

SUBPART 307

VISUAL AIDS FOR NAVIGATION

307.1 INDICATORS AND SIGNALLING DEVICES

307.1.1 WIND DIRECTION INDICATORS

307.1.1.1 An aerodrome shall be equipped with at least one wind direction indicator.

307.1.1.2 A wind direction indicator shall be located so as to be visible from aircraft in flight or on the movement area and in such a way as to be free from the effects of air disturbances caused by nearby objects.

307.1.1.3 Characteristics

The wind direction indicator should be in the form of a truncated cone made of fabric and should have a length of not less than 3.6 m and a diameter, at the larger end, of not less than 0.9 m. It should be constructed so that it gives a clear indication of the direction of the surface wind and a general indication of the wind speed. The colour or colours should be so selected as to make the wind direction indicator clearly visible and understandable from a height of at least 300 m, 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 bands being the darker colour.

307.1.1.4 The location of at least one wind direction indicator should be marked by a circular band 15 m in diameter and 1.2 m wide. The band should be centred about the wind direction indicator support and should be in a colour chosen to give adequate conspicuity, preferably white.

307.1.2 SIGNALLING LAMP

307.1.2.1 A signalling lamp shall be provided at a controlled aerodrome in the aerodrome control tower.

307.1.2.2 A signalling lamp should be capable of producing red, green and white signals, and of:

- a) being aimed manually at any target as required;
- b) giving a signal in any one colour followed by a signal in either of the two other colours; and
- c) transmitting a message in any one of the three colours by Morse Code up to a speed of at least four words per minute.

When selecting the green light, use should be made of the restricted boundary of green as specified.

307.1.2.3 The beam spread should be not less than 1° nor greater than 3°, with negligible light beyond 3°. When the signalling lamp is intended for use in the daytime the intensity of the coloured light should be not less than 6 000 cd.

307.2 MARKINGS

307.2.1 GENERAL

Interruption of Runway Markings

307.2.1.1 At an intersection of two (or more) runways the marking of the more important runway, except for the runway side stripe marking, shall be displayed and the markings of the other runway(s) shall be interrupted. The runway side stripe marking of the more important runway may be either continued across the intersection or interrupted. The order of importance of runways for the display of runway markings shall be as follows:

1st – precision approach runway;

2nd – non–precision approach runway; and

3rd – non–instrument runway.

307.2.1.2 At an intersection of a runway and taxiway the markings of the runway shall be displayed and the markings of the taxiway interrupted, except that runway side stripe markings may be interrupted.

Colour and Conspicuity

307.2.1.3 Runway markings shall be white.

307.2.1.4 Taxiway markings, runway turn pad and aircraft stand markings shall be yellow.

307.2.1.5 Apron safety lines shall be of a conspicuous colour which shall contrast with that used for aircraft stand markings.

307.2.1.6 At aerodromes where operations take place at night, pavement markings should be made with reflective materials designed to enhance the visibility of the markings.

Unpaved taxiways

307.2.1.7 An unpaved taxiway should be provided, so far as practicable, with the markings prescribed for paved taxiways.

307.2.2 RUNWAY DESIGNATION MARKINGS

307.2.2.1 A runway designation marking shall be provided at the thresholds of a paved runway.

307.2.2.2 A runway designation marking shall be provided at the thresholds of an unpaved runway.

307.2.2.3 A runway designation marking shall be located at a threshold as shown in Figure 7-1 as appropriate.

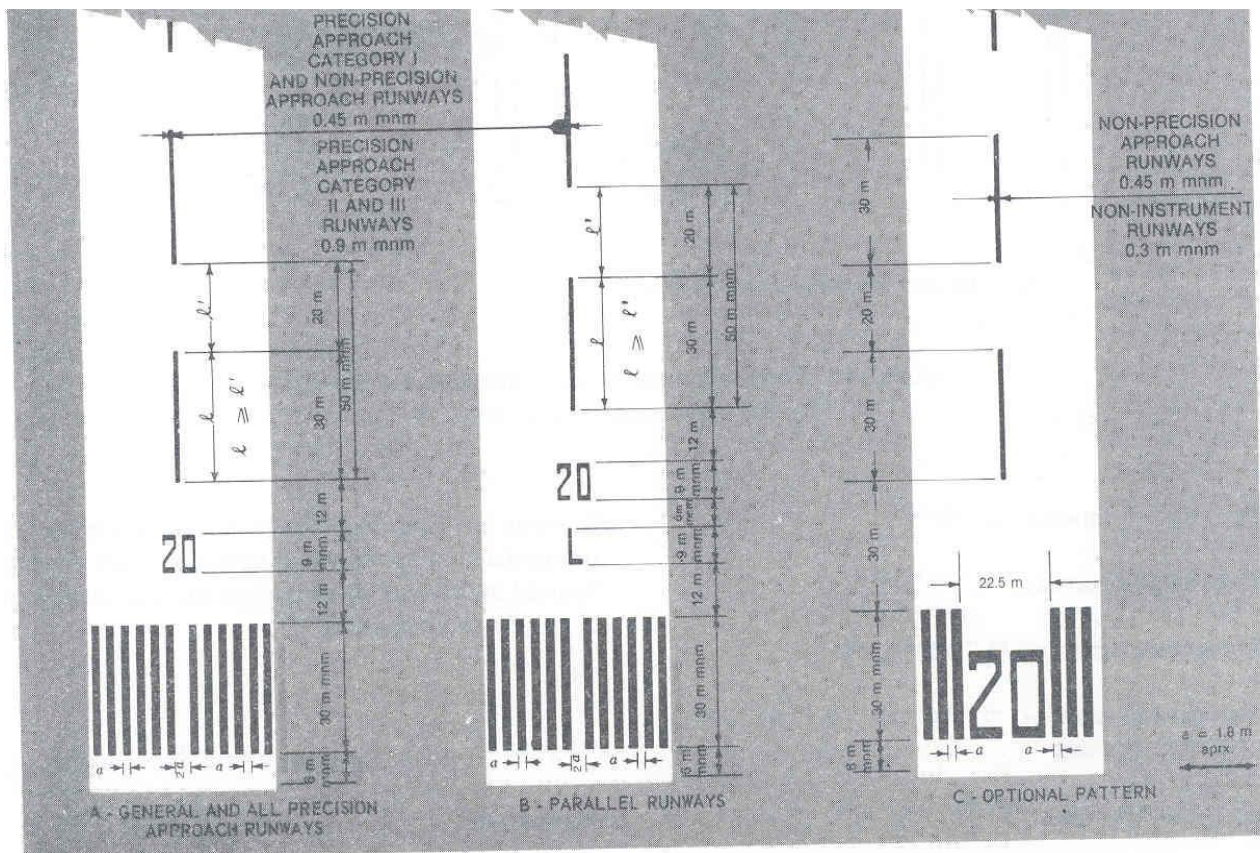


Figure 7-1. Runway designation, centre line and threshold markings

307.2.2.4 A runway designation marking shall consist of a two-digit number and on parallel runways shall be supplemented with a letter. On a single runway, dual parallel runways and triple parallel runways the two-digit number shall be the whole number nearest the one-tenth of the magnetic North when viewed from the direction of approach. On four or more parallel runways, one set of adjacent runways shall be numbered to the nearest one-tenth magnetic azimuth and the other set of adjacent runways numbered to the next nearest one-tenth of the magnetic azimuth. When the above rule would give a single digit number, it shall be preceded by a zero.

307.2.2.5 In the case of parallel runways, each runway designation number shall be supplemented by a letter as follows, in the order shown from left to right when viewed from the direction of approach:

- for two parallel runways: “L” “R”;
- for three parallel runways: “L” “C” “R”;
- for four parallel runways: “L” “R” “L” “R”;
- for five parallel runways: “L” “C” “R” “L” “R” or “L” “R” “L” “C” “R”;

— for six parallel runways: “L” “C” “R” “L” “C” “R”.

307.2.2.6 The numbers and letters shall be in the form and proportion shown in Figure 7-2. The dimensions shall be not less than those shown in Figure 7-2, but where the numbers are incorporated in the threshold marking, larger dimensions shall be used in order to fill adequately the gap between the stripes of the threshold marking.

307.2.3 RUNWAY CENTRE LINE MARKING

307.2.3.1 A runway centre line marking shall be provided on a paved runway.

307.2.3.2 A runway centre line marking shall be located along the centre line of the runway between the runway designation markings as shown in Figure 7-1, except when interrupted in compliance with 307.2.1.1.

307.2.3.3 A runway centre line marking shall consist of a line of uniformly spaced stripes and gaps. The length of a stripe plus a gap shall be not less than 50 m or more than 75 m. The length of each stripe shall be at least equal to the length of the gap or 30 m, whichever is greater.

307.2.3.4 The width of the stripes shall be not less than:

- 0.90 m on precision approach category II and III runways;
- 0.45 m on non-precision approach runways where the code number is 3 or 4, and precision approach category I runways; and
- 0.30 m on non-precision approach runways where the code number is 1 or 2, and on non-instrument runways.

307.2.4 THRESHOLD MARKING

307.2.4.1 A threshold marking shall be provided at the threshold of a paved runway.

307.2.4.2 A threshold marking should be provided at the threshold of an unpaved runway.

307.2.4.3 The stripes of the threshold marking shall commence 6 m from the threshold.

307.2.4.4 A runway threshold marking shall consist of a pattern of longitudinal stripes of uniform dimensions disposed symmetrically about the centre line of a runway as shown in Figure 7-1 (A) and (B) for a runway width of 45 m. The number of stripes shall be in accordance with the runway width as follows:

Runway width	Numbers of stripes
18 m	4
23 m	6
30 m	8
45 m	12
60 m	16

except that on non-precision approach and non-instrument runways 45 m or greater in width, they may be as shown in Figure 7-1 (C).

307.2.4.5 The stripes shall extend laterally to within 3 m of the edge of a runway or to a distance of 27 m on either side of a runway centre line, whichever results in the smaller lateral distance. Where a runway designation marking is placed within a threshold marking there shall be a minimum of three stripes on each side of the centre line of the runway. Where a runway designation marking is placed above a threshold marking, the stripes shall be continued across the runway. The stripes shall be at least 30 m long and approximately 1.80 m wide with spacing of approximately 1.80 m between them except that, where the stripes are continued across a runway, a double spacing shall be used to separate the two stripes nearest the centre line of the runway, and in the case where the designation marking is included within the threshold marking this spacing shall be 22.5 m.

Transverse stripe

307.2.4.6 Where a threshold is displaced from the extremity of a runway or where the extremity of a runway is not square with the runway centre line, a transverse stripe as shown in Figure 7-3 (B) should be added to the threshold marking.

307.2.4.7 A transverse stripe shall be not less than 1.80 m wide.

Arrows

307.2.4.8 Where a runway threshold is permanently displaced, arrows conforming to Figure 7-3 (B) shall be provided on the portion of the runway before the displaced threshold.

307.2.4.9 When a runway threshold is temporarily displaced from the normal position, it shall be marked as shown in Figure 7-3 (A) or 7-3 (B) and all markings prior to the displaced threshold shall be obscured except the runway centre line marking, which shall be converted to arrows.

307.2.5 AIMING POINT MARKING

Application

307.2.5.1 An aiming point marking shall be provided at each approach end of a paved instrument runway where the code number is 2, 3 or 4.

307.2.5.2 An aiming point marking should be provided at each approach end of:

- a) a paved non-instrument runway where the code number is 3 or 4,
- b) a paved instrument runway where the code number is 1,

when additional conspicuity of the aiming point is desirable.

307.2.5.3 The aiming point marking shall commence no closer to the threshold than the distance indicated in the appropriate column of Table 7-1, except that, on a runway equipped with a

visual approach slope indicator system, the beginning of the marking shall be coincident with the visual approach slope origin.

307.2.5.4 An aiming point marking shall consist of two conspicuous stripes. The dimensions of the stripes and the lateral spacing between their inner sides shall be in accordance with the provisions of the appropriate column of Table 7-1. Where a touchdown zone marking is provided, the lateral spacing between the markings shall be the same as that of the touchdown zone marking.

307.2.6 TOUCHDOWN ZONE MARKING

307.2.6.1 A touchdown zone marking shall be provided at each end of a paved precision approach runway where the code number is 2, 3 or 4.

307.2.6.2 A touchdown zone marking shall be provided at each end of a paved non precision approach or non-instrument runway where the code number is 3 or 4.

307.2.6.3 A touchdown zone marking shall consist of pairs of rectangular markings symmetrically disposed about the runway centre line with the number of such pairs related to the landing distance available and, where the marking is to be displayed at both the approach directions of a runway, the distance between the thresholds, as follows:

Table 7-1. Location and dimensions of aiming point marking

Location and dimensions (1)	Landing distance available			
	Less than 800 m (2)	800 m up to but not including 1 200 m (3)	1 200 m up to but not including 2 400 m (4)	2 400 m and above (5)
Distance from threshold to beginning of marking	150 m	250 m	300 m	400 m
Length of stripe ^a	30-45 m	30-45 m	45-60 m	45-60 m
Width of stripe	4 m	6 m	6-10 m ^b	6-10 m ^b
Lateral spacing between inner sides of stripes	6 m ^c	9 m ^c	18-22.5 m	18-22.5 m

a. The greater dimensions of the specified ranges are intended to be used where increased conspicuity is required.
 b. The lateral spacing may be varied within these limits to minimize the contamination of the marking by rubber deposits.
 c. These figures were deduced by reference to the outer main gear wheel span which is element 2 of the aerodrome reference code at Chapter 1, Table 1-1

Landing distance available or the distance between thresholds	Pair(s) of markings
less than 900 m	1
900 m up to but not including 1 200 m	2
1 200 m up to but not including 1 500 m	3
1 500 m up to but not including 2 400 m	4
2 400 m or more	6

307.2.6.4 A touchdown zone marking shall conform to either of the two patterns shown in Figure 7-4. For the pattern shown in Figure 7-4 (A), the markings shall be not less than 22.5 m long and 3 m wide. For the pattern shown in Figure 7-4 (B), each stripe of each marking shall be not less than 22.5 m long and 1.8 m wide with a spacing of 1.5 m between adjacent stripes. The lateral spacing between the inner sides of the rectangles shall be equal to that of the aiming point marking where provided. Where an aiming point marking is not provided, the lateral spacing between the inner sides of the rectangles shall correspond to the lateral spacing specified for the aiming point marking in Table 7-1 (columns 2, 3, 4 or 5, as appropriate). The pairs of markings shall be provided at longitudinal spacings of 150 m beginning from the threshold except that pairs of touchdown zone markings coincident with or located within 50 m of an aiming point marking shall be deleted from the pattern.

307.2.6.5 On a non-precision approach runway where the code number is 2, an additional pair of touchdown zone marking stripes should be provided 150 m beyond the beginning of the aiming point marking.

307.2.7 RUNWAY SIDE STRIPE MARKING

307.2.7.1 A runway side stripe marking shall be provided between the thresholds of a paved runway.

Location

307.2.7.2 A runway side stripe marking should consist of two stripes, one placed along each edge of the runway with the outer edge of each stripe approximately on the edge of the runway, except that, where the runway is greater than 60 m in width, the stripes should be located 30 m from the runway centre line.

307.2.7.3 Where a runway turn pad is provided, the runway side stripe marking should be continued between the runway and the runway turn pad.

Characteristics

307.2.7.4 A runway side stripe should have an overall width of at least 0.9 m on runways 30 m or more in width and at least 0.45 m on narrower runways.

307.2.8 TAXIWAY CENTRE LINE MARKING

- 307.2.8.1 A taxiway centre line marking shall be provided on a paved taxiway and apron where the code number is 3 or 4 in such a way as to provide continuous guidance between the runway centre line and aircraft stands.
- 307.2.8.2 Taxiway centre line markings shall be provided on a paved taxiway where the code number is 1 or 2 in such a way as to provide guidance from the runway centre line to the point on the apron where aircraft stand markings commence.
- 307.2.8.3 Taxiway centre line marking shall be provided on a paved runway when the runway is part of a taxi route, and where the taxiway centre line is not coincident with the runway centre line.

Location

- 307.2.8.4 On a straight section of a taxiway the taxiway centre line marking should be located along the taxiway centre line. On a taxiway curve the marking should continue from the straight portion of the taxiway at a constant distance from the outside edge of the curve.
- 307.2.8.5 At an intersection of a taxi-way with a runway where the taxiway serves as an exit from the runway, the taxiway centre line marking should be curved into the runway centre line marking as shown in Figures 7-5 and 7-23. The taxiway centre line marking should be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.
- 307.2.8.6 Where taxiway centre line marking is provided on a runway in accordance with 307.2.8.3, the marking should be located on the centre line of the designated taxiway.

Characteristics

- 307.2.8.7 A taxiway centre line marking shall be at least 15 cm in width and continuous in length except where it intersects with a runway-holding position marking or an intermediate holding position marking as shown in Figure 7-5.

307.2.9 RUNWAY TURN PAD MARKING

APPLICATION

- 307.2.9.1 Where a runway turn pad is provided, a runway turn pad marking shall be provided for continuous guidance to enable an aeroplane to complete a 180-degree turn and align with the runway center line.
- 307.2.9.2 The runway turn pad marking should be curved from the runway center line into the turn pad. The radius of the curve should be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the runway pad is intended. The intersection angle of the runway turn pad marking with the runway center line should not be greater than 30 degrees.

- 307.2.9.3 The runway turn pad marking should be extended parallel to the runway center line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.
- 307.2.9.4 A runway turn pad marking should guide the aeroplane in such a way as to allow a straight portion of taxiing before the point where a 180-degree turn is to be made. The straight portion of the runway turn pad marking should be parallel to the outer edge of the runway turn pad.
- 307.2.9.5 The design of the curve allowing the aeroplane to negotiate a 180-degree turn should be based on a nose wheel steering angle not exceeding 45 degrees.
- 307.2.9.6 The design of the turn pad marking should be such that, when the cockpit of the aeroplane remains over the runway turn pad marking, the clearance distance between any wheel of the aeroplane landing gear and the edge of the runway turn pad should be not less than those specified in 5.3.6.

Characteristics

- 307.2.9.7 A runway turn pad marking shall be at least 15 cm in width and continuous in length.

307.2.10 RUNWAY-HOLDING POSITION MARKING

- 307.2.10.1 A runway-holding position marking shall be displayed along a runway-holding position.

Characteristics

- 307.2.10.2 At an intersection of a taxiway and a non-instrument, non-precision approach or take-off runway, the runway-holding position marking shall be as shown in Figure 7-5, pattern A.
- 307.2.10.3 Where a single runway-holding position is provided at an intersection of a taxiway and a precision approach category I, II or III runway, the runway-holding position marking shall be as shown in Figure 7-5, pattern A. Where two or three runway-holding positions are provided at such an intersection, the runway-holding position marking closer (closest) to the runway shall be as shown in Figure 7-5, pattern A and the markings farther from the runway shall be as shown in Figure 7-5, pattern B.
- 307.2.10.4 The runway-holding position marking displayed at a runway-holding position established in accordance with 5.11.3 shall be as shown in Figure 7-5, pattern A.
- 307.2.10.5 Where increased conspicuity of the runway-holding position is required, the runway-holding position marking should be as shown in Figure 5-7
- 307.2.10.6 Where a pattern B runway-holding position marking is located on an area where it would exceed 60 m in length, the term "CAT II" or "CAT III" as appropriate should be marked on the surface at the ends of the runway-holding position marking and at equal intervals of 45m maximum between successive marks. The letters should be not less than 1.8 m high and should be placed not more than 0.9 m beyond the holding position marking.

307.2.10.7 The runway-holding position marking displayed at a runway/runway intersection shall be perpendicular to the centre line of the runway forming part of the standard taxi-route. The pattern of the marking shall be as shown in Figure 7-6, pattern A.

307.2.11 INTERMEDIATE HOLDING POSITION MARKING

307.2.11.1 An intermediate holding position marking shall be displayed along an intermediate holding position.

307.2.11.2 Where an intermediate holding position marking is displayed at an intersection of two paved taxiways, it shall be located across the taxiway at sufficient distance from the near edge of the intersecting taxiway to ensure safe clearance between taxiing aircraft. It shall be coincident with a stop bar or intermediate holding position lights, where provided.

307.2.11.3 An intermediate holding position marking shall consist of a single broken line as shown in Figure 7-5.

307.2.12 AIRCRAFT STAND MARKINGS

307.2.12.1 Aircraft stand markings shall be provided for designated parking positions on a paved apron.

Location

307.2.12.2 Aircraft stand markings on a paved apron should be located so as to provide the clearances specified in 5.12.6 and in 5.14.9 respectively, when the nose wheel follows the stand marking.

307.2.12.3 Aircraft stand markings should include such elements as stand identification, lead-in line, turn bar, turning line, alignment bar, stop line and lead-out line, as are required by the parking configuration and to complement other parking aids.

307.2.12.4 An aircraft stand identification (letter and/or number) should be included in the lead-in line a short distance after the beginning of the lead-in line. The height of the identification should be adequate to be readable from the cockpit of aircraft using the stand.

307.2.12.5 Where two sets of aircraft stand markings are superimposed on each other in order to permit more flexible use of the apron and it is difficult to identify which stand marking should be followed, or safety would be impaired if the wrong marking was followed, then identification of the aircraft for which each set of markings is intended should be added to the stand identification.

307.2.12.6 Lead-in, turning and lead-out lines should normally be continuous in length and have a width of not less than 15 cm. Where one or more sets of stand markings are superimposed on a stand marking, the lines should be continuous for the most demanding aircraft and broken for other aircraft.

307.2.12.7 The curved portions of lead-in, turning and lead-out lines should have radii appropriate to the most demanding aircraft type for which the markings are intended.

307.2.12.8 Where it is intended that an aircraft proceed in one direction only, arrows pointing in the direction to be followed should be added as part of the lead-in and lead-out lines.

307.2.12.9 A turn bar should be located at right angles to the lead-in line, abeam the left pilot position at the point of initiation of any intended turn. It should have a length and width of not less than 6 m and 15 cm, respectively, and include an arrowhead to indicate the direction of turn.

307.2.12.10 If more than one turn bar and/or stop line is required, they should be coded.

307.2.12.11 An alignment bar should be placed so as to be coincident with the extended centre line of the aircraft in the specified parking position and visible to the pilot during the final part of the parking manoeuvre. It should have a width of not less than 15 cm.

307.2.12.12 A stop line should be located at right angles to the alignment bar, abeam the left pilot position at the intended point of stop. It should have a length and width of not less than 6 m and 15 cm, respectively.

307.2.13 APRON SAFETY LINES

307.2.13.1 Apron safety lines shall be provided on a paved apron as required by the parking configurations and ground facilities.

307.2.13.2 Apron safety lines shall be located so as to define the areas intended for use by ground vehicles and other aircraft servicing equipment, etc., to provide safe separation from aircraft.

307.2.13.3 Apron safety lines should include such elements as wing tip clearance lines and service road boundary lines as required by the parking configurations and ground facilities.

307.2.13.4 An apron safety line should be continuous in length and at least 10 cm in width.

307.2.14 ROAD-HOLDING POSITION MARKING

307.2.14.1 A road-holding position marking shall be provided at all paved road entrances to a runway.

307.2.14.2 The road-holding position marking shall be located across the road at the holding position.

307.2.14.3 The road-holding position marking shall be in accordance with the local road traffic regulations.

307.2.15 MANDATORY INSTRUCTION MARKING

307.2.15.1 Where it is impracticable to install an instruction sign in accordance with (307.4.2.1), a mandatory instruction marking shall be provided on the surface of the pavement.

307.2.15.2 A mandatory instruction sign shall be supplemented by a mandatory instruction marking.

307.2.15.3 The mandatory instruction marking shall be located on the left-hand side of the taxiway centre line marking and on the holding side of the runway-holding position marking as shown in Figure 7-8. The distance between the nearest edge of the marking and the runway-holding position marking or the taxiway centre line marking shall be not less than 1 m.

307.2.15.4 Except where operationally required, a mandatory instruction marking should not be located on a runway.

307.2.15.5 A mandatory instruction marking shall consist of an inscription in white on a red background. Except for a NO ENTRY marking, the inscription shall provide information identical to that of the associated mandatory instruction sign.

307.2.15.6 A NO ENTRY marking shall consist of an inscription in white reading NO ENTRY on a red background.

307.2.15.7 Where there is insufficient contrast between the marking and the pavement surface, the mandatory instruction marking shall include an appropriate border, preferably white or black.

307.2.15.8 The character height should be 4 m. The inscriptions should be in the form and proportions shown in Appendix 3.

307.2.15.9 The back-ground should be rectangular and extend a minimum of 0.5 m laterally and vertically beyond the extremities of the inscription.

307.2.16 INFORMATION MARKING

307.2.16.1 Where it is impracticable to install an information sign, the information should be conveyed through an information marking.

307.2.16.2 An information sign shall be supplemented by an information marking.

307.2.16.3 The information marking should be displayed across the surface of the taxiway or apron where necessary and positioned so as to be legible from the cockpit of an approaching aircraft.

307.2.16.4 An information marking shall consist of:

- a) an inscription in yellow, when it replaces or supplements a location sign; and
- b) an inscription in black, when it replaces or supplements a direction or destination sign.

307.2.16.5 Where there is insufficient contrast between the marking and the pavement surface, the marking shall include:

- a) a black background where the inscriptions are in yellow; and
- b) a yellow background where the inscriptions are in black.

307.2.16.6 The character height should be 4 m. The inscriptions should be in the form and proportions shown in Appendix 8.

307.3 LIGHTS

307.3.1 GENERAL

Lights which may endanger the safety of aircraft

307.3.1.1 A non-aeronautical ground light near an aerodrome which might endanger the safety of aircraft shall be extinguished, screened or otherwise modified so as to eliminate the source of danger.

Laser emissions which may endanger the safety of aircraft

307.3.1.2 To protect the safety of aircraft against the hazardous effects of laser emitters, the following protected zones should be established around aerodromes:

- a laser-beam free flight zone (LFFZ)
- a laser-beam critical flight zone(LCFZ)
- a laser-beam sensitive flight zone (LSFZ).

Lights which may cause confusion

307.3.1.3 A non-aeronautical ground light which, by reason of its intensity, configuration or colour, might prevent, or cause confusion in, the clear interpretation of aeronautical ground lights should be extinguished, screened or otherwise modified so as to eliminate such a possibility. In particular, attention should be directed to a non-aeronautical ground light visible from the air within the areas described hereunder:

- a) Instrument runway — code number 4:
within the areas before the threshold and beyond the end of the runway extending at least 4 500 m in length from the threshold and runway end and 750 m either side of the extended runway centre line in width.
- b) Instrument runway — code number 2 or 3:
as in a), except that the length should be at least 3 000 m.
- c) Instrument runway — code number 1;
and non-instrument runway:
within the approach area.

Elevated approach lights

307.3.1.4 Elevated approach lights and their supporting structures within 300 m from the threshold, or up to a distance from the runway end where the approach lights no longer constitute the

major hazard to an aircraft overrunning the runway end to an airborne aircraft inadvertently striking them, whichever distance is less, shall be frangible.

307.3.1.5 When an approach light fixture or supporting structure is not in itself sufficiently conspicuous, it shall be suitably marked.

Elevated lights

307.3.1.6 Elevated runway, stopway and taxiway lights shall be frangible. Their height shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

Surface lights

307.3.1.7 Light fixtures inset in the surface of runways, stopways, taxiways and aprons shall be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the lights themselves.

307.3.1.8 The temperature produced by conduction or radiation at the interface between an installed inset light and an aircraft tire should not exceed 160°C during a 10-minute period of exposure.

Light intensity and control

307.3.1.9 The intensity of runway lighting shall be adequate for the minimum conditions of visibility and ambient light in which use of the runway is intended, and compatible with that of the nearest section of the approach lighting system when provided.

307.3.1.10 Where a high-intensity lighting system is provided, a suitable intensity control shall be incorporated to allow for adjustment of the light intensity to meet the prevailing conditions. Separate intensity controls or other suitable methods shall be provided to ensure that the following systems, when installed, can be operated at compatible intensities:

- approach lighting system;
- runway edge lights;
- runway threshold lights;
- runway end lights;
- runway centre line lights;
- runway touchdown zone lights; and
- taxiway centre line lights.

307.3.2 EMERGENCY LIGHTING

- 307.3.2.1 At an aerodrome provided with runway lighting and without a secondary power supply, sufficient emergency lights shall be conveniently available for installation on at least the primary runway in the event of failure of the normal lighting system.
- 307.3.2.2 When installed on a runway the emergency lights shall, as a minimum, conform to the configuration required for a non-instrument runway.
- 307.3.2.3 The colour of the emergency lights should conform to the colour requirements for runway lighting, except that, where the provision of coloured lights at the threshold and the runway end is not practicable, all lights may be variable white or as close to variable white as practicable.

307.3.3 Aeronautical beacons

Application

- 307.3.3.1 Where operationally necessary an aerodrome beacon or an identification beacon shall be provided at each aerodrome intended for use at night.
- 307.3.3.2 The operational requirement shall be determined having regard to the requirements of the air traffic using the aerodrome, the conspicuity of the aerodrome features in relation to its surroundings and the installation of other visual and non-visual aids useful in locating the aerodrome.

Aerodrome beacon

- 307.3.3.3 An aerodrome beacon shall be provided at an aerodrome intended for use at night if one or more of the following conditions exist:
- a) aircraft navigate predominantly by visual means;
 - b) reduced visibilities are frequent; or
 - c) it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.

Location

- 307.3.3.4 The aerodrome beacon shall be located on or adjacent to the aerodrome in an area of low ambient background lighting.
- 307.3.3.5 The location of the beacon should be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.
- 307.3.3.6 The aerodrome beacon shall show either coloured flashes alternating with white flashes, or white flashes only. The frequency of total flashes shall be from 20 to 30 per minute. Where used, the coloured flashes emitted by beacons at land aerodromes shall be green and

coloured flashes emitted by beacons at water aerodromes shall be yellow. In the case of a combined water and land aerodrome, coloured flashes, if used, shall have the colour characteristics of whichever section of the aerodrome is designated as the principal facility.

307.3.3.7 The light from the beacon shall show at all angles of azimuth. The vertical light distribution shall extend upwards from an elevation of not more than 1° to an elevation determined by the appropriate authority to be sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used and the effective intensity of the flash shall be not less than 2 000 cd.

Identification beacon

Application

307.3.3.8 An identification beacon shall be provided at an aerodrome which is intended for use at night and cannot be easily identified from the air by other means.

Location

307.3.3.9 The identification beacon shall be located on the aerodrome in an area of low ambient background lighting.

307.3.3.10 The location of the beacon should be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

307.3.3.11 An identification beacon at a land aerodrome shall show at all angles of azimuth. The vertical light distribution shall extend upwards from an elevation of not more than 1° to an elevation determined by the appropriate authority to be sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used and the effective intensity of the flash shall be not less than 2 000 cd.

307.3.3.12 An identification beacon shall show flashing-green at a land aerodrome and flashing-yellow at a water aerodrome.

307.3.3.13 The identification characters shall be transmitted in the International Morse Code.

307.3.3.14 The speed of transmission should be between six and eight words per minute, the corresponding range of duration of the Morse dots being from 0.15 to 0.2 seconds per dot.

307.3.4 APPROACH LIGHTING SYSTEMS

307.3.4.1 A. — Non-instrument runway

A simple approach lighting system shall be provided to serve a non-instrument runway where circling guidance is necessary or where the code number is 3 or 4 and intended for use at night, except when the runway is used only in conditions of good visibility, and sufficient guidance is provided by other visual aids.

B. — Non precision approach runway

A simple approach lighting system shall be provided to serve a non-precision approach runway, except when the runway is used only in conditions of good visibility or sufficient guidance is provided by other visual aids.

C. — Precision approach runway category I

A precision approach category I lighting system shall be provided to serve a precision approach runway category I.

D. — Precision approach runway category II and III

A precision approach runway category II and III lighting systems shall be provided to serve a precision approach runway category II or III.

Simple approach lighting system

Location

- 307.3.4.2 A simple approach lighting system shall consist of a row of lights on the extended centre line of the runway extending, whenever possible, over a distance of not less than 420 m from the threshold with a row of lights forming a crossbar 18 m or 30 m in length at a distance of 300 m from the threshold.
- 307.3.4.3 The lights forming the crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights of the crossbar shall be spaced so as to produce a linear effect, except that, when a crossbar of 30 m is used, gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6 m.
- 307.3.4.4 The lights forming the centre line shall be placed at longitudinal intervals of 60 m, except that, when it is desired to improve the guidance, an interval of 30 m may be used. The innermost light shall be located either 60 m or 30 m from the threshold, depending on the longitudinal interval selected for the centre line lights.
- 307.3.4.5 If it is not physically possible to provide a centre line extending for a distance of 420 m from the threshold, it should be extended to 300 m so as to include the crossbar. If this is not possible, the centre line lights should be extended as far as practicable, and each centre line light should then consist of a barrette at least 3 m in length. Subject to the approach system having a crossbar at 300 m from the threshold, an additional crossbar may be provided at 150 m from the threshold.
- 307.3.4.6 The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:
- a) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

- b) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

Characteristics

307.3.4.7 The lights of a simple approach lighting system shall be fixed lights and the colour of the lights shall be such as to ensure that the system is readily distinguishable from other aeronautical ground lights, and from extraneous lighting if present. Each centre line light shall consist of either:

- a) a single source; or
- b) a barrette at least 3 m in length.

307.3.4.8 Where provided for a non-instrument runway, the lights should show at all angles in azimuth necessary to a pilot on base leg and final approach. The intensity of the lights should be adequate for all conditions of visibility and ambient light for which the system has been provided.

307.3.4.9 Where provided for a non-precision approach runway, the lights should show at all angles in azimuth necessary to the pilot of an aircraft which on final approach does not deviate by an abnormal amount from the path defined by the non-visual aid. The lights should be designed to provide guidance during both day and night in the most adverse conditions of visibility and ambient light for which it is intended that the system should remain usable.

Precision approach category I lighting system

Location

307.3.4.10 A precision approach category I lighting system shall consist of a row of lights on the extended centre line of the runway extending, wherever possible, over a distance of 900 m from the runway threshold with a row of lights forming a crossbar 30 m in length at a distance of 300 m from the runway threshold.

307.3.4.11 The lights forming the crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights of the crossbar shall be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6 m.

307.3.4.12 The lights forming the centre line shall be placed at longitudinal intervals of 30 m with the innermost light located 30 m from the threshold.

307.3.4.13 The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

- a) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and
- b) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

Characteristics

307.3.4.14 The centre line and crossbar lights of a precision approach category I lighting system shall be fixed lights showing variable white. Each centre line light position shall consist of either:

- a) a single light source in the innermost 300 m of the centre line, two light sources in the central 300 m of the centre line and three light sources in the outer 300 m of the centre line to provide distance information; or
- b) a barrette.

307.3.4.15 Where the serviceability level of the approach lights specified as a maintenance objective in 10.4.10 can be demonstrated, each centre line light position may consist of either:

- a) a single light source; or
- b) a barrette.

307.3.4.16 The barrettes shall be at least 4 m in length. When barrettes are composed of lights approximating to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5 m.

307.3.4.17 If the centre line consists of barrettes as described in 307.3.4.14 b) or 307.3.4.15 b), each barrette should be supplemented by a capacitor discharge light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.

307.3.4.18 Each capacitor discharge light as described in 307.3.4.17 shall be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system. The design of the electrical circuit shall be such that these lights can be operated independently of the other lights of the approach lighting system.

307.3.4.19 If the centre line consists of lights as described in 307.3.4.14 a) or 307.3.4.15 a), additional crossbars of lights to the crossbar provided at 300 m from the threshold shall be provided at 150 m, 450 m, 600 m and 750 m from the threshold. The lights forming each crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights shall be spaced so as to produce a linear effect,

except that gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6 m.

307.3.4.20 Where the additional crossbars described in 307.3.4.19 are incorporated in the system, the outer ends of the crossbars shall lie on two straight lines that either are parallel to the line of the centre line lights or converge to meet the runway centre line 300 m from threshold.

307.3.4.21 The lights shall be in accordance with the specifications of Appendix 2, Figure 2.1.

**Precision approach category II and III
lighting system**

307.3.4.22 The approach lighting system shall consist of a row of lights on the extended centre line of the runway, extending, wherever possible, over a distance of 900 m from the runway threshold. In addition, the system shall have two side rows of lights, extending 270 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold, all as shown in figure 7-13. Where the serviceability level of the approach lights specified as maintenance objectives in 10.4.7 can be demonstrated, the system may have two side rows of lights, extending 240 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold, all as shown in figure 5-14.

307.3.4.23 The lights forming the centre line shall be placed at longitudinal intervals of 30 m with the innermost lights located 30 m from the threshold.

307.3.4.24 The lights forming the side rows shall be placed on each side of the centre line, at a longitudinal spacing equal to that of the centre line lights and with the first light located 30 m from the threshold. Where the serviceability level of the approach lights specified as maintenance objectives in 10.4.7 can be demonstrated, lights forming the side rows may be placed on each side of the centre line, at a longitudinal spacing of 60 m with the first light located 60 m from the threshold. The lateral spacing (or gauge) between the innermost lights of the side rows shall be not less than 18 m, but in any event shall be equal to that of the touchdown zone lights.

307.3.4.25 The crossbar provided at 150 m from the threshold shall fill in the gaps between the center line and side row lights.

307.3.4.26 The crossbar provided at 300 m from the threshold shall extend on both sides of the center line lights to a distance of 15 m from the center line.

307.3.4.27 If the center line beyond a distance of 300 m from the threshold consists of lights as described in 307.3.4.31 b) or 307.3.4.32 b), additional crossbars of lights shall be provided at 450 m, 600 m and 750 m from the threshold.

307.3.4.28 Where the additional crossbars described in 307.3.4.27 are incorporated in the system, the outer ends of these crossbars shall lie on two straight lines that either are parallel to the center line or converge to meet the runway center line 300 m from the threshold.

307.3.4.29 The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

- a) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the center line of the system; and
- b) no light other than a light located within the central part of a crossbar or a center line barrette (not their extremities) shall be screened from an approaching aircraft.

Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

307.3.4.30 The center line of a precision approach category II and III lighting system for the first 300 m from the threshold shall consist of barrettes showing variable white, except that where the threshold is displaced 300 m or more, the center line may consist of single light sources showing variable white. Where the serviceability level of the approach category II and III lighting system for the first 300 m from the threshold may consist of either:

- a) barrettes, where the centre line beyond 300 m from the threshold consists of barrettes as described in 307.3.4.32 a); or
- b) alternate single light sources and barrettes, where the centre line beyond 300 m from the threshold consists of single light sources as described in 307.3.4.32 b), with the innermost single light source located 30 m and the innermost barrette located 60 m from the threshold; or
- c) single light sources where the threshold is displaced 30 m or more;

all of which shall show variable white.

7.3.4.31 Beyond 300 m from the threshold each center line light position shall consist of either:

- a) a barrette as used on the inner 300 m; or
- b) two light sources in the central 300 m of the center line and three light sources in the outer 300 m of the center line;

all of which shall show variable white.

7.3.4.32 Where the serviceability level of the approach lights specified as maintenance objectives in 10.4.7 can be demonstrated, beyond 300 m from the threshold each center line light position may consist of either:

- a) a barrette; or
- b) a single light source;

all of which shall show variable white.

- 7.3.4.33 The barrettes shall be at least 4 m in length. When barrettes are composed of lights approximating to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5 m.
- 7.3.4.34 If the center line beyond 300 m from the threshold consists of barrettes as described in 307.3.4.31 a) or 307.3.4.32 a), each barrette beyond 300 m should be supplemented by a capacitor discharge light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.
- 7.3.4.35 Each capacitor discharge light shall be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system. The design of the electrical circuit shall be such that these lights can be operated independently of the other lights of the approach lighting system.
- 7.3.4.36 The side row shall consist of barrettes showing red. The length of a side row barrette and spacing of its lights shall be equal to those of the touchdown zone light barrettes.
- 7.3.4.37 The lights forming the crossbars shall be fixed lights showing variable white. The lights shall be uniformly spaced at intervals of not more than 2.7 m.
- 7.3.4.38 The intensity of the red lights shall be compatible with the intensity of the white lights.
- 7.3.4.39 The lights shall be in accordance with the specifications of Appendix 2, Figures A2-1 and A2-2.

307.3.5 Visual approach slope indicator systems

Application

- 307.3.5.1 A visual approach slope indicator system shall be provided to serve the approach to a runway whether or not the runway is served by other visual approach aids or by non-visual aids, where one or more of the following conditions exist:
- a) the runway is used by turbojet or other aeroplanes with similar approach guidance requirements;
 - b) the pilot of any type of aeroplane may have difficulty in judging the approach due to:
 - 1) inadequate visual guidance such as is experienced during an approach over water or featureless terrain by day or in the absence of sufficient extraneous lights in the approach area by night, or
 - 2) misleading information such as is produced by deceptive surrounding terrain or runway slopes;
 - c) the presence of objects in the approach area may involve serious hazard if an aeroplane descends below the normal approach path, particularly if there are no non-visual or other visual aids to give warning of such objects;

- d) physical conditions at either end of the runway present a serious hazard in the event of an aeroplane undershooting or overrunning the runway; and
- e) terrain or prevalent meteorological conditions are such that the aeroplane may be subjected to unusual turbulence during approach.

307.3.5.2 The standard visual approach slope indicator systems shall consist of the following:

- a) T-VASIS and AT-VASIS conforming to the specifications contained in 307.3.5.6 to 307.3.5.22 inclusive;
- b) PAPI and APAPI systems conforming to the specifications contained in 307.3.5.23 to 307.3.5.40 inclusive;

as shown in Figure 7- 14 .

307.3.5.3 PAPI, T-VASIS or AT-VASIS shall be provided where the code number is 3 or 4 when one or more of the conditions specified in 307.3.5.1 exist.

307.3.5.4 PAPI or APAPI shall be provided where the code number is 1 or 2 when one or more of the conditions specified in 307.3.5.1 exist.

307.3.5.5 Where a runway threshold is temporarily displaced from the normal position and one or more of the conditions specified in 307.3.5.1 exist, a PAPI should be provided except that where the code number is 1 or 2 an APAPI may be provided.

T-VASIS and AT-VASIS

Description

307.3.5.6 The T-VASIS shall consist of twenty light units symmetrically disposed about the runway centre line in the form of two wing bars of four light units each, with bisecting longitudinal lines of six lights, as shown in Figure 7-15.

307.3.5.7 The AT-VASIS shall consist of ten light units arranged on one side of the runway in the form of a single wing bar of four light units with a bisecting longitudinal line of six lights.

307.3.5.8 The light units shall be constructed and arranged in such a manner that the pilot of an aeroplane during an approach will:

- a) when above the approach slope, see the wing bar(s) white, and one, two or three fly-down lights, the more fly-down lights being visible the higher the pilot is above the approach slope;
- b) when on the approach slope, see the wing bar(s) white; and
- c) when below the approach slope, see the wing bar(s) and one, two or three fly-up lights white, the more fly-up lights being visible the lower the pilot is below the

approach slope; and when well below the approach slope, see the wing bar(s) and the three fly-up lights red.

When on or above the approach slope, no light shall be visible from the fly-up light units; when on or below the approach slope, no light shall be visible from the fly-down light units.

Siting

307.3.5.9 The light units shall be located as shown in Figure 7-15, subject to the installation tolerances given therein.

Characteristics of the light units

307.3.5.10 The systems shall be suitable for both day and night operations.

307.3.5.11 The light distribution of the beam of each light unit shall be of fan shape showing over a wide arc in azimuth in the approach direction. The wing bar light units shall produce a beam of white light from 1°54' vertical angle up to 6° vertical angle and a beam of red light from 0° to 1°54' vertical angle. The fly-down light units shall produce a white beam extending from an elevation of 6° down to approximately the approach slope, where it shall have a sharp cut-off. The fly-up light units shall produce a white beam from approximately the approach slope down to 1°54' vertical angle and a red beam below a 1°54' vertical angle. The angle of the top of the red beam in the wing bar units and fly-up units may be increased to comply with 307.3.5.21.

307.3.5.12 The light intensity distribution of the fly-down, wing bar and fly-up light units shall be as shown in Appendix 2, Figure 2-22.

307.3.5.13 The colour transition from red to white in the vertical plane shall be such as to appear to an observer, at a distance of not less than 300 m, to occur over a vertical angle of not more than 15'.

307.3.5.14 At full intensity the red light shall have a Y coordinate not exceeding 0.320.

307.3.5.15 A suitable intensity control shall be provided to allow adjustments to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

307.3.5.16 The light units forming the wing bars, or the light units forming a fly-down or a fly-up matched pair, shall be mounted so as to appear to the pilot of an approaching aeroplane to be substantially in a horizontal line. The light units shall be mounted as low as possible and shall be frangible.

307.3.5.17 The light units shall be so designed that deposits of condensation, dirt, etc., on optically transmitting or reflecting surfaces shall interfere to the least possible extent with the light signals and shall in no way affect the elevation of the beams or the contrast between the red and white signals. The construction of the light units shall be such as to minimize the probability of the slots being wholly or partially blocked by snow or ice where these conditions are likely to be encountered.

Approach slope and elevation setting of light beams

- 307.3.5.18 The approach slope shall be appropriate for use by the aeroplanes using the approach.
- 307.3.5.19 When the runway on which a T-VASIS is provided is equipped with an ILS and/or MLS, the siting and elevations of the light units shall be such that the visual approach slope conforms as closely as possible with the glide path of the ILS and/or the minimum glide path of the MLS, as appropriate.
- 307.3.5.20 The elevation of the beams of the wing bar light units on both sides of the runway shall be the same. The elevation of the top of the beam of the fly-up light unit nearest to each wing bar, and that of the bottom of the beam of the fly-down light unit nearest to each wing bar, shall be equal and shall correspond to the approach slope. The cut-off angle of the top of the beams of successive fly-up light units shall decrease by 5' of arc in angle of elevation at each successive unit away from the wing bar. The cut-in angle of the bottom of the beam of the fly-down light units shall increase by 7' of arc at each successive unit away from the wing bar (see Figure 7-16).
- 307.3.5.21 The elevation setting of the top of the red light beams of the wing bar and fly-up light units shall be such that, during an approach, the pilot of an aeroplane to whom the wing bar and three fly-up light units are visible would clear all objects in the approach area by a safe margin if any such light did not appear red.
- 307.3.5.22 The azimuth spread of the light beam shall be suitably restricted where an object located outside the obstacle protection surface of the system, but within the lateral limits of its light beam, is found to extend above the plane of the obstacle protection surface and an aeronautical study indicates that the object could adversely affect the safety of operations. The extent of the restriction shall be such that the object remains outside the confines of the light beam.

PAPI and APAPI

Description

- 307.3.5.23 The PAPI system shall consist of a wing bar of 4 sharp transition multi-lamp (or paired single lamp) units equally spaced. The system shall be located on the left side of the runway unless it is physically impracticable to do so.
- 307.3.5.24 The APAPI system shall consist of a wing bar of 2 sharp transition multi-lamp (or paired single lamp) units. The system shall be located on the left side of the runway unless it is physically impracticable to do so.
- 307.3.5.25 The wing bar of a PAPI shall be constructed and arranged in such a manner that a pilot making an approach will:
- a) when on or close to the approach slope, see the two units nearest the runway as red and the two units farthest from the runway as white;

- b) when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach slope, see all the units as white; and
- c) when below the approach slope, see the three units nearest the runway as red and the unit farthest from the runway as white; and when further below the approach slope, see all the units as red.

307.3.5.26 The wing bar of an APAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

- a) when on or close to the approach slope, see the unit nearer the runway as red and the unit farther from the runway as white;
- b) when above the approach slope, see both the units as white; and
- c) when below the approach slope, see both the units as red.

Siting

307.3.5.27 The light units shall be located as in the basic configuration illustrated in Figure 7-17, subject to the installation tolerances given therein. The units forming a wing bar shall be mounted so as to appear to the pilot of an approaching aeroplane to be substantially in a horizontal line. The light units shall be mounted as low as possible and shall be frangible.

Characteristics of the light units

307.3.5.28 The system shall be suitable for both day and night operations.

307.3.5.29 The colour transition from red to white 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 3'.

307.3.5.30 At full intensity the red light shall have a Y coordinate not exceeding 0.320.

307.3.5.31 The light intensity distribution of the light units shall be as shown in Appendix 2, Figure 2.23.

307.3.5.32 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.

307.3.5.33 Each light unit shall be capable of adjustment in elevation so that the lower limit of the white part of the beam may be fixed at any desired angle of elevation between 1°30' and at least 4°30' above the horizontal.

307.3.5.34 The light units shall be so designed that deposits of condensation, snow, ice, dirt, etc., on optically transmitting or reflecting surfaces shall interfere to the least possible extent with the light signals and shall not affect the contrast between the red and white signals and the elevation of the transition sector.

Approach slope and elevation setting of light units

- 307.3.5.35 The approach slope as defined in Figure 5-18 shall be appropriate for use by the aeroplanes using the approach.
- 307.3.5.36 When the runway is equipped with an ILS and/or MLS, the siting and the angle of elevation of the light units shall be such that the visual approach slope conforms as closely as possible with the glide path of the ILS and/or the minimum glide path of the MLS, as appropriate.
- 307.3.5.37 The angle of elevation settings of the light units in a PAPI wing bar shall be such that, during an approach, the pilot of an aeroplane observing a signal of one white and three reds will clear all objects in the approach area by a safe margin.
- 307.3.5.38 The angle of elevation settings of the light units in an APAPI wing bar shall be such that, during an approach, the pilot of an aeroplane observing the lowest on slope signal, i.e. one white and one red, will clear all objects in the approach area by a safe margin.
- 307.3.5.39 The azimuth spread of the light beam shall be suitably restricted where an object located outside the obstacle protection surface of the PAPI or APAPI system, but within the lateral limits of its light beam, is found to extend above the plane of the obstacle protection surface and an aeronautical study indicates that the object could adversely affect the safety of operations. The extent of the restriction shall be such that the object remains outside the confines of the light beam.
- 307.3.5.40 Where wing bars are installed on each side of the runway to provide roll guidance, corresponding units shall be set at the same angle so that the signals of each wing bar change symmetrically at the same time.

Obstacle protection surface

- 307.3.5.41 An obstacle protection surface shall be established when it is intended to provide a visual approach slope indicator system.
- 307.3.5.42 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 7-3 and in Figure 5-19.
- 307.3.5.43 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.
- 307.3.5.44 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 aeroplanes.

307.3.5.45 Where an aeronautical study indicates that an existing object extending above an obstacle protection surface could adversely affect the safety of operations of aeroplanes 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 threshold; and
- e) where d) is found to be impracticable, suitably displace the system upwind of the threshold to provide an increase in threshold crossing height equal to the height of the object penetration.

307.3.6 RUNWAY LEAD-IN LIGHTING SYSTEMS

307.3.6.1 A runway lead-in lighting system should be provided where it is desired to provide visual guidance along a specific approach path, for reasons such as avoiding hazardous terrain or for purposes of noise abatement.

Table 7-2. Wheel clearance over threshold for PAPI and APAPI

Eye-to-wheel height of aeroplane in the approach configuration ^a	Desired wheel clearance (metres) ^{b, c}	Minimum wheel clearance (metres) ^d
(1)	(2)	(3)
Up to but not including 3 m	6	3 ^e
3 m up to but not including 5 m	9	4
5 m up to but not including 8 m	9	5
8 m up to but not including 14 m	9	6

- a. In selecting the eye-to-wheel height group, only aeroplanes meant to use the system on a regular basis shall be considered. The most demanding amongst such aeroplanes shall determine the eye-to-wheel height group.
- b. Where practicable the desired wheel clearances shown in column (2) shall be provided.
- c. The wheel clearances in column (2) may be reduced to no less than those in column (3) where an aeronautical study indicates that such reduced wheel clearances are acceptable.
- d. When a reduced wheel clearance is provided at a displaced threshold it shall be ensured that the corresponding desired wheel clearance specified in column (2) will be available when an aeroplane at the top end of the eye-to-wheel height group chosen overflies the extremity of the runway.
- e. This wheel clearance may be reduced to 1.5 m on runways used mainly by light-weight non-turbo-jet aeroplanes.

Table 7-3. Dimensions and slopes of the obstacle protection surface

Surface dimensions	Runway type/code number							
	Non-instrument Code number				Instrument Code number			
	1	2	3	4	1	2	3	4
Length of inner edge	60 m	80 m ^a	150 m	150 m	150 m	150 m	300 m	300 m
Distance from threshold	30 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m
Divergence (each side)	10 %	10 %	10 %	10 %	15 %	15 %	15 %	15 %
Total length	7 500 m	7 500 m ^b	15 000 m	15 000 m	7 500 m	7 500 m ^b	15 000 m	15 000 m
Slope								
a) T-VASIS and AT-VASIS	- ^c	1.9 °	1.9 °	1.9 °	-	1.9 °	1.9 °	1.9 °
b) PAPI ^d	-	A-0.57 °	A-0.57 °	A-0.57 °	A-0.57 °	A-0.57 °	A-0.57 °	A-0.57 °
c) APAPI ^d	A-0.9 °	A-0.9 °	-	-	A-0.9 °	A-0.9 °	-	-

a. This length is to be increased to 150 m for a T-VASIS or AT-VASIS.

b. This length is to be increased to 15 000 m for a T-VASIS or AT-VASIS.

c. No slope has been specified if a system is unlikely to be used on runway type/code number indicated.

d. Angles indicated in Figure 7-1307.

307.3.6.2 A runway lead-in lighting system should consist of groups of lights positioned so as to define the desired approach path and so that one group may be sighted from the preceding group. The interval between adjacent groups should not exceed approximately 1 600 m.

307.3.6.3 A runway lead-in lighting system should extend from a point as determined by the appropriate authority, up to a point where the approach lighting system, if provided, or the runway or the runway lighting system is in view.

307.3.6.4 Each group of lights of a runway lead-in lighting system should consist of at least three flashing lights in a linear or cluster configuration. The system may be augmented by steady burning lights where such lights would assist in identifying the system.

307.3.6.5 The flashing lights should be white, and the steady burning lights gaseous discharge lights.

307.3.6.6 Where practicable, the flashing lights in each group should flash in sequence towards the runway.

307.3.7 RUNWAY THRESHOLD IDENTIFICATION LIGHTS (RILS)

307.3.7.1 Runway threshold identification lights should be provided:

- a) at the threshold of a non-precision approach runway where it is not practical to provide other visual approach aids; and

- b) where a runway threshold is permanently displaced from the runway extremity or temporarily displaced from the normal position and additional threshold conspicuity is necessary.

Location

- 307.3.7.2 Runway threshold identification lights shall be located symmetrically about the runway centre line, in line with the threshold and approximately 10 m outside each line of runway edge lights.
- 307.3.7.3 Runway threshold identification lights should be flashing white lights with a flash frequency between 60 and 120 per minute.
- 307.3.7.4 The lights shall be visible only in the direction of approach to the runway.

307.3.8 RUNWAY EDGE LIGHTS

- 307.3.8.1 Runway edge lights shall be provided for a runway intended for use at night or for a precision approach runway intended for use by day or night.
- 307.3.8.2 Runway edge lights shall be provided on a runway intended for take off with an operating minima below an RVR of 800 m by day.

Location

- 307.3.8.3 Runway edge lights shall be placed along the full length of the runway and shall be in two parallel rows equidistant from the centre line.
- 307.3.8.4 Runway edge lights shall be placed along the edges of the area declared for use as the runway or outside the edges of the area at a distance of not more than 3 m.
- 307.3.8.5 Where the width of the area which could be declared as runway exceeds 60 m, the distance between the rows of lights should be determined taking into account the nature of the operations, the light distribution characteristics of the runway edge lights, and other visual aids serving the runway.
- 307.3.8.6 The lights shall be uniformly spaced in rows at intervals of not more than 60 m for an instrument runway, and at intervals of not more than 100 m for a non-instrument runway. The lights on opposite sides of the runway axis shall be on lines at right angles to that axis. At intersections of runways, lights may be spaced irregularly or omitted, provided that adequate guidance remains available to the pilot.

Characteristics

- 307.3.8.7 Runway edge lights shall be fixed lights showing variable white, except that:
 - a) in the case of a displaced threshold, the lights between the beginning of the runway and the displaced threshold shall show red in the approach direction; and

- b) a section of the lights 600 m or one-third of the runway length, whichever is the less, at the remote end of the runway from the end at which the take-off run is started, may show yellow.

307.3.8.8 The runway edge lights shall show at all angles in azimuth necessary to provide guidance to a pilot landing or taking off in either direction. When the runway edge lights are intended to provide circling guidance, they shall show at all angles in azimuth (see 307.3.6.1).

307.3.8.9 In all angles of azimuth required in 307.3.8.8, runway edge lights shall show at angles up to 15° above the horizontal with an intensity adequate for the conditions of visibility and ambient light in which use of the runway for take-off or landing is intended. In any case, the intensity shall be at least 50 cd except that at an aerodrome without extraneous lighting the intensity of the lights may be reduced to not less than 25 cd to avoid dazzling the pilot.

307.3.8.10 Runway edge lights on a precision approach runway shall be in accordance with the specifications of Appendix 2, Figure 2-9 or 2-10.

307.3.9 RUNWAY THRESHOLD and WING BAR LIGHTS

307.3.9.1 Runway threshold lights shall be provided for a runway equipped with runway edge lights except on a non-instrument or non-precision approach runway where the threshold is displaced and wing bar lights are provided.

307.3.9.2 When a threshold is at the extremity of a runway, the threshold lights shall be placed in a row at right angles to the runway axis as near to the extremity of the runway as possible and, in any case, not more than 3 m outside the extremity.

307.3.9.3 When a threshold is displaced from the extremity of a runway, threshold lights shall be placed in a row at right angles to the runway axis at the displaced threshold.

307.3.9.4 Threshold lighting shall consist of:

- a) on a non-instrument or non-precision approach runway, at least six lights;
- b) on a precision approach runway category I, at least the number of lights that would be required if the lights were uniformly spaced at intervals of 3 m between the rows of runway edge lights; and
- c) on a precision approach runway category II or III, lights uniformly spaced between the rows of runway edge lights at intervals of not more than 3 m.

307.3.9.5 The lights prescribed in 307.3.9.4 a) and b) should be either:

- a) equally spaced between the rows of runway edge lights, or
- b) symmetrically disposed about the runway centre line in two groups, with the lights uniformly spaced in each group and with a gap between the groups equal to the gauge of the touchdown zone marking or lighting, where such is provided, or otherwise not more than half the distance between the rows of runway edge lights.

- 307.3.9.6 Wing bar lights should be provided on a precision approach runway when additional conspicuity is considered desirable.
- 307.3.9.7 Wing bar lights shall be provided on a non- instrument or non-precision approach runway where the threshold is displaced and runway threshold lights are required, but are not provided.
- 307.3.9.8 Wing bar lights shall be symmetrically disposed about the runway centre line at the threshold in two groups, i.e. wing bars. Each wing bar shall be formed by at least five lights extending at least 10 m outward from, and at right angles to, the line of the runway edge lights, with the innermost light of each wing bar in the line of the runway edge lights.
- 307.3.9.9 Runway threshold and wing bar lights shall be fixed unidirectional lights showing green in the direction of approach to the runway. The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.
- 307.3.9.10 Runway threshold lights on a precision approach runway shall be in accordance with the specifications of Appendix 2, Figure 2.3.
- 307.3.9.11 Threshold wing bar lights on a precision approach runway shall be in accordance with the specifications of Appendix 2, Figure 2.4.

307.3.10 RUNWAY END LIGHTS

- 307.3.10.1 Runway end lights shall be provided for a runway equipped with runway edge lights.
- 307.3.10.2 Runway end lights shall be placed on a line at right angles to the runway axis as near to the end of the runway as possible and, in any case, not more than 3 m outside the end.
- 307.3.10.3 Runway end lighting should consist of at least six lights. The lights should be either:
- a) equally spaced between the rows of runway edge lights, or
 - b) symmetrically disposed about the runway centre line in two groups with the lights uniformly spaced in each group and with a gap between the groups of not more than half the distance between the rows of runway edge lights.
- 307.3.10.4 Runway end lights shall be fixed unidirectional lights showing red in the direction of the runway. The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.
- 307.3.10.5 Runway end lights on a precision approach runway shall be in accordance with the specifications of Appendix 2, Figure 2-8.

307.3.11 RUNWAY CENTRE LINE LIGHTS

- 307.3.11.1 Runway centre line lights shall be provided on a precision approach runway category II or III.

307.3.11.2 Runway centre line lights should be provided on a precision approach runway category I, particularly when the runway is used by aircraft with high landing speeds or where the width between the runway edge lights is greater than 50 m.

307.3.11.3 Runway centre line lights shall be provided on a runway intended to be used for take-off with an operating minimum below an RVR of the order of 400 m.

307.3.11.4 Runway centre line lights should be provided on a runway intended to be used for take-off with an operating minimum of an RVR of the order of 400 m or higher when used by aeroplanes with a very high take-off speed, particularly where the width between the runway edge lights is greater than 50 m.

307.3.11.5 Runway centre line lights shall be located along the centre line of the runway, except that the lights may be uniformly offset to the same side of the runway centre line by not more than 60 cm where it is not practicable to locate them along the centre line. The lights shall be located from the threshold to the end at longitudinal spacing of approximately 15 m. Where the serviceability level of the runway centre line lights specified as maintenance objectives in 9.4.26 or 9.4.30, as appropriate, can be demonstrated and the runway is intended for use in runway visual range conditions of 350 m or greater, the longitudinal spacing may be approximately 30 m.

307.3.11.6 Centre line guidance for take-off from the beginning of a runway to a displaced threshold should be provided by:

- a) an approach lighting system if its characteristics and intensity settings afford the guidance required during take-off and it does not dazzle the pilot of an aircraft taking off; or
- b) runway centre line lights; or
- c) barrettes of at least 3 m length and spaced at uniform intervals of 30 m, as shown in Figure 7-22, designed so that their photometric characteristics and intensity setting afford the guidance required during take-off without dazzling the pilot of an aircraft taking off.

Where necessary, provision should be made to extinguish those centre line lights specified in b) or reset the intensity of the approach lighting system or barrettes when the runway is being used for landing. In no case should only the single source runway centre line lights show from the beginning of the runway to a displaced threshold when the runway is being used for landing.

307.3.11.7 Runway centre line lights shall be fixed lights showing variable white from the threshold to the point 900 m from the runway end; alternate red and variable white from 900 m to 300 m from the runway end; and red from 300 m to the runway end, except that for runways less than 1 800 m in length, the alternate red and variable white lights shall extend from the mid-point of the runway usable for landing to 300 m from the runway end.

307.3.11.8 Runway centre line lights shall be in accordance with the specifications of Appendix 2, Figure 2.6 or 2.307.

307.3.12 STOPWAY LIGHTS

307.3.12.1 Stopway lights shall be provided for a stopway intended for use at night.

307.3.12.2 Stopway lights shall be placed along the full length of the stopway and shall be in two parallel rows that are equidistant from the centre line and coincident with the rows of the runway edge lights. Stopway lights shall also be provided across the end of a stopway on a line at right angles to the stopway axis as near to the end of the stopway as possible and, in any case, not more than 3 m outside the end.

307.3.12.3 Stopway lights shall be fixed unidirectional lights showing red in the direction of the runway.

307.3.13 TAXIWAY CENTRE LINE LIGHTS

307.3.13.1 Taxi-way centre line lights be provided on a taxiway intended for use at night in runway visual range conditions of 350 m or greater, and particularly on complex taxiway intersections and exit taxiways, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.

307.3.13.2 Taxiway centre line lights should be provided on an exit taxiway, taxiway and apron in all visibility conditions where specified as components of an advanced surface movement guidance and control system in such a manner as to provide continuous guidance between the runway centre line and aircraft stands.

307.3.13.3 Taxi-way centre line lights should be provided in all visibility conditions on a runway forming part of a standard taxi-route where specified as components of an advanced surface movement guidance and control system.

307.3.13.4 Taxiway centre line lights on a taxiway other than an exit taxiway and on a runway forming part of a standard taxi-route shall be fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or in the vicinity of the taxiway.

307.3.13.5 Taxiway centre line lights on an exit taxiway shall be fixed lights. Alternate taxiway centre line lights shall show green and yellow from their beginning near the runway centre line to the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway; and thereafter all lights shall show green (Figure 5-23). The light nearest to the perimeter shall always show yellow. Where aircraft may follow the same centre line in both directions, all the centre line lights shall show green to aircraft approaching the runway.

307.3.13.6 Taxiway centre line lights shall be in accordance with the specifications of:

- a) Appendix 2, Figure 2-12, 2-13, or 2-14 for taxiways intended for use in runway visual range conditions of less than a value of 350 m; and
- b) Appendix 2, Figure 2-15 or 2-16 for other taxiways.

307.3.13.7 Where taxiway centre line lights are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, taxiway centre line lights should be in accordance with the specifications of Appendix 2, Figure 2-17, 2-18 or 2-19.

307.3.13.8 Taxi-way centre line lights should normally be located on the taxiway centre line marking, except that they may be offset by not more than 30 cm where it is not practicable to locate them on the marking.

307.3.13.9 Taxiway centre line lights on a straight section of a taxiway should be spaced at longitudinal intervals of not more than 30 m, except that:

- a) larger intervals not exceeding 60 m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing; and
- b) intervals less than 30 m should be provided on short straight sections;

307.3.13.10 Taxi-way centre line lights on a taxiway curve should continue from the straight portion of the taxiway at a constant distance from the outside edge of the taxiway curve. The lights should be spaced at intervals such that a clear indication of the curve is provided.

307.3.13.11 Taxiway centre line lights on a rapid exit taxiway should commence at a point at least 60 m before the beginning of the taxiway centre line curve and continue beyond the end of the curve to a point on the centre line of the taxiway where an aeroplane can be expected to reach normal taxiing speed. The lights on that portion parallel to the runway centre line should always be at least 60 cm from any row of runway centre line lights, as shown in Figure 7-21.

307.3.13.12 The lights should be spaced at longitudinal intervals of not more than 15 m, except that, where runway centre line lights are not provided, a greater interval not exceeding 30 m may be used.

307.3.13.13 Taxi-way centre line lights on exit taxiways other than rapid exit taxiways should commence at the point where the taxiway centre line marking begins to curve from the runway centre line, and follow the curved taxiway centre line marking at least to the point where the marking leaves the runway. The first light should be at least 60 cm from any row of runway centre line lights, as shown in Figure 7-21.

307.3.13.14 The lights should be spaced at longitudinal intervals of not more than 307.5 m.

307.3.14 TAXIWAY EDGE LIGHTS

307.3.14.1 Taxiway edge lights shall be provided on a holding bay, apron, etc. intended for use at night and on a taxiway not provided with taxiway centre line lights and intended for use at night, except that taxiway edge lights need not be provided where, considering the nature of the operations, adequate guidance can be achieved by surface illumination or other means.

307.3.14.2 Taxiway edge lights shall be provided on a runway forming part of a standard taxi-route and intended for taxiing at night where the runway is not provided with taxiway centre lights.

307.3.14.3 Taxi-way edge lights on a straight section of a taxiway and on a runway forming part of a standard taxi-route should be spaced at uniform longitudinal intervals of not more than 60 m. The lights on a curve should be spaced at intervals less than 60 m so that a clear indication of the curve is provided.

307.3.14.4 Taxi-way edge lights on a holding bay, apron, etc. should be spaced at uniform longitudinal intervals of not more than 60 m.

307.3.14.5 The lights should be located as near as practicable to the edges of the taxiway, holding bay, apron or runway, etc. or outside the edges at a distance of not more than 3 m.

307.3.14.6 Taxiway edge lights shall be fixed lights showing blue. The lights shall show up to at least 30° above the horizontal and at all angles in azimuth necessary to provide guidance to a pilot taxiing in either direction. At an inter section, exit or curve the lights shall be shielded as far as practicable so that they cannot be seen in angles of azimuth in which they may be confused with other lights.

307.3.15 STOP BARS

307.3.15.1 A stop bar shall be provided at every runway-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 550 m except where:

- a) operational procedures exist to limit to one at any time the number of aircraft on the manoeuvring area; or
- b) appropriate aids and procedures are available to assist in preventing inadvertent incursions of aircraft and vehicles onto the runway.

307.3.16 APRON FLOODLIGHTING

307.3.16.1 Apron floodlighting shall be provided on an apron, on a designated isolated aircraft parking position intended to be used at night.

307.3.16.2 Apron floodlights shall be located so as to provide adequate illumination on all apron service areas, with a minimum of glare to pilots of aircraft in flight and on the ground, aerodrome and apron controllers, and personnel on the apron. The arrangement and aiming of floodlights shall be such that an aircraft stand receives light from two or more directions to minimize shadows.

307.3.16.3 The spectral distribution of apron floodlights shall be such that the colours used for aircraft marking connected with routine servicing, and for surface and obstacle marking, can be correctly identified.

307.3.16.4 The average illuminance should be at least the following:

Aircraft stand:

- horizontal illuminance — 20 lux with a uniformity ratio (average to minimum) of not more than 4 to 1; and
- vertical illuminance — 20 lux at a height of 2 m above the apron in relevant directions.

Other apron areas:

- horizontal illuminance — 50 per cent of the average illuminance on the aircraft stands with a uniformity ratio (average to minimum) of not more than 4 to 1.

307.3.17 VISUAL DOCKING GUIDANCE SYSTEM

307.3.17.1 A visual docking guidance system shall be provided when it is intended to indicate, by a visual aid, the precise positioning of an aircraft on an aircraft stand and other alternative means, such as marshallers, are not practicable.

307.3.17.2 The system shall provide both azimuth and stopping guidance.

AZIMUTH GUIDANCE UNIT

307.3.17.3 The azimuth guidance unit and the stopping position indicator shall be adequate for use in all weather, visibility, background lighting and pavement conditions for which the system is intended both by day and night, but shall not dazzle the pilot.

307.3.17.4 The azimuth guidance unit and the stopping position indicator shall be of a design such that:

- a) a clear indication of malfunction of either or both is available to the pilot; and
- b) they can be turned off.

307.3.17.5 The azimuth guidance unit and the stopping position indicator shall be located in such a way that there is continuity of guidance between the aircraft stand markings, the aircraft stand manoeuvring guidance lights, if present, and the visual docking guidance system.

307.3.17.6 The accuracy of the system shall be adequate for the type of loading bridge and fixed aircraft servicing installations with which it is to be used.

307.3.17.7 The system should be usable by all types of aircraft for which the aircraft stand is intended, preferably without selective operation.

307.3.17.8 If selective operation is required to prepare the system for use by a particular type of aircraft, then the system shall provide an identification of the selected aircraft type to both the pilot and the system operator as a means of ensuring that the system has been set properly.

307.3.17.9 The azimuth guidance unit shall be located on or close to the extension of the stand centre line ahead of the aircraft so that its signals are visible from the cockpit of an aircraft throughout the docking manoeuvre and aligned for use at least by the pilot occupying the left seat.

307.3.17.10 The azimuth guidance unit should be aligned for use by the pilots occupying both the left and right seats.

307.3.17.11 The azimuth guidance unit shall provide unambiguous left/right guidance which enables the pilot to acquire and maintain the lead-in line without overcontrolling.

307.3.17.12 When azimuth guidance is indicated by colour change, green shall be used to identify the centre line and red for deviations from the centre line.

STOPPING POSITION INDICATOR

307.3.17.13 The stopping position indicator shall be located in conjunction with, or sufficiently close to, the azimuth guidance unit so that a pilot can observe both the azimuth and stop signals without turning the head.

307.3.17.14 The stopping position indicator shall be usable at least by the pilot occupying the left seat.

307.3.17.15 The stopping position indicator should be usable by the pilots occupying both the left and right seats.

307.3.17.16 The stopping position information provided by the indicator for a particular aircraft type shall account for the anticipated range of variations in pilot eye height and/or viewing angle.

307.3.17.17 The stopping position indicator shall show the stopping position for the aircraft for which guidance is being provided, and shall provide closing rate information to enable the pilot to gradually decelerate the aircraft to a full stop at the intended stopping position.

307.3.17.18 The stopping position indicator should provide closing rate information over a distance of at least 10 m.

307.3.17.19 When stopping guidance is indicated by colour change, green shall be used to show that the aircraft can proceed and red to show that the stop point has been reached except that for a short distance prior to the stop point a third colour may be used to warn that the stopping point is close.

307.4 SIGNS

307.4.1 GENERAL

307.4.1.1 Signs shall be provided to convey, a mandatory instruction, information on a specific location or destination on a movement area or to provide other information to meet the requirements of Chapter 8.9 (Surface Movement Guidance and Control System).

- 307.4.1.2 Signs shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. The installed height of the sign shall not exceed the dimension shown in the appropriate column of Table 7-4.
- 307.4.1.3 Signs shall be rectangular, as shown in Figures 7-24 and 7-25 with the longer side horizontal.
- 307.4.1.4 The only signs on the movement area utilizing red shall be mandatory instruction signs.
- 307.4.1.5 The inscriptions on a sign shall be in accordance with the provisions of Appendix 4.
- 307.4.1.6 Signs shall be illuminated in accordance with the provisions of Appendix 4 when intended for use:
- a) in runway visual range conditions less than a value of 800 m; or
 - b) at night in association with instrument runways; or
 - c) at night in association with non-instrument runways where the code number is 3 or 4.
- 307.4.1.7 Signs shall be retroreflective and/or illuminated in accordance with the provisions of Appendix 4 when intended for use at night in association with non-instrument runways where the code number is 1 or 2.

307.4.2 MANDATORY INSTRUCTION SIGNS

- 307.4.2.1 A mandatory instruction sign shall be provided to identify a location beyond which an aircraft taxiing or vehicle shall not proceed unless authorised by the aerodrome control tower.
- 307.4.2.2 Mandatory instruction signs shall include runway designation signs, Category I, II or III holding position signs, runway holding position signs, road holding position signs and NO ENTRY signs.
- 307.4.2.3 A pattern "A" runway-holding position marking shall be supplemented at a taxiway/runway intersection or a runway/runway intersection with a runway designation sign.
- 307.4.2.4 A pattern "B" runway-holding position marking shall be supplemented with a Category I, II or III holding position sign.
- 307.4.2.5 A pattern "A" runway-holding position marking at a runway-holding position established in accordance with 5.11.3 shall be supplemented with a runway-holding position sign.
- 307.4.2.6 A runway designation sign at a taxiway/runway intersection should be supplemented with a location sign in the outboard (farthest from the taxiway) position, as appropriate.
- 307.4.2.7 A NO ENTRY sign shall be provided when entry into an area is prohibited.

307.4.2.8 A runway designation sign at a taxiway/runway intersection or a runway/runway intersection shall be located on each side of the runway-holding position marking facing the direction of approach to the runway.

Table 7- 4. Location distances for taxiing guidance signs including runway exit signs

Code number	Sign height (mm)			Perpendicular distance from defined taxiway pavement edge to near side of sign	Perpendicular distance from defined runway pavement edge to near side of sign
	Legend	Face (min.)	Installed (max.)		
1 or 2	200	400	700	5-11 m	3-10 m
1 or 2	300	600	900	5-11 m	3-10 m
3 or 4	300	600	900	11-21 m	8-15 m
3 or 4	400	800	1 100	11-21 m	8-15 m

307.4.2.9 A category I, II or III holding position sign shall be located on each side of the runway-holding position marking facing the direction of the approach to the critical area.

307.4.2.10 A NO ENTRY sign shall be located at the beginning of the area to which entrance is prohibited on each side of the taxiway as viewed by the pilot.

307.4.2.11 A runway-holding position sign shall be located on each side of the runway-holding position established in accordance with 5.11.3, facing the approach to the obstacle limitation surface or ILS/MLS critical/sensitive area, as appropriate.

307.4.2.12 A mandatory instruction sign shall consist of an inscription in white on a red background.

307.4.2.13 The inscription on a runway designation sign shall consist of the runway designations of the intersecting runway properly oriented with respect to the viewing position of the sign, except that a runway designation sign installed in the vicinity of a runway extremity may show the runway designation of the concerned runway extremity only.

307.4.2.14 The inscription on a category I, II, III or joint II/III holding position sign shall consist of the runway designator followed by CAT I, CAT II, CAT III or CAT II/III, as appropriate.

307.4.2.15 The inscription on a NO ENTRY sign shall be in accordance with Figure 7-2307.

307.4.2.16 The inscription on a runway-holding position sign at a runway-holding position established in accordance with 5.11.3 shall consist of the taxiway designation and a number.

307.4.2.17 Where appropriate, the following inscriptions/ symbol shall be used:

Inscription/ Symbol	Use
Runway designation of	To indicate a runway-holding position at a runway extremity

a runway
extremity

OR

Runway designation of extremities or of a runway	To indicate a runway-holding position located at other both taxiway/runway intersections runway/runway intersections
25 CAT I (Example)	To indicate a category I runway-holding position at the threshold of runway 25
25 CAT II (Example)	To indicate a category II runway-holding position at the threshold of runway 25
25 CAT II/III (Example)	To indicate a joint category II/III runway-holding position at the threshold of runway 25
NO ENTRY symbol	To indicate that entry to an area is prohibited
B2 (Example)	To indicate a runway-holding position established in accordance with 5.11.3

307.4.3 INFORMATION SIGNS

- 307.4.3.1 An information sign shall be provided where there is an operational need to identify by a sign, a specific location or routing information.
- 307.4.3.2 Information signs shall include direction signs, location signs, destination signs, runway exit signs, runway vacated signs and intersection take-off signs.
- 307.4.3.3 A runway exit sign shall be provided where there is an operational need to identify a runway exit.
- 307.4.3.4 A runway vacated sign shall be provided where the exit taxiway is not provided with taxiway center line lights and there is a need to indicate to a pilot leaving the runway the perimeter of the ILS critical/sensitive area or the lower edge of the inner transitional slope whichever is farther from the runway center line.
- 307.4.3.5 An inter-section take-off sign should be provided when there is an operational need to indicate the remaining take-off run available (TORA) for intersection take-offs.

- 307.4.3.6 Where necessary, a destination sign should be provided to indicate the direction to a specific destination on the aerodrome, such as cargo area, general aviation, etc.
- 307.4.3.7 A combined location and direction sign shall be provided when it is intended to indicate routing information prior to a taxiway intersection.
- 307.4.3.8 A direction sign shall be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.
- 307.4.3.9 A location sign should be provided at an intermediate holding position.
- 307.4.3.10 A location sign shall be provided in conjunction with a runway designation sign except at a runway/runway intersection.
- 307.4.3.11 A location sign shall be provided in conjunction with a direction sign, except that it may be omitted where an aeronautical study indicates that it is not needed.
- 307.4.3.12 A location sign shall be provided to identify taxiways exiting an apron or to identify taxiways beyond an intersection.
- 307.4.3.13 Where a taxiway ends at an intersection such as a “T” and it is necessary to identify this, a direction sign and/or other appropriate visual aid shall be used.

Location.

- 307.4.3.14 Information signs shall, wherever practicable, be located on the left-hand side of the taxiway.
- 307.4.3.15 At a taxiway intersection, information signs shall be located prior to the intersection and in line with the taxiway intersection marking. Where there is no taxiway intersection marking, the signs shall be installed at least 60 m from the centre line of the intersecting taxiway where the code number is 3 or 4 and at least 40 m where the code number is 1 or 2.
- 307.4.3.16 A runway exit sign shall be located on the same side of the runway (left or right) as the exit.
- 307.4.3.17 A runway exit sign shall be located prior to the runway exit point in line with a position at least 60 m prior to the point of tangency where the code number is 3 or 4, and at least 30 m where the code number is 1 or 2.
- 307.4.3.18 A runway vacated sign shall be located at least on one side of the taxiway. The distance between the sign and the centre line of a runway shall be not less than the greater of the following:
- a) the distance between the centre line of the runway and the perimeter of the ILS/MLS critical/sensitive area; or
 - b) the distance between the centre line of the runway and the lower edge of the inner transitional surface.

- 307.4.3.19 Where provided in conjunction with a runway vacated sign, the taxiway location sign shall be positioned outboard of the runway vacated sign.
- 307.4.3.20 An intersection take-off sign shall be located at the left-hand side of the entry taxiway. The distance between the sign and the centre line of the runway shall be not less than 60 m where the code number is 3 or 4 and not less than 45 m where the code number is 1 or 2.
- 307.4.3.21 A taxiway location sign installed in conjunction with a runway designation sign shall be positioned outboard of the runway designation sign.
- 307.4.3.22 A destination sign should not normally be collocated with a location or direction sign.
- 307.4.3.23 An information sign other than a location sign shall not be collocated with a mandatory instruction sign.
- 307.4.3.24 A direction sign, barricade and/or other appropriate visual aid used to identify a ‘‘T’’ intersection should be located on the opposite side of the intersection facing the taxiway.

Characteristics

- 307.4.3.25 An information sign other than a location sign shall consist of an inscription in black on a yellow background.
- 307.4.3.26 A location sign shall consist of an inscription in yellow on a black background and where it is a stand-alone sign shall have a yellow border.
- 307.4.3.27 The inscription on a runway exit sign shall consist of the designator of the exit taxiway and an arrow indicating the direction to follow.
- 307.4.3.28 The inscription on a runway vacated sign shall depict the pattern A runway-holding position marking as shown in Figure 7-28.
- 307.4.3.29 The inscription on an intersection take-off sign shall consist of a numerical message indicating the remaining take-off run available in metres plus an arrow, appropriately located and oriented, indicating the direction of the take-off as shown in Figure 7-28.
- 307.4.3.30 The inscription on a destination sign shall comprise an alpha alphanumerical or numerical message identifying the destination plus an arrow indicating the direction to proceed as shown in Figure 7-28.
- 307.4.3.31 The inscription on a direction sign shall comprise an alpha or alphanumerical message identifying the taxiway(s) plus an arrow or arrows appropriately oriented as shown in Figure 7-28.
- 307.4.3.32 The inscription on a location sign shall comprise the designation of the location taxiway, runway or other pavement the aircraft is on or is entering and shall not contain arrows.
- 307.4.3.33 Where it is necessary to identify each of a series of intermediate holding positions on the same taxiway, the location sign should consist of the taxiway designation and a number.

307.4.3.34 Where a location sign and direction signs are used in combination:

- a) all direction signs related to left turns shall be placed on the left side of the location sign and all direction signs related to right turns shall be placed on the right side of the location sign, except that where the junction consists of one intersecting taxiway, the location sign may alternatively be placed on the left hand side;
- b) the direction signs shall be placed such that the direction of the arrows departs increasingly from the vertical with increasing deviation of the corresponding taxiway;
- c) an appropriate direction sign shall be placed next to the location sign where the direction of the location taxiway changes significantly beyond the intersection; and
- d) adjacent direction signs shall be delineated by a vertical black line as shown in Figure 7-28.

307.4.3.35 A taxiway shall be identified by a designator comprising a letter, letters or a combination of a letter or letters followed by a number.

307.4.3.36 When designating taxiways, the use of the letters I, O or X and the use of words such as inner and outer should be avoided wherever possible to avoid confusion with the numerals 1, 0 and closed marking.

307.4.3.37 The use of numbers alone on the manoeuvring area shall be reserved for the designation of runways.

307.4.4 AIRCRAFT STAND IDENTIFICATION SIGNS

307.4.4.1 An aircraft stand identification marking shall be supplemented with an aircraft stand identification sign where feasible.

307.4.4.2 An aircraft stand identification sign should be located so as to be clearly visible from the cockpit of an aircraft prior to entering the aircraft stand.

307.4.4.3 An aircraft stand identification sign should consist of an inscription in black on a yellow background.

307.4.5 ROAD-HOLDING POSITION SIGN

307.4.5.1 A road-holding position sign shall be provided at all road entrances to a runway.

307.4.5.2 The road-holding position sign shall be located 1.5 m from the edge of the road at the holding position.

Characteristics

307.4.5.3 A road-holding position sign shall consist of an inscription in white on a red background.