INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES

AERODROMES

ANNEX 14

TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

VOLUME II
HELIPORTS

SECOND EDITION — JULY 1995

This edition incorporates all amendments to Annex 14, Volume II, adopted by the Council prior to 14 March 1995 and supersedes on 9 November 1995 all previous editions of Annex 14, Volume II.

For information regarding the applicability of the Standards and Recommended Practices, *see* Foreword and the relevant clauses in each Chapter

INTERNATIONAL CIVIL AVIATION ORGANIZATION

CHAPTER 5. VISUAL AIDS

5.1 Indicators

5.1.1 Wind direction indicators

Application

5.1.1.1 A heliport shall be equipped with at least one wind direction indicator.

Location

5.1.1.2 A wind direction indicator shall be located so as to indicate the wind conditions over the final approach and take-off area and in such a way as to be free from the effects of airflow disturbances caused by nearby objects or rotor downwash. It shall be visible from a helicopter in flight, in a hover or on the movement area.

5.1.1.3 **Recommendation.**— *Where a touchdown and lift-off area may be subject to a disturbed air flow, then additional wind direction indicators located close to the area should be provided to indicate the surface wind on the area.*

Note.— Guidance on the location of wind direction indicators is given in the Heliport Manual.

Characteristics

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

5.1.1.5 **Recommendation.**— *An indicator should be a truncated cone made of lightweight fabric and should have the following minimum dimensions:*

	Surface level heliports	Elevated heliports and helidecks
Length	*2.4 m*	*1.2 m*
Diameter (larger end)	*0.6 m*	*0.3 m*
Diameter (smaller end)	*0.3 m*	*0.15 m*

5.1.1.6 **Recommendation.**— *The colour of the wind direction indicator should be so selected as to make it clearly visible and understandable from a height of at least 200 m (650 ft) above the heliport, having regard to background. Where practicable, a single colour, preferably white or orange, should be used. Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should preferably be orange and white, red and white, or black and white, and should be arranged in five alternate bands the first and last band being the darker colour.*

5.1.1.7 A wind direction indicator at a heliport intended for use at night shall be illuminated.

5.2 Markings and markers

Note.— See Annex 14, Volume I, 5.2.1.4, Note 1, concerning improving conspicuity of markings.

5.2.1 Winching area marking

Application

5.2.1.1 **Recommendation.**— *A winching area marking should be provided at a winching area.*

Location

5.2.1.2 A winching area marking shall be located so that its centre coincides with the centre of the clear zone of the winching area.

Characteristics

5.2.1.3 A winching area marking shall consist of a solid circle of not less than 5 m in diameter and painted yellow.

5.2.2 Heliport identification marking

Application

5.2.2.1 A heliport identification marking shall be provided at a heliport.

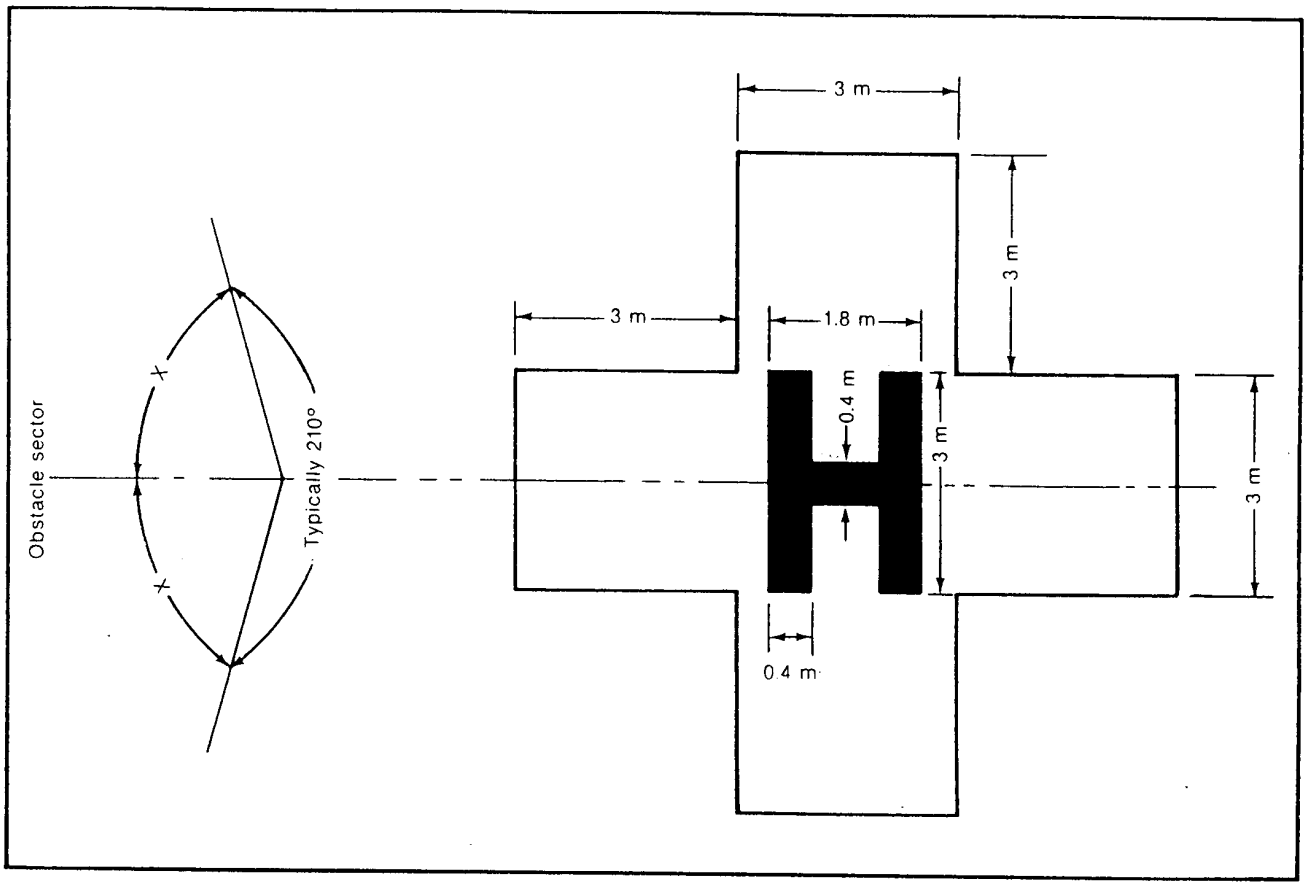


Figure 5-1. Heliport identification marking (shown with hospital cross and orientation with obstacle-free sector)

Location

5.2.2.2 A heliport identification marking shall be located within the final approach and take-off area, at or near the centre of the area or when used in conjunction with runway designation markings at each end of the area.

Characteristics

5.2.2.3 A heliport identification marking, except for a heliport at a hospital, shall consist of a letter H, white in colour. The dimensions of the marking shall be no less than those shown in Figure 5-1 and where the marking is used in conjunction with the final approach and take-off area designation marking specified in 5.2.5 its dimensions shall be increased by a factor of 3.

Note.— On a helideck covered with a rope netting, it may be advantageous to increase the height of the marking to 4 m and the other dimensions proportionally.

5.2.2.4 A heliport identification marking for a heliport at a hospital shall consist of a letter H, red in colour, on a white cross made of squares adjacent to each of the sides of a square containing the H as shown in Figure 5-1.

5.2.2.5 A heliport identification marking shall be oriented with the cross arm of the H at right angles to the preferred final approach direction. For a helideck the cross arm shall be on or parallel to the bisector of the obstacle-free sector as shown in Figure 5-1.

5.2.3 Maximum allowable mass marking

Application

5.2.3.1 **Recommendation.**— *A maximum allowable mass marking should be displayed at an elevated heliport and at a helideck.*

Location

5.2.3.2 **Recommendation.**— *A maximum allowable mass marking should be located within the touchdown and lift-off area and so arranged as to be readable from the preferred final approach direction.*

Characteristics

5.2.3.3 A maximum allowable mass marking shall consist of a two digit number followed by a letter "t" to indicate the allowable helicopter mass in tonnes (1 000 kg).

5.2.3.4 **Recommendation.**— *The numbers and the letter of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 5-2.*

5.2.4 Final approach and take-off area marking or marker

Application

5.2.4.1 Final approach and take-off area marking or markers shall be provided at a surface level heliport on ground where the extent of the final approach and take-off area is not self-evident.

Location

5.2.4.2 Final approach and take-off area marking or markers shall be located on the boundary of the final approach and take-off area.

Characteristics

5.2.4.3 Final approach and take-off area marking or markers shall be spaced:

a) for a square or rectangular area at equal intervals of not more than 50 m with at least three markings or markers on each side including a marking or marker at each corner; and

b) for any other shaped area, including a circular area, at equal intervals of not more than 10 m with a minimum number of five markings or markers.

5.2.4.4 A final approach and take-off area marking shall be a rectangular stripe with a length of 9 m or one-fifth of the side of the final approach and take-off area which it defines and a width of 1 m. Where a marker is used its characteristics shall conform to those specified in Annex 14, Volume I, 5.5.8.3 except that the height of the marker shall not exceed 25 cm above ground or snow level.

5.2.4.5 A final approach and take-off area marking shall be white.

5.2.5 Final approach and take-off area designation marking

Application

5.2.5.1 **Recommendation.**— *A final approach and take-off area designation marking should be provided where it is necessary to designate the final approach and take-off area to the pilot.*

Location

5.2.5.2 A final approach and take-off area designation marking shall be located at the beginning of the final approach and take-off area as shown in Figure 5-3.

Characteristics

5.2.5.3 A final approach and take-off area designation marking shall consist of a runway designation marking described in Annex 14, Volume I, 5.2.2.4 and 5.2.2.5 supplemented by an H, specified in 5.2.2 above, and as shown in Figure 5-3.

5.2.6 Aiming point marking

Application

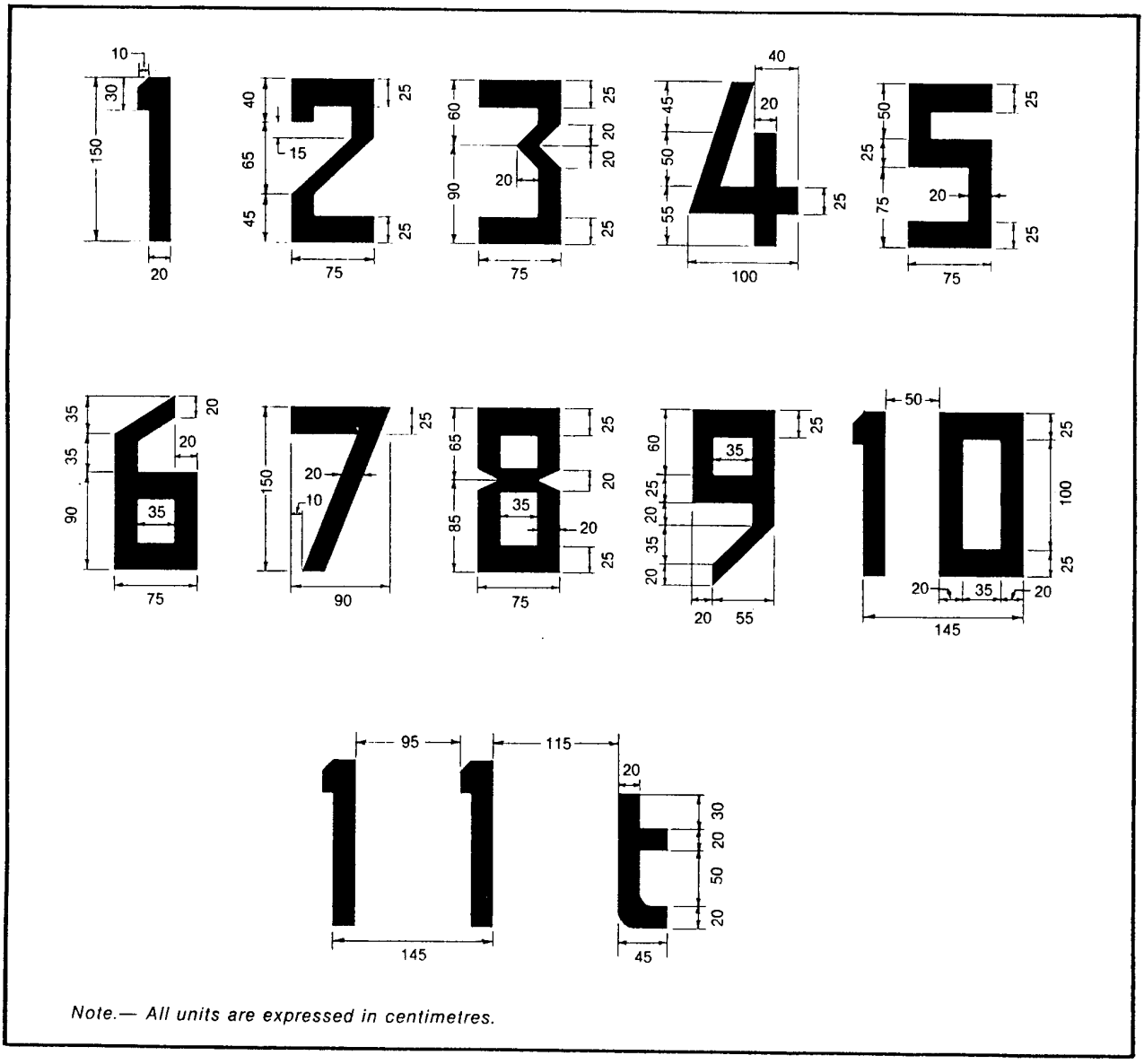
5.2.6.1 **Recommendation.**— *An aiming point marking should be provided at a heliport where it is necessary for a pilot to make an approach to a particular point before proceeding to the touchdown and lift-off area.*

Location

5.2.6.2 The aiming point marking shall be located within the final approach and take-off area.

Characteristics

5.2.6.3 The aiming point marking shall be an equilateral triangle with the bisector of one of the angles aligned with the preferred approach direction. The marking shall consist of continuous white lines and the dimensions of the marking shall conform to those shown in Figure 5-4.



Note.— All units are expressed in centimetres.

Figure 5-2. Form and proportions of numbers and letter for maximum allowable mass marking

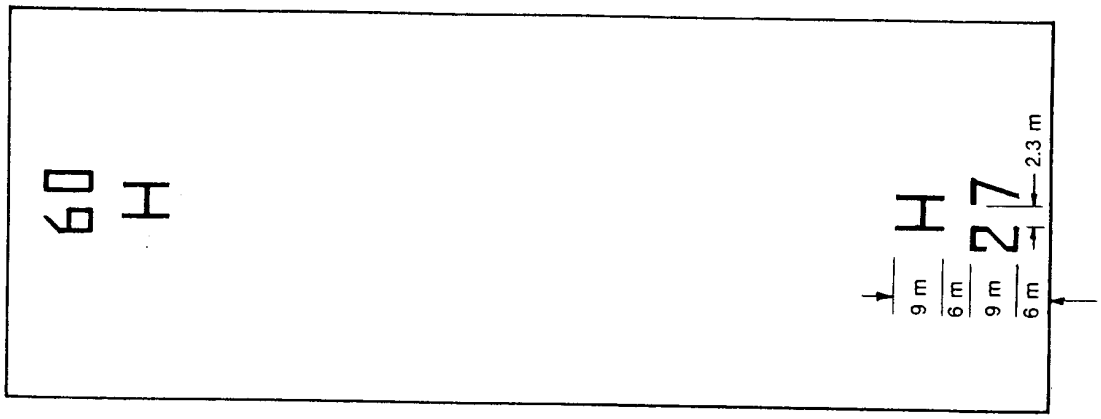


Figure 5-3. Final approach and take-off area designation marking

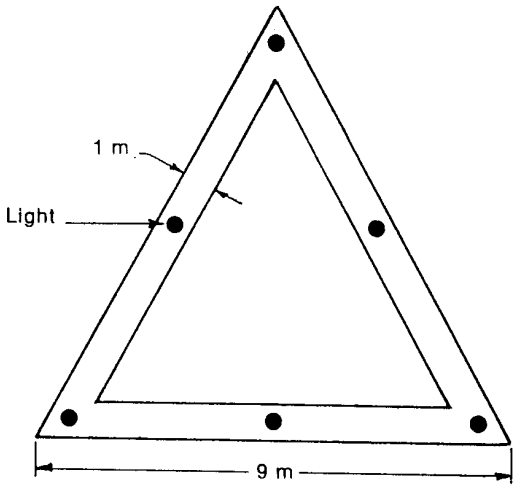


Figure 5-4. Aiming point marking

5.2.7 Touchdown and lift-off area marking

Application

5.2.7.1 A touchdown and lift-off area marking shall be provided on a helideck.

5.2.7.2 **Recommendation.**— *A touchdown and lift-off area marking should be provided on a heliport other than a helideck if the perimeter of the touchdown and lift-off area is not self-evident.*

Location

5.2.7.3 The touchdown and lift-off area marking shall be located along the perimeter of the touchdown and lift-off area.

Characteristics

5.2.7.4 A touchdown and lift-off area marking shall consist of a continuous white line with a width of at least 30 cm.

5.2.7 Touchdown and lift-off area marking

Application

5.2.7.1 A touchdown and lift-off area marking shall be provided on a helideck.

5.2.7.2 **Recommendation.—** *A touchdown and lift-off area marking should be provided on a heliport other than a helideck if the perimeter of the touchdown and lift-off area is not self-evident.*

Location

5.2.7.3 The touchdown and lift-off area marking shall be located along the perimeter of the touchdown and lift-off area.

Characteristics

5.2.7.4 A touchdown and lift-off area marking shall consist of a continuous white line with a width of at least 30 cm.

5.2.8 Touchdown marking

Application

5.2.8.1 **Recommendation.—** *A touchdown marking should be provided where it is necessary for a helicopter to touch down in a specific position.*

Location

5.2.8.2 A touchdown marking shall be located so that when a helicopter for which the marking is intended is positioned, with the main undercarriage inside the marking and the pilot situated over the marking, all parts of the helicopter will be clear of any obstacle by a safe margin.

5.2.8.3 On a helideck or on an elevated heliport the centre of the touchdown marking shall be located at the centre of the touchdown and lift-off area except that the marking may be offset away from the origin of the obstacle-free sector by no more than 0.1 D where an aeronautical study indicates such offsetting to be necessary and that a marking so offset would not adversely affect the safety.

Characteristics

5.2.8.4 A touchdown marking shall be a yellow circle and have a line width of at least 0.5 m. For a helideck the line width shall be at least 1 m.

5.2.8.5 On helidecks the inner diameter of the circle shall be half the D value of the helideck or 6 m whichever is the greater.

5.2.9 Heliport name marking

Application

5.2.9.1 **Recommendation.—** *A heliport name marking should be provided at a heliport where there is insufficient alternative means of visual identification.*

Location

5.2.9.2 **Recommendation.—** *The heliport name marking should be placed on the heliport so as to be visible, as far as practicable, at all angles above the horizontal. Where an obstacle sector exists the marking should be located on the obstacle side of the H identification marking.*

Characteristics

5.2.9.3 A heliport name marking shall consist of the name or the alphanumeric designator of the heliport as used in the R/T communications.

5.2.9.4 **Recommendation.—** *The characters of the marking should be not less than 3 m in height at surface level heliports and not less than 1.2 m on elevated heliports and helidecks. The colour of the marking should contrast with the background.*

5.2.9.5 A heliport name marking intended for use at night or during conditions of poor visibility shall be illuminated, either internally or externally.

5.2.10 Helideck obstacle-free sector marking

Application

5.2.10.1 **Recommendation.—** *A helideck obstacle-free sector marking should be provided at a helideck.*

Location

5.2.10.2 A helideck obstacle-free sector marking shall be located on the touchdown and lift-off area marking.

Characteristics

5.2.10.3 The helideck obstacle-free sector marking shall indicate the origin of the obstacle free sector, the directions of

5.2.12 Air taxiway markers

Application

5.2.12.1 **Recommendation.**— *An air taxiway should be marked with air taxiway markers.*

Note.— These markers are not meant to be used on helicopter ground taxiways.

Location

5.2.12.2 Air taxiway markers shall be located along the centre line of the air taxiway and shall be spaced at intervals of not more than 30 m on straight sections and 15 m on curves.

Characteristics

5.2.12.3 An air taxiway marker shall be frangible and when installed shall not exceed 35 cm above ground or snow level. The surface of the marker as viewed by the pilot shall be a rectangle with a height to width ratio of approximately 3 to 1 and shall have a minimum area of 150 cm^2 as shown in Figure 5-6.

5.2.12.4 An air taxiway marker shall be divided into three equal, horizontal bands coloured yellow, green and yellow, respectively. If the air taxiway is to be used at night, the markers shall be internally illuminated or retro-reflective.

5.2.13 Air transit route markers

Application

5.2.13.1 **Recommendation.**— *When established an air transit route should be marked with air transit route markers.*

Location

5.2.13.2 Air transit route markers shall be located along the centre line of the air transit route and shall be spaced at intervals of not more than 60 m on straight sections and 15 m on curves.

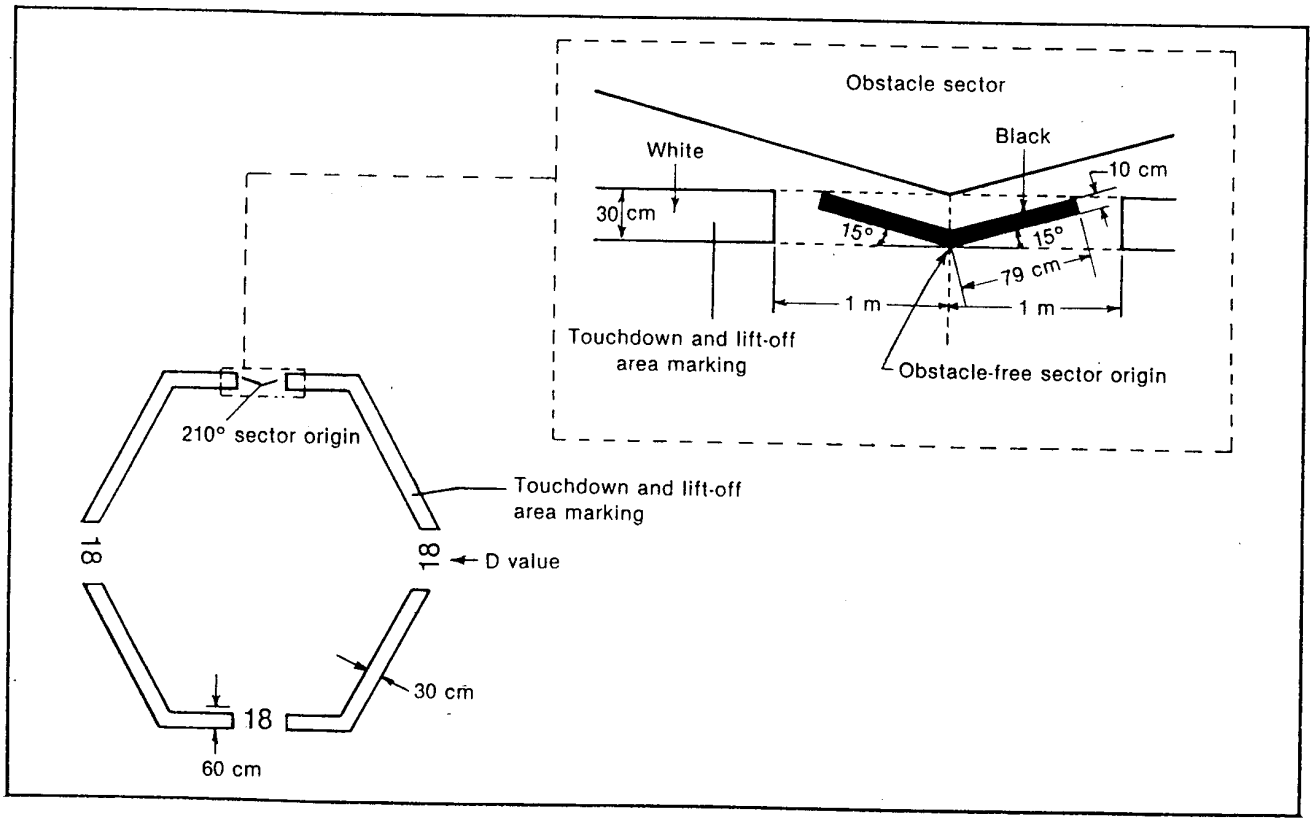


Figure 5-5. Helideck obstacle-free sector marking

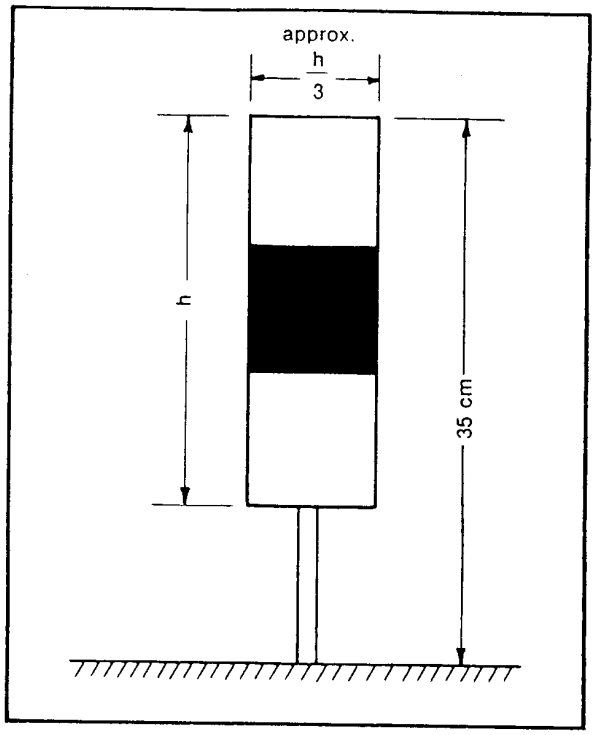


Figure 5-6. Air taxiway marker

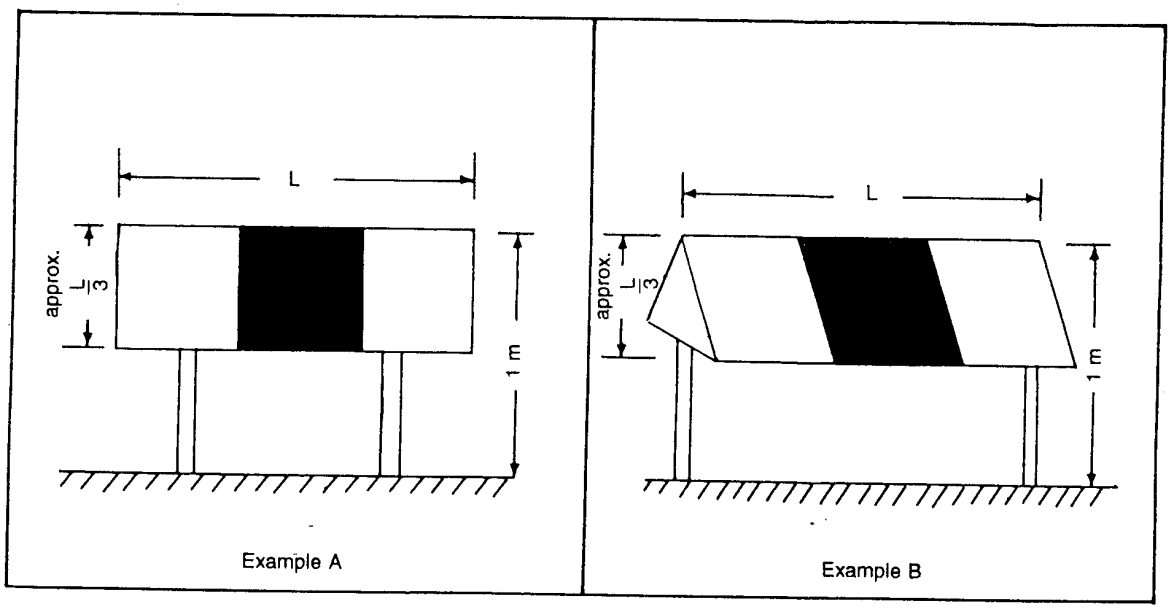


Figure 5-7. Air transit route marker

Characteristics

5.2.13.3 An air transit route marker shall be frangible and when installed shall not exceed 1 m above ground or snow level. The surface of the marker as viewed by the pilot shall be a rectangle with a height to width ratio of approximately 1 to 3 and shall have a minimum area of 1 500 cm^2 as shown in the examples in Figure 5-7.

5.2.13.4 An air transit route marker shall be divided into three equal, vertical bands coloured yellow, green and yellow, respectively. If the air transit route is to be used by night, the marker shall be internally illuminated or retro-reflective.

5.3 Lights

5.3.1 General

Note 1.— See Annex 14, Volume I, 5.3.1 concerning specifications on screening of non-aeronautical ground lights, and design of elevated and inset lights.

Note 2.— In the case of helidecks and heliports located near navigable waters, consideration needs to be given to ensuring that aeronautical ground lights do not cause confusion to mariners.

Note 3.— As helicopters will generally come very close to extraneous light sources, it is particularly important to ensure that, unless such lights are navigation lights exhibited in accordance with international regulations, they are screened or located so as to avoid direct and reflected glare.

Note 4.— The following specifications have been developed for systems intended for use in conjunction with a non-instrument or non-precision final approach and take-off area.

5.3.2 Heliport beacon

Application

5.3.2.1 **Recommendation.**— *A heliport beacon should be provided at a heliport where:*

a) long-range visual guidance is considered necessary and is not provided by other visual means; or

b) identification of the heliport is difficult due to surrounding lights.

Location

5.3.2.2 The heliport beacon shall be located on or adjacent to the heliport preferably at an elevated position and so that it does not dazzle a pilot at short range.

Note.— Where a heliport beacon is likely to dazzle pilots at short range it may be switched off during the final stages of the approach and landing.

Characteristics

5.3.2.3 The heliport beacon shall emit repeated series of equispaced short duration white flashes in the format in Figure 5-8.

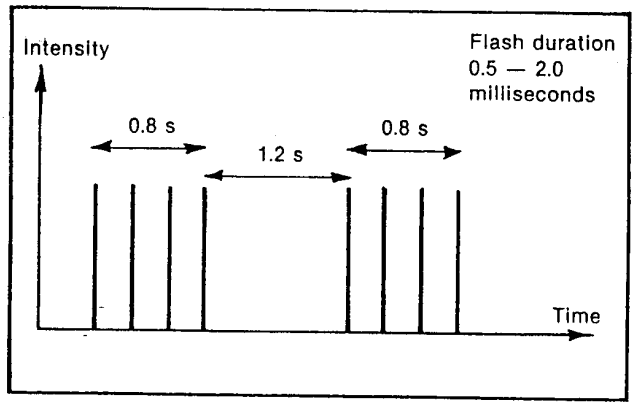


Figure 5-8. Heliport beacon flash characteristics

5.3.2.4 The light from the beacon shall show at all angles of azimuth.

5.3.2.5 **Recommendation.**— *The effective light intensity distribution of each flash should be as shown in Figure 5-9, Illustration 1.*

Note.— Where brilliancy control is desired, settings of 10 per cent and 3 per cent have been found to be satisfactory. In addition, shielding may be necessary to ensure that pilots are not dazzled during the final stages of the approach and landing.

5.3.3 Approach lighting system

Application

5.3.3.1 **Recommendation.**— *An approach lighting system should be provided at a heliport where it is desirable and practicable to indicate a preferred approach direction.*

Location

5.3.3.2 The approach lighting system shall be located in a straight line along the preferred direction of approach.

Characteristics

5.3.3.3 **Recommendation.**— *An approach lighting system should consist of a row of three lights spaced uniformly at 30 m intervals and of a crossbar 18 m in length at a distance of 90 m from the perimeter of the final approach and take-off area as shown in Figure 5-10. The lights forming the crossbar should be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights and spaced at 4.5 m intervals. Where there is the need to make the final approach course more conspicuous additional lights spaced uniformly at 30 m intervals should be added beyond the crossbar. The lights beyond the crossbar may be steady or sequenced flashing, depending upon the environment.*

Note.— Sequenced flashing lights may be useful where identification of the approach lighting system is difficult due to surrounding lights.

5.3.3.4 **Recommendation.**— *Where an approach lighting system is provided for a non-precision final approach and take-off area, the system should not be less than 210 m in length.*

5.3.3.5 The steady lights shall be omnidirectional white lights.

5.3.3.6 **Recommendation.**— *The light distribution of steady lights should be as indicated in Figure 5-9, Illustration 2 except that the intensity should be increased by a factor of 3 for a non-precision final approach and take-off area.*

5.3.3.7 Sequenced flashing lights shall be omnidirectional white lights.

5.3.3.8 **Recommendation.**— *The flashing lights should have a flash frequency of one per second and their light distribution should be as shown in Figure 5-9, Illustration 3. The flash sequence should commence from the outermost light and progress towards the crossbar.*

5.3.3.9 **Recommendation.**— *A suitable brilliancy control should be incorporated to allow for adjustment of light intensity to meet the prevailing conditions.*

Note.— The following intensity settings have been found suitable:

a) steady lights — 100 per cent, 30 per cent and 10 per cent; and

b) flashing lights — 100 per cent, 10 per cent and 3 per cent.

5.3.4 Visual alignment guidance system

Application

5.3.4.1 **Recommendation.**— *A visual alignment guidance system should be provided to serve the approach to a heliport where one or more of the following conditions exist especially at night:*

a) obstacle clearance, noise abatement or traffic control procedures require a particular direction to be flown;

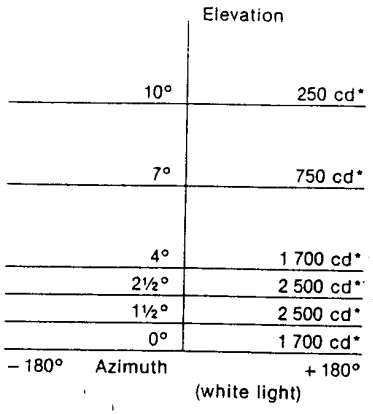
b) the environment of the heliport provides few visual surface cues; and

c) it is physically impracticable to install an approach lighting system.

Location

5.3.4.2 The visual alignment guidance system shall be located such that a helicopter is guided along the prescribed track towards the final approach and take-off area.

5.3.4.3 **Recommendation.**— *The system should be located at the downwind edge of the final approach and take-off area and aligned along the preferred approach direction.*



* Effective intensity

Illustration 1 — Heliport beacon

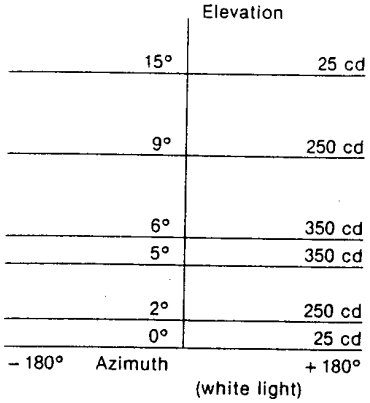
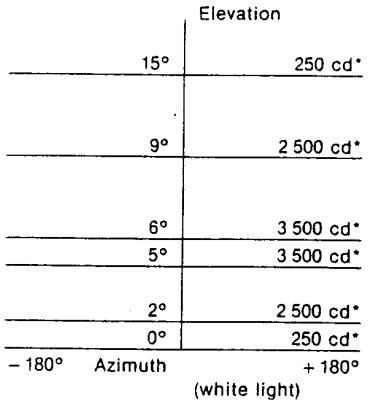


Illustration 2 — Approach light steady burning



* Effective intensity

Illustration 3 — Approach light flashing

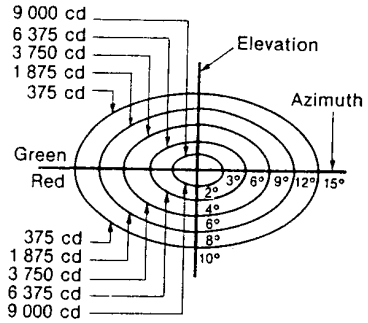


Illustration 4 — HAPI system

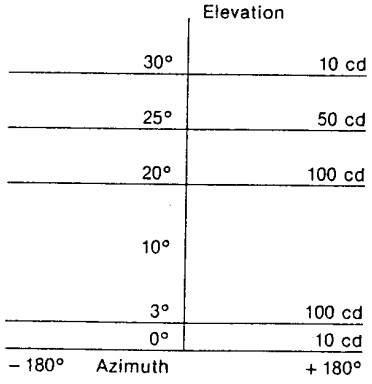


Illustration 5 — Final approach and take-off area lights and aiming point lights

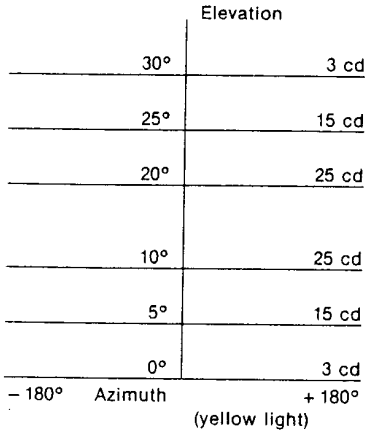


Illustration 6 — Touchdown and lift-off area perimeter lights

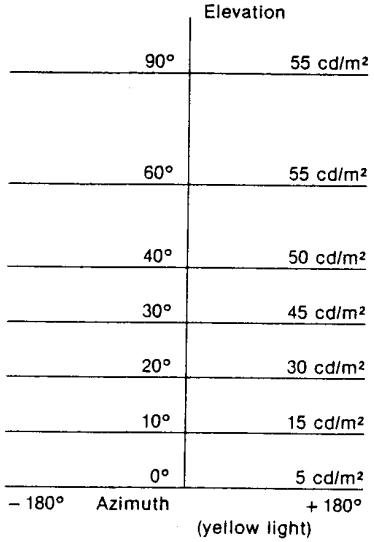


Illustration 7 — Touchdown and lift-off area electro-luminescent panels

Figure 5-9. Isocandela diagrams of lights meant for helicopter non-instrument and non-precision approaches

5.3.4.4 The light units shall be frangible and mounted as low as possible.

5.3.4.5 Where the lights of the system need to be seen as discrete sources, light units shall be located such that at the extremes of system coverage the angle subtended between units as seen by the pilot shall not be less than 3 minutes of arc.

5.3.4.6 The angles subtended between light units of the system and other units of comparable or greater intensities shall also be not less than 3 minutes of arc.

Note.— Requirements of 5.3.4.5 and 5.3.4.6 can be met for lights on a line normal to the line of sight if the light units are separated by 1 metre for every kilometre of viewing range.

Signal format

5.3.4.7 The signal format of the alignment guidance system shall include a minimum of three discrete signal sectors providing "offset to the right", "on track" and "offset to the left" signals.

5.3.4.8 The divergence of the "on track" sector of the system shall be as shown in Figure 5-11.

5.3.4.9 The signal format shall be such that there is no possibility of confusion between the system and any associated visual approach slope indicator or other visual aids.

5.3.4.10 The system shall avoid the use of the same coding as any associated visual approach slope indicator.

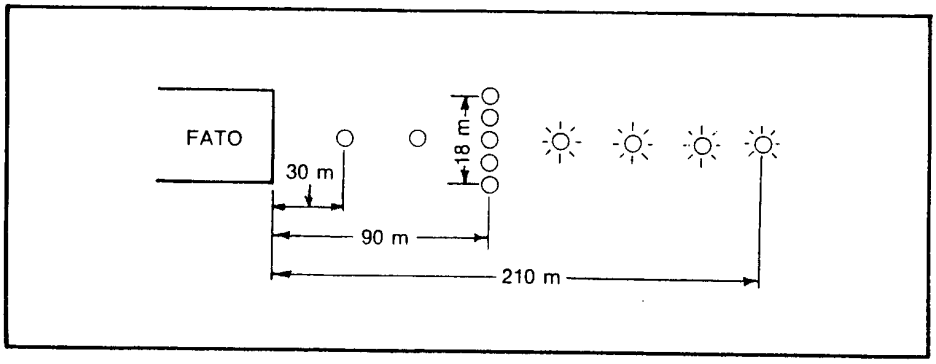


Figure 5-10. Approach lighting system

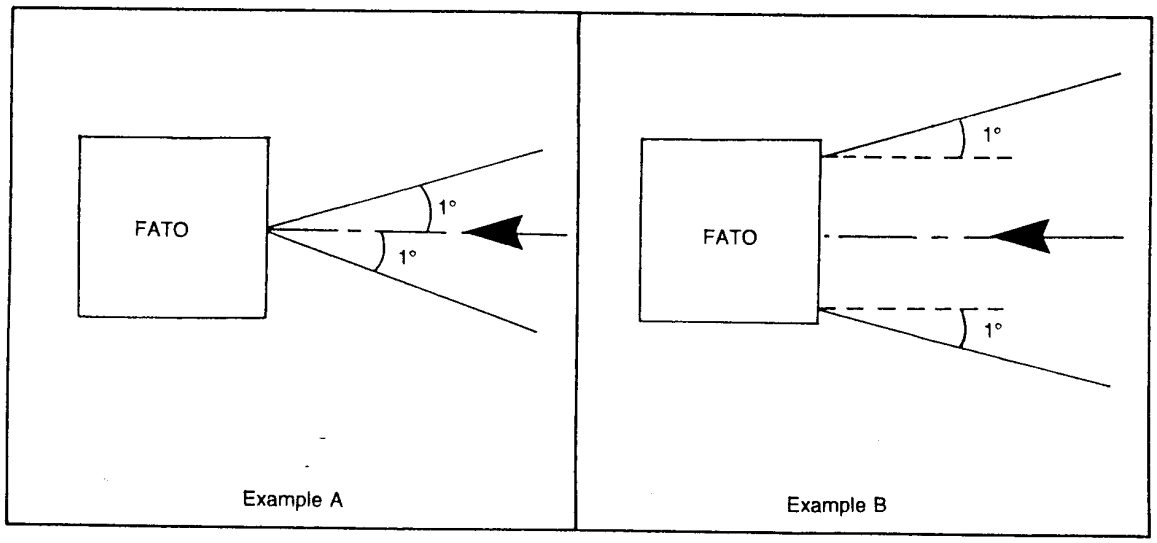


Figure 5-11. Divergence of the "on track" sector

5.3.4.11 The signal format shall be such that the system is unique and conspicuous in all operational environments.

5.3.4.12 The system shall not significantly increase the pilot workload.

Light distribution

5.3.4.13 The useable coverage of the visual alignment guidance system shall be equal to or better than that of the visual approach slope indicator system, with which it is associated.

5.3.4.14 A suitable intensity control shall be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

Approach track and azimuth setting

5.3.4.15 A visual alignment guidance system shall be capable of adjustment in azimuth to within ± 5 minutes of arc of the desired approach path.

5.3.4.16 The angle of azimuth guidance system shall be such that during an approach the pilot of a helicopter at the boundary of the "on track" signal will clear all objects in the approach area by a safe margin.

5.3.4.17 The characteristics of the obstacle protection surface specified in 5.3.5.23, Table 5-1 and Figure 5-13 shall equally apply to the system.

Characteristics of the visual alignment guidance system

5.3.4.18 In the event of the failure of any component affecting the signal format the system shall be automatically switched off.

5.3.4.19 The light units shall be so designed that deposits of condensation, ice, dirt, etc. on optically transmitting or reflecting surfaces will interfere to the least possible extent with the light signal and will not cause spurious or false signals to be generated.

5.3.5 Visual approach slope indicator

Application

5.3.5.1 **Recommendation.**— *A visual approach slope indicator should be provided to serve the approach to a heliport, whether or not the heliport is served by other visual approach aids or by non-visual aids, where one or more of the following conditions exist especially at night:*

a) obstacle clearance, noise abatement or traffic control procedures require a particular slope to be flown;

b) the environment of the heliport provides few visual surface cues; and

c) the characteristics of the helicopter require a stabilized approach.

5.3.5.2 The standard visual approach slope indicator systems for helicopter operations shall consist of the following:

a) PAPI and APAPI systems conforming to the specifications contained in Annex 14, Volume I, 5.3.5.23 to 5.3.5.40 inclusive except that the angular size of the on-slope sector of the systems shall be increased to 45 minutes; or

b) helicopter approach path indicator (HAPI) system conforming to the specifications in 5.3.5.6 to 5.3.5.21 inclusive.

Location

5.3.5.3 A visual approach slope indicator shall be located such that a helicopter is guided to the desired position within the final approach and take-off area and so as to avoid dazzling the pilot during final approach and landing.

5.3.5.4 **Recommendation.**— *A visual approach slope indicator should be located adjacent to the nominal aiming point and aligned in azimuth with the preferred approach direction.*

5.3.5.5 The light unit(s) shall be frangible and mounted as low as possible.

HAPI signal format

5.3.5.6 The signal format of the HAPI shall include four discrete signal sectors, providing an "above slope", an "on slope", a "slightly below" and a "below slope" signal.

5.3.5.7 The signal format of the HAPI shall be as shown in Figure 5-12, Illustrations A and B.

Note.— Care is required in the design of the unit to minimize spurious signals between the signal sectors and at the azimuth coverage limits.

5.3.5.8 The signal repetition rate of the flashing sector of the HAPI shall be at least 2 Hz.

5.3.5.9 **Recommendation.**— *The on-to-off ratio of pulsing signals of the HAPI should be 1 to 1 and the modulation depth should be at least 80 per cent.*

5.3.5.10 The angular size of the "on-slope" sector of the HAPI shall be 45 minutes.

5.3.5.11 The angular size of the "slightly below" sector of the HAPI shall be 15 minutes.

Light distribution

5.3.5.12 **Recommendation.—** *The light intensity distribution of the HAPI in red and green colours should be as shown in Figure 5-9, Illustration 4.*

Note.— A larger azimuth coverage can be obtained by installing the HAPI system on a turntable.

5.3.5.13 Colour transition of the HAPI in the vertical plane shall be such as to appear to an observer at a distance of not less than 300 m to occur within a vertical angle of not more than three minutes.

5.3.5.14 The transmission factor of a red or green filter shall be not less than 15 per cent at the maximum intensity setting.

5.3.5.15 At full intensity the red light of the HAPI shall have a Y-coordinate not exceeding 0.320 and the green light shall be within the boundaries specified in Annex 14, Volume I, Appendix 1, 2.1.3.

5.3.5.16 A suitable intensity control shall be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

Approach slope and elevation setting

5.3.5.17 A HAPI system shall be capable of adjustment in elevation at any desired angle between 1 degree and 12 degrees above the horizontal with an accuracy of ±5 minutes of arc.

5.3.5.18 The angle of elevation setting of HAPI shall be such that during an approach, the pilot of a helicopter observing the upper boundary of the "below slope" signal will clear all objects in the approach area by a safe margin.

Characteristics of the light unit

5.3.5.19 The system shall be so designed that:

a) in the event the vertical misalignment of a unit exceeds ± 0.5° (± 30 minutes), the system will switch off automatically; and

b) if the flashing mechanism fails, no light will be emitted in the failed flashing sector(s).

Table 5-1. Dimensions and slopes of the obstacle protection surface

SURFACE AND DIMENSIONS	NON-INSTRUMENT FATO		NON-PRECISION FATO
Length of inner edge	Width of safety area		Width of safety area
Distance from end of FATO	3 m minimum		60 m
Divergence	10%		15%
Total length	2 500 m		2 500 m
Slope	PAPI	A^a - 0.57°	A^a - 0.57°
	HAPI	A^b - 0.65°	A^b - 0.65°
	APAPI	A^a - 0.9°	A^a -0.9°

a. As indicated in Annex 14, Volume I, Figure 5-13.
b. The angle of the upper boundary of the "below slope" signal.

Sector	*Format*
Above	Flashing green
On slope	Green
Slightly below	Red
Below	Flashing red

Illustration A

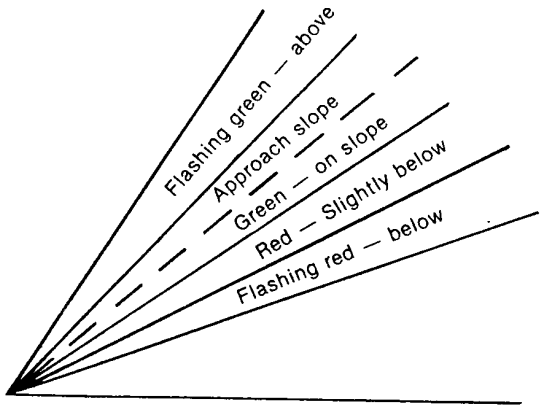


Illustration B

Figure 5-12. HAPI signal format

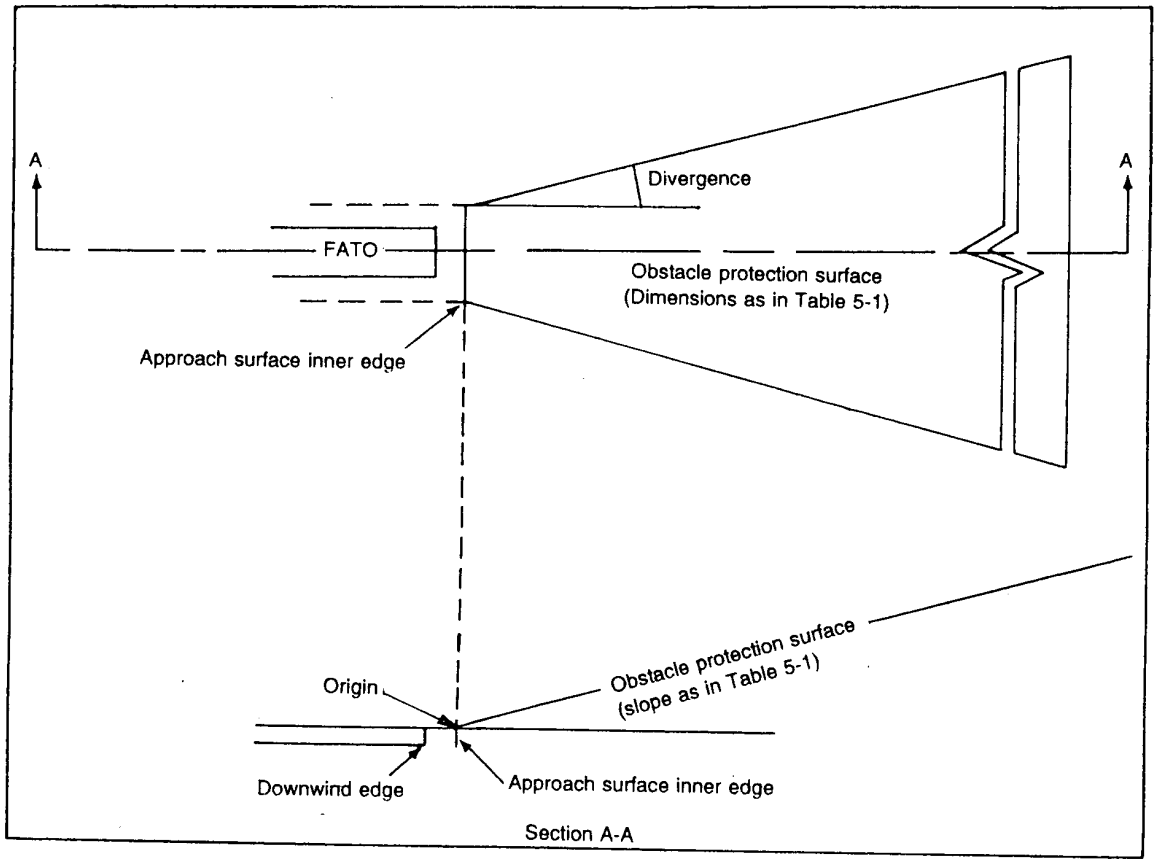


Figure 5-13. Obstacle protection surface for visual approach slope indicator systems

5.3.5.20 The light unit of the HAPI shall be so designed that deposits of condensation, ice, dirt, etc. on optically transmitting or reflecting surfaces will interfere to the least possible extent with the light signal and will not cause spurious or false signals to be generated.

5.3.5.21 **Recommendation.**— *A HAPI system intended for installation on a floating helideck should afford a stabilization of the beam to an accuracy of ± 1/4° within ± 3° pitch and roll movement of the heliport.*

Obstacle protection surface

Note.— The following specifications apply to PAPI, APAPI and HAPI.

5.3.5.22 An obstacle protection surface shall be established when it is intended to provide a visual approach slope indicator system.

5.3.5.23 The characteristics of the obstacle protection surface, i.e. origin, divergence, length and slope shall correspond to those specified in the relevant column of Table 5-1 and in Figure 5-13.

5.3.5.24 New objects or extensions of existing objects shall not be permitted above an obstacle protection surface except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing immovable object.

Note.— Circumstances in which the shielding principle may reasonably be applied are described in the Airport Services Manual, *Part 6.*

5.3.5.25 Existing objects above an obstacle protection surface shall be removed except when, in the opinion of the appropriate authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of operations of helicopters.

5.3.5.26 Where an aeronautical study indicates that an existing object extending above an obstacle protection surface could adversely affect the safety of operations of helicopters one or more of the following measures shall be taken:

a) suitably raise the approach slope of the system;

b) reduce the azimuth spread of the system so that the object is outside the confines of the beam;

c) displace the axis of the system and its associated obstacle protection surface by no more than 5°;

d) suitably displace the final approach and take-off area; and

e) install a visual alignment guidance system specified in 5.3.4.

Note.— Guidance on this issue is contained in the Heliport Manual.

5.3.6 Final approach and take-off area lights

Application

5.3.6.1 Where a final approach and take-off area is established at a surface level heliport on ground intended for use at night, final approach and take-off area lights shall be provided except that they may be omitted where the final approach and take-off area and the touchdown and lift-off area are nearly coincidental or the extent of the final approach and take-off area is self-evident.

Location

5.3.6.2 Final approach and take-off area lights shall be placed along the edges of the final approach and take-off area. The lights shall be uniformly spaced as follows:

a) for an area in the form of a square or rectangle, at intervals of not more than 50 m with a minimum of four lights on each side including a light at each corner; and

b) for any other shaped area, including a circular area, at intervals of not more than 5 m with a minimum of ten lights.

Characteristics

5.3.6.3 Final approach and take-off area lights shall be fixed omnidirectional lights showing white. Where the intensity of the lights is to be varied the lights shall show variable white.

5.3.6.4 **Recommendation.**— *The light distribution of final approach and take-off area lights should be as shown in Figure 5-9, Illustration 5.*

5.3.6.5 **Recommendation.**— *The lights should not exceed a height of 25 cm and should be inset when a light extending above the surface would endanger helicopter operations. Where a final approach and take-off area is not meant for lift-off or touchdown, the lights should not exceed a height of 25 cm above ground or snow level.*

5.3.7 Aiming point lights

Application

5.3.7.1 **Recommendation.—** *Where an aiming point marking is provided at a heliport intended for use at night, aiming point lights should be provided.*

Location

5.3.7.2 Aiming point lights shall be collocated with the aiming point marking.

Characteristics

5.3.7.3 Aiming point lights shall form a pattern of at least six omnidirectional white lights as shown in Figure 5-4. The lights shall be inset when a light extending above the surface could endanger helicopter operations.

5.3.7.4 **Recommendation.—** *The light distribution of aiming point lights should be as shown in Figure 5-9, Illustration 5.*

5.3.8 Touchdown and lift-off area lighting system

Application

5.3.8.1 A touchdown and lift-off area lighting system shall be provided at a heliport intended for use at night.

5.3.8.2 The touchdown and lift-off area lighting system for a surface level heliport shall consist of one or more of the following:

a) perimeter lights; or

b) floodlighting; or

c) luminescent panel lighting when a) and b) are not practicable and final approach and take-off area lights are available.

5.3.8.3 The touchdown and lift-off area lighting system for an elevated heliport or helideck shall consist of:

a) perimeter lights; and

b) floodlighting and/or luminescent panel lighting.

Note.— At elevated heliports and helidecks, surface texture cues within the touchdown and lift-off area are essential for helicopter positioning during the final approach and landing. Such cues are provided by using floodlighting or luminescent panel lighting or a combination of these two forms of lighting, in addition to perimeter lights.

5.3.8.4 **Recommendation.—** *Touchdown and lift-off area floodlighting or luminescent panel lighting should be provided at a surface-level heliport intended for use at night when enhanced surface texture cues are required.*

Location

5.3.8.5 Touchdown and lift-off area perimeter lights shall be placed along the edge of the area designated for use as the touchdown and lift-off area or within a distance of 1.5 m from the edge. Where the touchdown and lift-off area is a circle the lights shall be:

a) located on straight lines in a pattern which will provide information to pilots on drift displacement; and

b) where a) is not practicable, evenly spaced around the perimeter of the touchdown and lift-off area at the appropriate interval except that over a sector of 45° the lights shall be spaced at half spacing.

5.3.8.6 Touchdown and lift-off area perimeter lights shall be uniformly spaced at intervals of not more than 3 m for elevated heliports and helidecks and not more than 5 m for surface level heliports. There shall be a minimum number of four lights on each side including a light at each corner. For a circular touchdown and lift-off area, where lights are installed in accordance with 5.3.8.5 b) there shall be a minimum of fourteen lights.

Note.— Guidance on this issue is contained in the Heliport Manual.

5.3.8.7 The touchdown and lift-off area perimeter lights shall be installed at an elevated heliport or fixed helideck such that the pattern cannot be seen by the pilot from below the elevation of the touchdown and lift-off area.

5.3.8.8 The touchdown and lift-off area perimeter lights shall be installed at a floating helideck, such that the pattern cannot be seen by the pilot from below the elevation of the touchdown and lift-off area when the helideck is level.

5.3.8.9 On surface level heliports, luminescent panel lights shall be placed along the marking designating the edge of the touchdown and lift-off area. Where the touchdown and lift-off area is a circle the luminescent panels shall be located on straight lines circumscribing the area.

5.3.8.10 On surface level heliports the minimum number of panels on a touchdown and lift-off area shall be nine. The total length of luminescent panels in a pattern shall not be less than 50 per cent of the length of the pattern. There shall be an odd number with a minimum number of three panels on each

side of the touchdown and lift-off area including a panel at each corner. Luminescent panels shall be uniformly spaced with a distance between adjacent panel ends of not more than 5 m on each side of the touchdown and lift-off area.

5.3.8.11 **Recommendation.**— *When luminescent panels are used on an elevated heliport or helideck to enhance surface texture cues the panels should not be placed adjacent to the perimeter lights. They should be placed around a touchdown marking where it is provided or coincident with heliport identification marking.*

5.3.8.12 Touchdown and lift-off area floodlights shall be located so as to avoid glare to pilots in flight or to personnel working on the area. The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.

Characteristics

5.3.8.13 The touchdown and lift-off area perimeter lights shall be fixed omnidirectional lights showing yellow.

5.3.8.14 At a surface level heliport the luminescent panels shall emit yellow light when used to define the boundary of the touchdown and lift-off area.

Note.— In other circumstances, luminescent panels may emit light of other colours.

5.3.8.15 **Recommendation.**— *The chromaticity and luminance of colours of luminescent panels should conform to Annex 14, Volume I, Appendix 1, 3.4.*

5.3.8.16 A luminescent panel shall have a minimum width of 6 cm. The panel housing shall be the same colour as the marking it defines.

5.3.8.17 **Recommendation.**— *The perimeter lights should not exceed a height of 25 cm and should be inset when a light extending above the surface could endanger helicopter operations.*

5.3.8.18 **Recommendation.**— *The touchdown and lift-off area floodlights should not exceed a height of 25 cm.*

5.3.8.19 The luminescent panels shall not extend above the surface by more than 2.5 cm.

5.3.8.20 **Recommendation.**— *The light distribution of the perimeter lights should be as shown in Figure 5-9, Illustration 6.*

5.3.8.21 **Recommendation.**— *The light distribution of the luminescent panels should be as shown in Figure 5-9, Illustration 7.*

5.3.8.22 The spectral distribution of touchdown and lift-off area floodlights shall be such that the surface and obstacle marking can be correctly identified.

5.3.8.23 **Recommendation.**— *The average horizontal illuminance of the floodlighting should be at least 10 lux, with a uniformity ratio (average to minimum) of not more than 8:1 measured on the surface of the touchdown and lift-off area.*

5.3.9 Winching area floodlighting

Application

5.3.9.1 Winching area floodlighting shall be provided at a winching area intended for use at night.

Location

5.3.9.2 Winching area floodlights shall be located so as to avoid glare to pilots in flight or to personnel working on the area. The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.

Characteristics

5.3.9.3 The spectral distribution of winching area floodlights shall be such that the surface and obstacle markings can be correctly identified.

5.3.9.4 **Recommendation.**— *The average horizontal illuminance should be at least 10 lux, measured on the surface of the winching area.*

5.3.10 Taxiway lights

Note.— The specifications for taxiway centre line lights and taxiway edge lights in Annex 14, Volume I, 5.3.15 and 5.3.16 are equally applicable to taxiways intended for ground taxiing of helicopters.

5.3.11 Visual aids for denoting obstacles

Note.— The specifications for marking and lighting of obstacles included in Annex 14, Volume I, Chapter 6, are equally applicable to heliports and winching areas.

5.3.12 Floodlighting of obstacles

Application

5.3.12.1 At a heliport intended for use at night, obstacles shall be floodlighted if it is not possible to display obstacle lights on them.

Location

5.3.12.2 Obstacle floodlights shall be arranged so as to illuminate the entire obstacle and as far as practicable in a manner so as not to dazzle the helicopter pilots.

Characteristics

5.3.12.3 **Recommendation.—** *Obstacle floodlighting should be such as to produce a luminance of at least 10 cd/m².*