaTo threshold, for heliport intended to be operated as indicated the guidance material available in the Authority website	0.25 m surveyed	critical
WGS–84 geoid undulation at FaTo threshold, TLOF geometric centre, for heliport intended to be operated as indicated the guidance material available in the Authority website	0.25 m surveyed	critical
A helicopter ground taxiway centre line points and a helicopter air taxiway points	1m surveyed	essential
Obstacles in Area 2 (the part within a heliport boundary)	3m surveyed	essential

Obstacles in Area 3	0.5 m surveyed	essential
Distance measuring equipment/precision (DME/P)	3m surveyed	essential

Table A1-3. Declination and magnetic variation

Declination/variation	**Accuracy Data type**	**Integrity Classification**
A heliport magnetic variation	1 degree	essential

	surveyed	
ILS localizer antenna magnetic variation	1 degree surveyed	essential
MLS azimuth antenna magnetic variation	1 degree surveyed	essential

Table A1-4. Bearing

Bearing	**Accuracy** **Data type**	**Integrity** **Classification**
ILS localizer alignment	1/100	essential

	degree surveyed	
MLS zero azimuth alignment	1/100 degree surveyed	essential
FaTo bearing (true)	1/100 degree surveyed	essential

Table A1-5. Length/distance/dimension

Length/distance/dimension	**Accuracy Data**	**Integrity Classification**

	type	
FaTo length, TLOF dimensions	1m surveyed	critical
Clearway length and width	1m surveyed	essential
Landing distance available	1m surveyed	critical
Take-off distance available	1m surveyed	critical
Rejected take-off distance available	1m surveyed	critical
A helicopter ground or air taxiway/taxi-route width	1m surveyed	essential
ILS localizer antenna-FaTo end, distance	3m calc	routine

	ulat ed	
ILS glide slope antenna-threshold, distance along centre line	3m calc ulat ed	routine
ILS marker-threshold distance	3m calc ulat ed	essentia l
ILS DME antenna-threshold, distance along centre line	3m calc ulat ed	essentia l
MLS azimuth antenna-FaTo end, distance	3m calc ulat ed	routine
MLS elevation antenna-threshold, distance along centre line	3m calc ulat ed	routine
MLS DME/P antenna-threshold, distance along centre line	3m calc ulat ed	essentia l

Table A1-6 Chromaticity factors of colours for luminescent panels

(1) The chromaticity and luminance factors of colours for luminescent or internally illuminated signs and panels shall be within the boundaries referred to in Table A1-6 when determined under standard conditions.

(2) Refer to figure A1-1 for Commission on Illumination Equations (CIE):

Table A1-6

(a) Red Purple boundary White boundary Orange boundary Luminance factor (day condition) Relative luminance to white (night condition)	 y = 0.345 – 0.051x y = 0.910 – x y = 0.314 + 0.047x ß = 0.07 (minimum) 5% (minimum) 20% (max)
(b) Yellow Orange boundary White boundary Green boundary Luminance factor (day condition) Relative luminance to white (night condition)	 y = 0.108 + 0.707x y = 0.910 – x y = 1.35x – 0.093 ß = 0.45 (minimum) 30% (minimum) 80% (max)
(c) White Purple boundary Blue boundary	 y = 0.010 + x y = 0.610 – x

Green boundary	y = 0.030 + x
Yellow boundary	y = 0.710 – x
Luminance factor (day condition)	ß = 0.75 (minimum)
Relative luminance to white (night condition)	100%
(d) Black Purple boundary	y = x – 0.030
Blue boundary	y = 0.570 – x
Green boundary	y = 0.050 + x
Yellow boundary	y = 0.740 – x
Luminance factor (day condition)	ß = 0.03 (max)
Relative luminance to white (night condition)	0% (minimum) 2% (max)
(e) Green Yellow boundary:	x = 0.313
White boundary:	y = 0.243 + 0.670x
Blue boundary:	y = 0.493 – 0.524x
Luminance factor:	β = 0.10 minimum (day conditions) 5% (minimum)

Relative luminance: to white (night conditions)	30% (maximum)

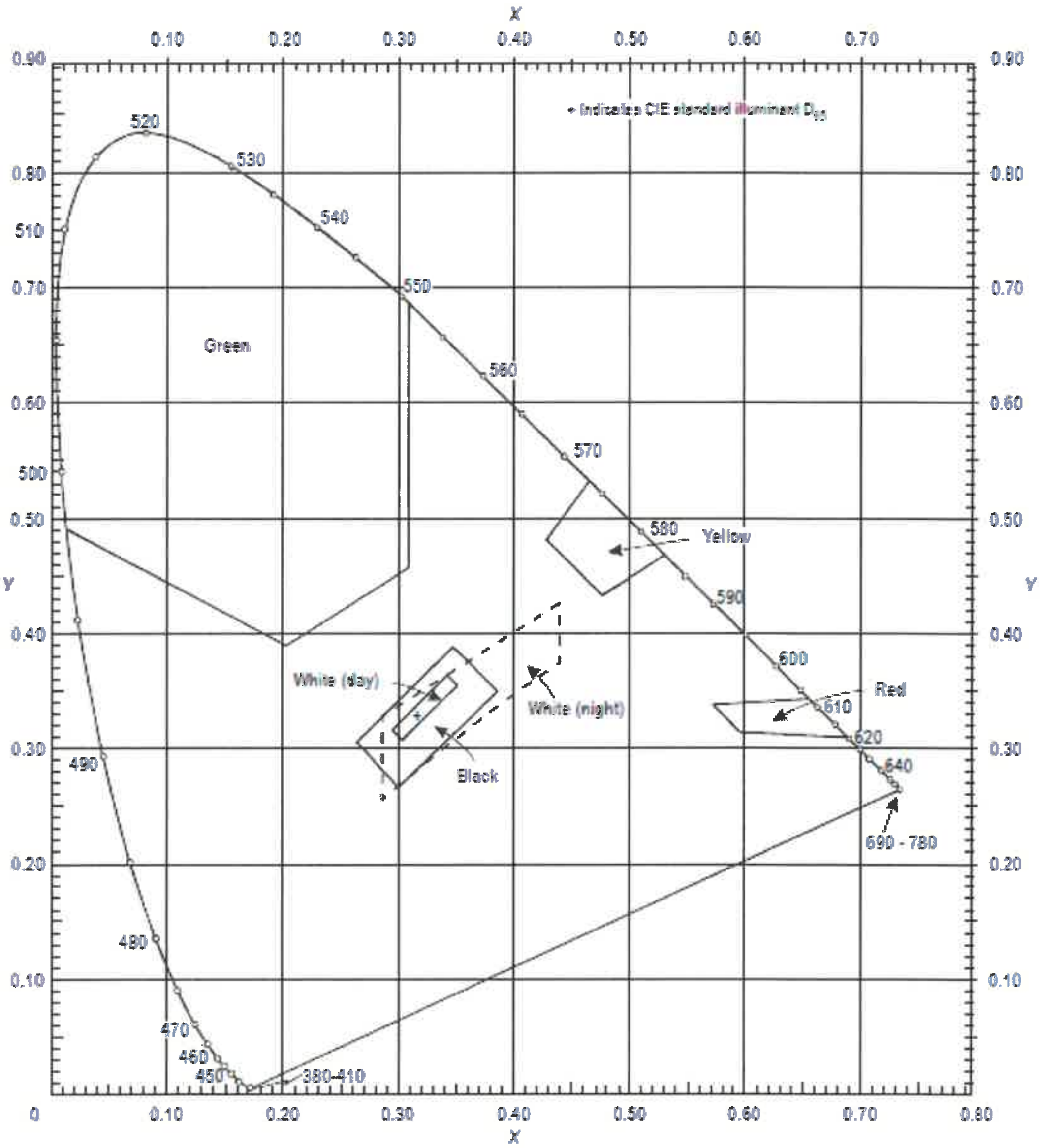


Figure A1-1. Colours of luminescent or transilluminated (internally illuminated) signs and panels”.”

(e) the substitution in technical standard 139.03.4 for subsection (3) of the following subsection:

"(3) The quality assurance system must be included in a heliport manual referred to in regulation 139.03.3."

(f) the insertion after technical standard 139.03.4 of the following technical standard:

"139.03.6 Heliport Emergency Response

1.Heliport emergency planning

(1) A heliport emergency plan shall be established commensurate with a helicopter operations and other activities conducted at a heliport.

(2) A heliport emergency plan shall identify agencies which may be of assistance in responding to an emergency at a heliport or in its vicinity.

(3) A heliport emergency plan shall provide for the coordination of the actions to be taken in the event of an emergency occurring at a heliport or in its vicinity.

(4) Where an approach or departure path at a heliport is located over water, a heliport emergency plan shall identify which agency is responsible for coordinating rescue in the event of a helicopter ditching and indicate how to contact that agency.

(5) A heliport emergency plan shall include the following information:

(a) the types of emergencies planned for;

(b) how to initiate a heliport emergency plan for each emergency specified;

(c) the name of agencies on and off a heliport to contact for each type of emergency with telephone numbers or other contact information;

(d) the role of each agency for each type of emergency;

(e) a list of pertinent on-heliport services available with telephone numbers or other contact formation;

(f) copies of any written agreements with other agencies for mutual aid and the provision of emergency services;

(g) a grid map of a heliport and its immediate vicinity indicating available water resources and other landmarks of significance;

(h) a grid map indicating a heliport and its surrounding up to a radius of 10 kilometer indicating the location of hospitals, clinics and road layout;

(i) provision for a fully equipped emergency operations centre and command post for each type of emergency which may be encountered.

(k) call out procedures for prompt response to emergencies planned for;

(l) a person involved in executing the allocated tasks;

(m) a description of all available rescue and medical equipment and the location of such equipment; and

(n) information on the particulars of personnel and person to be contacted in the case of a particular emergency.

(6) Agencies identified in the heliport emergency plan shall be consulted about their role in the heliport emergency plan.

(7) The heliport emergency plan shall 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.

(8) A test of the heliport emergency plan shall be carried out at least once every three years"."

(g) the substitution for technical standard 139.03.7 of the following technical standard:

"**139.03.7 Heliport rescue and firefighting**

1. Rescue and fire-fighting categories of heliport

1.1. Applicability

(1) Rescue and firefighting equipment and services shall be provided at helidecks and at elevated heliports located above occupied structures.

(2) A safety risk assessment shall be performed to determine the need for rescue and firefighting equipment and services at surface level heliport and elevated heliport located above unoccupied structures.

1.2. Level of protection provided

1.2.1. Practical critical area calculation where primary media is applied as a solid stream

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

Table 1: Heliport firefighting category

Category	Maximum fuselage length	Maximum fuselage width
H 0	up to but not including 8 m.	1.5 m
H 1	from 8 m up to but not including 12 m.	2 m
H 2	from 12 m up to but not including 16 m.	2.5 m
H 3	From 16 m up to 20 m	3 m

1.2.2. Practical critical area calculation where primary media is applied in a dispersed pattern

(1) For heliport, except helidecks, the practical critical area shall be based on an area contained within a heliport perimeter, which includes the TLOF, and to the extent that it is load-bearing, the critical area shall include the FaTo.

(2) For helidecks, the practical critical area shall be based on the largest circle capable of being accommodated within the TLOF perimeter.

1.3. Extinguishing agents

1.3.1. Surface level heliport with primary media applied as a solid stream using a portable foam application system (PFAS)

(1) Where a rescue and firefighting service is provided at a surface level heliport, the amount of primary media and complementary agents shall be in accordance with Table 2.

Table 2: Minimum usable amounts of extinguishing agents for surface level heliport

	Foam meeting level B performance		**Foam meeting level C performance**		**Complementary agents**	
Category	**Water (L)**	**Discharge rate foam solution /minute (L)**	**Water (L)**	**Discharge rate foam solution /minute (L)**	**Dry chemical powder (kg)**	**Gaseous media (kg)**
H 0	500	250	330	165	23	9
H 1	800	400	540	270	23	9
H 2	1200	600	800	400	45	18

H 3	1600	800	1100	550	90	36

1.3.2. Elevated heliport with primary media applied as a solid stream using a fixed foam application system (FFAS)

(1) Where a rescue and firefighting service is provided at an elevated heliport, the amount of foam media and complementary agents shall be in accordance with Table 3.

Table 3: Minimum usable amounts of extinguishing agents for elevated heliport

	Foam meeting level B performance		Foam meeting level C performance		Complementary agents	
Category	**Water (L)**	**Discharge rate foam solution /minute (L)**	**Water (L)**	**Discharge rate foam solution /minute (L)**	**Dry chemical powder (kg)**	**Gaseous media (kg)**
H 0	1250	250	825	165	23	9
H 1	20	400	13	270	45	18

	0 0		5 0			
H 2	3 0 0 0	600	2 0 0 0	400	45	18
H 3	4 0 0 0	800	2 7 5 0	550	90	36

1.3.3. Elevated heliport/ limited-sized surface level heliport with primary media applied in a dispersed pattern through a fixed foam application system (FFAS) – a solid plate heliport

(1) The amount of water required for foam production shall be predicated on the practical critical area (m^2) multiplied by the appropriate application rate (L/min/m^2), giving a discharge rate for foam solution (in L/min).

(2) The discharge rate shall be multiplied by the discharge duration to calculate the amount of water needed for foam production.

(3) The discharge duration shall be at least three minutes.

(4) Complementary media shall be in accordance with Table 3, for H2 operations.

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

(1) The amount of water required shall 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).

(2) The discharge rate shall be multiplied by the discharge duration to determine the total amount of water needed.

(3) The discharge duration shall be at least two minutes.

(4) Complementary media shall be in accordance with Table 3, for H2 operations.

1.3.5. 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

(1) The amount of water required for foam media production shall be predicated on the practical critical area (m^2) multiplied by the application rate ($L/min/m^2$) giving a discharge rate for foam solution (in L/min).

(2) The discharge rate shall be multiplied by the discharge duration to calculate the amount of water needed for foam production.

(3) The discharge duration shall be at least five minutes.

(4) Complementary media shall be in accordance with Table 3, H0 levels for helidecks up to and including 16m and to H1/H2 levels for helidecks greater than 16m and helidecks greater than 24m shall adopt H3 levels.

1.3.6. Purpose-built helidecks with primary media applied in a dispersed pattern through a fixed application system (FAS) – a passive fire-retarding surface with water-only DIFFS

(1) The amount of water required shall 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).

(2) The discharge rate shall be multiplied by the discharge duration to calculate the amount of water needed.

(3) The discharge duration shall be at least three minutes.

(4) Complementary media shall be in accordance with Table 3, to H0 levels for helidecks up to and including 16m and to H1/H2 levels for helidecks greater than 16m and helidecks greater than 24m shall adopt H3 levels.

2. Rescue equipment

(1) At an elevated heliport, rescue equipment shall be stored adjacent to a heliport.

(2) Rescue equipment for categories H0, H1, H2 and H3 shall be as specified in Table 4.

Table 4: Rescue equipment.

Equipment	Heliport category	
	H0, H1, H2 and H3	**H3**
Adjustable wrench	1	1
Bolt cutter 60 cm	1	1
Crowbar 105 cm	1	1
Rescue axe, non- wedge or aircraft type	1	1
Hook, grab or salving	1	1
Fire resistant blanket	1	1
Ladder, length appropriate to helicopter in use	1	1
Set of assorted screwdrivers	1	1
Harness knife complete with sheath	1	1
Fire resistant gloves	1 pair per firefighter	1 pair per firefighter
Power cutting tool	1	1
Pliers, side cutting	1	1
Lifeline 5 cm, 15 m in length	1	1
Hacksaw, heavy duty complete with 6 spare blades	1	1

3. Response time

(1) At surface level heliports, the operational objective of the rescue and firefighting response shall be to achieve response times not exceeding two minutes in optimum conditions of visibility and surface conditions.

(2) At elevated heliport, limited-sized surface level heliport and helidecks, the response time for the discharge of primary media at the required application rate shall be 15 seconds measured from system activation.

(3) If rescue and firefighting personnel are needed, they shall be immediately available on or in the vicinity of a heliport while a helicopter movements are taking place.

4. Rescue arrangements

(1) Rescue arrangements commensurate with the overall risk of a helicopter operation shall be provided at a heliport.

5. Communication and alerting system

(1) A suitable alerting or communication system shall be provided in accordance with the emergency response plan.

6. Personnel training standards

(1) The number of rescue and firefighting personnel shall be sufficient for the required task.

(2) Where provided, rescue and firefighting personnel shall be trained to perform their duties and maintain their competence.

(3) Rescue and firefighting personnel shall be provided with protective equipment.

(4) Rescue and firefighting personnel deployed at a heliport shall be in possession of at least a fire fighter 1, first aid level 2 and aircraft construction certificates obtained from accredited institutions.

(5) Rescue and firefighting personnel in a Fire Officer's position shall be in possession of a minimum of at least a Fire Fighter 2, first aid level 3 and aircraft construction certificates obtained from accredited institutions.

7. Means of escape

(1) Elevated heliport and helidecks shall be provided with a main access and at least one additional means of escape.

(2) Access points shall be located as far apart from each other.

8. Requirements and standards

(1) A holder of a heliport license shall continuously assess operations and personnel training standards at a heliport in relation to the rescue and firefighting, and during anticipated periods of reduced or increased activity capability.

(2) The level of protection shall be not less than needed for the highest category of a helicopter planned to use a heliport during that time, irrespective of the number of movements.

(3) A holder of the heliport license may, during any period of operations limited to a helicopter with a specification lower than that which is normally applicable under regulation139.03.7, reduce the rescue and fire-fighting capability to the appropriate level required for the heliport category referred to in TS 139.03.7, corresponding with the level of operation.

(4) Any reduction in the rescue and fire-fighting capability, shall be included in a heliport manual, such as –

(a) procedures for, and particulars of, the persons having the authority to implement the reduction; and

(b) procedures for recall of the full heliport rescue and fire-fighting capability.

(5) A reduction in the rescue and fire-fighting capability shall not be implemented unless information on the anticipated level of services is forwarded to the ATSU concerned and the Director, for the necessary publication of such information in an AIP.

(6) If the required response time cannot be met by rescue and fire-fighting services which are not based at a heliport, the holder of the license shall have a dedicated rescue and fire-fighting services based at the heliport in order to comply with the response time, and –

(a) introduce a system of preventative maintenance of such vehicles and equipment to ensure effectiveness and compliance with the required response time throughout the entire life of each vehicle; and

(b) immediately repair or replace any required rescue and fire fighting vehicle or equipment that becomes inoperative to the extent that a holder of the heliport license cannot meet the response capability with a vehicle or a piece of equipment which shall enable the holder of the heliport license to meet such capability.

(7) If the replacement of a vehicle or a piece of equipment is not immediately possible or available, a holder of the license shall –

(a) follow the procedure prescribed in regulation 139.03.9;

(b) if the required response time cannot be met within 72 hours, limit operations on a heliport equal to the category level of protection it can provide with the remainder of vehicles and equipment as determined in accordance with TS 139.03.7.

(8) A holder of the heliport license shall respond to each emergency during heliport operations with rescue and fire-fighting equipment suitable to limit loss of life and to prevent damage to property.".

(h) the insertion after technical standard 139.03.7 of the following technical standard:

139.03.8 ESTABLISHMENT OF HELIPORT ENVIRONMENTAL MANAGEMENT PROGRAMME

(1) The information referred to in regulation 139.03.8 which must be contained in the environmental management programme which include the following:

(a) human resources: A statement identifying human resources available for the implementation of the EMP.

(b) scope: The activities that are within the scope of the EMP.

(c) a Procedure for:

(i) the identification of environmental aspects and impact of the heliport operator's activities, services and products;

(ii) significance rating which details an assessment of each potential impact that heliport operator identifies that gives an overall indication of the implication of the impact; and

(iii) determination of any legal obligations.

(d) a register of the identified and rated environmental aspects and impacts that is kept up to date and reviewed annually to identify new aspects and remove any unnecessary items.

(e) the following is required for each EMP:

(i) objectives;

(ii) targets;

(iii) mitigation measures or action plans or procedures;

(iv) responsibilities;

(v) time frames to rectify all identified environmental impacts; and

(vi) continuous measurement and monitoring

(f) An operator shall ensure that, at a minimum, the EMPs consider management of environmental aspects resulting from:

(i) helicopter noise;

(ii) air quality in the vicinity of heliport;

(iii) use of ozone-depleting substances;

(iv) construction and expansion of airports or associated infrastructure or airports and associated infrastructure development projects;

(v) water and soil pollution in the vicinity of heliport;

(vi) energy use;

(vii) waste at heliport; and

(viii) environmental emergencies arising from accidents and incidents involving dangerous goods and hazardous materials”."

(i) the substitution for technical standard 139.03.19 of the following technical standard:

"139.03.19 GENERAL DUTIES OF HOLDER OF HELICOPTER LICENCE

1 Monitoring of helicopter noise

(1) Balanced approach to noise management

(a) The balanced approach to noise management shall consists of identifying the noise problem at a heliport and then analysing the various measures available to reduce noise through the exploration of four principal elements, namely reduction at source, land-use planning and management, noise abatement operational procedures and operating restrictions.

(b) Aircraft operating procedures for noise abatement shall not be introduced unless the regulatory authority, based on appropriate studies and consultation, determines that a noise problem exists.

(c) Aircraft operating procedures for noise abatement shall be developed in consultation with operators that use a heliport concerned. These procedures must be done in accordance with the requirements and standards contained in Chapter 6 of ICAO Doc 9829 and Section 7 of ICAO Doc 8168.

(d) The factors to be taken into consideration in the development of appropriate aircraft operating procedures for noise abatement shall include the following:

(i) the nature and extent of the noise problem including: the location of noise-sensitive areas; and critical hours;

(ii) the types of aircraft affected, including aircraft mass, heliport elevation, temperature considerations;

(iii) the types of procedures likely to be affective

(iv) obstacle clearances; and

(v) human performance in the application of the operating procedures.

(e) Land-use planning and management are the responsibility of national or local planning authorities. Guidance material which shall be used to assist planning authorities in taking appropriate measures to ensure compatible land-use management around heliport to the benefit of both the airport and the surrounding communities is contained in the ICAO Doc9184- Airport Planning Manual, Part 2.";

(j) the substitution for technical standard 139.03.26 of the following technical standard:

"139.03.26 ACCESS OF GROUND VEHICLES TO HELIPORT MOVEMENT AREA

1. Signs, signals or standards

(1) The signs, signals and standards prescribed in Chapter 9 of the National Road Traffic Regulations, 2000 shall apply with the changes required by the context to the use of all surface roads in a heliport movement area.

2. Rules of procedures for the operation of ground vehicles.

(1) The rules and procedures for the operation of ground vehicles in a heliport movement area are the rules and procedures prescribed in Chapter 10 of the National Road Traffic Regulations, 2000.".

(k) the substitution for technical standard 139.03.29 of the following technical standard:

"139.03.29 Heliport abandoned or closed.

(1) All markings of a closed heliport, such as FaTo or TLOF area, shall be obliterated.

(2) If it is impractical to obliterate markings, a white X shall be placed over the H, as illustrated in figure 1.

(3) The white X shall be large enough to ensure early pilot recognition that a heliport is closed.

(4) The windsock and other visual indications of an active heliport shall also be removed as indicated in figure1.

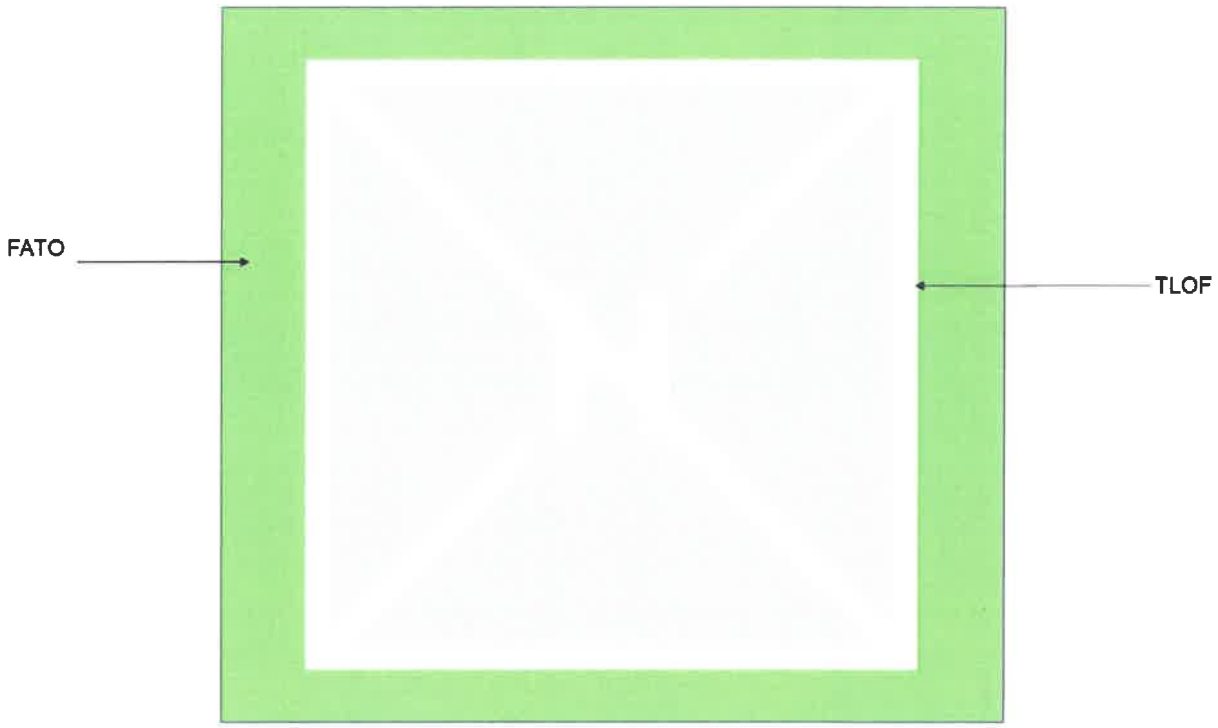


Figure 1. Closed Heliport;";

(l) the insertion after technical standard 139.03.29 of the following technical standard:

"**139.04.2 Helistop design standards**

1. Selection of approach and departure paths

(1) Approach and departure paths shall preferably be 180 degrees to permit a pilot to avoid downwind conditions and minimize crosswind operations.

(2) The preferred flight approach and departure path shall to the extent feasible, be aligned with the predominant wind direction, when this information is not available the separation between such flight path and the preferred flight path shall not be less than 135 degrees as shown in figure 1.

(3) In determining approach/ departure paths, it shall be necessary to consider the obstructions in the vicinity of the helistop and those likely to be a hazard to air navigation.

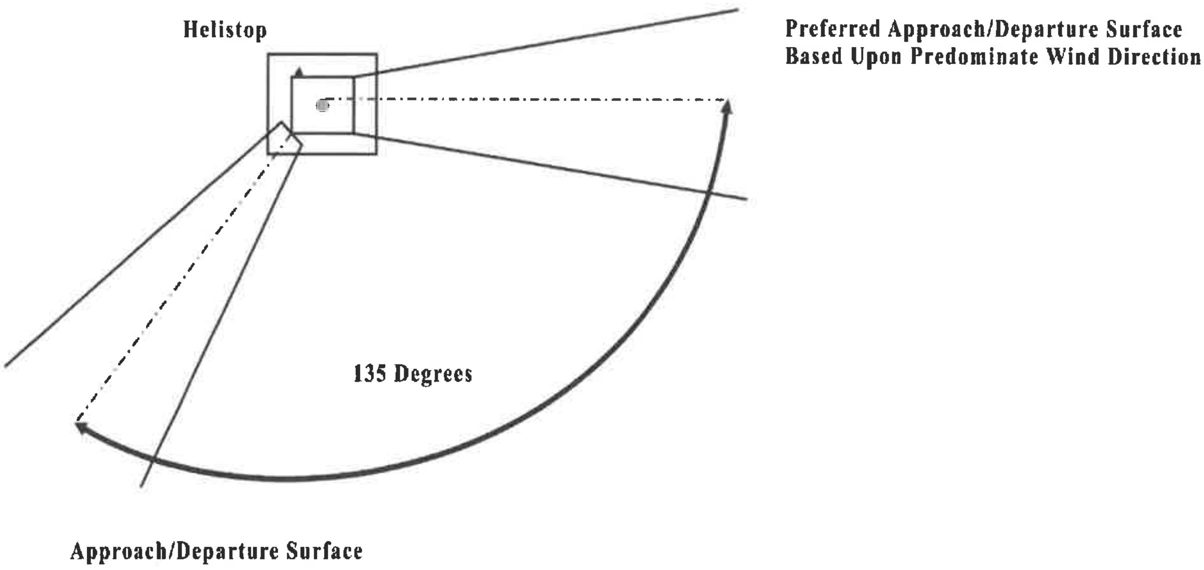


Figure 1: Separation between approach/departure paths

2. Slopes for approach, departure and transitional surfaces

(1) The slopes for approach and departure surfaces shall be as follows:

- (a) VFR day 1:8 or 12.5%; and
- (b) VFR night 1:15 or 6.7%

(2) The slope for transitional surfaces shall be as follows (refer to figure 2):

- (a) VFR day 1: 2 or 50% ; and
- (b) VFR night 1:4 or 25%.

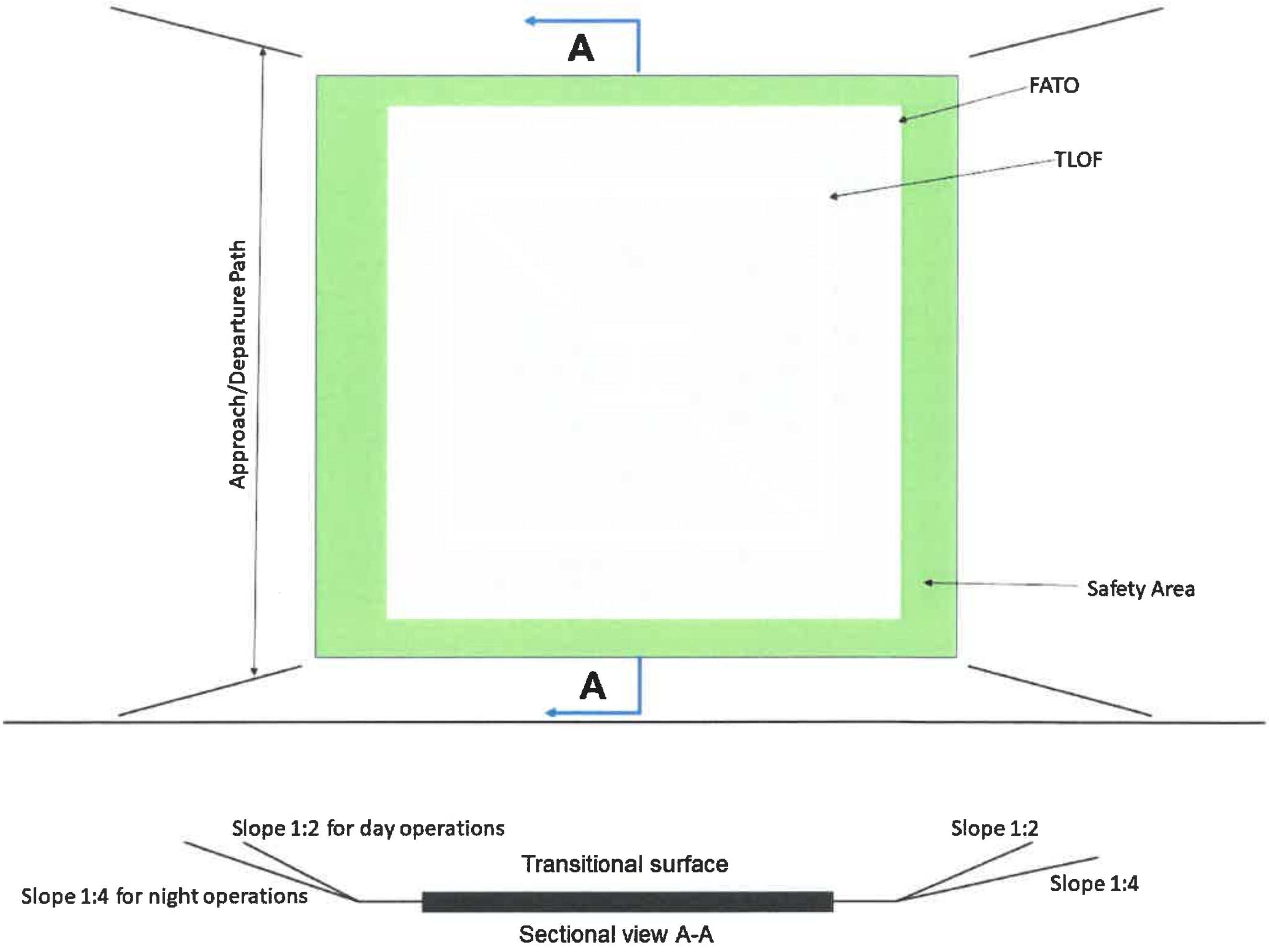


Figure 2. Obstacle restriction for transitional surfaces

3. Surface-level helistop

3.1. Touchdown and lift-off area (TLOF)

(1) A surface-level helistop shall be provided with a touchdown and lift off area.

(2) The entire TLOF shall be load bearing, preferably on a paved surface and shall be designed to withstand the dynamic loads of the heaviest helicopter.

(3) Pavements shall have a finish that provides a skid-resistant surface and a non- slippery footing for people.

(4) The minimum TLOF dimensions shall be 15m x 15m for a square or 15m diameter for a

circle but not less than 1.0 x the overall length (D) of the largest helicopter if the overall length is greater than 15m.

(5) Slopes on a TLOF area shall be sufficient to prevent accumulation of water on the surface of the area but shall not exceed 2% in any direction.

3.2. FaTo

(1) A surface-level helistop shall be provided with at least one final approach and take-off area.

(2) The minimum dimensions of a FaTo shall be 20m x 25m for an area in a form of a rectangle or 20m diameter for a circle but not less than 1.5 x the overall length(D) of the design helicopter.

(3) When the TLOF is marked, the FaTo outside the TLOF shall be capable of supporting the static loads of the design helicopter.

(4) When the TLOF is not marked and it is intended that a helicopter can land anywhere within the FaTo, the FaTo outside the TLOF and any FaTo supporting structure shall, like the TLOF, be capable of supporting the dynamic loads of the design helicopter.

3.3. Safety area

(1) The FaTo shall be surrounded by a safety area which need not be solid.

(2) The safety area shall be free of all obstacles except for small, frangible objects that, because of their function, must be located there.

(3) Objects whose function requires them to be located within the safety area shall not exceed a height of 25 cm.

(4) The safety area shall extend outwards from the periphery of the FaTo for a distance of at least 3m.

4. Elevated helistop

4.1. TLOF

(1) The specifications for a touchdown and lift-off area of an elevated Helistop shall be equally applicable to that of a surface level Helistop.

4.2. FaTo

(1) The specifications for a final approach and take off area of an elevated Helistop shall be equally applicable to that of a surface level Helistop.

4.3. Safety net

(1) Areas exposed on elevated structures or rooftops shall be secured on all sides with a safety net.

(2) The safety net shall not project above the level of the TLOF, it shall be installed in such a way that it does not create an obstacle to landing and departing helicopter.

(3) The safety net shall be designed such that it is able to protect a person having accidentally stepped over the edge.

(4) The safety net shall have a width of not less than 1.5 metres.

(5) The FaTo surface shall slope upwards and outwards at 1:4 with its outer edge not higher than the TLOF surface.

5. Windsock

(1) All approved Helistops shall be provided with at least one windsock.

(2) A windsock shall be located so that it provides the pilot with valid wind direction and speed information in the vicinity of the helistop under all wind conditions.

(3) The windsock shall provide the best possible colour contrast to its background.

(4) The windsock shall be located outside the safety area.

(5) For night operations, the windsock shall be internally or externally illuminated.

(6) The windsock shall be a truncated cone made of lightweight fabric and shall have the dimensions as specified in Table 1.

Table 1: Dimensions of a windsock

	Surface Level Helistop	Elevated Helistop
Windsock length	2 m	1.2m
Diameter(larger end)	0.6m	0.3m
Diameter(smaller end)	0.3m	0.15m

6. Helistop markings

6.1. Surfaced-level helistop markings

(1) A surface-level helistop shall be marked with a capital letter "H" placed horizontally in the centre of the touch-down area.

(2) The "H" shall be placed so that the parallel stems thereof are orientated with the most desirable direction for take-off and landing.

(3) The dimensions of the 'H' shall be the following:

(a) Height 3m

(b) Width 2m

(c) Width of stems 30cm

(4) The edges of the TLOF or FaTo area shall be marked with a solid line that is 30cm wide.

(5) A helistop intended for private use shall be marked with a white diagonal bar spanning about 45 degrees affixed within the touchdown area from the top right corner to the bottom left corner, interrupted 15cm from the "H" as indicated in figure 3 and figure 4.

(6) The colour used for this line shall be white and if so desired may be accentuated by a black outline in order to make it more conspicuous.

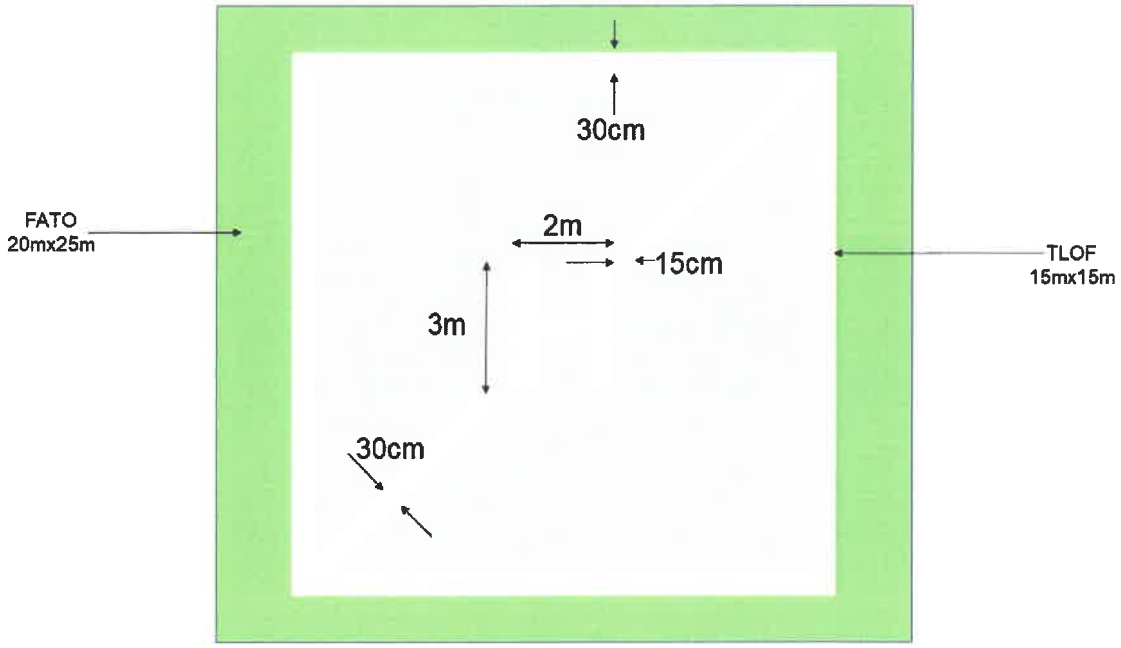


Figure 3. Surface level rectangular helistop markings

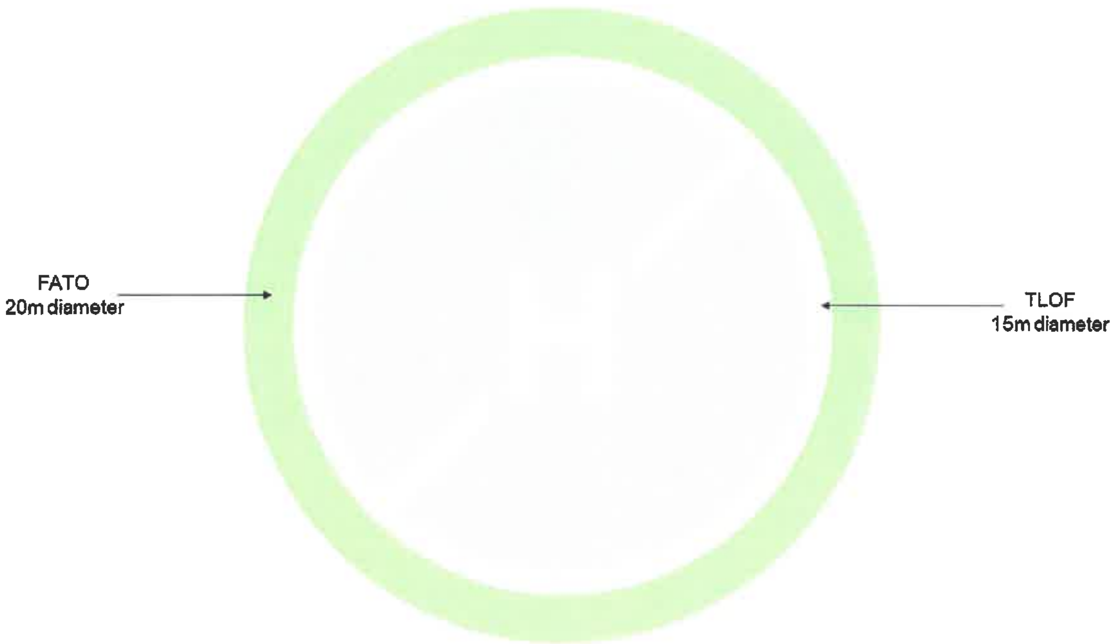


Figure 4. Surface level circular helistop markings

6.2. Elevated helistop markings

6.2.1. Restriction on rotor diameter marking

(1) If a restriction on rotor diameter is imposed on a helistop then this shall be indicated by a circled number indicating the maximum permissible rotor diameter in metres.

(2) The marking shall be affixed to the top left of the "H" viewed from the most preferred approach direction as indicated in figure 5 and figure 6.

(3) The size of the circle shall be at least two meters in diameter and the width of the band shall be 10cm wide.

6.2.2. Restriction on operational mass marking

(1) An elevated helistop shall indicate the operational mass restriction of a helicopter in accordance with the structure's strength.

(2) The elevated helistop shall be marked with figures indicating the maximum operational mass in metric tonnes, placed to the bottom right of the "H" and underlined with a bar 10cm wide as indicated in figure 5 and figurer 6.

(3) The height of the numbers and letters of the figures shall be as indicated in figure 7.

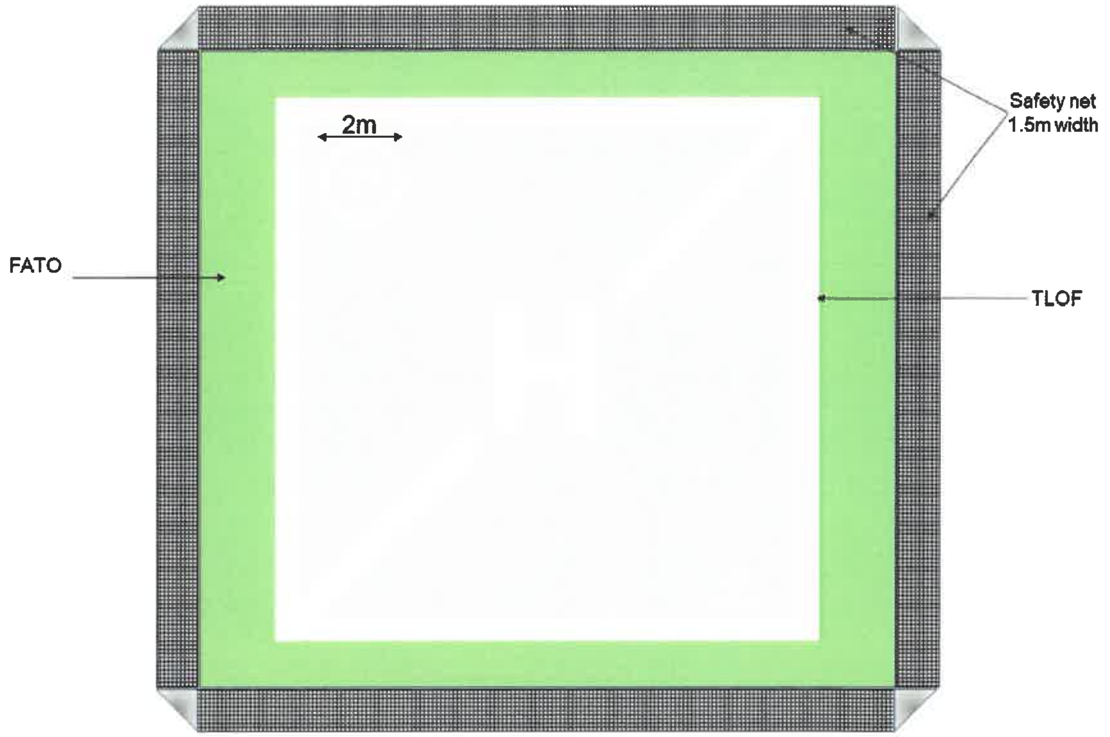


Figure 5. Elevated rectangular helistop markings

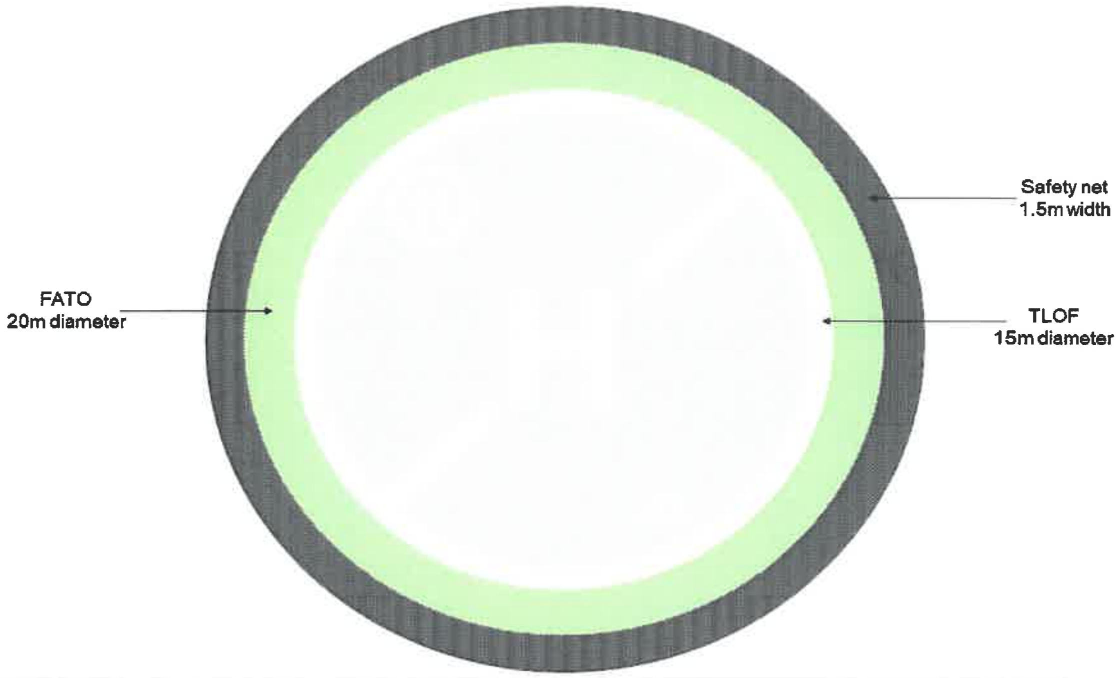
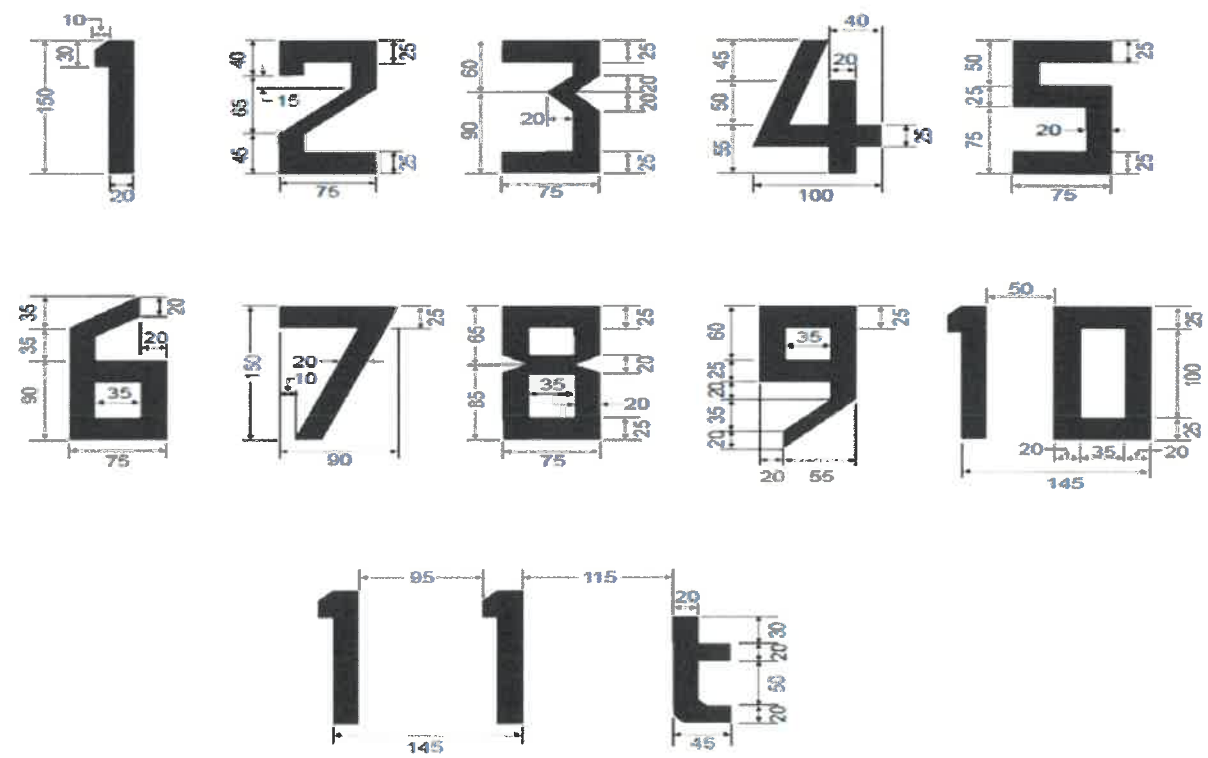


Figure 6. Elevated circular helistop markings



Note.— All units are expressed in centimetres.

Figure 7: Forms and proportions of numbers and letters

6.3. Hospital helistop markings

(1) A hospital helistop identification marking shall consist of a letter H, white in colour and a red cross, both positioned at the centre of the touchdown and lift off area.

(2) The white 'H' shall be superimposed over the red- cross and the stems of the 'H' shall be placed so that they are orientated with the most desirable direction for take-off and landing.

(3) The dimensions of the 'H' for a hospital helistop shall be equally applicable to that of a surface level helistop.

(4) The dimensions of the red- cross shall be as indicated as follows:

(a) Height 9m;

(b) Width 9m; and

(c) Width of bars 3m.

(5) The markings and specifications of a hospital helistop shall be as indicated in figure 8 and figure 9.

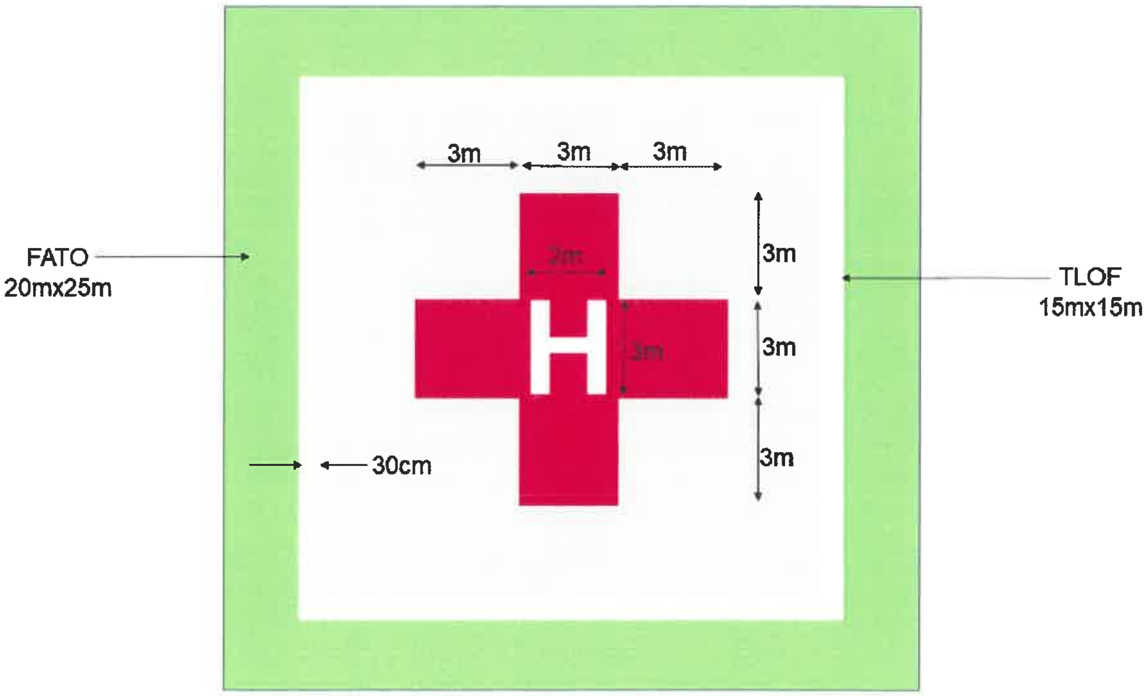


Figure 8. Surface level rectangular hospital helistop markings

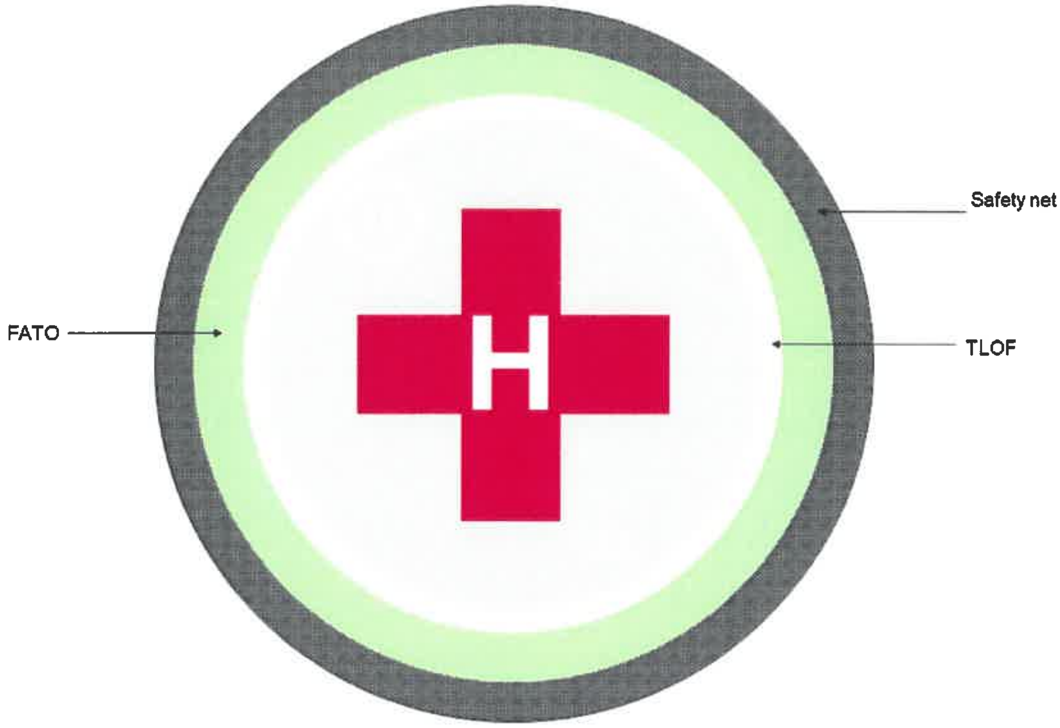


Figure 9. Elevated circular hospital helistop markings

7. Lighting aids for Helistops

7.1. TLOF area lighting

(1) A touchdown and lift off area lighting system shall be provided at a Helistop intended for use at night.

(2) For a TLOF area in a form of a square, there shall be a minimum of four lights on each side including a light at each corner, refer to figure 10.

(3) For a TLOF area in a form of a circle, there shall be a minimum of eight uniformly spaced lights, refer to figure 11.

(4) TLOF perimeter lights shall be fixed omnidirectional lights showing green.

(5) The lights shall be preferably inset when a light extending above the surface may endanger helicopter operations.

7.2. FaTo area lighting

(1) Where a FaTo is established at a Helistop intended for use at night, FaTo lights shall be provided.

(2) FaTo lights shall be placed along the edges and the lights shall be uniformly spaced as follows:

(a) for an area in the form of a rectangle, there shall be a minimum of four lights per side including a light at each corner, refer to figure 10; and

(b) for an area in a form of a circle, there shall be a minimum of 12 equally spaced lights, refer to figure 11.

(3) FaTo lights shall be fixed omnidirectional lights showing white, where the intensity of the lights is to be varied the lights shall show variable white.

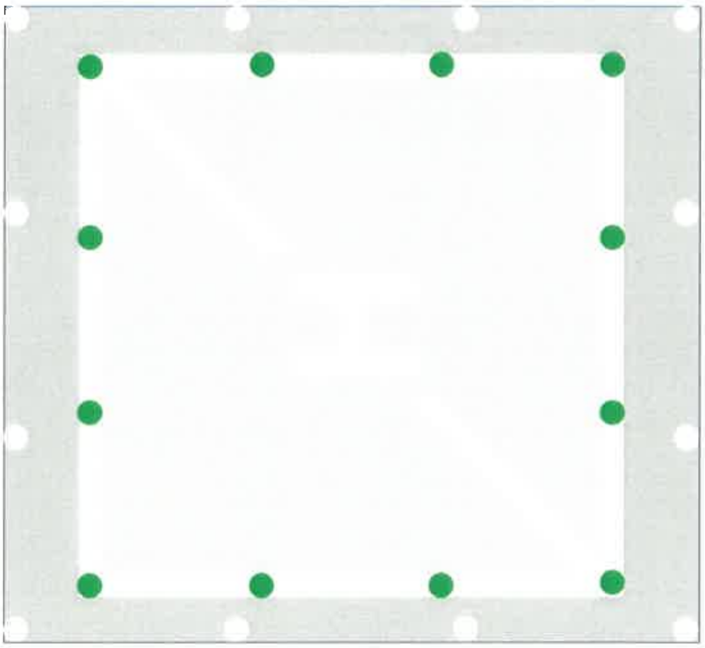


Figure 10. Layout of lighting aids for Helistops

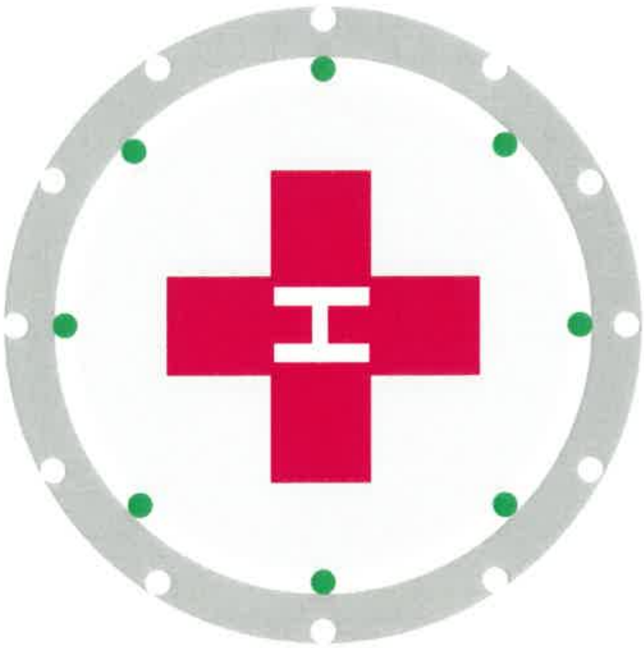


Figure 11. Layout of lighting aids for Helistops.

(m) the insertion after technical standard 139.04.2 of the following technical standards:

"139.04.12 Helistop abandoned or closed

(1) All markings of a closed helistop, such as FaTo or TLOF area shall be obliterated, the windsock and other visual aids indicating an active heliport shall be removed.

(2) If it is impractical to obliterate markings, a white X shall be placed over the H, refer to figure 1.

(3) The white X shall be large enough to ensure early pilot recognition that a helistop is closed.

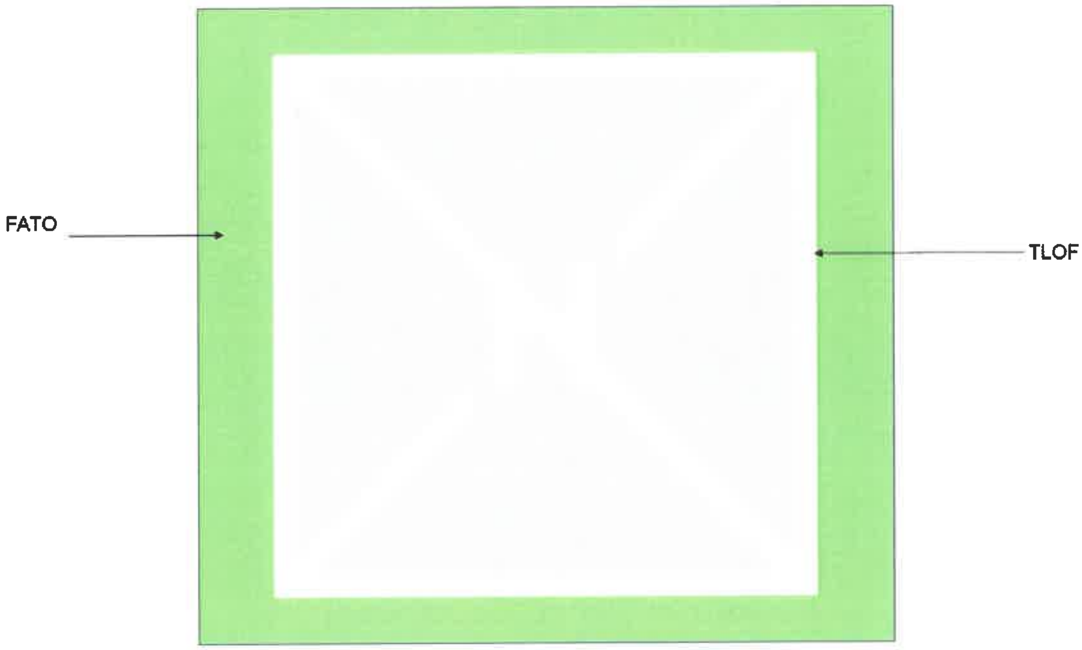


Figure 1. Closed helistop

139.04.13 Fire-Fighting Equipment

(1) At a surface level Helistop, an applicant shall provide fire extinguishers at the access point to a Helistop, commensurate with the level of operational risk.

(2) At an elevated Helistop, at least one hose spray line capable of delivering foam in a jet spray pattern at 250 L/min shall be provided.”.