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HELIPORT MANUAL

THIRD EDITION — 1995

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AMENDMENTS

The issue of amendments is announced regularly in the *ICAO Journal* and in the monthly *Supplement to the Catalogue of ICAO Publications and Audio Visual Training Aids*, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS			
No.	Date applicable	Date entered	Entered by

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No.	Date of issue	Date entered	Entered by

FOREWORD

Annex 14, Volume II, which became applicable on 15 November 1990, includes specifications on the planning, design and operation of heliports. The applicability of the visual aids part of the specifications is now limited to operations in visual meteorological conditions. However, Amendment No. 1 to Annex 14, Volume II, which is being processed for applicability in November 1995, will expand the specifications to support helicopter non-precision approaches. The purpose of this updated *Heliport Manual*, which replaces all previous editions, is to provide guidance in implementing the above-mentioned specifications.

The manual deals with three principal types of heliports, namely, surface level heliports, elevated heliports and helidecks which may be located on offshore installations or ships. The manual not only enlarges upon some of the specifications in Annex 14, Volume II, as necessary, but also provides guidance on aspects not dealt with in the Annex, e.g. site selection, winching areas, underslung load operating areas, etc.

Users of this manual are advised that specifications related to helicopter operations in other Annexes, for instance, Annex 6, Part III, *International Operations — Helicopters*, may vary somewhat from those specified in Annex 14, Volume II. In such cases, the more demanding requirements should be applied. To assist users of this manual, the characteristics of the majority of helicopter types currently in use have been included in an Appendix.

It is intended that the manual be kept up-to-date. Future editions will be improved on the basis of on-going studies by ICAO and on comments and suggestions received from the users of this manual. Therefore, readers are invited to provide their views, comments and suggestions on this edition. These should be directed to the Secretary General of ICAO.

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Chapter 1

SITE SELECTION AND STRUCTURAL DESIGN

Note.— Although by definition a heliport is an aerodrome for use by helicopters only, in this manual when the term aerodrome is used, it means an aerodrome designed primarily for the use of aeroplanes.

1.1 GENERAL

1.1.1 The particular advantages of the operation of helicopters, in that air services can be provided in very close proximity to the centres where traffic is generated, should be given full consideration when choosing a site. The selected site should also be conveniently situated as regards ground transport access and adequate vehicle parking facilities.

1.1.2 To minimize noise disturbance, the ambient noise level should be considered, particularly near noise sensitive buildings such as hospitals, schools and business premises and especially in relation to areas beneath the approach and departure paths of helicopters.

1.1.3 Heliport design and location should be such that downwind operations are avoided and cross-wind operations are kept to a minimum. Heliports should have two approach surfaces, separated by at least 150°. Additional approach surfaces may be provided, the total number and orientation ensuring that the heliport usability factor will be at least 95 per cent for the helicopters the heliport is intended to serve. These criteria should apply equally to surface level and elevated heliports.

1.1.4 Possible air traffic conflicts between helicopters using a heliport and other air traffic should be avoided. The need to provide air traffic control services may need to be examined.

1.1.5 For heliports used by performance class 2 and 3 helicopters the ground beneath the take-off climb and approach surfaces should permit safe one-engine-inoperative landings or forced landings during which injury to persons on the ground and damage to property are minimized. The provision of such areas should also minimize the risk of injury to the helicopter occupants. The main factors in determining the suitability of such areas will be the most critical helicopter type for which the heliport is intended and the ambient conditions.

1.1.6 The presence of large structures close to the proposed site may be the cause, in certain wind conditions, of considerable eddies and turbulence that might adversely affect the control or performance of the helicopters operating at the heliport. Equally, the heat generated by large chimneys under or close to the flight paths may adversely affect helicopter performance during approaches to land or climbs after take-off. Therefore it may be necessary to conduct wind tunnel or flight tests to establish if such adverse conditions do exist and, if so, to determine possible remedial action.

1.1.7 Other factors to be considered in the selection of a site are:

a) high terrain or other obstacles, especially power lines, in the vicinity of the proposed heliport; and

b) if instrument operations are planned, the availability of suitable airspace for instrument approach and departure procedures.

1.1.8 The essential components of a heliport are areas suitable for lift off, for the take-off manoeuvre, for the approach manoeuvre and for touchdown and, if these components are not co-located at a particular site, taxiways to link the areas.

1.1.9 Normally a site will have a simple layout which combines those individual areas that have common characteristics. Such an arrangement will require the smallest area over-all where the helicopter will be operating close to the ground and from which it is essential to remove all permanent obstacles and to exclude transient and mobile obstacles when helicopters are operating. When the characteristics or obstacle environment of a particular site do not allow such an arrangement, the component areas may be separated provided they meet their respective individual criteria. Thus a different direction may be used for take-off from that used in the approach and these areas may be served by a separate touchdown and lift-off area, located at the most convenient position on the site and connected to the other manoeuvring areas by helicopter ground taxiways or air taxiways.

1.2 SURFACE-LEVEL HELIPORTS

1.2.1 Final approach and take-off areas (FATOs)

1.2.1.1 A FATO is an area over which a helicopter completes the approach manoeuvre to a hover or landing or commences movement into forward flight in the take-off manoeuvre.

1.2.1.2 A touchdown may or may not be made on the FATO. It may be preferable to come to the hover and then air-taxi to a more desirable location for touchdown. Similarly, a helicopter may lift off from its parked location and air-taxi to the FATO where it assumes the hover before commencing the take-off manoeuvre.

1.2.1.3 All final approaches shall terminate at the FATO and all take-offs to climb shall start there.

1.2.1.4 A FATO may be any shape but it must be able to accommodate a circle whose diameter is at least equal to the dimension specified in Annex 14, Volume II, plus any rejected take-off area required.

1.2.1.5 When heliports are planned at high elevations or in places of high temperatures, the effects of the less dense air and/or high temperature result in reductions in both helicopter engine performance and rotor performance. In some helicopters this could mean that the power available is reduced below that which is required for the helicopter to climb vertically out of the ground effect without considerably reducing the gross take-off mass.

1.2.1.6 As a helicopter gains forward speed, the mass airflow through the rotor disc increases up to a certain speed and enhances lift. In consequence, the power required for horizontal flight is reduced, thus releasing more of the power available to be used for the climb.

1.2.1.7 In the field of commercial helicopter operations, an operation cannot be considered economically viable if the gross take-off mass is reduced to less than 85 per cent. In order to avoid this, a FATO of greater size than the statutory minimum dimensions should be provided, over which the helicopter can accelerate safely to its climbing speed before leaving the ground effect.

1.2.1.8 Table 1-1 gives guidance on the length of the FATO that should be provided for helicopters with limited climbing power, for a selection of altitudes and temperature conditions. In calculating the climbing speed, a maximum rotation angle of 10° should be considered commensurate with passenger comfort.

1.2.1.9 Helicopter flight manuals contain performance graphs which indicate combinations of forward speed and height above ground in which flight should be avoided since, in the event of engine failure, the probability of a successful forced landing is remote (see Figure 1-1). Therefore, to provide the helicopter with an area over which it can safely accelerate to avoid these unsafe combinations, it may be prudent to provide the sizes of FATO suggested in Table 1-1 in all cases except where otherwise required by Annex 14, Volume II.

1.2.1.10 Although helicopters are not intended to actually touch down on certain FATOs, it is possible that a helicopter may be forced into making an emergency landing on the area. Also, when a FATO is designed to accept performance class 1 helicopters, it must be capable of withstanding a rejected take-off, which may well equate to an emergency landing. Therefore the bearing strength of a FATO should cover an emergency landing with a rate of descent of 3.6 m/s (12 ft/s). The design load in this case should be taken as 1.66 times the maximum take-off mass of the heaviest helicopter for which the FATO is intended.

1.2.2 Water heliports

1.2.2.1 The physical characteristics of a water heliport are, in essence, the same as for a surface level ground heliport except that:

a) because the surface of a safety area and a FATO are the same at a water heliport, the safety area requirement at a water heliport designed for the use of performance class 2 and 3 helicopters is

Table 1-1. Acceleration distances required due to changes in altitude and temperature

CLIMBING SPEED	*40 kts*			*50 kts*			*60 kts*		
TEMPERATURE	*ISA-15° C*	*ISA*	*ISA+15° C*	*ISA-15° C*	*ISA*	*ISA+15° C*	*ISA-15° C*	*ISA*	*ISA+15° C*
HELIPORT ELEVATION feet	*ACCELERATION DISTANCE (metres (feet))*								
Sea level	118 (387)	124 (408)	131 (429)	184 (604)	194 (637)	204 (670)	265 (870)	280 (918)	294 (966)
1 000	121 (398)	128 (420)	135 (442)	190 (622)	200 (656)	210 (690)	273 (895)	288 (945)	303 (995)
2 000	125 (410)	132 (433)	139 (456)	195 (640)	206 (676)	217 (712)	281 (922)	297 (973)	312 (1 024)
3 000	129 (422)	136 (446)	143 (470)	201 (659)	212 (696)	223 (733)	290 (950)	306 (1 003)	322 (1 056)
4 000	132 (434)	140 (459)	148 (484)	207 (679)	219 (717)	230 (755)	298 (978)	315 (1 033)	332 (1 088)
5 000	137 (448)	144 (473)	152 (498)	213 (699)	225 (739)	237 (779)	307 (1 007)	324 (1 064)	342 (1 121)
6 000	141 (462)	149 (488)	157 (514)	220 (721)	232 (762)	245 (803)	316 (1 038)	335 (1 098)	353 (1 158)
7 000	145 (475)	153 (503)	162 (531)	226 (743)	240 (786)	253 (829)	326 (1 070)	345 (1 132)	364 (1 193)
8 000	149 (490)	158 (519)	167 (548)	233 (766)	247 (811)	261 (856)	336 (1 103)	356 (1 167)	375 (1 231)
9 000	154 (505)	163 (535)	172 (565)	241 (790)	255 (836)	269 (882)	346 (1 135)	366 (1 202)	387 (1 269)
10 000	159 (521)	168 (552)	178 (583)	248 (815)	263 (863)	278 (911)	358 (1 174)	379 (1 243)	400 (1 312)