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CERTIFICATION OF UN HELIPORTS FOR NIGHT OPERATIONS

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CONTENTS

1 PURPOSE

Requirements for certification of heliports for night time operations are established in this report.

2 INTRODUCTION

For strategic reasons, it is very important to increase the number of heliports certified for UN helicopter operations, as this enhances the efficiency of the UN Peacekeeping Missions. For instance, increased availability of certified heliports over a wider area on the field would enable improvements of the management of UN resources and the air transport activities. In particular, for the case of casualty evacuation (CASEVAC) involving injured military or civilian personnel where a threat to life or limb exists, or medical evacuations (MEDEVAC) of patients, a wider network of heliports is paramount, because it enables much faster and painless transfers of personnel to the first available levels of medical care. Hence, the chances of saving the lives of injured or seriously ill persons increase significantly. In any case, the heliports must meet critical requirements so essentially it is guaranteed the safety of the operations.

3 DEFINITIONS

Aircraft classification number (ACN)
A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category[1] (ICAO Annex 14, Vol. I).

Approach and landing phase — helicopters
That part of the flight from 300 m (1 000 ft) above the elevation of the FATO, if the flight is planned to exceed this height, or from the commencement of the descent in the other cases, to landing or to the balked landing point (ICAO Annex 6, Part III).

CASEVAC
Aerial[2] casualty evacuation involving injured military or civilian personnel where a threat to life or limb exists. This entails the movement of an injured or seriously ill person, usually to the first available level of medical care, by whatever available means and will usually involve the use of dedicated air resources available on a continuous 7/24 basis. Verification by a doctor or qualified medic is required (UN DFS Aviation Manual, Section V, To Chapter 03, Annex E).

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[1] The aircraft classification number is calculated with respect to the position of the center of gravity (CG) which yields the critical loading on the critical gear. Normally, the aftmost CG position appropriate to the maximum gross apron (ramp) mass is used to calculate the ACN. In exceptional cases the forwardmost CG position may result in the nose gear loading being more critical.
[2] A CASEVAC can also be performed by road when appropriate and patient condition permits.

Category A
With respect to helicopters, means a multi-engined helicopter designed with engine and system isolation features specified in Annex 8, Part IVB, and capable of operations using take-off and landing data scheduled under a critical engine failure concept which assures adequate designated surface area and adequate performance capability for continued safe flight or safe rejected take-off (ICAO Annex 6, Part III).

Category B
With respect to helicopters, means a single engine or multi-engined helicopter which does not meet Category A standards. Category B helicopters have no guaranteed capability to continue safe flight in the event of an engine failure, and a forced landing is assumed (ICAO Annex 6, Part III).

California Bearing Ratio (CBR)
The CBR is a penetration test for evaluation of the mechanical strength of road subgrades and base-courses. The test was developed by the Department of Transportation of the State of California[3].

D
The maximum dimension of the helicopter (ICAO Annex 6, Part III).

Defined point after take-off[4] (DPATO)
The point, within the take-off and initial climb phase, before which the helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required (ICAO Annex 6, Part III).

Defined point before landing[4] (DPBL)
The point, within the approach and landing phase, after which the helicopter's ability to continue the flight safely, with one engine inoperative, is not assured and a forced landing may be required (ICAO Annex 6, Part III).

Distance DR
Horizontal distance that the helicopter has travelled from the end of the take-off distance available (ICAO Annex 6, Part III).

Emergency evacuation
A flight conducted to preserve life or limb in case of civil and/or military unrest, or natural disaster (UN DFS Aviation Manual, Section V, To Chapter 03, Annex E).

Final approach and take-off area (FATO)
A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FATO is to be used by performance Class 1 helicopters, the defined area includes the rejected take-off area available (ICAO Annex 14, Vol. II).

[3] Department of Transportation of the State of California: http://www.dot.ca.gov/
[4] Defined points apply to helicopters operating in performance Class 2 only.

Helicopter[5]
A heavier-than-air aircraft supported in flight chiefly by the reactions of the air on one or more power-driven rotors on substantially vertical axes (ICAO Annex 6, Part III).

Helideck
A heliport located on a floating or fixed offshore structure (ICAO Annex 6, Part III).

Heliport
An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters (ICAO Annex 6, Part III).

Landing decision point (LDP)
The point[6] used in determining landing performance from which, a power-unit failure occurring at this point, the landing may be safely continued or a balked landing initiated (ICAO Annex 6, Part III).

Landing distance required (LDRH)
The horizontal distance required to land and come to a full stop from a point 15 m (50 ft) above the landing surface (ICAO Annex 6, Part III).

MEDEVAC
Medical evacuations of patients, from one facility to another, that do not constitute an emergency. This type of evacuation is considered as an administrative move. The use of dedicated air resources assigned for emergencies is not required. Essentially the transportation is provided for a patient under stable conditions, and may or may not be accompanied by a doctor. MEDEVACs do not require air resources[7] assigned on 7/24 stand by status and are normally requested by a doctor (UN DFS Aviation Manual, Section V, To Chapter 03, Annex E).

Night
The hours between the end of evening civil twilight (last light) and the beginning of morning civil twilight (first light) or such other period between sunset and sunrise, as prescribed by the appropriate authority (ICAO Annex 6, Part III)[8]. If night has not been prescribed, for the purpose of DPKO air operations, last light and first light are defined as follows (UN DFS Aviation Manual, Section V, To Chapter 03, Annex O):

a) Last Light: In the latitudes between the Tropics of Cancer and Capricorn, local sunset plus 15 minutes; in the latitudes north of the Tropic of Cancer and South of the Tropic of Capricorn, local sunset plus 30 minutes; and
b) First Light: In the latitudes between the Tropics of Cancer and Capricorn, local sunrise minus 15 minutes; in the latitudes north of the Tropic of Cancer and South of the Tropic of Capricorn, local sunrise minus 30 minutes.

[5] Some States use the term “rotorcraft” as an alternative to “helicopter”.
[6] LDP applies only to helicopters operating in performance Class 1.
[7] A MEDEVAC can also be performed by road when appropriate and patient condition permits.
[8] According to FAA Rotorcraft Flying Handbook 8083-21, the night is defined as the time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the American Air Almanac.

Obstacle[9]

a) For the purpose of the obstacle clearance requirements, an obstacle shall be considered if its lateral distance from the nearest point on the surface below the intended flight path (either for take-off climb or approach) is not further than half of the minimum width of the FATO (or the equivalent term used in the helicopter flight manual) defined in the helicopter flight manual (or when no width is defined, 0.75 D), plus 0.25 times D (or 3 m, whichever is greater), plus 0.15 DR (ICAO Annex 6, Part III).
b) For a take-off using a backup take-off procedure (or with lateral transition), for the purpose of the obstacle clearance requirements, an obstacle located below the backup flight path (lateral flight path) shall be considered if its lateral distance from the nearest point on the surface below the intended flight path is not further than half of the minimum width of the FATO (or the equivalent term used in helicopter flight manual) defined in the helicopter flight manual (when no width is defined, 0.75 D plus 0.25 times D, or 3 m, whichever is greater) plus 0.15 distance travelled from the back edge of the FATO (ICAO Annex 6, Part III).
c) Obstacles may be disregarded if the lateral distance from the nearest point on the surface below the intended flight path (either for take-off climb or approach) is beyond:
    i. 10R for night operations if it is assured that navigational accuracy can be achieved by reference to suitable visual cues during the climb; or
    ii. 900 m in the other cases (ICAO Annex 6, Part III).

Pavement classification number (PCN)
A number expressing the bearing strength of a pavement for unrestricted operations (ICAO Annex 14, Vol. I).

Touch-down and lift-off area (TLOF)
A load bearing area on which a helicopter may touch down or lift off (ICAO Annex 14, Vol. II).

Take-off and initial climb phase
That part of the flight from the start of take-off to 300 m (1 000 ft) above the elevation of the FATO, if the flight is planned to exceed this height, or to the end of the climb in the other cases (ICAO Annex 6, Part III).

Take-off decision point (TDP)
The point[10] used in determining take-off performance from which, a power-unit failure occurring at this point, either a rejected take-off may be made or a take-off safely continued (ICAO Annex 6, Part III).

R
Helicopter rotor radius (ICAO Annex 6, Part III).

Rejected take-off distance required (RTODR)
The horizontal distance required from the start of the take-off to the point where the helicopter comes to a full stop following a power-unit failure and rejection of the take-off at the take-off decision point (ICAO Annex 6, Part III).

[9] See lateral and top views of obstacle limitation surfaces and obstacles in Fig. 8, Fig. 9 and Fig. 10.
[10] TDP applies only to helicopters operating in performance Class 1.

Take-off distance required (TODRH)

The horizontal distance required from the start of the take-off to the point at which VTOSS, a selected height and a positive climb gradient are achieved, following failure of the critical power-unit being recognized at TDP, the remaining power-units operating within approved operating limits (ICAO Annex 6, Part III).

Visual Flight Rules (VFR)

Visual Meteorological Conditions (VMC)

Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling (as defined in ICAO Annex 2, Chapter 4), equal to or better than specified minima (ICAO Annex 6, Part III).

4 ASSUMPTIONS & COMMENTS

To elaborate this document it was presumed the following:

1. The target heliports to be certified are of surface-level type, so none of them is a helideck or an elevated heliport (on the roof of a building), for example.

2. Although this document is thought for certification of heliports for night operations particularly, the heliports are intended for use during both daytime and night time. Thus, the proposed certification requirements will always be based in the most demanding amongst the existing requirements for daytime and night time operations.

3. The critical operation for which it is intended to certify the target heliports is a night CASEVAC/MEDEVAC[11] under VFR (non-instrument procedures). The operation is considered to be ideally of performance Class 1 (see Section 7 for further information). In principle, the operating helicopter does not park or stay overnight at the destination heliport (the one to be certified), but departs as soon as possible after boarding of casualties. There are no taxiing phases in the destination heliport either, unless it is completely necessary because of the particular features of the heliport. This definition of the critical operation does not intend to narrow the scope of this study or to limit its applicability, but is used as a tool to:
    a. help the reader realize the most demanding operations that might be performed in the target heliports; and
    b. enable the selection of the most demanding requirements for certification, such that an heliport that is compliant with these requirements is also valid for less demanding operations.

[11] According to the UN DFS Aviation Manual, Section V, To Chapter 03, Annex E, once it has been decided that an evacuation by air is to be conducted, a risk assessment must be accomplished to insure that the risks involved are understood and the level of risk is within acceptable safety parameters.

4. The proposed requirements to certify the target heliports are based in a wide set of applicable documentation. To prioritize the requirements, the criteria that are taken in consideration are the UN DFS's Aviation Regulatory Regime and the level of demand and actuality. Next follows the hierarchy stated by the mentioned regime from highest to lowest priority:
    a. ICAO SARPS;
    b. regulations of the CAA of the state:
        i. for civil aircraft operations: EASA and FAA; and
        ii. for military operations: MOT (national directives of TCC);
    c. UN AVSTADS[12] (DPKO & WFP) for peacekeeping and humanitarian air transport operations;
    d. UN DFS Aviation Manual; and
    e. Missions' SOPs[13].

5. The target heliports are not simply remote HLS (also called tactical, temporal or non-permanent heliports). In case the heliport to be certified is simply a remote HLS, the requirements stated in the UN DFS Aviation Manual apply (see Section V, To Chapter 03, Annex Q: Remote HLS or quotes in Annex C of this report).

6. The target heliports are not permanent use helipads as defined by ICAO (also called regular schedule heliports). In case the heliport to be certified falls in this category, it would have to meet ICAO requirements, as stated in the UN DFS Aviation Manual (see Section V, To Chapter 03, Annex Q: Remote HLS or quotes in Annex C of this report).

7. The FATO and TLOF areas of the target heliports are not necessarily coincidental, but it is likely that the TLOF area will be included within the FATO area[14].

8. The target heliports are not required to have any taxiway, air taxiway or air transit route[14].

9. The inspector in charge of the heliport certification is the designated mission's ATO. It is assumed that this officer has appropriate skills and expertise to understand the proposed

[12] According to the UN DFS Aviation Manual, Section II, Chapter 02, the AVSTADS are a set of standards that were developed pursuant to specific recommendations issued by ICAO to DPKO and WFP during their review of UN air operations to facilitate interoperability. These standards shall apply to all persons or organizations operating and/or maintaining civil registered aircraft operating for and/or on behalf of the UN.

[13] According to the UN DFS Aviation Manual, Section III, Chapter 11, each Mission with aviation assets will develop an Aviation SOP. This Aviation SOP may be part of the Mission SOP or a stand-alone document. The Aviation SOP will state how the Aviation Section will implement ICAO SARPS, national CAA rules and regulations, TCC Military Directives and the requirements contained in the UN DFS Aviation Manual.

[14] These characteristics are typical of the simplest and smallest heliport configurations. It is likely that a big part of the target heliports will be very simple and/or small and thus will feature these characteristics. In any case, these considerations do not mean that heliports with other configurations are excluded from the scope of this study and of the certification process.

requirements and to correctly evaluate the degree to which the heliport is compliant[15]. Nevertheless, it is worth recalling that the UN can request technical certification support services from ICAO experts (UN General Assembly Document A/63/696).

10. The operations in the target heliports are compliant with all applicable operational requirements stated in the UN DFS Aviation Manual, ICAO Annex 6, Part III and provisions issued by the local CAA (see sample quotes from these documents in Annex C).

11. The slope of the obstacle limitation surfaces is 7% (see lateral view of these surfaces in Fig. 3). This is considered to be the most convenient as it is the most restrictive slope according to the reviewed documentation[16].

5 REFERENCE DOCUMENTATION

The applicable reference documentation for this study is presented in this section. This body consists of a series of norms, regulations, recommendations and other reference documents.

5.1 NORMS & REGULATIONS

Next follows a list including the essential AIPs and local regulations that are applicable to and considered in this study[17]:

1. No AIP has been issued by Chad's Directorate of Civil Aeronautics by July 2009[18]. Instead, the following documents were considered:
    a. 14 GEN 1-6-01 – Summary of national regulations and international agreements or conventions[19]; and

[15] According to the UN DFS Aviation Manual, Section II, Chapter 10, Airfield/Air Terminal functions within DPKO fall under the authority of the Mission's Chief Aviation Officer (CAVO) and are implemented by the designated mission's Airfield/Air Terminal Officer (ATO), belonging to the Airfield/Air Terminal Unit (ATU). The establishment and survey of Helicopter Landing Sites (HLS) is one of the ATO's tasks, as well as dispatching licenses.

[16] According to a reference document by the UN DFS Engineering Section, the take-off climb and approach surfaces have a gradient (slope) of 8:1 (12.5%) from the edge of the FATO area. According to the UN DFS Aviation Manual, the slope of the obstacle protection surfaces for night operations should be 7%. The latter slope is considered to be the more convenient since it is the most restrictive.

[17] According to the UN DFS Aviation Manual, Section II, Chapter 10, all the necessary aeronautical information will be provided to crews by ATU: IFR Procedures Charts, NOTAM, AIP, weather forecast and aeronautical assets of each destination: airfields, airports, HLS. Thus, the corresponding ATU can provide the reader with the local AIPs and other useful information. Some documentation may also be found on the internet.

[18] Periodic checks should be conducted to verify whether Chad's Directorate of Civil Aeronautics issues an AIP for Chad and whether the Democratic Republic of the Congo's CAA issues an AIP for DRC.

    b. 14 GEN 1-7-01 – Differences from ICAO SARPS[19].

2. No AIP has been issued by the Democratic Republic of the Congo's CAA by July 2009[18]. Instead, the following document was considered:
    a. 5 GEN 1-6-01 – Summary of national regulations and international agreements or conventions[19].
3. AIP of the Republic of Sudan.

5.2 RECOMMENDATIONS

The following recommendations are not compulsory for all countries, but they are guidelines and procedures widely accepted. They are only compulsory wherever there is a body of law that enforces them. These recommendations are mainly extracted from ICAO publications (i.e. SARPS). Next follows a list of documents with recommendations that apply to this study:

1. ICAO Annex 6, Part III: International Operations – Helicopters;
2. ICAO Annex 8, Part IV: Helicopters;
3. ICAO Annex 9 Facilitation;
4. ICAO Annex 14, Volume I: Aerodromes and Volume II: Heliports;
5. ICAO Circular 048 Helicopter Operations;
6. ICAO Doc 9157 Aerodrome Design Manual; and
7. ICAO Doc 9261 Heliport Manual[20].

5.3 OTHER REFERENCE DOCUMENTS

These are specific reports or documents particularly interesting. They are not compulsory for countries but are well-renamed and accounted commonly as reference guidelines and manuals. Most of them are publications of the FAA and reference documents issued by the UN:

1. ASECNA Aeronautical Information Manual;
2. Aviation SOP[21] of:
    a. MINURCAT: this particular SOP was not considered since it is being developed;
    b. MONUC[22]; and

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[19] These documents were downloaded from: http://www.ais-asecna.org/en/index.htm. AIS-ASECNA provides aeronautical information on several African countries. EUROCONTROL links to ASECNA as AIS for certain African countries.

[20] The provisions relating to helicopter operations of some documents, for example, ICAO Annex 6, Part III, may be somewhat different from those listed in other documents like ICAO Annex 14, Vol. II, or Doc 9261 Heliport Manual. In such cases, the most demanding requirements apply.

[21] The Mission SOPs should also reflect for each mission the particularities related to the corresponding scenario of operations (e.g. regulations issued by the local CAA, the national AIP, if existing, or the alternative applicable documentation, if the AIP does not exist, etc.).

   c. UNMIS[22].
3. FAA Advisory Circular AC 00-59;
4. FAA Advisory Circular AC 90-66A;
5. FAA Advisory Circular AC 150/5390-2A;
6. FAA Part 91 — General Operating & Flight Rules
7. FAA Rotorcraft Flying Handbook 8083-21;
8. UN AVSTADS (DPKO & WFP) for peacekeeping and humanitarian air transport operations;
9. UN contracts:
   a. Contract No. PD/C0316/04 – Provision of Mobile Airfield Landing Lighting Equipment; and
   b. Contract No. PD/C0133/07 – Provision of Lighted & Unlighted Windsock Assembly & Helipad Emergency Landing Site Lighting.
10. UN DFS Aviation Manual;
11. UN documents issued by the UN DFS Engineering Section;
12. UN General Assembly Document A/63/696; and
13. US Army Corps of Engineers Technical Letter No. 1110-3-486: Engineering and design: Army Airfield/Heliport Pavement Design.

[22] These SOPs were not reviewed in-depth since priority was given to other documents and according to the UN DFS Aviation Manual they should be compliant with other documents that were reviewed.

6 HELICOPTERS

The UN uses a myriad of helicopters in its various missions, for example: Bell 212, Eurocopter Puma, Mi-8, Mi-17, Mi-26 and UH-H1. It is considered convenient to define a reference or representative helicopter among these, and also to identify the critical helicopter that might be using the heliports. The selection of these helicopters does not intend to narrow the scope of the study or to limit its applicability, but they are used in several occasions as case examples to facilitate the understanding of some requirements.

6.1 SAMPLE HELICOPTER

The selected sample helicopter is the MIL Mi-8 (see Fig. 1). The reasons for selecting this helicopter are the following:

1. the MIL Mi-8T (which is derived from the Mi-8) is an helicopter capable of performing night operations in some UN Peace Missions; and

2. the MIL Mi-8 is a medium twin-turbine helicopter with representative performances for its category, and it is widely present in the UN helicopter fleet.

The specification of a sample helicopter is intended to help the reader realize the type of helicopters that are likely to be operating in the target heliports most of the time. The characteristics of the sample helicopter are listed in Table 1 (ICAO Doc 9261 Heliport Manual).

Table 1 Specifications of the helicopter MIL Mi-8.

Specifications of MIL Mi-8	
Company	MIL
Model	Mi-8
Rotor diameter	21.29 m
Total length	25.24 m
Fuselage length	8.17 m
Fuselage width	2.50 m
Height	5.65 m
Width of rear landing gear	4.50 m
Basis of wheels	4.26 m
Maximum take-off weight	12 000 Kg
Engines	2
Crew	2
Passengers	24 / 26
Fuel capacity	1 870 litres

Fig. 1 Helicopter MIL Mi-8.

6.2 CRITICAL HELICOPTER

The critical helicopter for heliport design purposes (especially those concerning dimensions of airfield areas) is the largest helicopter that the heliport is intended to serve, since it imposes the most demanding constraints. The selected critical helicopter is the MIL Mi-26 (see Fig. 2), the largest in the UN helicopter fleet. The specification of the critical helicopter is intended to help the reader realize the features of the largest helicopter that might operate in the target heliports eventually. Nevertheless, it should be noted that the MIL Mi-26 is mostly used for strategic purposes (e.g. transport of large loads) and not for night operations, so this helicopter should not perform any CASEVAC/MEDEVAC operation unless completely necessary. A list of the characteristics of the critical helicopter is presented in Table 2 (Jane's All The World's Aircraft).

Table 2 Specifications of the helicopter MIL Mi-26.

Specifications of MIL Mi-26	
Company	MIL
Model	Mi-26
Rotor diameter	32.00 m
Total length	40.00 m
Fuselage length	33.50 m
Fuselage width	3.12 m
Height	8.15 m
Maximum take-off weight	56 000 Kg
Engines	2
Crew	5
Passengers	80 / 90
Fuel capacity	11 900 litres

Fig. 2 Helicopter MIL Mi-26.

7 PERFORMANCE CLASS SELECTION

The considerations in this section are derived from ICAO Annex 6, Part III[23]. Detailed definitions of helicopter performance Classes can be found in Annex A. In this study, it is considered that the operations in the target heliports are ideally of performance Class 1, for these reasons:

1. the requirements for performance Class 1 operations are the most demanding in a major part of the cases;

2. the helicopters from the UN fleet that will operate in the target heliports are most likely twin-engine helicopters (not single-engine) and, as a preliminary assessment, a twin-engine helicopter under normal conditions is generally able to operate in performance Class 1 or 2;

3. the operations might take place in a congested hostile environment and, except as permitted by the appropriate authority, take-off or landing from/to heliports in a congested hostile environment shall only be conducted in performance Class 1, while operations in performance Class 3 shall only be conducted in a non-hostile environment; and

4. according to ICAO Annex 6, Part III, performance Class 3 operations (which involve usually single-engine helicopters) shall not be performed at night[24].

[23] Particularly, within this annex, it is considered more convenient to take into account provisions stated at Section II. International Commercial Air Transport, rather than the ones stated at Section III. International General Aviation, although all the latter provisions were also reviewed to elaborate this document.
[24] This provision is taken from ICAO Annex 6, Part III, Section III. International General Aviation.

Nevertheless, we must bear in mind that the performance Class depends on the particular helicopter and the local conditions, such as elevation and temperature. These parameters cannot be known on beforehand in this study and might change for each particular case. In order to establish the performance Class, it would be necessary to assess the performances of the particular helicopter and the local conditions at the destination heliport prior to each flight.

8 CERTIFICATION REQUIREMENTS

The in-situ verification of all applicable requirements derived from all the standards and recommended practices stated in the wide reference documentation would imply a complex, time consuming certification process. To minimize the problems arising from the large volume of reference documentation, special effort has been devoted to synthesize the information provided in this documentation. Thus, the proposed requirements for certification of heliports for night operations are the result of a process of selection, simplification and integration (when possible) of the applicable norms, regulations and recommendations from the reference documentation.

The criterion for the selection of the proposed requirements is a trade solution between adequate safety for sustained UN operations (like the critical operation previously defined in Section 4) and flexibility enough to allow a significant number of heliports to be certified, and thus increase the UN heliport network. Whenever non-matching recommendations were found in different documents, first priority was given to the more demanding and more updated requirements, when reasonable. The UN DFS's Aviation Regulatory Regime hierarchy was also considered.

The level of demand of the requirements proposed in this document lies between two particular categories named in the UN DFS Aviation Manual. For heliports that fall in these categories, the level of demand and provisions are as follows:

1. remote HLS (also called tactical, temporal or non-permanent heliports): less demanding requirements apply since the heliport must only meet the requirements stated in the UN DFS Aviation Manual, Section V, To Chapter 03, Annex Q: Remote HLS; and

2. permanent use helipads as defined by ICAO (also called regular schedule heliports): more demanding requirements apply since the heliport must meet all ICAO requirements.

Finally, the proposed requirements are presented in two separate certification phases or sets of requirements according to their priority, from highest to lowest:

1. Certification Phase 1: this is a list with the minimum essential requirements for performing night helicopter operations safely (these provisions include -but are not limited to- the requirements for remote HLS stated in the UN DFS Aviation Manual); and

2. Certification Phase 2: building on the previous Phase 1, this set contains requirements that are not so essential for safety but that are advisable to meet in the medium- or long-term. This set of requirements might be useful to define the future needs of the heliport and to plan future investments.

8.1 CERTIFICATION PHASE 1

1. The heliport shall be located far enough of large buildings[25], elevated terrain, large chimneys[26], power lines and big ship channels or anchorages[27], in the case of waterfront heliports. In particular, lateral distance from these obstacles to the nearest point on the surface below the intended flight path (during both take-off climb and approach) shall be beyond:
   a) 10R for night operations if it is assured that navigational accuracy can be achieved by reference to suitable visual cues during the climb; or
   b) 900 m in the other cases.

2. The heliport shall be provided with at least one FATO.

3. The dimensions[28] of the FATO[29] shall be as prescribed in the helicopter flight manual except that, in the absence of width specifications, the width shall be not less than 1.5 times[30] the over-all length/width, whichever is greater, of the longest/widest helicopter the heliport is intended to serve. As an example, the dimensions of a rectangular-shaped FATO are given:
   a) for the reference helicopter (MIL Mi-8):
      i. the width shall be not less than 38 m; and
      ii. the length shall be not less than 114 m[29].
   b) for the critical helicopter (the largest, Mi-26):
      i. the width shall be not less than 60 m; and
      ii. the length shall be not less than 180 m[29].

[25] According to ICAO Doc 9261 Heliport Manual, large buildings can be the cause of considerable turbulence and eddies that might adversely affect the command or the performance of helicopters operating in the heliport.
[26] According to ICAO Doc 9261 Heliport Manual, the heat generated by large chimneys below or in the vicinity of the flight paths may adversely affect the performance of the helicopter during approaches to landing or during climb after take-off.
[27] According to ICAO Doc 9261 Heliport Manual, the masts of such ships will be a hazard at night and in poor visibility perception.
[28] Local conditions, such as elevation and temperature, may need to be considered when determining the size of a FATO. Further guidance is given in the ICAO Doc 9261 Heliport Manual.
[29] According to ICAO Circular 048 Helicopter Operations, although theoretically a helicopter can alight in an area only slightly larger than is swept by its rotors, in practice a margin should be allowed for clearance. According to the UN DFS Aviation Manual, helicopters generally will not take-off or land vertically and the ideal FATO is a flat strip 30.5 m wide and 91.5 m long. Summarizing, a greater margin has to be allowed in the longitudinal direction of the FATO area. In this study, the length of the FATO has been chosen to be 3 times the width. It might be worth to consider 30.5 m x 91.5 m as the minimum acceptable size for the FATO.
[30] According to the UN DFS Aviation Manual, the FATO should be at least a circular area with a diameter equal to twice the overall length of the helicopter, when the rotors(s) are turning.

4. The over-all slope in any direction on the FATO area shall not exceed 3%[31] and no portion of the FATO area shall have a local slope exceeding 5%[31].

5. The surface of the FATO area shall:
   a) be firm and well drained, regardless it is natural or artificial, to prevent helicopters from bogging down or creating excessive dust;
   b) be resistant to the effects of rotor downwash;
   c) be free of tall dry grass and shrubs to prevent possible damage to the tail rotor;
   d) be free of loose material (e.g. debris or stones) which could be caught in the rotor down-wash;
   e) be free of irregularities (i.e. sufficiently smooth, free of ruts and other unevenness, tree stumps should be less than 30 cm high);
   f) have bearing strength sufficient to withstand the static loading imposed by the heaviest helicopter when parked at the heliport (see Section 9.2); and
   g) for a rejected take-off and emergency or badly controlled landing, have bearing strength sufficient to withstand this dynamic loading imposed by the heaviest helicopter (i.e. the surface shall be strong enough to withstand an impact factor of 2 or more). As an example, the impact force is given:
      i. for the reference helicopter (MIL Mi-8): 24 000 Kg; and
      ii. for critical helicopter (the largest, Mi-26): 112 000 Kg.

6. The heliport shall have at least the following obstacle limitation surfaces for the FATO area, having the surfaces a slope of 4º (7%) (see lateral and top views of these surfaces in Fig. 3, Fig. 8, Fig. 9 and Fig. 10, and check Annex B, and Table 3, Fig. 12 and Fig. 13 therein, for further information on the specifications of these surfaces):
   a) two take-off climb surfaces separated by not less than 150º; and
   b) two approach surfaces[32] separated by not less than 150º.

7. The take-off climb and approach flight paths shall be free of obstacles that penetrate the obstacle limitation surfaces (see definitions in Section 3 for the determination of what obstacles to consider). Obstacles that cannot be eliminated must be noted.

8. The location and configuration of the heliport and the helicopter flight paths (take-off climb and approach) shall be such that:
   a) the negative effects of sunlight and other restrictions to visibility are minimized;
   b) operations with tailwind (downwind) are prevented;
   c) operations with lateral (cross) wind are reduced to a minimum; and
   d) the directions of approach or take-off climb are over the lowest obstacles[33], along the long axis of the FATO area and into the wind.

9. The heliport shall be provided with at least one TLOF area.

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[31] According to ICAO Circular 048 Helicopter Operations, the slope should not normally exceed 2%, since at gradient of more than about 5% there is a danger that the tail rotor will strike the ground. But this reference dates back to year 1955, so priority is given to recommendations from posterior documents. In this case, the chosen recommendation stems from ICAO Annex 14, Vol. II. According to the UN DFS Aviation Manual, the degree of slope angle must not exceed the capability of the helicopter in order to prevent Dynamic Rollover. If the slope is excessive, the helicopter must be able to terminate the approach at a hover.

[32] The easiest configuration might be to have two superposed take-off climb-approach surfaces. Other approach surfaces can be also provided, whose total number and orientation shall be such that it is ensured a heliport utilization factor of at least 95%, respect to the helicopters the heliport is intended to serve.

[33] According to the UN DFS Aviation Manual, approaches that do not meet these criteria may be acceptable depending on the nature of the operations undertaken.

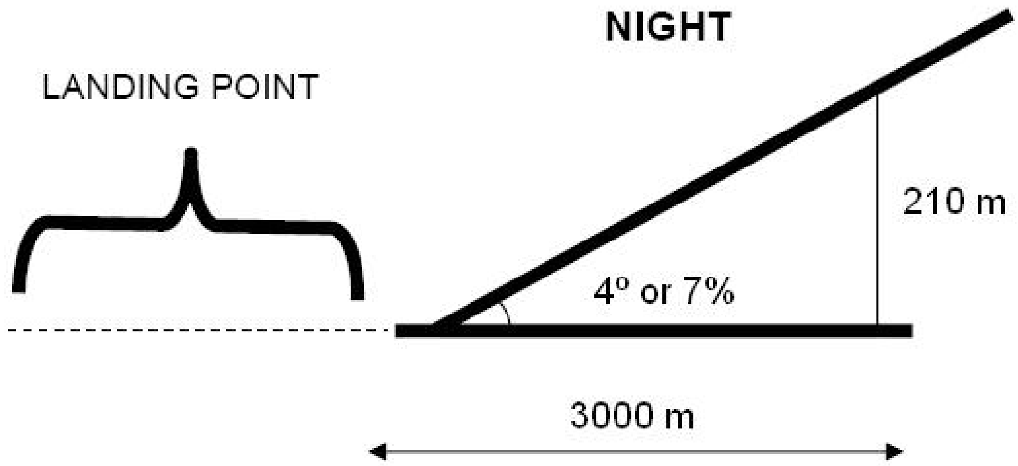

Fig. 3 Minimum required criteria to permit full flexibility in helicopter operations: landing point obstruction angle on approach and take-off paths for night operations (UN DFS Aviation Manual).

10. The TLOF shall be of sufficient size to contain a circle of diameter 1.5 times the length or width of the undercarriage[34], whichever is the greater, of the largest helicopter the area is intended to serve. As an example, the dimensions of a circular-shaped[35] TLOF are given:
    a) for the reference helicopter (MIL Mi-8): it shall have a diameter not less than 7 m.

11. The FATO shall be surrounded by a safety area.

12. The safety area surrounding the FATO shall extend outwards from the periphery of the FATO for a distance of at least 3 m or 0.25 times the over-all length/width, whichever is greater, of the longest/widest helicopter the area is intended to serve[36]. As an example, the safety area shall extend outwards from the periphery of the FATO:
    a) for the reference helicopter (MIL Mi-8): a distance of 6.5 m; and
    b) for the critical helicopter (the largest, Mi-26): a distance of 10 m.

13. No fixed object shall be permitted on the FATO area and safety area, except for frangible objects, which, because of their function, must be located on the area.

14. No mobile object shall be permitted on the FATO area and safety area during helicopter operations[37].

[34] In this point there is a significant difference between ICAO SARPS and the UN DFS Aviation Manual, since in the latter it is stated that, as per the size of the landing zone, the minimum dimensions of the TLOF area should be no less than two rotor diameters of the helicopter, and that the helicopter manual should be considered. Also, for heliports located above 1000 ft (305 m), the dimensions of the TLOF should be taken from the helicopter manual or should be in accordance with the recommendations at FAA AC 150/5390-2A.
[35] According to the UN DFS Aviation Manual, if the shape of the TLOF is other than circular, again the elongation should be in the direction of take-off and approach.
[36] According to a reference document by the UN DFS Engineering Section, the safety area width shall be one third of the rotor diameter of the largest helicopter (in terms of rotor) abutting from the edge of the FATO.
[37] According to a reference document by the UN DFS Engineering Section, the operational areas of the heliport need to be kept free of people, animals and vehicles.

15. The surface of the safety area abutting the FATO shall be continuous with the FATO and be capable of supporting, without structural damage, the helicopters that the heliport is intended to serve.

16. The heliport shall be provided with at least one wind direction indicator[38] (e.g. windsock).

17. The wind direction indicator shall be illuminated. This lighting shall be screened, shielded or located so as to avoid excessive direct and reflected glare to pilots in flight or to personnel working on the area.

18. The wind direction indicator shall be located so as to indicate the wind conditions (i.e. it shall give a clear indication of the direction of the wind and a general indication of wind velocity) over the FATO area and in such a way as to be free from the effects of airflow disturbances or turbulence caused by nearby objects or rotor downwash[39].

19. The wind direction indicator shall be in the form of a truncated cone made of lightweight fabric, with minimum dimensions[40] as shown in Fig. 4.

20. The cone shall be of a single colour (white or orange), preferably. Where a combination of two colours is required to provide adequate visibility against changing backgrounds, the combination shall be orange and white, red and white, or black and white, and they shall be arranged in five alternate bands, the first and last band being the darker colour.

21. The heliport shall be provided[41] with the following lights or lighting systems[42], or with an appropriate lighting kit that fulfils the same purposes (see Section 9.1):
    a) wind direction indicator lighting;
    b) FATO area lights[43];
    c) TLOF area lighting system[43]; and
    d) visual aids for denoting fixed obstacles[44].

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[38] According to the UN DFS Aviation Manual, smoke may be used but should be placed at the downwind side to avoid obscuring the touch down point.

[39] According to ICAO Doc 9261 Heliport Manual, when in the TLOF area air flow disturbances may occur: 1) it might be useful to install some additional small and lightweight vanes in or close to that area, and 2) additional wind direction indicators located close to the area should be provided to indicate the surface wind on the area.

[40] According to ICAO Doc 9261 Heliport Manual, the cone shall be of sufficient size such that it is visible from helicopters flying at an altitude of 200 m, in a hover or on the movement area.

[41] According to ICAO Doc 9261 Heliport Manual, taxiway lights and air transit route lights shall also be provided in case the heliport has one or more taxiways and/or air transit routes. These are not included in this set of requirements since they are kept to a minimum while guaranteeing safety, and it is likely that the heliports to be certified are simple and small and have no taxiways nor air transit routes.

[42] Location and characteristics of markings, markers, light signals and other visual aids referred in this section are described in-depth in ICAO Annex 14, Vol. II, and ICAO Doc 9261 Heliport Manual. They have been primarily designed to approach non-precision and for transactions in VMC flight.

[43] According to ICAO Annex 14, Vol. II, FATO area lights may be omitted where the FATO area and the TLOF area are nearly coincidental or the extent of the FATO area is self-evident. If this is the case, it is not necessary to provide FATO area lights in the heliport, since the TLOF area lighting system will be sufficient. According to a reference document by the UN DFS Engineering Section, it is recommended that the perimeter of the FATO or TLOF areas (but not both) be defined with yellow lights.

[44] According to ICAO Doc 9261 Heliport Manual, the obstacle lighting specified in relation to airports is also applicable to elevated heliports and heliplatforms, and so could be helpful for surface-level heliports, too.

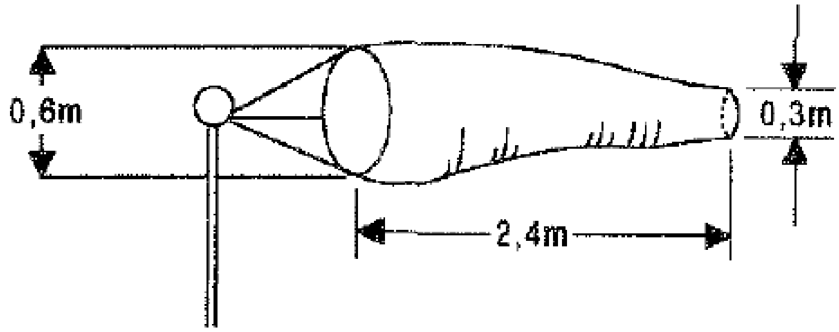

Fig. 4 Dimensions of wind direction indicator for surface-level heliports (ICAO Annex 14, Vol. II, and ICAO Doc 9261 Heliport Manual).

22. The TLOF area lighting system shall consist of one or more of the following elements[45]:
    a) perimeter lights;
    b) floodlighting; and
    c) ASPSL and/or LP lighting to identify the TLOF area when a) and b) are not practicable and FATO area lights are available.

23. When used for the lighting of the FATO or TLOF area, floodlights:
    a) shall be placed out of the safety area and they shall not penetrate the take-off climb or approach surfaces;
    b) shall be aimed down so as not to interfere with pilot vision;
    c) shall provide a minimum of 32 lux (3 foot candles) of illumination over the FATO or TLOF area;
    d) may be mounted on adjacent buildings to eliminate the need for tall poles;
    e) it should be possible to switch off during take-off and landings those floodlights that may interfere with pilot vision during these phases of flight.

24. Obstacles shall be floodlighted if it is not possible to display obstacle lights on them[44].

25. The characteristics, arrangement and aiming of lights and floodlights shall be such that:
    a) shadows are kept to a minimum;
    b) they shall be placed out of the safety area and they shall not penetrate the take-off climb or approach surfaces; and
    c) except from navigation lights in accordance with international regulations, all lights close to the heliport shall be screened, shielded or located so as to avoid excessive direct and reflected glare to pilots in flight (especially during the final stages of approach and landing) or to personnel working on the area[46].

[45] According to ICAO Doc 9261 Heliport Manual, TLOF area lighting system consists of perimeter lights and floodlights or LPs, or perimeter lights and a combination of floodlights and LPs. According to ICAO Annex 14, Vol. II, at elevated heliports and helidecks, surface texture cues within the TLOF area are essential for helicopter positioning during the final approach and landing. Such cues can be provided using various forms of lighting (ASPSL, LP, floodlights or a combination of these lights, etc.) in addition to perimeter lights. Best results have been demonstrated by the combination of perimeter lights and ASPSL to identify the touchdown and heliport identification markings.

[46] According to ICAO Circular 048 Helicopter Operations, the intensity of the illumination is not as important as the quality obtained in giving uniform illumination which does not have glare and which does not create illusions resulting in false depth perception.

26. The lighting and floodlighting should provide an average horizontal illuminance of at least 10 lux, with a uniformity ratio of 8 to 1 (average to minimum). The readings should be taken in the surface of the TLOF area[47].

27. The heliport shall be provided with a means to determine barometric pressure and outside temperature.

28. The heliport shall be provided with two way radio communications between the helicopter and ground.

29. At least one person with ATC training, or at least one person trained by the mission as ALO, must be available. This person must be familiar with aeronautical radio procedures and phraseology for the conduct of two way radio communications with aircraft on established frequencies, in order to provide traffic advisory, status of site security, prevailing weather, hazard, and any other information required.

30. Have at least one IFR instrument approach procedure at a heliport reachable by the heliport being used for night flights from the furthest point of the planned night flight. This procedure is to be used for recovering to the selected heliport in case of weather deterioration, inadvertent entry into IMC conditions, loss of visual contact with the terrain, loss of situational awareness, or any other emergency situation.

8.2 CERTIFICATION PHASE 2

31. The selected take-off climb and approach paths should contain a sector of not less than 160º in azimuth as measured from the edge of the cleared to ground level area. Within the selected take-off climb and approach paths, the maximum obstruction angle should not exceed 40º as measured from the edge of cleared to ground level area, and the helicopter must be equipped with NVD (NVG and FLIR). If aircrew are not wearing Night Vision Goggles or FLIR equipment is not installed, the maximum obstruction angle should not exceed 40º as measured from the edge of the cleared to ground level area to a distance of 3000 m (maximum obstacle height 210 m) (see Fig. 3).

32. In heliports for helicopters of performance Class 2 and 3[48], the area below the take-off climb surface and the approach surface shall facilitate landings with one engine inactive in safe conditions, or forced landings, minimizing the possibility of injury of people on ground and property damage. The provision of such areas shall also minimize the risk of injury of helicopter occupants and of damage to the helicopter. The main factors that influence the suitability of such areas will be the most critical type of helicopter that the heliport is intended to serve and the environmental conditions.

33. The heliport shall be provided[49] with the following markings[50] or markers[52]:

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[47] According to ICAO Doc 9261 Heliport Manual, to what extent floodlights will be useful for the pilot will depend on the reflectance of the surface of the platform. To optimize the performance and efficiency of a lighting system with floodlights, the surface of the TLOF area should feature high reflectance characteristics.

[48] Although in the initial assumptions it was presumed that the operations are of performance Class 1, this recommendation is included here-in due to its importance as per safety issues, in view of particular cases in which the helicopters are conducting operations of performance Class 2 and 3.

[49] According to ICAO Doc 9261 Heliport Manual, air taxiway markers and air transit route markers shall also be provided in case the heliport has one or more taxiways and/or air transit routes. These are not included in this set of requirements since they are kept to a minimum while guaranteeing safety, and it is likely that the heliports to be certified are simple and small and have no taxiways nor air transit routes.

a) heliport identification marking or marker;
b) FATO area marking or marker (only where the extent of the FATO area is not self-evident at night time);
c) FATO area designation marking (see Fig. 5);
d) TLOF area marking;
e) aiming point marking (see Fig. 6);
f) touchdown marking;
g) heliport name marking; and
h) obstacle marking.

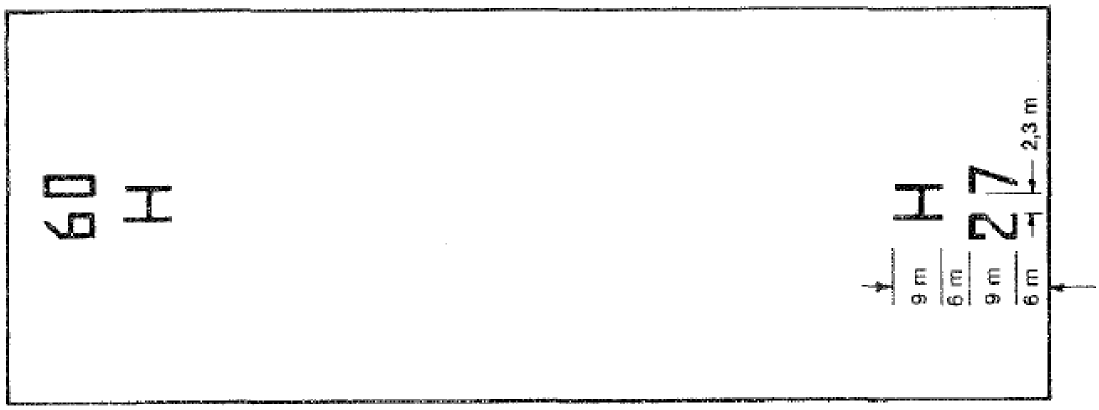

Fig. 5 FATO area designation marking (ICAO Annex 14, Vol. II, and ICAO Doc 9261 Heliport Manual).

34. The heliport shall be provided[51] with the following lights or lighting systems[52], or with an appropriate lighting kit that fulfils the same purposes (see Section 9.1):
    a) heliport beacon;
    b) approach lighting system (see Fig. 7);
    c) visual alignment guidance system, where one or more of the following conditions exist:
        i. obstacle clearance, noise abatement or traffic control procedures require a particular direction to be flown;
        ii. the environment of the heliport provides few visual surface cues; or
        iii. it is physically impracticable to install an approach lighting system;
    d) visual approach slope indicator, where one or more of the following conditions exist:

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[50] According to ICAO Doc 9157 Airport Design Manual, reflective aerodrome markings are used to improve performance of the markings at night, especially when the markings may be wet. Because of the additional costs, some authorities may use reflective markings only for those aerodromes which can benefit from the improved performance. Aerodromes which operate only during daylight or are used only by aircraft without landing or taxiing lights would not need to provide reflectorized markings. Reflective markings may not be necessary on runways with operating runway centre line and touchdown zone lights; however, the reflective markings may be helpful for night-time operations in clearer visibilities when the centre line and touchdown zone lights are not energized. Tests have shown that the reflectivity of markings may be enhanced by factors in excess of 5 by the inclusion of glass beads. This is considered applicable to heliports, too.

[51] According to ICAO Doc 9261 Heliport Manual, taxiway lights and air transit route lights shall also be provided in case the heliport has one or more taxiways and/or air transit routes. These are not included in this set of requirements since they are kept to a minimum while guaranteeing safety, and it is likely that the heliports to be certified are simple and small and have no taxiways nor air transit routes.

[52] Location and characteristics of markings, markers, light signals and other visual aids referred in this section are described in-depth in ICAO Annex 14, Vol. II, and ICAO Doc 9261 Heliport Manual. They have been primarily designed to approach non-precision and for transactions in VMC flight.

i. obstacle clearance, noise abatement or traffic control procedures require a particular slope to be flown;
ii. the environment of the heliport provides few visual surface cues; or
iii. the characteristics of the helicopter require a stabilized approach; and

e) aiming point lights (see Fig. 6).

35. The lighting system shall be designed so that deposits of condensation, ice, dirt, etc. on the optical transmitter or reflective surfaces interfere as little as possible with the light and they do not cause spurious or false signals.

36. The lighting system illuminating the ground markings shall be mounted at elevations of only 30 or 60 cm (one or two ft) above the ground[53].

37. A periodic verification of the lighting systems should be carried out to ensure that:
a) all lamps work well and the lighting is uniform;
b) there are no obvious evidences of deterioration; and
c) the optical transmitter or reflective surfaces are not contaminated.

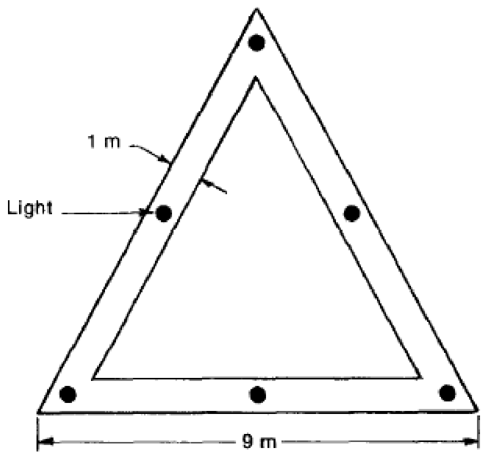


Fig. 6 Aiming point marking (ICAO Annex 14, Vol. II, and ICAO Doc 9261 Heliport Manual).

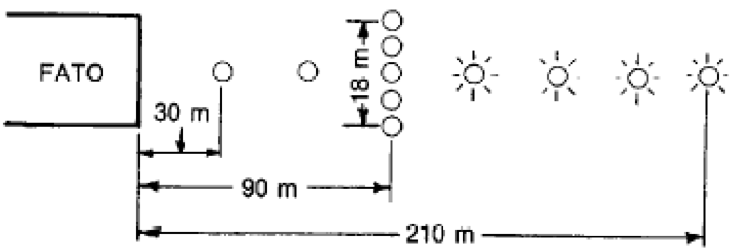


Fig. 7 Approach lighting system (ICAO Doc 9261 Heliport Manual).

[53] According to ICAO Circular 048 Helicopter Operations, ground markings will be useful for night landings when illuminated by a floodlighting system which, in effect, gives texture recognition. This is achieved when floodlighting systems are mounted at elevations of only one or two ft above the ground.

38. The heliport take-off climb paths shall meet the requirements presented in Fig. 8 regarding limitations (e.g. vertical distances to obstacles) resulting from performance for operations in performance Class 1 in take-off. Alternatively[54], the heliport take-off climb paths shall meet the requirements presented in Fig. 9, which depicts another accepted configuration of limitations resulting from performance.

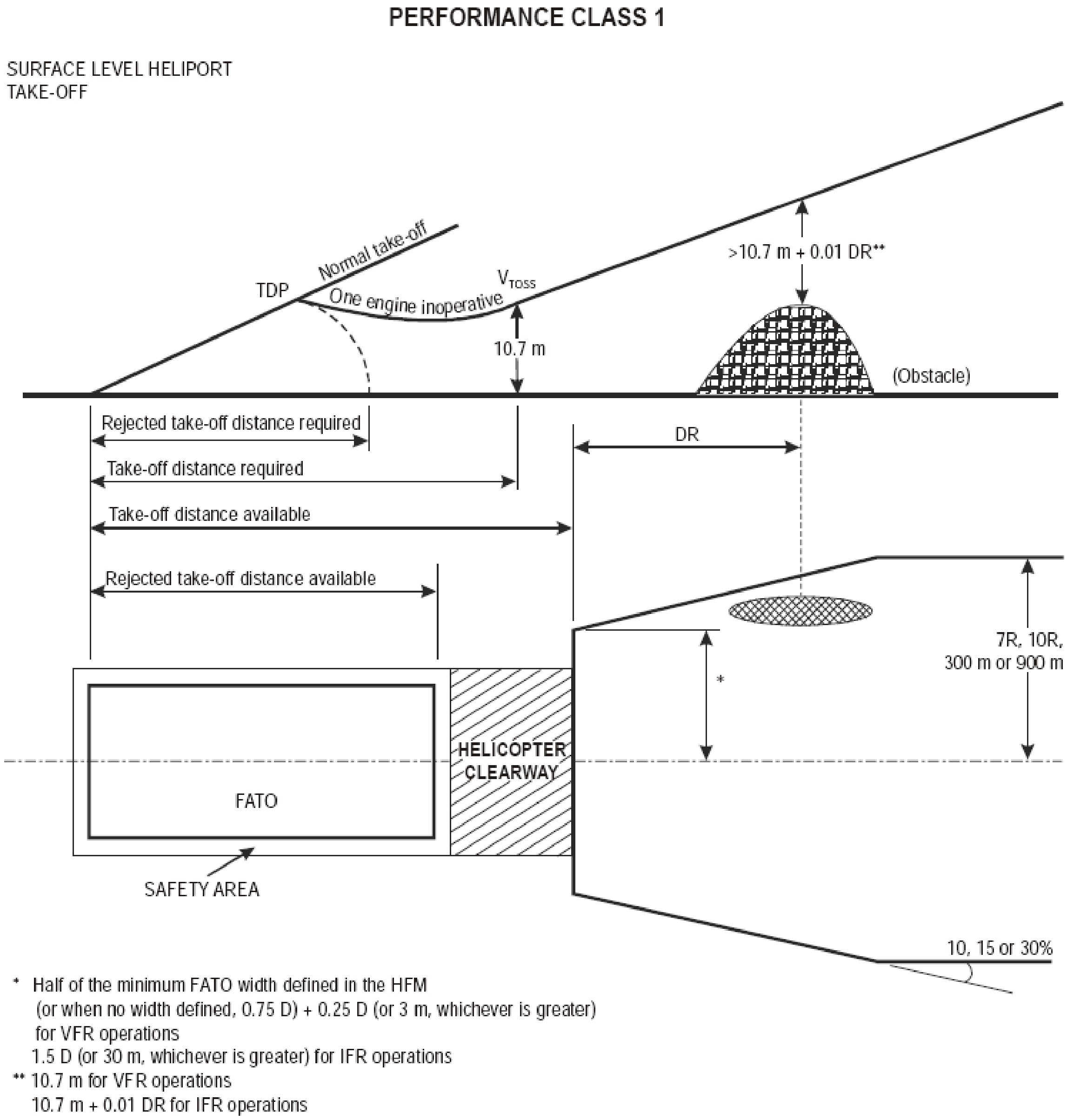


Fig. 8 Limitations resulting from performance for operations in performance Class 1 at surface-level heliports, in take-off phase (ICAO Annex 6, Part III).

[54] This alternative configuration of limitations might be more suitable to night operations since a take-off at night shall usually be an “altitude over airspeed” maneuver (FAA Rotorcraft Flying Handbook 8083-21).

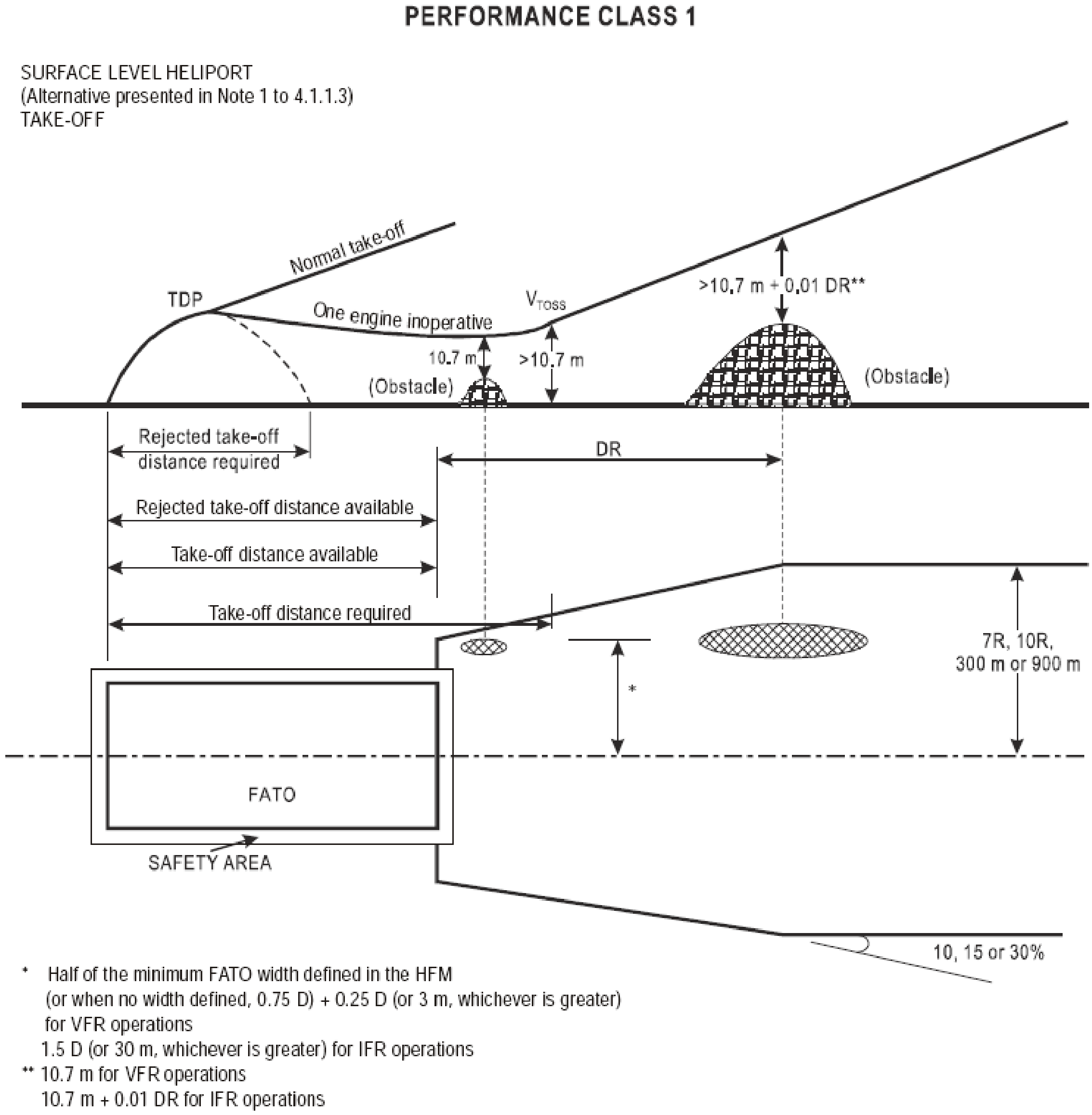
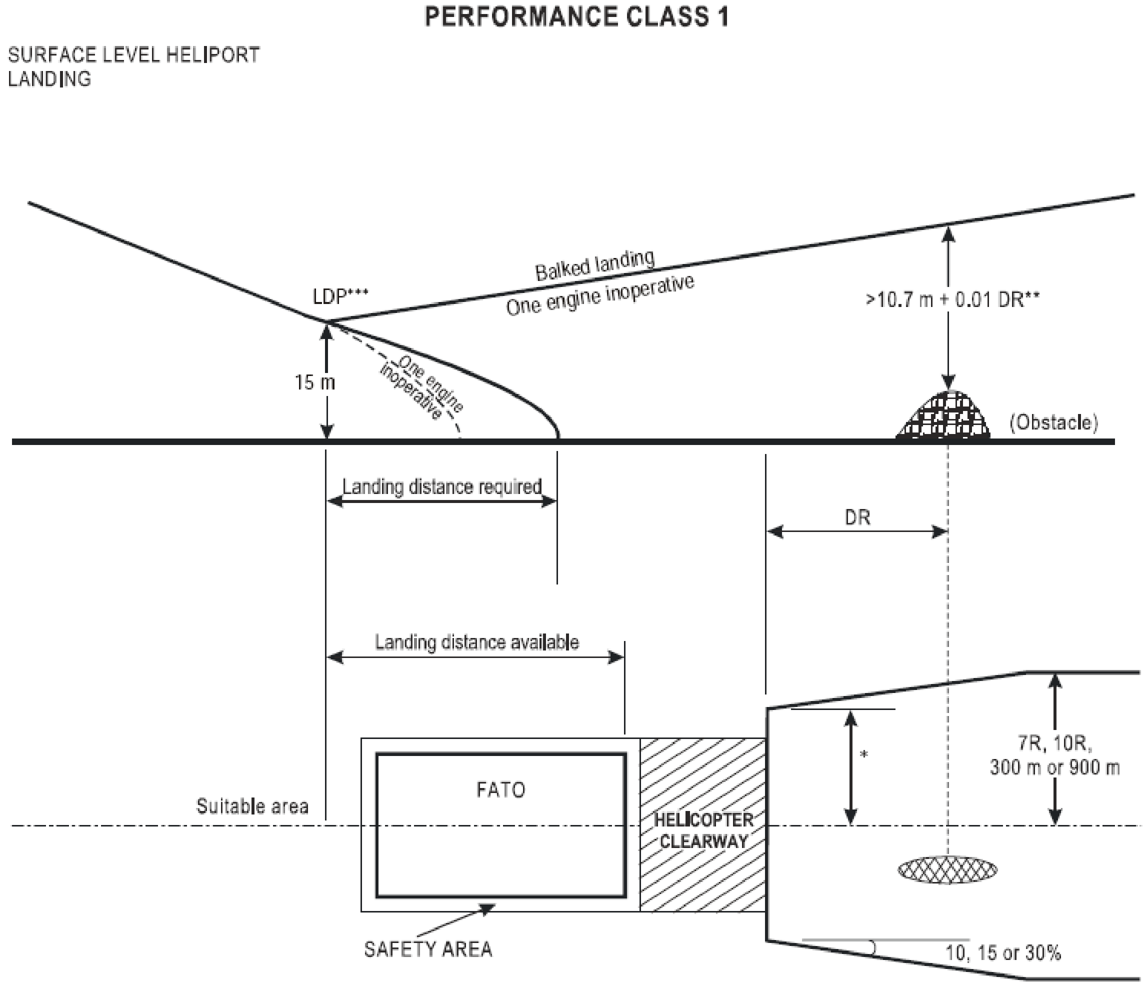


Fig. 9 Alternative limitations resulting from performance for operations in performance Class 1 at surface-level heliports, in take-off phase (ICAO Annex 6, Part III).

39. The heliport approach paths shall meet the requirements presented in Fig. 10 regarding limitations (e.g. vertical distances to obstacles) resulting from performance for operations in performance Class 1 in approach, landing and balked landing.

40. In all cases where a fence is used to prevent people from entering the safety area, the fence shall be as low as possible and shall be located as far as possible from the safety area. The fence shall not penetrate any take-off climb or approach surface.

41. Provisions shall be issued to prevent any spilled fuel or oil into confined locations and/or contaminating waterway.



* Half of the minimum FATO width defined in the HFM (or when no width defined, 0.75 D) + 0.25 D (or 3 m, whichever is greater) for VFR operations
1.5 D (or 30 m, whichever is greater) for IFR operations

** 10.7 m for VFR operations
10.7 m + 0.01 DR for IFR operations

*** For the purposes of the diagram, all paths and distances emanate from 50 ft (15 m).
The actual height of this point and position of the LDP should be obtained from the HFM.

Fig. 10 Limitations resulting from performance for operations in performance Class 1 at surface-level heliports, in approach, landing and balked landing phases (ICAO Annex 6, Part III).

9 IMPORTANT CONSIDERATIONS

9.1 LIGHTING OF THE HELIPORT

Lighting is essential for performing night operations in heliports. According to the reference documentation[55], it is necessary to provide the heliport with several lighting systems for the sake of safe, effective and secure helicopter night operations. This is reflected in the requirements proposed in this document; that is, for the heliports to be certified, they shall be provided with some essential lighting infrastructures.

The lighting systems might be of fixed or mobile/portable type. In some cases it might not be feasible (there is not enough budget allocated) or worth to implement fixed lighting systems, because of the high cost and/or the utilization of the particular heliport expected to be scarce. In these cases, mobile/portable systems are a cheaper alternative[56] and can be used to service several heliports. This kind of equipment is already available in the UN system. See for instance the following contracts, where the acquired equipment is ICAO- and FAA-compliant:

1. No. PD/C0316/04 – Provision of Mobile Airfield Landing Lighting Equipment: this portable kit is designed for the lighting of airports, though, and includes PAPI systems among other lights[57].

2. No. PD/C0133/07 – Provision of Lighted & Unlighted Windsock Assembly & Helipad Emergency Landing Site Lighting: this portable kit is designed for temporary or emergency lighting of airports, airfields and heliports, and includes:
    a. batteries;
    b. runway threshold and end lights (these lights are bidirectional and able to fulfil both functions simultaneously for opposite approach directions);
    c. runway edge lights;
    d. taxiway edge lights; and
    e. heliport perimeter lights.

55 Essential SARPS on lighting can be found in ICAO Annex 14, ICAO Doc 9261 Heliport Manual, ICAO Doc 9157 Airport Design Manual and technical reports from the FAA.

56 These lights usually incorporate spikes or metal stakes and can be stabbed into the ground, and later removed and relocated in another airfield.

57 It is very important to remind that the kit does not include centre lights. According to ICAO Doc 9157 Airport Design Manual, runway edge lighting is used at night to supplement the centre line particularly where runway centre line lighting is not available.

9.1.1 Innovative use of lighting technologies

Aside from the traditional systems used for aeronautical lighting (e.g. fixed or mobile/portable floodlighting and lights), alternative well-known technologies are starting to be used to fulfil these same purposes: reflectors, LP and LED. The latter are usually encapsulated and arranged in strips in the so-called ASPSL (see Fig. 11). In general, where applicable, these systems are being used at present day in parallel with traditional lighting systems, that is, under normal conditions, critical aeronautical lighting systems are not constituted exclusively of ASPSL or LP, but they are used together with the traditional sets. For example, LP (or reflectors) are used in well established airports for edge/perimeter lighting of taxiways, or threshold and end (of runway) lighting, where reflectors (or LP) are deployed alternatively with conventional lights.

Fig. 11 Perimeter/taxiway and threshold/end of runway reflectors from Striplin Airfield & Aviation Services.

The important advantages of using these technologies are a significant reduction of power consumption (note that for some lighting systems the total number of lights might be reduced roughly by half if reflectors or LP are used), reduced price and maintenance costs, and increased availability. The reasons are that, on one hand, the reflectors and LP work without any power supply. On the other hand, the ASPSL can work even when some of the constituting LED are broken down, and consume less energy than traditional lights (e.g. incandescent). In addition, these systems can serve as back-up lighting in emergency cases, namely when sufficient power supply or traditional fixed or portable lighting systems are not available and landing is a must. Summarizing, these technologies are very interesting since allow implementing cheaper, greener lighting systems, with increased availability. Thus, it is advisable to study more in detail their utilization in the target heliports, either together with traditional fixed or mobile/portable systems, or as stand-alone option (also fixed or mobile/portable), being the latter an innovative alternative that would require special consideration to ensure adequate lighting and hence safety of the operations.

9.1.2 No lighting systems available

Under some circumstances it might not be feasible to provide the heliport with any sort of appropriate lighting system. The reasons may be various: fixed or mobile/portable kits might not be available before the scheduled landing of the helicopters (UN routinely conducts aviation operations in completely or partially non-functioning infrastructures with none/limited airport services, and access by land to the heliport to deploy portable kits might be very complex or not possible, or be delayed), etc. In these cases, no civil night operations should be conducted.

9.2 PAVEMENT OF THE HELIPORT

If the helicopter mass is greater than 5700 kg (like the MIL Mi-8 and the MIL Mi-26, the sample and critical helicopters specified in this study), the bearing strength of the pavement shall be made available using the ACN-PCN method, as stated in ICAO Annex 14, Vol. I:

2.6.2 The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5700 kg shall be made available using the aircraft classification number-pavement classification number (ACN-PCN) method[58] by reporting all of the following information:

a) the PCN;
b) pavement type for ACN-PCN determination;
c) subgrade strength category;
d) max. allowable tire pressure category or max. allowable tire pressure value; and
e) evaluation method.

Another useful tool is the document by the US Army Corps of Engineers entitled: Technical Letter No. 1110-3-486: Engineering and design: Army Airfield/Heliport Pavement Design. Pavement thickness design curves are presented depicting pavement CBR and thickness versus gross weight of A/C and A/C passes.

10 CONCLUSIONS

It is very important to increase the number of heliports certified for UN helicopter operations, as this enhances the efficiency of the UN Peacekeeping Missions. For the case of casualty evacuation (CASEVAC) involving injured military or civilian personnel, or medical evacuations (MEDEVAC) of patients, a wider network of heliports enables much faster transfers of personnel to the first available levels of medical care. Hence the chances of saving lives increase.

Nevertheless, the heliports must meet critical requirements such that the safety of operations is guaranteed. After reviewing a wide spectrum of reference documentation (e.g. ICAO and FAA

[58] The bearing strength of the pavement can easily be determined by a method to measure ACN/PCN: drilling the ground and extracting a sample to determine asphalt load capabilities.

SARPS), two sets of integrated requirements for certification of heliports for night operations have been proposed in this report. These provisions are thought for surface-level heliports, in which the critical operations are night CASEVAC/MEDEVAC operations of performance Class 1, under VFR (non-instrument procedures). Also, it is assumed that the considered helicopter operations are compliant with the UN DFS Aviation Manual and provisions issued by local CAA. Prioritization of the requirements from the reference documentation was done bearing in mind a balance between adequate safety for sustained UN critical operations and flexibility to allow a significant number of heliports to be certified. In addition to this, the criteria to prioritize were the level of demand and actuality and the UN DFS's Aviation Regulatory Regime hierarchy.

The first set of provisions, termed Certification Phase 1, contains the minimum essential requirements for performing night helicopter operations safely. The second set, termed Certification Phase 2, which builds on the previous, contains requirements that are advisable to meet in the medium- or long-term. The level of demand of the proposed sets of requirements lies between two categories that are stated in the UN DFS Aviation Manual: the less demanding requirements applicable to remote HLS and the more demanding requirements applicable to permanent use helipads as defined by ICAO.

Appropriate lighting is one of the most important issues for guaranteeing the safety of night operations in heliports. The lighting systems might be fixed or mobile/portable. The latter are a cheaper alternative as can be used to service several heliports. This kind of equipment is already available in the UN system. Reflectors, LP and LEDs (usually arranged in ASPSL) are interesting alternatives to traditional lighting systems. These greener systems are being used at present day in parallel with traditional lighting systems for some applications. They have some important advantages over the traditional systems: significant reductions of power consumption, reduced price and maintenance costs, and increased availability, since they can provide service in emergency cases (for instance, when power supply is not available and landing is a must). Thus, it is advisable to study more in detail their utilization in the target heliports, either together with traditional fixed or mobile/portable systems, or as stand-alone option (also fixed or mobile/portable), being the latter an innovative alternative that would require special consideration to ensure adequate lighting and hence safety of the operations.

Finally, the determination of the bearing strength of the FATO and TLOF areas of the heliport is another important issue. It shall be made available using the ACN-PCN method for helicopters of mass greater than 5700 kg. Other reference documents feature pavement thickness design guidelines (namely, curves depicting pavement CBR and thickness versus gross weight of A/C and A/C passes).

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Michael Walsh (DFS/LSD)
Nestor Rodríguez (DFS/ATS)
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Annex A – Performance Classes

The definitions within this section are extracted from ICAO Annex 6, Part III. These considerations apply to all helicopters intended for the carriage of passengers, cargo or mail in international air navigation, which have to be certificated in accordance with the Standards of ICAO Annex 8, Part IV.

Take-Off & Initial Climb Phase

3.2.7.2.1 Operations in performance Class 1
The helicopter shall be able, in the event of the failure of the critical power-unit being recognized at or before the TDP, to discontinue the take-off and stop within the rejected take-off area available or, in the event of the failure of the critical power-unit being recognized at or after the TDP, to continue the take-off, clearing all obstacles along the flight path by an adequate margin until the helicopter is in a position to comply with 3.2.7.3.1.

3.2.7.2.2 Operations in performance Class 2
The helicopter shall be able, in the event of the failure of the critical power-unit at any time after reaching DPATO, to continue the take-off, clearing all obstacles along the flight path by an adequate margin until the helicopter is in a position to comply with 3.2.7.3.1. Before the DPATO, failure of the critical power-unit may cause the helicopter to force-land; therefore the conditions stated in 3.1.2 shall apply.

3.2.7.2.3 Operations in performance Class 3
At any point of the flight path, failure of a power-unit will cause the helicopter to force-land; therefore the conditions stated in 3.1.2 shall apply.

En-Route Phase

3.2.7.3.1 Operations in performance Classes 1 and 2
The helicopter shall be able, in the event of the failure of the critical power-unit at any point in the en-route phase, to continue the flight to a site at which the conditions of 3.2.7.4.1 for operations in performance Class 1, or the conditions of 3.2.7.4.2 for operations in performance Class 2 can be met, without flying below the appropriate minimum flight altitude at any point.

Note.— When the en-route phase is conducted over a hostile environment and the diversion time to an alternate would exceed two hours, it is recommended that the State of the Operator assess the risks associated with a second power-unit failure.

3.2.7.3.2 Operations in performance Class 3
The helicopter shall be able, with all power-units operating, to continue along its intended route or planned diversions without flying at any point below the appropriate minimum flight altitude. At any point of the flight path, failure of a power-unit will cause the helicopter to force-land; therefore the conditions stated in 3.1.2 shall apply.

Approach & Landing Phase

3.2.7.4.1 Operations in performance Class 1
In the event of the failure of the critical power-unit being recognized at any point during the approach and landing phase, before the LDP, the helicopter shall, at the destination and at any alternate, after clearing all obstacles in the approach path, be able to land and stop within the landing distance available or to perform a balked landing and clear all obstacles in the flight path by an adequate margin equivalent to that specified in 3.2.7.2.1. In case of the failure occurring after the LDP, the helicopter shall be able to land and stop within the landing distance available.

3.2.7.4.2 Operations in performance Class 2
In the event of the failure of the critical power-unit before the DPBL, the helicopter shall, at the destination and at any alternate, after clearing all obstacles in the approach path, be able either to land and stop within the landing distance available or to perform a balked landing and clear all obstacles in the flight path by an adequate margin equivalent to that specified in 3.2.7.2.2. After the DPBL, failure of a power-unit may cause the helicopter to force-land; therefore the conditions stated in 3.1.2 shall apply.

3.2.7.4.3 Operations in performance Class 3
At any point of the flight path, failure of a power-unit will cause the helicopter to force-land; therefore the conditions stated in 3.1.2 shall apply.

Alternative Definitions ICAO Annex 6, Part III, Section I, Chapter 1

Operations in performance Class 1
Operations with performance such that, in the event of a critical power-unit failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, unless the failure occurs prior to reaching the TDP or after passing the LDP, in which cases the helicopter must be able to land within the rejected take-off or landing area.

Operations in performance Class 2
Operations with performance such that, in the event of critical power-unit failure, performance is available to enable the helicopter to safely continue the flight to an appropriate landing area, except when the failure occurs early during the take-off manoeuvre or late in the landing manoeuvre, in which cases a forced landing may be required.

3.2.7.2.3 Operations in performance Class 3
Operations with performance such that, in the event of a power-unit failure at any time during the flight, a forced landing will be required.

Annex B – Obstacle Limitation Surfaces

Next follows some brief information on obstacle limitation (or protection) surfaces, as provided in ICAO Annex 14, Vol. II, and in ICAO Doc 9261 Heliport Manual. Further information on this issue can be found in these documents.

Approach Surface

4.1.1 *Description*. An inclined plane or a combination of planes sloping upwards from the end of the safety area and centred on a line passing through the centre of the FATO.

4.1.2 *Characteristics*. The limits of an approach surface shall comprise (see Table 3 and Fig. 12 and Fig. 13):

a) an inner edge horizontal and equal in length to the minimum specified width of the FATO plus the safety area, perpendicular to the centre line of the approach surface and located at the outer edge of the safety area;
b) two side edges originating at the ends of the inner edge and:
    1. for other than a precision approach FATO, diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO,
    2. for a precision approach FATO, diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO, to a specified height above FATO, and then diverging uniformly at a specified rate to a specified final width and continuing thereafter at that width for the remaining length of the approach surface; and
c) an outer edge horizontal and perpendicular to the centre line of the approach surface and at a specified height above the elevation of the FATO.

4.1.3 The elevation of the inner edge shall be the elevation of the safety area at the point on the inner edge that is intersected by the centre line of the approach surface.

4.1.4 The slope(s)[16] of the approach surface shall be measured in the vertical plane containing the centre line of the surface.

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

Table 3 Dimensions and slopes of the obstacle protection surface.

Surface & dimensions	Non-instrument FATO	
Length of inner edge	Width of safety area	
Distance from end of FATO	3 m minimum	
Divergence	10%	
Total length	2 500 m	
Slope	PAPI	A[a] – 0.57º
	HAPI	A[b] – 0.65º
	APAPI	A[a] – 0.90º
a. As indicated in ICAO Annex 14, Vol. I, Figure 5-13. b. The angle of the upper boundary of the "below slope" signal.		

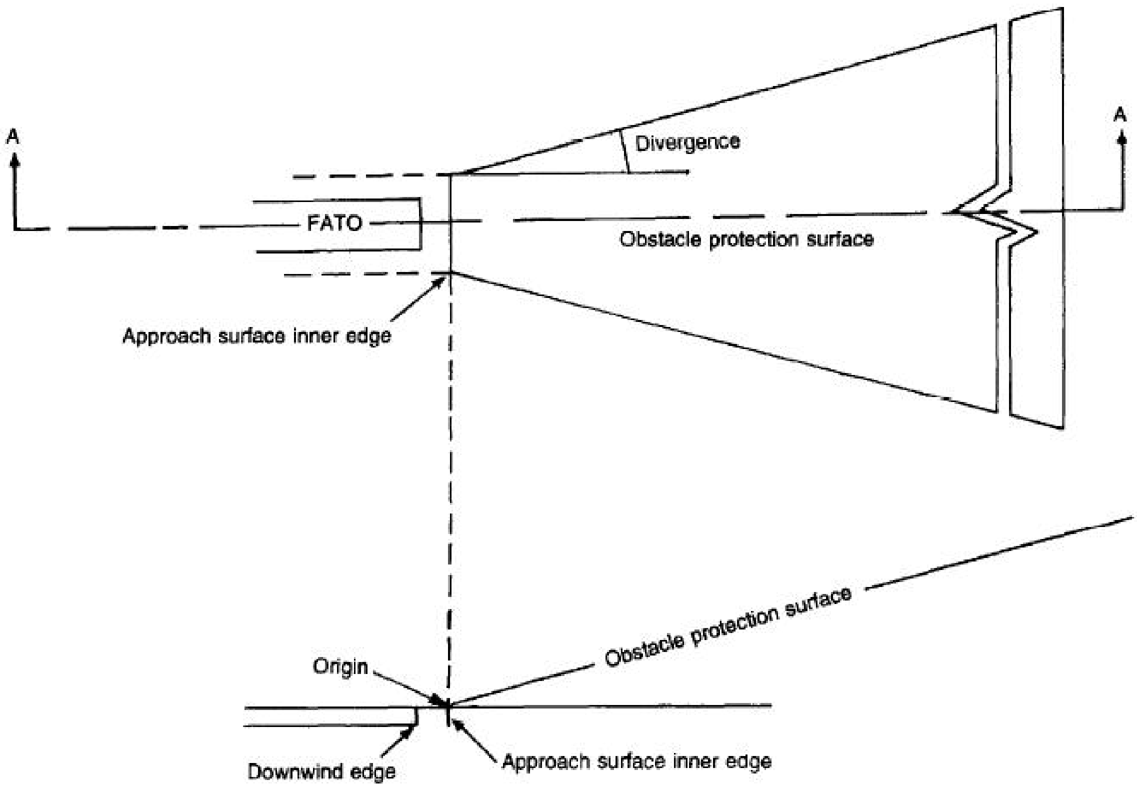

Fig. 12 Approach obstacle protection surface for visual approach slope indicator systems. Dimensions of the protection surface are as stated in Table 3 (ICAO Annex 14, Vol. II, and ICAO Doc 9261 Heliport Manual).

Take-Off Climb Surface

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

4.1.16 *Characteristics*. The limits of a take-off climb surface shall comprise (see Table 3 and Fig. 12 and Fig. 13):

a) an inner edge horizontal and equal in length to the minimum specified width of the FATO plus the safety area, perpendicular to the centre line of the take-off climb surface and located at the outer edge of the safety area or clearway;
b) two side edges originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO; and
c) an outer edge horizontal and perpendicular to the centre line of the take-off climb surface and at a specified height above the elevation of the FATO.

4.1.17 The elevation of the inner edge shall be the elevation of the safety area at the point on the inner edge that is intersected by the centre line of the take-off climb surface, except that when a clearway is provided, the elevation shall be equal to the highest point on the ground on the centre line of the clearway.

4.1.18 In the case of a straight take-off climb surface, the slope[16] shall be measured in the vertical plane containing the centre line of the surface.

4.1.19 In the case of a take-off climb surface involving a turn, the surface shall be a complex surface containing the horizontal normals to its centre line and the slope[16] of the centre line shall be the same as that for a straight take-off climb surface. That portion of the surface between the inner edge and 30 m above the inner edge shall be straight.

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

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

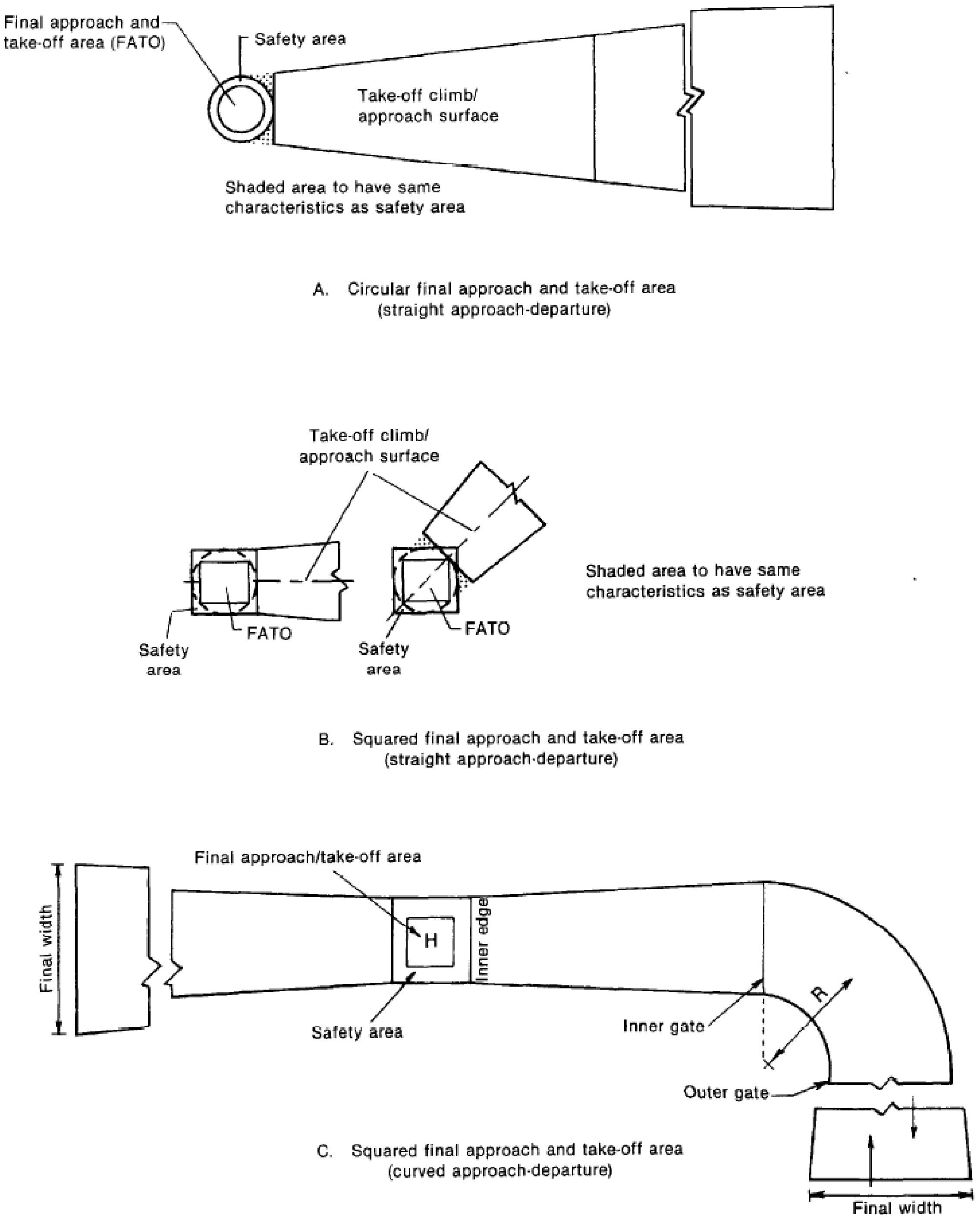

Fig. 13 Take-off climb/approach surface for a non-instrument FATO. Dimensions of the protection surface are as stated in Table 3 (ICAO Annex 14, Vol. II, and ICAO Doc 9261 Heliport Manual).

Annex C – Considerations Regarding Operations

Parts of applicable provisions and considerations which are important for this study are included in this section, as quoted from the reference documentation.

ASECNA Manual

A3. Heliports are not listed in this aeronautical information manual. When they exist, heliports are generally for restricted use (private) or for reserved use (administrations, army, and so on). Moreover, information concerning heliports is not currently available. Some restricted information is provided in sections AD 2.16 in case of aerodromes where helicopter landing area is available.

Common AIP Requirements

In the following, some from quotes from AIP[21] are presented.

2.11.1 VFR flights shall NOT be operated:
- a) by night in all airspace;
- b) by day above FL 150 in all controlled airspace and advisory areas.

5.2.6 All flights within a control zone, by night or in IMC, shall be conducted in accordance with IFR or special authorisation by ATC.

1.2.2 An aircraft may fly under VFR in controlled airspace other than along Airways, provided that it is able to remain at least 1.5km (1 NM) horizontally and 1,000 ft vertically from cloud, with a flight visibility of 5 km (3 NM) or more. It may not fly under VFR in controlled airspace at night, whatever the weather conditions, unless specifically authorised by ATC to do so.

1.2.7 An aircraft may not fly under VFR at night whatever the weather conditions may be unless specifically authorised by ATC to do so, in the immediate vicinity of an aerodrome.

2.3.1 Vertical separation during en-route flight shall be expressed in terms of flight levels at all times during an IFR flight and at night.

FAA Rotorcraft Flying Handbook 8083-21, Chapter 13 – Night Operations

Landing illusions
While performing night time operations, visibility is restricted so the helicopter pilot has to be more alert in steering clear of obstructions and low clouds. Landing illusions occur in many forms. Above featureless terrain at night, there is a natural tendency to fly a lower-than-normal approach. Elements that cause any type of visual obscuration, such as rain, haze, or a dark runway environment also can cause low approaches. Bright lights, steep surrounding terrain, and a wide runway can produce the illusion of being too low, with a tendency to fly a higher-than-normal approach.

Take-off

1. Before take-off, the pilot must make sure that the take-off path is clear and unobstructed:
   a) At airports, he may accomplish this by taking off over a runway or taxiway.
   b) If operating off-airport, the pilot must pay more attention to the surroundings.
   Obstructions may be difficult to see if taking off from an unlighted area.
2. Once a suitable take-off path has been chosen, the pilot must select a point down the take-off path to use for directional reference.
3. During a night take-off, the pilot may notice a lack of reliable outside visual references after airborne. This is particularly true at small airports and off-airport landing sites located in sparsely populated areas. To compensate for the lack of outside references, the pilot should use the available flight instruments as an aid:
   a) Check the altimeter and the airspeed indicator to verify the proper climb attitude.
   b) An attitude indicator, if installed, can enhance pilot's attitude reference.
   The first 500 ft of altitude after take-off is considered to be the most critical period in transitioning from the comparatively well-lighted airport or heliport into what sometimes appears to be total darkness.

4. A take-off at night is usually an "altitude over airspeed" manoeuvre, meaning the pilot will most likely perform a nearly maximum performance take-off. This improves the chances for obstacle clearance and enhances safety. When performing this manoeuvre, the pilot must make sure to avoid the cross-hatched or shaded areas of the height-velocity diagram.

Approach & landing

Night approaches and landings do have some advantages over daytime approaches:

1. Air is generally smoother.
2. Disruptive effects of turbulence and excessive crosswinds are often absent.

However, there are a few special considerations and techniques that apply to approaches at night:

1. When landing at night, especially at an unfamiliar airport, make the approach to a lighted runway and then use the taxiways to avoid unlighted obstructions or equipment.
2. Carefully controlled studies have revealed that pilots have a tendency to make lower approaches at night than during the day. This is potentially dangerous as you have a greater chance of hitting an obstacle, such as an overhead wire or fence, which are difficult to see. It is good practice to make steeper approaches at night, thus increasing any obstacle clearance. Monitor your altitude and rate of descent using the altimeter.
3. Another tendency is to focus too much on the landing area and not pay enough attention to airspeed. If too much airspeed is lost, a settling-with-power condition may result. Maintain the proper attitude during the approach, and make sure you keep some forward airspeed and movement until close to the ground. Outside, visual reference for airspeed and rate of closure may not be available, especially when landing in an unlighted area, so pay special attention to the airspeed indicator.

Although the landing light is a helpful aid when making night approaches, there is an inherent disadvantage:

1. The portion of the landing area illuminated by the landing light seems higher than the dark area surrounding it.
2. This effect can cause you to terminate the approach at too high an altitude, resulting in a settling-with power condition and a hard landing.

ICAO Annex 6, Part III: International Operations – Helicopters

2.2.8.1 The State of the Operator shall require that the operator establish heliport operating minima for each heliport to be used in operations and shall approve the method of determination of such minima. Such minima shall not be lower than any that may be established for such heliports by the State in which the heliport is located, except when specifically approved by that State.

2.3.5.1 A flight to be conducted in accordance with VFR shall not be commenced unless current meteorological reports or a combination of current reports and forecasts indicate that the meteorological conditions along the route or that part of the route to be flown or in the intended area of operations under VFR will, at the appropriate time, be such as to render compliance with these rules possible[59].

2.3.6.1 All helicopters. A flight shall not be commenced unless, taking into account both the meteorological conditions and any delays that are expected in flight, the helicopter carries sufficient fuel and oil to ensure that it can safely complete the flight. In addition, a reserve shall be carried to provide for contingencies.

2.3.6.2 VFR operations. The fuel and oil carried in order to comply with 2.3.6.1 shall, in the case of VFR operations, be at least the amount sufficient to allow the helicopter:

a) to fly to the heliport to which the flight is planned;
b) to fly thereafter for a period of 20 minutes at best-range speed; and
c) to have an additional amount of fuel, sufficient to provide for the increased consumption on the occurrence of any of the potential contingencies specified by the operator to the satisfaction of the State of the Operator.

2.4.1.1 A flight shall not be continued towards the heliport of intended landing, unless the latest available information indicates that at the expected time of arrival, a landing can be effected at that heliport, or at least one alternate heliport, in compliance with the operating minima established in accordance with 2.2.8.1.

3.1.4 Where helicopters are operated to or from heliports in a congested hostile environment, the competent authority of the State in which the heliport is situated shall specify the requirements to enable these operations to be conducted in a manner that gives appropriate consideration for the risk associated with a power-unit failure.

2.1 Helicopters operating in performance Classes 1 and 2 shall be certificated in Category A.

2.2 Helicopters operating in performance Class 3 shall be certificated in either Category A or Category B (or equivalent).

2.3 Except as permitted by the appropriate authority:

2.3.1 Take-off or landing from/to heliports in a congested hostile environment shall only be conducted in performance Class 1.
2.3.2 Operations in performance Class 2 shall only be conducted with a safe forced landing capability during take-off and landing.
2.3.3 Operations in performance Class 3 shall only be conducted in a non-hostile environment.

2.4 In order to permit variations from 2.3.1, 2.3.2 and 2.3.3, the Authority shall undertake a risk assessment, considering factors such as:

a) the type of operation and the circumstances of the flight;

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[59] When a flight is conducted in accordance with VFR, the use of NVIS or other vision enhancing systems does not diminish the requirement to comply with the provisions of 2.3.5.1.

b) the area/terrain over which the flight is being conducted;
c) the probability of a critical power-unit failure and the consequence of such an event;
d) the procedures to maintain the reliability of the power-unit(s);
e) the training and operational procedures to mitigate the consequences of the critical power-unit failure; and
f) installation and utilization of a usage monitoring system.

3.1.2 In conditions where the safe continuation of flight is not ensured in the event of a critical power-unit failure, helicopter operations shall be conducted in a manner that gives appropriate consideration[60] for achieving a safe forced landing.

UN DFS Aviation Manual

Section V, To Chapter 03, Annex O: Policy for night flight procedures

3O.2 General
3O.2.2 Night flying operations are only to be undertaken for those operations described in Section 3, in accordance with ICAO rules and regulations, and DPKO aviation standards in those missions where:

a) the mission has aircraft under contract properly equipped in accordance with Section 4 below or aircraft under LOA properly equipped in accordance with the relevant government's specific requirements for night operations;
b) crewmembers meet their respective national requirements for night flying and the in-mission familiarisation requirements at Section 5; and
c) the aerodrome or HLS meet the requirements in Section 6.

3O.3.4 Rotary Wing VFR Night Operations
Rotary wing aircraft can conduct VFR night operations under VMC conditions solely to fulfil one of the following four tasks and only if all the requirements listed in Sections 4 to 8 are met:

a) CASEVAC;
b) emergency evacuation[61];
c) night SAR;
d) special Mil/Pol OPS; and
e) night flying training to meet currency requirements in accordance with paragraph 3O.5.

3O.4 Aircraft Requirements
3O.4.1 Aircraft must be equipped, (…) for rotary wing, in accordance with ICAO Annex 6, Part III, Section II, Chapters 4 and 5, with particular attention to paragraph 4.11.

3O.6 Aerodrome and Helicopter Landing Sites
3O.6.1 For night flying operations required by the UN into unequipped landing sites chartered air operators must be authorized by their regulatory authority to perform such night flying operations required by the UN. Since National CAAs Regulations do not normally allow flying at night into landing sites that are not built and equipped in accordance with international civil aviation standards, particular attention must therefore be placed on the effective capabilities of the operator to conduct the tasks required. In this regard, if such authorization is not granted by the State of the Operator, consideration should be given to assign night flying duties to TCN military aircraft fully equipped and authorized by their State to operate in such conditions.

[60] Guidance on "appropriate consideration" is contained in Attachment A, 2.4 of ICAO Annex 6, Part III.
[61] Flights can be conducted, at the sole discretion of the aircraft commander, without fully conforming to applicable standards and regulations only during Emergency Evacuation situations, if the circumstances foresee immediate danger to life.

3O.6.2 All field missions intending to conduct night flights must meet the following requirements for infrastructure:

a) The CAAs and/or the mission (when no established CAA exists) must designate the heliport safe and operational for night operations[62].
b) The heliport must be equipped with a means to determine wind direction and velocity, barometric pressure and outside temperature.
c) The heliport must be lighted by an appropriate landing light kit indicating the landing zone(s), approach area(s), fixed obstacles and windsock(s).
d) The heliport must be equipped with two way radio communications between aircraft and ground.
e) At least one person with ATC training, or at least one person trained by the mission as ALO, must be available. This person must be familiar with aeronautical radio procedures and phraseology for the conduct of two way radio communications with aircraft on established frequencies, in order to provide traffic advisory, status of site security, prevailing weather, hazard, and any other information required.
f) Have at least one IFR instrument approach procedure at an airport reachable by the aircraft being used for night flights from the furthest point of the planned night flight. This procedure is to be used for recovering to the selected airport in case of weather deterioration, inadvertent entry into IMC conditions, loss of visual contact with the terrain, loss of situational awareness, or any other emergency situation.

3O.7 Rotary Wing CASEVAC

3O.7.1 Emergency Night CASEVAC can require flight into previously un-reconnoitred and unfamiliar landings sights. As such, night flights can be authorized, but at sole discretion of aircraft commander, without fully meeting all the requirements of paragraph 3O.6 above. By their nature, such flying operations require aircraft fitted with specialist equipment and specially trained crews. While some Commercial Operators can provide a night CASEVAC capability, military aircraft and crews are normally better equipped and trained to meet this requirement through the use of NVG. Aircraft and aircrews, whether under LOA or Commercial Contract, must operate within their respective CAA or military operating procedures when carrying out night CASEVAC operations. Moreover, CASEVAC night flights are only to be conducted if and when the circumstances categorise the casualty as Priority 1 (immediate danger to loss of limb, sight or life).

Section V, To Chapter 03, Annex Q: Remote HLS

3Q.1 HLS are considered remote sites and due to the diverse nature of Peacekeeping aviation operations, these HLS are not required to meet the ICAO requirements for a helipad. As part of the Aviation SOP, each Mission will develop a Section on remote HLS This Section may be a stand-alone document for easy reference and incorporated into the Mission SOP document. It will include information on all Mission approved remote HLS for helicopter use. Only those HLS included in the Section will be used for routine helicopter use. Helicopter landing sites that are not included in the HLS Section of the Aviation SOP and not designated as an approved HLS, may be used under the following conditions:

3Q.1.1 When aircraft is experiencing an in flight emergency, to include adverse weather, and must land.

3Q.1.2 When the specific purpose of the flight is to reconnoitre the landing area for potential use as an approved HLS.

3Q.1.3 In situations where aircrews must respond to an unanticipated and actual emergency in a situation to save lives.

[62] The present document shall serve as a means to determine whether a particular heliport safe is and operational for night operations.

3Q.2 At a minimum, the on file information for all approved HLS will include the following information:

3Q.2.1 Designation of the HLS
3Q.2.2 Location
3Q.2.3 Elevation with dimensions
3Q.2.4 Slope or grade
3Q.2.5 Recommended approach and departure routes
3Q.2.6 Obstacles and hazards in the HLS and in the vicinity
3Q.2.7 Number and type aircraft(s) approved for use
3Q.2.8 Restrictions
3Q.2.9 ATC procedures and controlling authority
3Q.2.10 A sketch, drawing of photograph will accompany this data

3Q.4 The following criteria, at a minimum, will be used in the selection of all HLS, to include helicopters responding to unanticipated and actual emergencies, as noted above:

3Q.4.2.4 Surface conditions: Surface conditions should allow use without resulting in the helicopter sinking into the surface, excessive dust or blowing debris. The area should be as free as possible from loose objects.

3Q.4.2.5 Slope: The surface should be a level as possible. Degree of slope angle must not exceed the capability of the aircraft in order to prevent Dynamic Rollover. If the slope is excessive, the helicopter must be able to terminate the approach at a hover.

3Q.4.2.6 Size of the HLS: The size of the HLS must be able to support the number and type of helicopters using the area.

3Q.4.2.7 Obstacles: The approach and departure ends of the HLS should be free of obstacles. Obstacles in the HLS that can not be eliminated must be noted in the on file information.

3Q.4.2.8 Approach and departure direction: Approach and departure directions should be over the lowest obstacles, along the long axis of the HLS and into the wind.

3Q.4.3 Meteorological criteria: (to be considered only during the selection of a HLS immediately before use)

3Q.4.3.1 Ceiling: Cloud base in relation to the HLS elevation must be considered. It is important to note that ceiling information is given in AGL elevation from the reporting station. The elevation of the HLS is provided in MSL elevation. These two elevations must be correlated when operating in mountainous areas.

3Q.4.3.2 Visibility: The effects of sunlight and other restrictions to visibility must be considered.

3Q.4.3.3 Density Altitude: Density altitude is determined by pressure altitude, temperature and humidity. As a general rule, as density increases, the size of the HLS must also be increased.

3Q.4.3.4 Prevailing winds: Prevailing winds in the area should be considered when selecting HLS.

3Q.5 Permanent use helipads as defined by ICAO must meet ICAO requirements.

LIST OF ACRONYMS

A/C	Aircraft
AC	Advisory Circular
ACN	Aircraft Classification Number
AD	Airworthiness Directive
AIP	Aeronautical Information Publication
AIS	Aeronautical Information System
ALO	Air Liaison Office
ANAC	(Congo's) Civil Aviation National Agency
AQAS	Aviation Quality Assurance & Standards Unit
ASECNA	Agence pour la Securité de la Navigation Aérienne en Afrique et à Madagascar
ASPSL	Arrays of Segmented Point Source Lighting
ATC	Air Traffic Control
ATO	Airfield/Air Terminal Officer
ATS	Air Transport Section
ATU	Air Terminal Unit
AVSTADS	Aviation Standards & Directives
BP	Boite Postale
CAA	Civil Aviation Authority
CASEVAC	Casualty Evacuation
CAVO	Mission's Chief Aviation Officer
CBR	California Bearing Ratio
CG	Center of Gravity
D	The maximum dimension of the helicopter
DFS	Department of Field Support
DPATO	Defined Point After Take-Off
DPBL	Defined Point Before Landing
DPKO	Department of Peacekeeping Operations
DR	Distance DR
DRC	Democratic Republic of the Congo
EASA	European Aviation Safety Agency
EUROCONTROL	European Organisation for the Safety of Air Navigation
FAA	Federal Aviation Authority
FAR	Federal Aviation Regulation
FATO	Final Approach & Take-Off Area
FLIR	Thermal (Infrared) Imaging System
GA	General Assembly
GL	Ground Level

HFM	Helicopter Flight Manual
HLS	Helicopter Landing Sites
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
LDP	Landing Decision Point
LDRH	Landing Distance Required
LED	Light-Emitting Diode
LOA	Letter Of Assist
LP	Luminescent Panel
LSD	Logistics Support Division
MCM	Maintenance Control Manual
MEDEVAC	Medical Evacuation
MINURCAT	United Nations Mission in the Central African Republic & Chad
MONUC	Mision de las Nations Unies au Congo
MOT	Ministry of Transportation
MTOW	Maximum Take-Off Weight
NA	Not Applicable
NOTAM	Notices To Airmen
NVD	Night Vision Device
NVG	Night Vision Goggles
NVIS	Night Vision Imaging Systems
OPS	Operations
PAPI	Precision Approach Path Indicator
PCN	Pavement Classification Number
R	Helicopter Rotor Radius
RD	Rotor Diameter
RTODR	Rejected Take-Off Distance Required
SAOC	Strategic Aviation Operations Centre (located at Brindisi)
SAR	Search & Rescue
SARPS	Standards & Recommended Practices
SOPS	Standing Operation Procedures
TCC	Troop Contributing Country
TCN	Troop Contributing Nations
TDP	Take-Off Decision Point
TLOF	Touch-Down & Lift-Off Area
TODRH	Take-Off Distance Required
UN	United Nations
UNAMID	African Union/United Nations Hybrid operation in Darfur
UNMIS	United Nations Mission in the Sudan
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions