

International Standards
and Recommended Practices



Annex 14
to the Convention on
International Civil Aviation

Aerodromes

Volume II
Heliports

This edition incorporates all amendments adopted by the Council prior to 28 February 2013 and supersedes, on 14 November 2013, all previous editions of Annex 14, Volume II.

For information regarding the applicability of Standards and Recommended Practices, see Chapter 1, 1.2 and Foreword.

Fourth Edition
July 2013

International Civil Aviation Organization
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AMENDMENTS

Amendments are announced in the supplements to the *Catalogue of ICAO Publications*; the Catalogue and its supplements are available on the ICAO website at www.icao.int. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

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(iii)



TABLE OF CONTENTS

	<i>Page</i>
Abbreviations and symbols; manuals	(viii)
FOREWORD.....	(xi)
CHAPTER 1. General	1-1
1.1 Definitions.....	1-1
1.2 Applicability	1-4
1.3 Common reference systems	1-5
1.3.1 Horizontal reference system	1-5
1.3.2 Vertical reference system.....	1-5
1.3.3 Temporal reference system	1-5
CHAPTER 2. Heliport data	2-1
2.1 Aeronautical data	2-1
2.2 Heliport reference point	2-2
2.3 Heliport elevations	2-2
2.4 Heliport dimensions and related information.....	2-2
2.5 Declared distances.....	2-3
2.6 Coordination between aeronautical information services and heliport authorities.....	2-4
CHAPTER 3. Physical characteristics	3-1
3.1 Surface-level heliports	3-1
— Final approach and take-off areas	3-1
— Helicopter clearways.....	3-2
— Touchdown and lift-off areas.....	3-3
— Safety areas	3-4
— Helicopter ground taxiways and ground taxi-routes	3-4
— Helicopter air taxiways and air taxi-routes	3-6
— Helicopter stands.....	3-7
— Location of a final approach and take-off area in relation to a runway or taxiway.....	3-10
3.2 Elevated heliports.....	3-10
— Final approach and take-off areas and touchdown and lift-off areas	3-11
— Helicopter clearways.....	3-11
— Touchdown and lift-off areas.....	3-12
— Safety areas	3-12
— Helicopter ground taxiways and ground taxi-routes	3-13
— Helicopter air taxiways and air taxi-routes	3-13
— Aprons.....	3-14

Page

3.3	Helidecks.....	3-15
—	Final approach and take-off areas and touchdown and lift-off areas	3-15
3.4	Shipboard heliports	3-16
—	Final approach and take-off areas and touchdown and lift-off areas	3-16
CHAPTER 4.	Obstacle environment	4-1
4.1	Obstacle limitation surfaces and sectors	4-1
—	Approach surface	4-1
—	Transitional surface.....	4-7
—	Take-off climb surface.....	4-7
—	Obstacle-free sector/surface — helidecks.....	4-8
—	Limited obstacle surface — helidecks	4-9
4.2	Obstacle limitation requirements	4-9
—	Surface-level heliports	4-9
—	Elevated heliports.....	4-14
—	Helidecks	4-14
—	Shipboard heliports	4-15
CHAPTER 5.	Visual aids	5-1
5.1	Indicators.....	5-1
5.1.1	Wind direction indicators.....	5-1
5.2	Markings and markers.....	5-2
5.2.1	Winching area marking.....	5-2
5.2.2	Heliport identification marking.....	5-3
5.2.3	Maximum allowable mass marking	5-3
5.2.4	D-value marking	5-6
5.2.5	Final approach and take-off area dimension(s) marking.....	5-8
5.2.6	Final approach and take-off area perimeter marking or markers for surface-level heliports ..	5-8
5.2.7	Final approach and take-off area designation markings for runway-type FATOs	5-10
5.2.8	Aiming point marking.....	5-10
5.2.9	Touchdown and lift-off area perimeter marking	5-10
5.2.10	Touchdown/positioning marking	5-11
5.2.11	Heliport name marking	5-12
5.2.12	Helideck obstacle-free sector (chevron) marking	5-13
5.2.13	Helideck and shipboard heliport surface marking	5-13
5.2.14	Helideck prohibited landing sector markings	5-14
5.2.15	Helicopter ground taxiway markings and markers	5-14
5.2.16	Helicopter air taxiway markings and markers	5-16
5.2.17	Helicopter stand markings	5-17
5.2.18	Flight path alignment guidance marking	5-19
5.3	Lights	5-20
5.3.1	General.....	5-20
5.3.2	Heliport beacon.....	5-21
5.3.3	Approach lighting system	5-23

	<i>Page</i>
5.3.4 Flight path alignment guidance lighting system	5-24
5.3.5 Visual alignment guidance system.....	5-25
5.3.6 Visual approach slope indicator.....	5-28
5.3.7 Final approach and take-off area lighting systems for surface-level heliports.....	5-31
5.3.8 Aiming point lights	5-31
5.3.9 Touchdown and lift-off area lighting system.....	5-32
5.3.10 Winching area floodlighting	5-34
5.3.11 Taxiway lights	5-34
5.3.12 Visual aids for denoting obstacles	5-34
5.3.13 Floodlighting of obstacles.....	5-35
CHAPTER 6. Heliport services	6-1
6.1 Rescue and fire fighting	6-1
— General.....	6-1
— Level of protection to be provided	6-1
— Extinguishing agents	6-2
— Rescue equipment	6-3
— Response time	6-3
APPENDIX 1. Aeronautical data quality requirements.....	APP 1-1
APPENDIX 2. International Standards and Recommended Practices for instrument heliports with non-precision and/or precision approaches and instrument departures.....	APP 2-1
1. General	APP 2-1
2. Heliport data.....	APP 2-1
3. Physical characteristics	APP 2-2
4. Obstacle environment	APP 2-2

ABBREVIATIONS AND SYMBOLS

*(used in Annex 14, Volume II)**Abbreviations*

APAPI	Abbreviated precision approach path indicator
ASPSL	Arrays of segmented point source lighting
cd	Candela
cm	Centimetre
FATO	Final approach and take-off area
ft	Foot
GNSS	Global navigation satellite system
HAPI	Helicopter approach path indicator
HFM	Helicopter flight manual
Hz	Hertz
kg	Kilogram
km/h	Kilometre per hour
kt	Knot
L	Litre
lb	Pounds
LDAH	Landing distance available
L/min	Litre per minute
LOA	Limited obstacle area
LOS	Limited obstacle sector
LP	Luminescent panel
m	Metre
MAPt	Missed approach point
MTOM	Maximum take-off mass
OFS	Obstacle-free sector
PAPI	Precision approach path indicator
PinS	Point-in-space
R/T	Radiotelephony or radio communications
RTODAH	Rejected take-off distance available
s	Second
t	Tonne (1 000 kg)
TLOF	Touchdown and lift-off area
TODAH	Take-off distance available
UCW	Undercarriage width
VSS	Visual segment surface

Symbols

°	Degree
=	Equals
%	Percentage
±	Plus or minus

MANUALS*(related to the specifications of this Annex)**Aerodrome Design Manual (Doc 9157)*

- Part 1 — Runways
- Part 2 — Taxiways, Aprons and Holding Bays
- Part 3 — Pavements
- Part 4 — Visual Aids
- Part 5 — Electrical Systems
- Part 6 — Frangibility

Airport Planning Manual (Doc 9184)

- Part 1 — Master Planning
- Part 2 — Land Use and Environmental Control
- Part 3 — Guidelines for Consultant/Construction Services

Airport Services Manual (Doc 9137)

- Part 1 — Rescue and Fire Fighting
- Part 2 — Pavement Surface Conditions
- Part 3 — Wildlife Control and Reduction
- Part 4 — Fog Dispersal (withdrawn)
- Part 5 — Removal of Disabled Aircraft
- Part 6 — Control of Obstacles
- Part 7 — Airport Emergency Planning
- Part 8 — Airport Operational Services
- Part 9 — Airport Maintenance Practices

*Heliport Manual (Doc 9261)**Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476)**Manual on the ICAO Bird Strike Information System (IBIS) (Doc 9332)**Stolport Manual (Doc 9150)*

FOREWORD

Historical background

Standards and Recommended Practices for aerodromes were first adopted by the Council on 29 May 1951 pursuant to the provisions of Article 37 of the Convention on International Civil Aviation (Chicago 1944) and designated as Annex 14 to the Convention. The document containing these Standards and Recommended Practices is now designated as Annex 14, Volume I, to the Convention. In general, Volume I addresses planning, design and operations of aerodromes but is not specifically applicable to heliports.

Therefore, Volume II is being introduced as a means of including provisions for heliports. Proposals for comprehensive Standards and Recommended Practices covering all aspects of heliport planning, design and operations have been developed with the assistance of the ANC Visual Aids Panel and the ANC Helicopter Operations Panel.

Table A shows the origin of the provisions in this volume, together with a list of the principal subjects involved and the dates on which the Annex was adopted by the Council, when it became effective and when it became applicable.

Action by Contracting States

Notification of differences. The attention of Contracting States is drawn to the obligation imposed by Article 38 of the Convention by which Contracting States are required to notify the Organization of any differences between their national regulations and practices and the International Standards contained in this Annex and any amendments thereto. Contracting States are invited to extend such notification to any differences from Recommended Practices contained in this Annex and any amendments thereto, when the notification of such differences is important for the safety of air navigation. Further, Contracting States are invited to keep the Organization currently informed of any differences which may subsequently occur, or of the withdrawal of any differences previously notified. A specified request for notification of differences will be sent to Contracting States immediately after the adoption of each amendment to this Annex.

The attention of States is also drawn to the provisions of Annex 15 related to the publication of differences between their national regulations and practices and the related ICAO Standards and Recommended Practices through the Aeronautical Information Service, in addition to the obligation of States under Article 38 of the Convention.

Promulgation of information. The establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations provided in accordance with the Standards and Recommended Practices specified in this Annex should be notified and take effect in accordance with the provisions of Annex 15.

Status of Annex components

An Annex is made up of the following component parts, not all of which, however, are necessarily found in every Annex; they have the status indicated:

1. — *Material comprising the Annex proper:*

- a) *Standards and Recommended Practices* adopted by the Council under the provisions of the Convention. They are defined as follows:

Standard: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under Article 38.

Recommended Practice: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention.

- b) *Appendices* comprising material grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council.
- c) *Definitions* of terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted dictionary meanings. A definition does not have independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specifications.
- d) *Tables* and *Figures* which add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

2.— *Material approved by the Council for publication in association with the Standards and Recommended Practices:*

- a) *Forewords* comprising historical and explanatory material based on the action of the Council and including an explanation of the obligations of States with regard to the application of the Standards and Recommended Practices ensuing from the Convention and the Resolution of Adoption.
- b) *Introductions* comprising explanatory material introduced at the beginning of parts, chapters or sections of the Annex to assist in the understanding of the application of the text.
- c) *Notes* included in the text, where appropriate, to give factual information or references bearing on the Standards or Recommended Practices in question, but not constituting part of the Standards or Recommended Practices.
- d) *Attachments* comprising material supplementary to the Standards and Recommended Practices, or included as a guide to their application.

Selection of language

This Annex has been adopted in six languages — English, Arabic, Chinese, French, Russian and Spanish. Each Contracting State is requested to select one of those texts for the purpose of national implementation and for other effects provided for in the Convention, either through direct use or through translation into its own national language, and to notify the Organization accordingly.

Editorial practices

The following practice has been adhered to in order to indicate at a glance the status of each statement: *Standards* have been printed in light face roman; *Recommended Practices* have been printed in light face italics, the status being indicated by the prefix **Recommendation**; *Notes* have been printed in light face italics, the status being indicated by the prefix *Note*.

The following editorial practice has been followed in the writing of specifications: for Standards the operative verb “shall” is used, and for Recommended Practices the operative verb “should” is used.

The units of measurement used in this document are in accordance with the International System of Units (SI) as specified in Annex 5 to the Convention on International Civil Aviation. Where Annex 5 permits the use of non-SI alternative units these are shown in parentheses following the basic units. Where two sets of units are quoted it must not be assumed that the pairs of values are equal and interchangeable. It may, however, be inferred that an equivalent level of safety is achieved when either set of units is used exclusively.

Any reference to a portion of this document, which is identified by a number and/or title, includes all subdivisions of that portion.

Table A. Amendments to Annex 14, Volume II

<i>Amendment</i>	<i>Source(s)</i>	<i>Subject(s)</i>	<i>Adopted Effective Applicable</i>
1st Edition	Fourth Meeting of the ANC Helicopter Operations Panel; Eleventh Meeting of the ANC Visual Aids Panel and Secretariat	Physical characteristics; obstacle limitation surfaces; visual aids for visual meteorological conditions; rescue and fire fighting services.	9 March 1990 30 July 1990 15 November 1990
1 (2nd Edition)	Twelfth Meeting of the ANC Visual Aids Panel and Secretariat	Standard geodetic reference system (WGS-84); frangibility; visual aids for helicopter non-precision approaches; and visual alignment guidance system.	13 March 1995 24 July 1995 9 November 1995
2	Air Navigation Commission	Aeronautical databases and vertical component of the World Geodetic System — 1984 (WGS-84).	21 March 1997 21 July 1997 6 November 1997
3	Fourteenth Meeting of the ANC Visual Aids Panel and Secretariat	Definitions of calendar, datum, Gregorian calendar and obstacle; common reference systems; heliport dimensions and related information; touchdown and lift-off area lighting system; Appendix 1 — Aeronautical Data Quality Requirements.	27 February 2004 12 July 2004 25 November 2004
4 (3rd Edition)	First Meeting of the Aerodromes Panel	Introductory note; definitions of air transit route, declared distances, dynamic load-bearing surface, final approach and take-off area, helicopter air taxiway, helicopter clearway, helicopter ground taxiway, helicopter stand, helideck, obstacle, protection area, rejected take-off area, shipboard heliport, static load-bearing surface, taxi-route, touchdown and lift-off area, winching area; applicability; physical characteristics for surface-level heliports, elevated heliports, helidecks, and shipboard heliports; obstacle limitation surfaces and sectors and requirements for helidecks and shipboard heliports; winching area marking; heliport identification marking; maximum allowable mass marking; maximum allowable D-value marking; touchdown and lift-off area marking; touchdown/positioning marking; helideck obstacle-free sector marking; helideck surface marking; and helideck prohibited landing sector marking.	4 March 2009 20 July 2009 19 November 2009

<i>Amendment</i>	<i>Source(s)</i>	<i>Subject(s)</i>	<i>Adopted Effective Applicable</i>
5 (4rd Edition)	Second Meeting of the Aerodromes Panel (AP/2) Secretariat supported by the AIS to AIM Study Group (AIS-AIMSG)	Definitions of D, helicopter taxi-route, helideck, heliport elevation, integrity classification, point-in-space approach, point-in-space visual segment, runway-type FATO and surface-level heliport; applicability; integrity of aeronautical data; physical characteristics for surface-level heliports; helidecks, shipboard heliports; obstacle environment, including obstacle limitation surfaces and sectors and obstacle limitation requirements; visual aids, including winching area marking, heliport identification marking, maximum allowable mass marking, D-value marking, final approach and take-off area dimension(s) marking, final approach and take-off area perimeter marking or markers for surface-level heliports, aiming point marking, touchdown/positioning marking, heliport name marking, helideck obstacle-free sector (chevron) marking, helideck and shipboard heliport surface marking, helideck prohibited landing sector markings, helicopter ground taxiway markings and markers, helicopter air taxiway markings and markers; helicopter stand markings; flight path alignment guidance marking, flight path alignment guidance lighting system Appendix 1, Aeronautical Data Quality Requirements; Appendix 2, International Standards and Recommended Practices for Instrument Heliports with non-precision and/or precision Approaches and Instrument Departures.	27 February 2013 15 July 2013 14 November 2013
6	Seventh, eighth, ninth, tenth and eleventh meetings of the Instrument Flight Procedures Panel Working Group of the Whole (IFPP/WG-WHL/7, 8, 9, 10 and 11)	Definitions of heliport reference point and landing location; heliport data; Appendix 1, Aeronautical Data Quality Requirements.	3 March 2014 14 July 2014 13 November 2014

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. GENERAL

Introductory Note.— Annex 14, Volume II, contains Standards and Recommended Practices (specifications) that prescribe the physical characteristics and obstacle limitation surfaces to be provided for at heliports, and certain facilities and technical services normally provided at a heliport. It is not intended that these specifications limit or regulate the operation of an aircraft.

When designing a heliport, the critical design helicopter, having the largest set of dimensions and the greatest maximum take-off mass (MTOM) the heliport is intended to serve, would need to be considered.

It is to be noted that provisions for helicopter flight operations are contained in Annex 6, Part III.

1.1 Definitions

When the following terms are used in this volume, they have the meanings given below. Annex 14, Volume I, contains definitions for those terms which are used in both volumes.

Accuracy. A degree of conformance between the estimated or measured value and the true value.

Note.— For measured positional data, the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.

Calendar. Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108*).

Cyclic redundancy check (CRC). A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.

D. The largest overall dimension of the helicopter when rotor(s) are turning measured from the most forward position of the main rotor tip path plane to the most rearward position of the tail rotor tip path plane or helicopter structure.

Note.— “D” is sometimes referred to in the text using the terminology “D-value”.

Data quality. A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity.

* ISO Standard 19108, Geographic information — Temporal schema

Datum. Any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities (ISO 19104**).

Declared distances — heliports.

- a) *Take-off distance available (TODAH).* The length of the FATO plus the length of helicopter clearway (if provided) declared available and suitable for helicopters to complete the take-off.
- b) *Rejected take-off distance available (RTODAH).* The length of the FATO declared available and suitable for helicopters operated in performance class 1 to complete a rejected take-off.
- c) *Landing distance available (LDAH).* The length of the FATO plus any additional area declared available and suitable for helicopters to complete the landing manoeuvre from a defined height.

Dynamic load-bearing surface. A surface capable of supporting the loads generated by a helicopter conducting an emergency touchdown on it.

Elevated heliport. A heliport located on a raised structure on land.

Ellipsoid height (Geodetic height). The height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question.

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

Geodetic datum. A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.

Geoid. The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea level (MSL) extended continuously through the continents.

Note.— The geoid is irregular in shape because of local gravitational disturbances (wind tides, salinity, current, etc.) and the direction of gravity is perpendicular to the geoid at every point.

Geoid undulation. The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.

Note.— In respect to the World Geodetic System — 1984 (WGS-84) defined ellipsoid, the difference between the WGS-84 ellipsoidal height and orthometric height represents WGS-84 geoid undulation.

Gregorian calendar. Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108***).

Note.— In the Gregorian calendar, common years have 365 days and leap years 366 days divided into twelve sequential months.

Helicopter air taxiway. A defined path on the surface established for the air taxiing of helicopters.

Helicopter clearway. A defined area on the ground or water, selected and/or prepared as a suitable area over which a helicopter operated in performance class 1 may accelerate and achieve a specific height.

** ISO Standard 19104, Geographic information — Terminology

*** ISO Standard 19108, Geographic information — Temporal schema

Helicopter ground taxiway. A ground taxiway intended for the ground movement of wheeled undercarriage helicopters.

Helicopter stand. An aircraft stand which provides for parking a helicopter and where ground taxi operations are completed or where the helicopter touches down and lifts off for air taxi operations.

Helicopter taxi-route. A defined path established for the movement of helicopters from one part of a heliport to another. A taxi-route includes a helicopter air or ground taxiway which is centred on the taxi-route.

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

Heliport. 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.

Heliport elevation. The elevation of the highest point of the FATO.

Heliport reference point (HRP). The designated location of a heliport or a landing location.

Integrity (aeronautical data). A degree of assurance that an aeronautical data and its value has not been lost nor altered since the data origination or authorized amendment.

Integrity classification (aeronautical data). Classification based upon the potential risk resulting from the use of corrupted data. Aeronautical data is classified as:

- a) routine data: there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe;
- b) essential data: there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and
- c) critical data: there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.

Landing location. A marked or unmarked area that has the same physical characteristics as a visual heliport final approach and take-off area (FATO).

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

- a) are located on an area intended for the surface movement of aircraft; or
- b) extend above a defined surface intended to protect aircraft in flight; or
- c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

Orthometric height. Height of a point related to the geoid, generally presented as an MSL elevation.

Point-in-space approach (PinS). The Point-in-space approach is based on GNSS and is an approach procedure designed for helicopter only. It is aligned with a reference point located to permit subsequent flight manoeuvring or approach and landing using visual manoeuvring in adequate visual conditions to see and avoid obstacles.

Point-in-space (PinS) visual segment. This is the segment of a helicopter PinS approach procedure from the MAPt to the landing location for a PinS “proceed visually” procedure. This visual segment connects the Point-in-space (PinS) to the landing location.

Note.— The procedure design criteria for a PinS approach and the detailed design requirements for a visual segment are established in the Procedures for Air Navigation Services — Aircraft Operations, (PANS-OPS, Doc 8168).

Protection area. An area within a taxi-route and around a helicopter stand which provides separation from objects, the FATO, other taxi-routes and helicopter stands, for safe manoeuvring of helicopters.

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

Runway-type FATO. A FATO having characteristics similar in shape to a runway.

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

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

Static load-bearing surface. A surface capable of supporting the mass of a helicopter situated upon it.

Station declination. An alignment variation between the zero degree radial of a VOR and true north, determined at the time the VOR station is calibrated.

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

Touchdown and lift-off area (TLOF). An area on which a helicopter may touch down or lift off.

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

1.2 Applicability

Note.— The dimensions discussed in this Annex are based on consideration of single-main-rotor helicopters. For tandem-rotor helicopters the heliport design will be based on a case-by-case review of the specific models using the basic requirement for a safety area and protection areas specified in this Annex. The specifications of the main chapters of this Annex are applicable for visual heliports that may or may not incorporate the use of a Point-in-space approach or departure. Additional specifications for instrument heliports with non-precision and/or precision approaches and instrument departures are detailed in Appendix 2. The specifications of this Annex are not applicable for water heliports (touchdown or lift-off on the surface of the water).

1.2.1 The interpretation of some of the specifications in the Annex expressly requires the exercising of discretion, the taking of a decision or the performance of a function by the appropriate authority. In other specifications, the expression appropriate authority does not actually appear although its inclusion is implied. In both cases, the responsibility for whatever determination or action is necessary shall rest with the State having jurisdiction over the heliport.

1.2.2 The specifications in Annex 14, Volume II, shall apply to all heliports intended to be used by helicopters in international civil aviation. They shall apply equally to areas for the exclusive use of helicopters at an aerodrome primarily meant for the use of aeroplanes. Where relevant, the provisions of Annex 14, Volume I, shall apply to the helicopter operations being conducted at such an aerodrome.

1.2.3 Unless otherwise specified, the specification for a colour referred to within this volume shall be that contained in Appendix 1 to Annex 14, Volume I.

1.3 Common reference systems

1.3.1 Horizontal reference system

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

Note.— Comprehensive guidance material concerning WGS-84 is contained in the World Geodetic System — 1984 (WGS-84) Manual (Doc 9674).

1.3.2 Vertical reference system

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

Note 1.— The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth which coincides with the undisturbed MSL extended continuously through the continents.

Note 2.— Gravity-related heights (elevations) are also referred to as orthometric heights while distances of points above the ellipsoid are referred to as ellipsoidal heights.

1.3.3 Temporal reference system

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

1.3.3.2 When a different temporal reference system is used, this shall be indicated in GEN 2.1.2 of the Aeronautical Information Publication (AIP).



CHAPTER 2. HELIPORT DATA

2.1 Aeronautical data

2.1.1 Determination and reporting of heliport-related aeronautical data shall be in accordance with the accuracy and integrity requirements set forth in Tables A1-1 to A1-5 contained in Appendix 1 while taking into account the established quality system procedures. Accuracy requirements for aeronautical data are based upon a 95 per cent confidence level and in that respect, three types of positional data shall be identified: surveyed points (e.g. FATO threshold), calculated points (mathematical calculations from the known surveyed points of points in space, fixes) and declared points (e.g. flight information region boundary points).

Note.— Specifications governing the quality system are given in Annex 15, Chapter 3.

2.1.2 Contracting States shall ensure that integrity of aeronautical data is maintained throughout the data process from survey/origin to the next intended user. Based on the applicable integrity classification, the validation and verification procedures shall:

- a) for routine data: avoid corruption throughout the processing of the data;
- b) for essential data: assure corruption does not occur at any stage of the entire process and may include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and
- c) for critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance procedures to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

Note.— Guidance material in respect to the processing of aeronautical data and aeronautical information is contained in RTCA Document DO-200B and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-76B — Standards for Processing Aeronautical Data.

2.1.3 Protection of electronic aeronautical data while stored or in transit shall be totally monitored by the cyclic redundancy check (CRC). To achieve protection of the integrity level of critical and essential aeronautical data as classified in 2.1.2, a 32- or 24-bit CRC algorithm shall apply respectively.

2.1.4 **Recommendation.**— *To achieve protection of the integrity level of routine aeronautical data as classified in 2.1.2, a 16-bit CRC algorithm should apply.*

Note.— Guidance material on the aeronautical data quality requirements (accuracy, resolution, integrity, protection and traceability) is contained in the World Geodetic System — 1984 (WGS-84) Manual (Doc 9674). Supporting material in respect of the provisions of Appendix 1 related to accuracy and integrity of aeronautical data is contained in RTCA Document DO-201A and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-77 — Industry Requirements for Aeronautical Information.

2.1.5 Geographical coordinates indicating latitude and longitude shall be determined and reported to the aeronautical information services authority in terms of the World Geodetic System — 1984 (WGS-84) geodetic reference datum, identifying those geographical coordinates which have been transformed into WGS-84 coordinates by mathematical means and whose accuracy of original field work does not meet the requirements in Appendix 1, Table A1-1.

2.1.6 The order of accuracy of the field work shall be such that the resulting operational navigation data for the phases of flight will be within the maximum deviations, with respect to an appropriate reference frame, as indicated in the tables contained in Appendix 1.

2.1.7 In addition to the elevation (referenced to mean sea level) of the specific surveyed ground positions at heliports, geoid undulation (referenced to the WGS-84 ellipsoid) for those positions as indicated in Appendix 1 shall be determined and reported to the aeronautical information services authority.

Note 1.— An appropriate reference frame is that which enables WGS-84 to be realized on a given heliport and with respect to which all coordinate data are related.

Note 2.— Specifications governing the publication of WGS-84 coordinates are given in Annex 4, Chapter 2, and Annex 15, Chapter 3.

2.2 Heliport reference point

2.2.1 A heliport reference point shall be established for a heliport or a landing location not collocated with an aerodrome.

Note.— When the heliport or landing location is collocated with an aerodrome, the established aerodrome reference point serves both aerodrome and heliport or landing location.

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

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

2.3 Heliport elevations

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

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

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

2.4 Heliport dimensions and related information

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

- a) heliport type — surface-level, elevated, shipboard or helideck;
- b) TLOF — dimensions to the nearest metre or foot, slope, surface type, bearing strength in tonnes (1 000 kg);

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

2.4.2 The geographical coordinates of the geometric centre of the TLOF and/or of each threshold of the FATO (where appropriate) shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.

2.4.3 The geographical coordinates of appropriate centre line points of helicopter ground taxiways and helicopter air taxiways shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and hundredths of seconds.

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

2.4.5 The geographical coordinates of obstacles in Area 2 (the part within the heliport boundary) and in Area 3 shall be measured and reported to the aeronautical information services authority in degrees, minutes, seconds and tenths of seconds. In addition, the top elevation, type, marking and lighting (if any) of obstacles shall be reported to the aeronautical information services authority.

Note 1.— See Annex 15, Appendix 8, for graphical illustrations of obstacle data collection surfaces and criteria used to identify obstacles in Areas 2 and 3.

Note 2.— Appendix 1 to this Annex provides requirements for obstacle data determination in Areas 2 and 3.

Note 3.— Implementation of Annex 15, provisions 10.1.4 and 10.1.6, concerning the availability, as of 12 November 2015, of obstacle data according to Area 2 and Area 3 specifications would be facilitated by appropriate advance planning for the collection and processing of such data.

2.5 Declared distances

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

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

2.6 Coordination between aeronautical information services and heliport authorities

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

- a) information on heliport conditions;
- b) the operational status of associated facilities, services and navigation aids within their area of responsibility;
- c) any other information considered to be of operational significance.

2.6.2 Before introducing changes to the air navigation system, due account shall be taken by the services responsible for such changes of the time needed by the aeronautical information service for the preparation, production and issue of relevant material for promulgation. To ensure timely provision of the information to the aeronautical information service, close coordination between those services concerned is therefore required.

2.6.3 Of a particular importance are changes to aeronautical information that affect charts and/or computer-based navigation systems which qualify to be notified by the aeronautical information regulation and control (AIRAC) system, as specified in Annex 15, Chapter 6 and Appendix 4. The predetermined, internationally agreed AIRAC effective dates in addition to 14 days postage time shall be observed by the responsible heliport services when submitting the raw information/data to aeronautical information services.

2.6.4 The heliport services responsible for the provision of raw aeronautical information/data to the aeronautical information services shall do that while taking into account accuracy and integrity requirements for aeronautical data as specified in Appendix 1 to this Annex.

Note 1.— Specifications for the issue of a NOTAM and SNOWTAM are contained in Annex 15, Chapter 5, and Appendices 6 and 2, respectively.

Note 2.— The AIRAC information is distributed by the AIS at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.

Note 3.— The schedule of the predetermined internationally agreed AIRAC common effective dates at intervals of 28 days and guidance for the AIRAC use are contained in the Aeronautical Information Services Manual (Doc 8126, Chapter 2, 2.6).

CHAPTER 3. PHYSICAL CHARACTERISTICS

3.1 Surface-level heliports

Note 1.— The provisions given in this section are based on the design assumption that no more than one helicopter will be in the FATO at the same time.

Note 2.— The design provisions given in this section assume when conducting operations to a FATO in proximity to another FATO, these operations will not be simultaneous. If simultaneous helicopter operations are required, appropriate separation distances between FATOs need to be determined, giving due regard to such issues as rotor downwash and airspace, and ensuring the flight paths for each FATO, defined in Chapter 4, do not overlap.

Note 3.— The specifications for ground taxi-routes and air taxi-routes are intended for the safety of simultaneous operations during the manoeuvring of helicopters. However, the wind velocity induced by the rotor downwash might have to be considered.

Final approach and take-off areas

3.1.1 A surface-level heliport shall be provided with at least one final approach and take-off area (FATO).

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

3.1.2 A FATO shall be obstacle free.

3.1.3 The dimensions of a FATO shall be:

- a) where intended to be used by helicopters operated in performance class 1, as prescribed in the helicopter flight manual (HFM) except that, in the absence of width specifications, the width shall be not less than the greatest overall dimension (D) of the largest helicopter the FATO is intended to serve;
- b) where intended to be used by helicopters operated in performance class 2 or 3, of sufficient size and shape to contain an area within which can be drawn a circle of diameter not less than:
 - 1) 1 D of the largest helicopter when the maximum take-off mass (MTOM) of helicopters the FATO is intended to serve is more than 3 175 kg;
 - 2) 0.83 D of the largest helicopter when the MTOM of helicopters the FATO is intended to serve is 3 175 kg or less.

Note.— The term FATO is not used in the HFM. The minimum landing/take-off area specified in the HFM for the appropriate performance class 1 flight profile is necessary to determine the size of the FATO. However, for vertical take-off procedures in performance class 1, the required rejected take-off area is not normally quoted in the HFM, and it will be necessary to obtain information which includes complete containment — this figure will always be greater than 1 D.

3.1.4 **Recommendation.**— *Where intended to be used by helicopters operated in performance class 2 or 3 with MTOM of 3 175 kg or less, the FATO should be of sufficient size and shape to contain an area within which can be drawn a circle of diameter not less than 1 D.*

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

3.1.5 The FATO shall provide rapid drainage but the mean slope in any direction shall not exceed 3 per cent. No portion of a FATO shall have a local slope exceeding:

- a) 5 per cent where the heliport is intended to be used by helicopters operated in performance class 1; and
- b) 7 per cent where the heliport is intended to be used by helicopters operated in performance class 2 or 3.

3.1.6 The surface of the FATO shall:

- a) be resistant to the effects of rotor downwash;
- b) be free of irregularities that would adversely affect the take-off or landing of helicopters; and
- c) have bearing strength sufficient to accommodate a rejected take-off by helicopters operated in performance class 1.

3.1.7 The surface of a FATO surrounding a touchdown and lift-off area (TLOF) intended for use by helicopters operated in performance classes 2 and 3 shall be static load-bearing.

3.1.8 **Recommendation.**— *The FATO should provide ground effect.*

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

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

Helicopter clearways

Note.— *A helicopter clearway would need to be considered when the heliport is intended to be used by helicopters operating in performance class 1. See the Heliport Manual (Doc 9261).*

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

3.1.11 **Recommendation.**— *The width of a helicopter clearway should not be less than that of the associated safety area. (See Figure 3-1.)*

3.1.12 **Recommendation.**— *The ground in a helicopter clearway should not project above a plane having an upward slope of 3 per cent, the lower limit of this plane being a horizontal line which is located on the periphery of the FATO.*

3.1.13 **Recommendation.**— *An object situated in a helicopter clearway, which may endanger helicopters in the air, should be regarded as an obstacle and should be removed.*

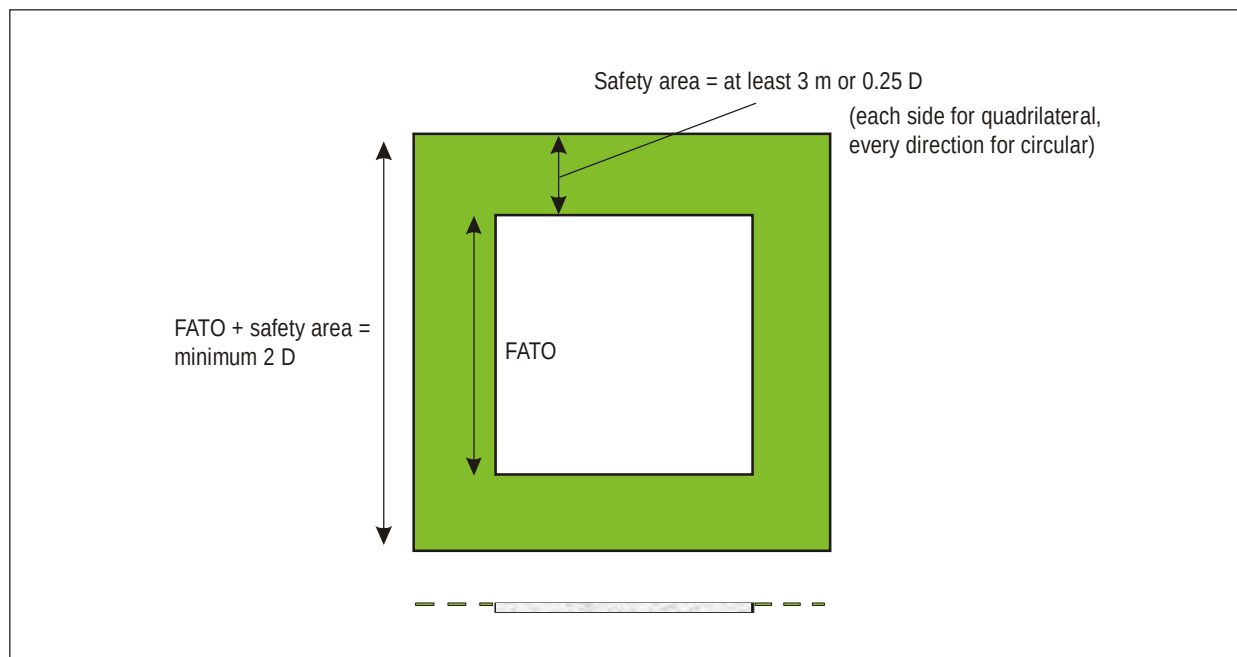


Figure 3-1. FATO and associated safety area

Touchdown and lift-off areas

3.1.14 At least one TLOF shall be provided at a heliport.

3.1.15 One TLOF shall be located within the FATO or one or more TLOFs shall be collocated with helicopter stands. For runway-type FATOs, additional TLOFs located in the FATO are acceptable.

Note.— For further guidance see the Heliport Manual (Doc 9261).

3.1.16 The TLOF shall be of sufficient size to contain a circle of diameter of at least 0.83 D of the largest helicopter the area is intended to serve.

Note.— A TLOF may be any shape.

3.1.17 Slopes on a TLOF shall be sufficient to prevent accumulation of water on the surface of the area, but shall not exceed 2 per cent in any direction.

3.1.18 Where the TLOF is within the FATO, the TLOF shall be dynamic load-bearing.

3.1.19 Where a TLOF is collocated with a helicopter stand, the TLOF shall be static load-bearing and be capable of withstanding the traffic of helicopters that the area is intended to serve.

3.1.20 Where a TLOF is located within a FATO which can contain a circle of diameter more than 1 D, the centre of the TLOF shall be located not less than 0.5 D from the edge of the FATO.

Safety areas

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

3.1.22 A safety area surrounding a FATO shall extend outwards from the periphery of the FATO for a distance of at least 3 m or 0.25 D, whichever is greater, of the largest helicopter the FATO is intended to serve and:

- a) each external side of the safety area shall be at least 2 D where the FATO is quadrilateral; or
- b) the outer diameter of the safety area shall be at least 2 D where the FATO is circular.

(See Figure 3-1.)

3.1.23 There shall be a protected side slope rising at 45 degrees from the edge of the safety area to a distance of 10 m, whose surface shall not be penetrated by obstacles, except that when obstacles are located to one side of the FATO only, they may be permitted to penetrate the side slope surface.

Note.— When only a single approach and take-off climb surface is provided, the need for specific protected side slopes would be addressed in the aeronautical study required in 4.2.7.

3.1.24 No fixed object shall be permitted above the plane of the FATO on a safety area, except for frangible objects, which, because of their function, must be located on the area. No mobile object shall be permitted on a safety area during helicopter operations.

3.1.25 Objects whose function requires them to be located on the safety area shall not:

- a) if located at a distance of less than 0.75 D from the centre of the FATO, penetrate a plane at a height of 5 cm above the plane of the FATO; and
- b) if located at a distance of 0.75 D or more from the centre of the FATO, penetrate a plane originating at a height of 25 cm above the plane of the FATO and sloping upwards and outwards at a gradient of 5 per cent.

3.1.26 The surface of the safety area, when solid, shall not exceed an upward slope of 4 per cent outwards from the edge of the FATO.

3.1.27 Where applicable, the surface of the safety area shall be treated to prevent flying debris caused by rotor downwash.

3.1.28 When solid, the surface of the safety area abutting the FATO shall be continuous with the FATO.

Helicopter ground taxiways and helicopter ground taxi-routes

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

Note 2.— When a taxiway is intended for use by aeroplanes and helicopters, the provisions for taxiways for aeroplanes and helicopter ground taxiways will be taken into consideration and the more stringent requirements will be applied.

3.1.29 The width of a helicopter ground taxiway shall not be less than 1.5 times the largest width of the undercarriage (UCW) of the helicopters the helicopter ground taxiway is intended to serve. (See Figure 3-2.)

3.1.30 The longitudinal slope of a helicopter ground taxiway shall not exceed 3 per cent.

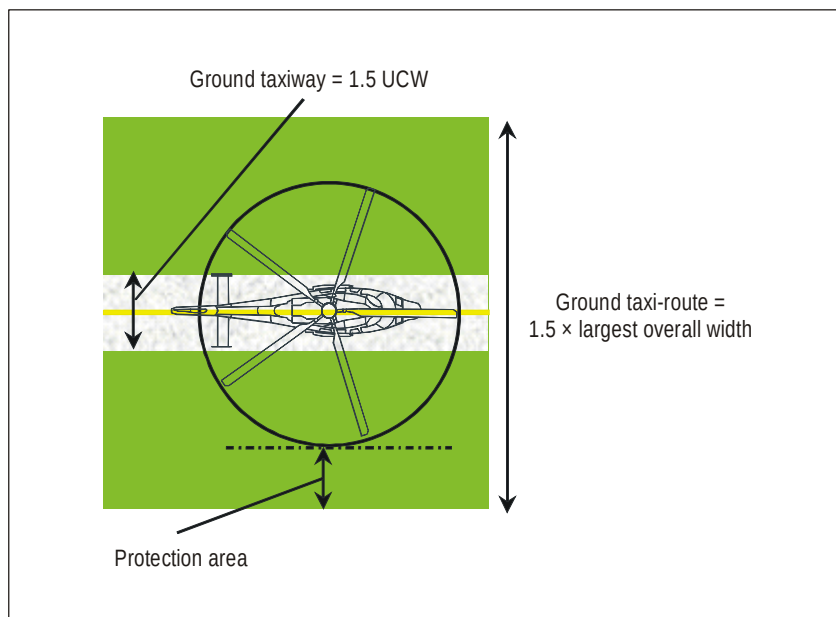


Figure 3-2. Helicopter ground taxi-route/taxiway

3.1.31 A helicopter ground taxiway shall be static load-bearing and be capable of withstanding the traffic of the helicopters the helicopter ground taxiway is intended to serve.

3.1.32 A helicopter ground taxiway shall be centred on a ground taxi-route.

3.1.33 A helicopter ground taxi-route shall extend symmetrically on each side of the centre line for at least 0.75 times the largest overall width of the helicopters it is intended to serve.

Note.— The part of the helicopter ground taxi-route that extends symmetrically on each side of the centre line from 0.5 times the largest overall width of the helicopters it is intended to serve to the outermost limit of the helicopter ground taxi-route is its protection area.

3.1.34 No fixed object shall be permitted above the surface of the ground on a helicopter ground taxi-route, except for frangible objects, which, because of their function, must be located thereon. No mobile object shall be permitted on a ground taxi-route during helicopter movements.

3.1.35 Objects whose function requires them to be located on a helicopter ground taxi-route shall not:

- a) be located at a distance of less than 50 cm from the edge of the helicopter ground taxiway; and
- b) penetrate a plane originating at a height of 25 cm above the plane of the helicopter ground taxiway, at a distance of 50 cm from the edge of the helicopter ground taxiway and sloping upwards and outwards at a gradient of 5 per cent.

3.1.36 The helicopter ground taxiway and the helicopter ground taxi-route shall provide rapid drainage but the helicopter ground taxiway transverse slope shall not exceed 2 per cent.

3.1.37 The surface of a helicopter ground taxi-route shall be resistant to the effect of rotor downwash.

3.1.38 For simultaneous operations, the helicopter ground taxi-routes shall not overlap.

Helicopter air taxiways and helicopter air taxi-routes

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

3.1.39 The width of a helicopter air taxiway shall be at least two times the largest width of the undercarriage (UCW) of the helicopters that the helicopter air taxiway is intended to serve. (See Figure 3-3.)

3.1.40 **Recommendation.**— *The surface of a helicopter air taxiway should be static load-bearing.*

3.1.41 **Recommendation.**— *The slopes of the surface of a helicopter air taxiway should not exceed the slope landing limitations of the helicopters the helicopter air taxiway is intended to serve. In any event the transverse slope should not exceed 10 per cent and the longitudinal slope should not exceed 7 per cent.*

3.1.42 A helicopter air taxiway shall be centred on an air taxi-route.

3.1.43 A helicopter air taxi-route shall extend symmetrically on each side of the centre line for a distance at least equal to the largest overall width of the helicopters it is intended to serve.

Note.— *The part of the helicopter air taxi-route that extends symmetrically on each side of the centre line from 0.5 times the largest overall width of the helicopters it is intended to serve to the outermost limit of the helicopter air taxi-route is its protection area.*

3.1.44 No fixed object shall be permitted above the surface of the ground on an air taxi-route, except for frangible objects, which, because of their function, must be located thereon. No mobile object shall be permitted on an air taxi-route during helicopter movements.

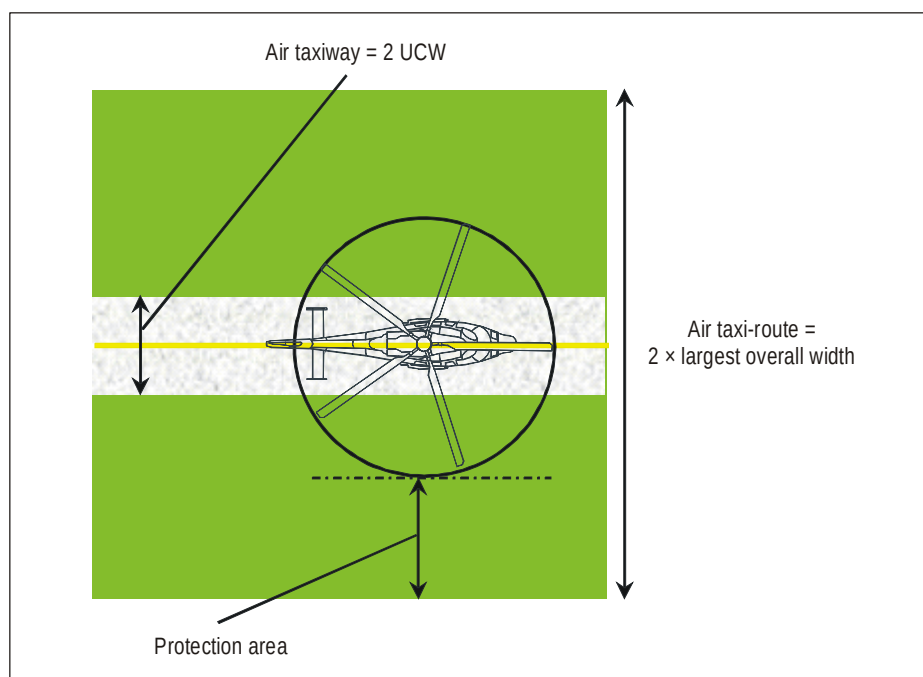


Figure 3-3. Helicopter air taxi-route/taxiway

3.1.45 Objects above ground level whose function requires them to be located on a helicopter air taxi-route shall not:

- a) be located at a distance of less than 1 m from the edge of the helicopter air taxiway; and
- b) penetrate a plane originating at a height of 25 cm above the plane of the helicopter air taxiway, at a distance of 1 m from the edge of the helicopter air taxiway and sloping upwards and outwards at a gradient of 5 per cent.

3.1.46 **Recommendation.**— *Objects above ground level whose function requires them to be located on a helicopter air taxi-route should not:*

- a) *be located at a distance of less than 0.5 times the largest overall width of the helicopter for which the helicopter air taxi-route is designed from the centre line of the helicopter air taxiway; and*
- b) *penetrate a plane originating at a height of 25 cm above the plane of the helicopter air taxiway, at a distance of 0.5 times the largest overall width of the helicopter for which the helicopter air taxi-route is designed from the centre line of the helicopter air taxiway, and sloping upwards and outwards at a gradient of 5 per cent.*

3.1.47 The surface of a helicopter air taxi-route shall be resistant to the effect of rotor downwash.

3.1.48 The surface of a helicopter air taxi-route shall provide ground effect.

3.1.49 For simultaneous operations, the helicopter air taxi-routes shall not overlap.

Helicopter stands

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

3.1.50 When a TLOF is collocated with a helicopter stand, the protection area of the stand shall not overlap the protection area of any other helicopter stand or associated taxi route.

3.1.51 The helicopter stand shall provide rapid drainage but the slope in any direction shall not exceed 2 per cent.

Note.— The requirements on the dimensions of helicopter stands assume the helicopter will turn in a hover when operating over a stand.

3.1.52 A helicopter stand intended to be used by helicopters turning in a hover shall be of sufficient size to contain a circle of diameter of at least 1.2 D of the largest helicopter the stand is intended to serve. (See Figure 3-4.)

3.1.53 Where a helicopter stand is intended to be used for taxi-through and where the helicopter using the stand is not required to turn, the minimum width of the stand and associated protection area shall be that of the taxi-route.

3.1.54 Where a helicopter stand is intended to be used for turning, the minimum dimension of the stand and protection area shall be not less than 2 D.

3.1.55 Where a helicopter stand is intended to be used for turning, it shall be surrounded by a protection area which extends for a distance of 0.4 D from the edge of the helicopter stand.

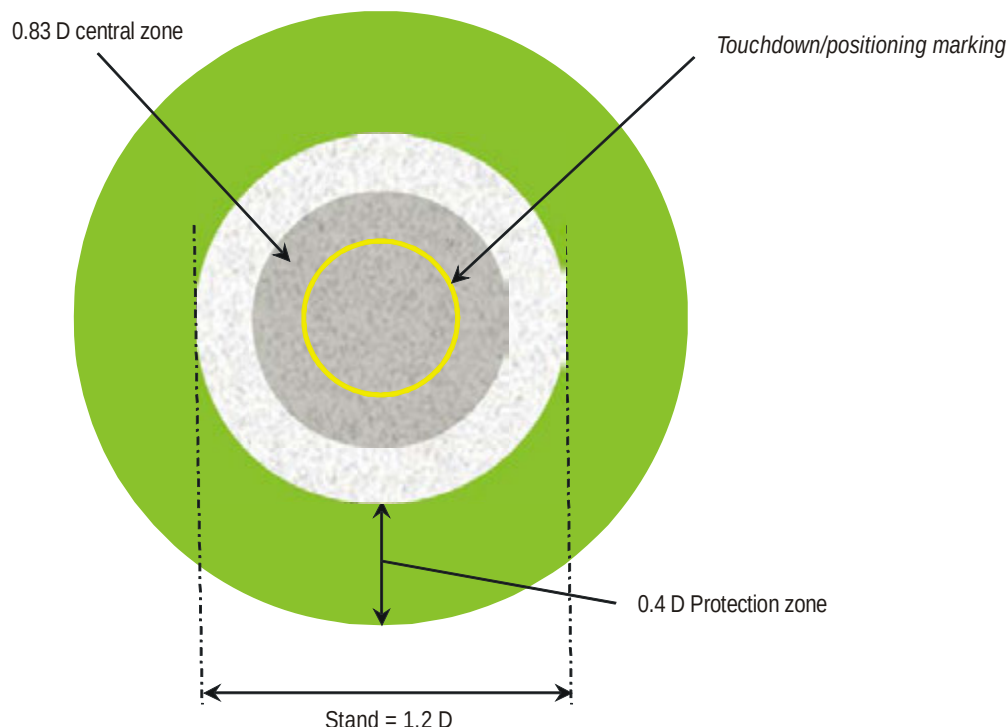


Figure 3-4. Helicopter stand and associated protection area

3.1.56 For simultaneous operations, the protection areas of helicopter stands and their associated taxi-routes shall not overlap. (See Figure 3-5.)

Note.— Where non-simultaneous operations are envisaged, the protection areas of helicopter stands and their associated taxi-routes may overlap. (See Figure 3-6.)

3.1.57 A helicopter stand and associated protection area intended to be used for air taxiing shall provide ground effect.

3.1.58 No fixed object shall be permitted above the surface of the ground on a helicopter stand.

3.1.59 No fixed object shall be permitted above the surface of the ground in the protection area around a helicopter stand except for frangible objects, which because of their function, must be located there.

3.1.60 No mobile object shall be permitted on a helicopter stand and the associated protection area during helicopter movements.

3.1.61 Objects whose function requires them to be located in the protection area shall not:

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

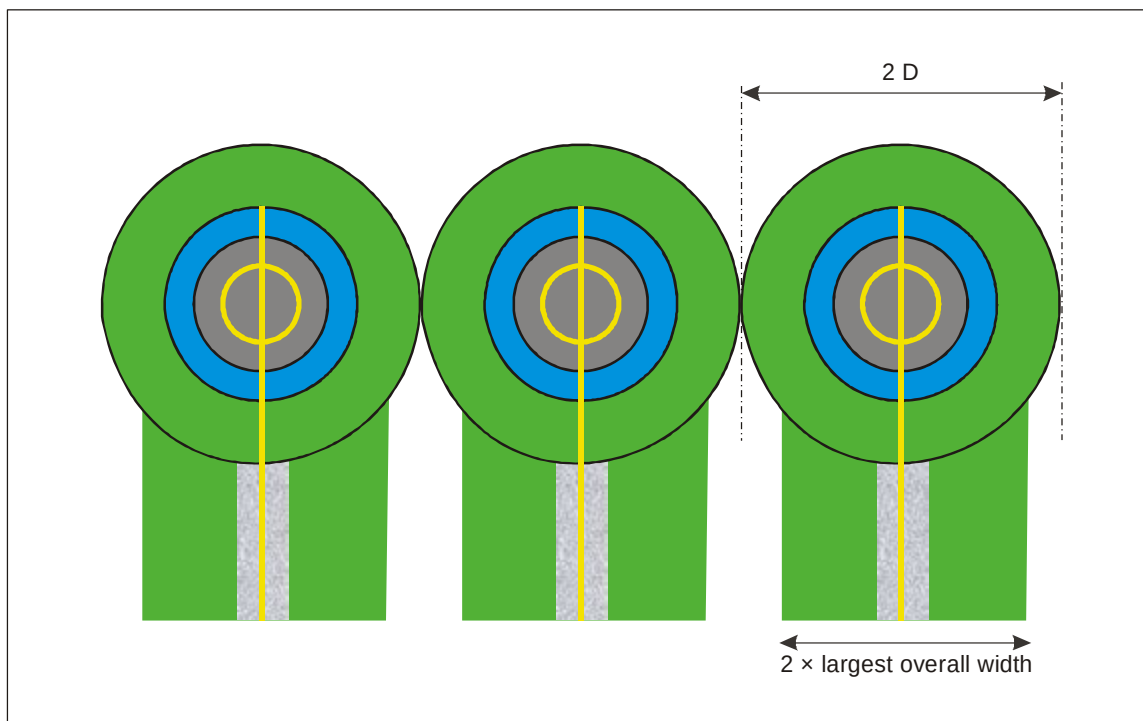


Figure 3-5. Helicopter stands designed for hover turns with air taxi-routes/taxiways — simultaneous operations

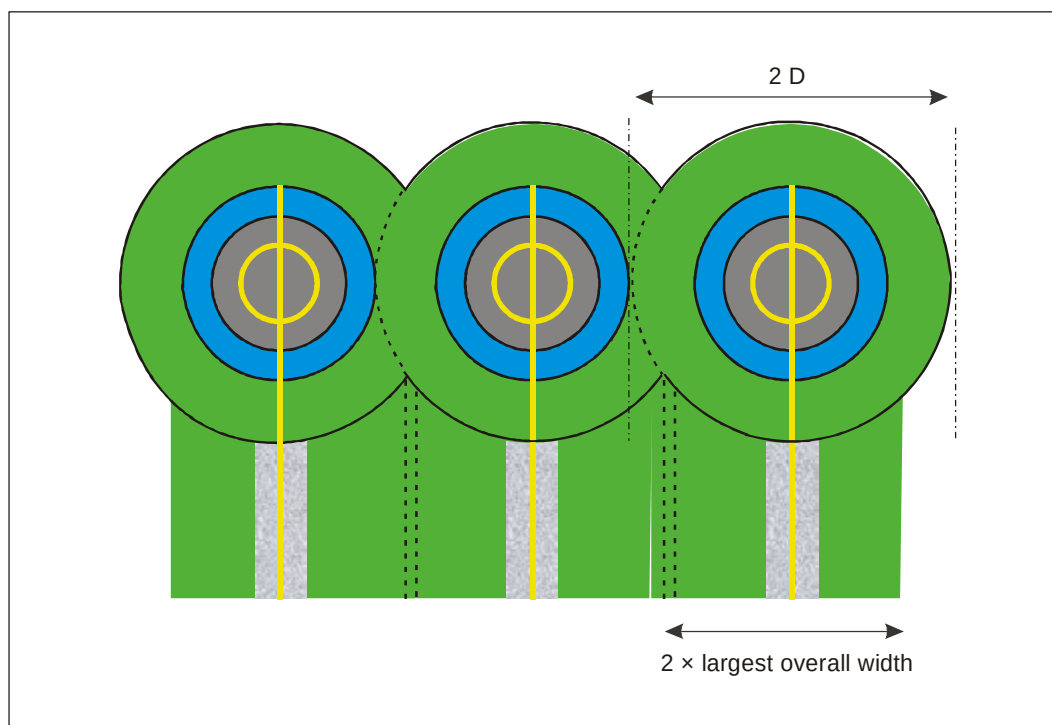


Figure 3-6. Helicopter stands designed for hover turns with air taxi-routes/taxiways — non-simultaneous operations

3.1.62 The central zone of a helicopter stand shall be capable of withstanding the traffic of helicopters it is intended to serve and have a static load-bearing area:

- a) of diameter not less than 0.83 D of the largest helicopter it is intended to serve; or
- b) for a helicopter stand intended to be used for taxi-through, and where the helicopter using the stand is not required to turn, the same width as the helicopter ground taxiway.

Note.— For a helicopter stand intended to be used for turning on the ground by wheeled helicopters, the dimension of the helicopter stand, including the dimension of the central zone, would need to be significantly increased. See the Heliport Manual (Doc 9261) for further guidance.

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

3.1.63 Where a FATO is located near a runway or taxiway, and where simultaneous operations are planned, the separation distance between the edge of a runway or taxiway and the edge of a FATO shall not be less than the appropriate dimension in Table 3-1.

3.1.64 **Recommendation.**— *A FATO should not be located:*

- a) *near taxiway intersections or holding points where jet engine efflux is likely to cause high turbulence; or*
- b) *near areas where aeroplane vortex wake generation is likely to exist.*

3.2 Elevated heliports

Note 1.— The dimensions of the taxi-routes and helicopter stands include a protection area.

Note 2.— Guidance on structural design for elevated heliports is given in the Heliport Manual (Doc 9261).

3.2.1 In the case of elevated heliports, design considerations of the different elements of the heliport shall take into account additional loading resulting from the presence of personnel, snow, freight, refuelling, fire fighting equipment, etc.

Table 3-1. FATO minimum separation distance

If aeroplane mass and/or helicopter mass are	Distance between FATO edge and runway edge or taxiway edge
up to but not including 3 175 kg	60 m
3 175 kg up to but not including 5 760 kg	120 m
5 760 kg up to but not including 100 000 kg	180 m
100 000 kg and over	250 m