Advisory Circular

CAA-AC- AGA032A

February, 2026

GUIDANCE ON MARKING AND LIGHTING OF OBSTACLES

.

1.0 PURPOSE

1.1 The purpose of this Advisory Circular (AC) is to provide guidance to aerodrome operators on the lighting and marking of obstacles at and in the vicinity of aerodromes in order to comply with the requirements of the Civil Aviation (Aerodromes) Regulations, 2013

1.2 This AC Supersedes CAA-AC- AGA032

1.2 This AC is effective on 1st February 2026.

2.0 REFERENCES

2.1 Civil Aviation (Aerodromes) Regulations

2.2 Annex 14 to the Chicago Convention

2.3 ICAO Doc 9157 Part 4 – Visual Aids

2.4 ICAO Doc 9137 Part 6 – Control of Obstacles

3.0 INTRODUCTION

3.1 This specification sets forth the Civil Aviation Authority's requirements for various obstructions lighting systems/equipment and marking/ lighting used to increase conspicuity of structures to permit early obstruction recognition by pilots. Marking and Lighting standards in this advisory circular are the minimum necessary for aviation safety. The lights should be positioned to ensure that a pilot has an unobstructed view of at least one light at each level.

3.2 Structures such as cranes, chimneys, tall buildings, extensive buildings, television, radio and telecommunications towers, flares stacks, electricity transmission lines, bridges, wind turbines and radar require lighting and marking.

4.0 GUIDANCE ON MARKING AND/OR LIGHTING OF OBJECTS

4.1 General

4.1.1 High-rise structures and other geographical obstructions are hazardous to aviation safety because of their heights and locations. Due to the numerous threat posed to aircraft in poor visibility, high-rising structures should be illuminated with obstruction lights.

4.1.2 The International Civil Aviation Organization has provided requirements on marking and/or lighting of objects within and in close proximity of aerodromes

4.2 Lighting Requirements

4.2.1 Objects within the lateral boundaries of the obstacle limitation surfaces

a) Vehicles and other mobile objects, excluding aircraft, on the movement area of an aerodrome are obstacles and shall be marked and, if the vehicles and aerodrome are

used at night or in conditions of low visibility, lighted, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.

b) Elevated aeronautical ground lights within the movement area shall be marked so as to be conspicuous by day. Obstacle lights shall not be installed on elevated ground lights or signs in the movement area.

c) All obstacles within the distance specified in Table 1 column 11 or 12, from the centre line of a taxiway, an apron taxiway or aircraft stand taxilane shall be marked and, if the taxiway, apron taxiway or aircraft stand taxilane is used at night, lighted.

d) A fixed obstacle that extends above the ground within the limits approved by the Authority and in the proximity of the aerodrome shall be marked and lighted,

Table 1: Lighting of obstacles within the airport

Code letter	Distance between taxiway centre line and runway centre line (metres)								Taxiway centre line to taxiway centre line (metres)	Taxiway, other than aircraft stand taxilane, centre line to object (metres)	Aircraft stand taxilane centre line to aircraft stand taxilane centre line (metres)	Aircraft stand taxilane centre line to object (metres)
	Instrument runways Code number				Non-instrument runways Code number							
	1	2	3	4	1	2	3	4				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
A	77.5	77.5	–	–	37.5	47.5	–	–	23	15.5	19.5	12
B	82	82	152	–	42	52	87	–	32	20	28.5	16.5
C	88	88	158	158	48	58	93	93	44	26	40.5	22.5
D	–	–	166	166	–	–	101	101	63	37	59.5	33.5
E	–	–	172.5	172.5	–	–	107.5	107.5	76	43.5	72.5	40
F	–	–	180	180	–	–	115	115	91	51	87.5	47.5

4.2.1 Lighting specifications for objects within and outside the aerodrome

a) The presence of objects as specified in 4.2.1 shall be indicated by low-, medium- or high intensity obstacle lights, or a combination of such lights.

b) Low-intensity obstacle lights, Types A, B, C, D and E, medium-intensity obstacle lights, Types A, B and C, high-intensity obstacle lights Type A and B, shall be in accordance with the specifications in Table 2.

c) The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked shall be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by another part of the object, or by an adjacent object, additional lights shall be provided on that adjacent object or the part of the object that is shielding the light, in such a way as to retain the general definition of the object to be lighted. If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

d) Obstruction lights are broadly divided into three types of (low, medium and high intensities).

4.2.2 Mobile Objects

a) Marking: All mobile objects to be marked shall be coloured or display flags.

b) Marking by colour: When mobile objects are marked by colour, a single conspicuous colour, preferably red or yellowish green for emergency vehicles and yellow for service vehicles, should be used.

c) Marking by flags: Flags used to mark mobile objects shall be displayed around, on top of, or around the highest edge of the object. Flags shall not increase the hazard presented by the object they mark.

d) Flags used to mark mobile objects shall not be less than 0.9 m on each side and shall consist of a chequered pattern, each square having sides of not less than 0.3 m. The colours of the pattern shall contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red and white shall be used, except where such colours merge with the background.

e) Lighting
   i) Low-intensity obstacle lights, Type C, shall be displayed on vehicles and other mobile objects excluding aircraft.
   ii) Low-intensity obstacle lights, Type C, displayed on vehicles associated with emergency or security shall be flashing-blue and those displayed on other vehicles shall be flashing-yellow.
   iii) Low-intensity obstacle lights, Type D, shall be displayed on follow-me vehicles.
   iv) Low-intensity obstacle lights on objects with limited mobility such as aerobridges shall be fixed-red, and as a minimum be in accordance with the specifications for low-intensity obstacle lights, Type A, in Table 2. The intensity of the lights shall be sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general levels of illumination against which they would normally be viewed.

Table 2. Characteristics of obstacle lights

1	2	3	4	5	6	7
Light Type	Colour	Signal type / (Flash rate)	Peak intensity (cd) at given Background Luminance (b)			Light Distribution Table
			Day (Above 500 cd/m^2)	Twilight (50-500 cd/m^2)	Night (Below 50 cd/m^2)	
Low-intensity, Type A (fixed obstacle)	Red	Fixed	N/A	N/A	10	Table 3
Low-intensity, Type B (fixed obstacle)	Red	Fixed	N/A	N/A	32	Table 3
Low-intensity, Type C (mobile obstacle)	Yellow / Blue (a)	Flashing (60-90 fpm)	N/A	40	40	Table 3
Low-intensity, Type D (follow-me vehicle)	Yellow	Flashing (60–90 fpm)	N/A	200	200	Table 3
Low-intensity, Type E	Red	Flashing (c)	N/A	N/A	32	Table 3
Medium-intensity, Type A	White	Flashing (20–60 fpm)	20 000	20 000	2 000	Table 4
Medium-intensity, Type B	Red	Flashing (20–60 fpm)	N/A	N/A	2 000	Table 4

1	2	3	4	5	6	7
Light Type	Colour	Signal type / (Flash rate)	Peak intensity (cd) at given Background Luminance (b)			Light Distribution Table
			Day (Above 500 cd/m^2)	Twilight (50-500 cd/m^2)	Night (Below 50 cd/m^2)	
Medium-intensity, Type C	Red	Fixed	N/A	N/A	2 000	Table 4
High-intensity, Type A	White	Flashing (40–60 fpm)	200 000	20 000	2 000	Table 4
High-intensity, Type B	White	Flashing (40–60 fpm)	100 000	20 000	2 000	Table 4

a) See 4.2.2.(e)
b) For flashing lights, effective intensity to allow conspicuous visibility
c) For wind turbine application, to flash at the same rate as the lighting on the nacelle.

Table 3. Light distribution for low-intensity obstacle lights

	Minimum intensity (a)	Maximum intensity (a)	Vertical beam spread (f)	
			Minimum beam	Intensity
Type A	10 cd (b)	N/A	10°	5
Type B	32 cd (b)	N/A	10°	16 cd
Type C	40 cd (b)	400 cd	12° (d)	20 cd
Type D	200 cd (c)	400 cd	N/A (e)	N/

Note: This table does not include recommended horizontal beam spreads. 4.2.1(c) requires 360° coverage around an obstacle. Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as the shape of the obstacle. Thus, with narrower beam spreads, more lights will be required.

a) Between 2 and 10° vertical. Elevation vertical angles are referenced to the horizontal when the light is levelled.
b) Between 2 and 20° vertical. Elevation vertical angles are referenced to the horizontal when the light is levelled.
c) Peak intensity should be located at approximately 2.5° vertical.
d) Peak intensity should be located at approximately 17° vertical.
e) Beam spread is defined as the angle between the horizontal plane and the directions for which the intensity exceeds that mentioned inthe “intensity” column.

Table 4. Light distribution for medium- and high-intensity obstacle lights according to benchmark intensities of Tables 2

Benchmark intensity	Minimum requirements					Recommendations				
	Vertical elevation angle			Vertical beam spread (c)		Vertical elevation angle			Vertical beam spread (c)	
	0°		-1°			0°	-1°	-10°		
	Minimum average	Minimum intensit	Minimum	Minimum beam spread	Intensity	Maximum	Maximum	Maximum	Maximum beam spread	Intensi
200 000	200 000	150 000	75 000	3°	75 000	250 000	112 500	7 500	7°	75
100 000	100 000	75 000	37 500	3°	37 500	125 000	56 250	3 750	7°	37
20 000	20 000	15 000	7 500	3°	7 500	25 000	11 250	750	N/A	N/A
2 000	2 000	1 500	750	3°	750	2 500	1 125	75	N/A	N/A

Note. — This table does not include recommended horizontal beam spreads. Regulation 219 requires 360° coverage around an obstacle. Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as the shape of the obstacle. Thus, with narrower beam spreads, more lights will be required.

a) Elevation vertical angles are referenced to the horizontal when the light unit is levelled.

b) Beam spread is defined as the angle between the horizontal plane and the directions for which the intensity exceeds that mentioned in the "intensity" column.

Note:- An extended beam spread may be necessary under specific configuration and justified by an aeronautical study.

4.3 Location of Obstacle Lights and Markings

Depending on the height of the tower and other factors, the installation of lights on towers and antennas may vary. They should be positioned to ensure that a pilot has an unobstructed view of at least one light at each level. In the case of an extensive/solid structure such as building, the top lights shall be so arranged to indicate the points or edges of the structure, and lights should be visible when approaching the structure from any direction (**see figure 2 (b)**). In the case of a chimney or other structure of like function, the top lights should be placed sufficiently below the top of the structure (**see chimney in figure 1(b)**) so as to minimize contamination by smoke, etc.

The overall height of the structure including all appurtenances such as rods, antennas, obstruction lights, etc., above ground level (AGL) determines the number of light levels.

For tall structures above 45m, there is the need for additional intermediate lights which should be spaced as equal as practicable between the top lights and ground level. At middle levels, obstruction lights should be displayed for each 45 m or fraction thereof. The position of these lights on the vertical plane should be equidistant between the top lights and the ground level as the shape and type of obstruction will permit.

Non Flashing obstruction red lights should be mounted at the top of a high rise building. One such light should be displayed at the outside corner on each level with the remaining lights evenly spaced between the corner lights.

The spacing between lights at the different level should not exceed 45m. **See figure 2 (a)** and use the simple formula to determine:

a) Number of levels required as structure height increases;
b) Determine the spacing between lights up to the top; and
c) The number of lights required at a level edge.

4.4 Operation and Maintenance of Obstruction Lightings

Light units must be maintained and lighted in poor visibility conditions at all times. Lighting should be auto operational from dusk to dawn by a photocell or light controller (photo sensing device) and an optional transfer relay that powers the standby light if main light fails.

4.5 Monitoring

Obstruction lighting systems should be closely monitored by visual or automatic means. It is extremely important to visually inspect obstruction lighting in all operating intensities at least once every 3 months on systems without automatic monitoring.

Each light unit must be monitored for FLASH/FAIL status. FAIL status is defined as either of the following conditions:

a) unit misses four or more consecutive flashes;
b) unit flashes at wrong intensity step during day operation;
c) outage of any lamp

Monitoring must be fail/safe (i.e., active signals for FLASH and absence of signals for FAIL). There must be a provision to permit connection to a remote alarm device, (supplied by others or as an option), to indicate the system and individual light unit FLASH/FAIL status.

In the event a structure is not readily accessible for visual observation, a properly maintained automatic monitor should be used. This monitor should be designed to register the malfunction of any light on the obstruction regardless of its position or color.

When using remote monitoring devices, the communication status and operational status of the system should be confirmed at least once every month. The monitor (aural or visual) should be located in an area generally occupied by responsible personnel. In some cases, this may require a remote monitor in an attended location. For each structure, a log should be maintained in which daily operations status of the lighting system is recorded. Beacon lenses should be replaced if serious cracks, crazing, dirt build up, etc., has occurred.

5. MARKING OF STRUCTURES

Low flying aircraft, in spite of the modern navigational facilities on board, need prominent obstruction markings in their flight paths. These markings should be visible enough to attract the pilot's attention. Obstructions are generally marked using a combination of two of three basic colours.

a) The structure shall be marked/painted to show alternating equal bands of either **Orange or Red and White**.
b) Coloured patterns used to mark objects should consist of rectangles of not less than 1.5 m and not more than 3 m on a side, the corners being of the darker colour This applies to skeletal types of structure as well. The bands should be perpendicular to the longest dimension of the structure (**See Figure 1(a) & (b)**).
c) The width of each band depends upon the total height of the particular structure. **Table 4** provides the bandwidth applicable to the differing structure heights.

5.1. Calculation of Width of Marking Band

Example (A): Structure 60m high.
Width of Band – since structure is greater than 1.5m but not exceeding 210m, Band width is 1/7 of 60m = 8.75m **(See Table 5)**

Table 5 Marking band widths

Longest dimension		**Band width (fraction of longest dimension)**
Greater than	**Not exceeding**	
1.5 m	210m	1/7
210 m	270 m	1/9
270 m	330 m	1/11
330 m	390 m	1/13
390 m	450 m	1/15
450 m	510 m	1/17
510 m	570 m	1/19
570 m	630 m	1/21

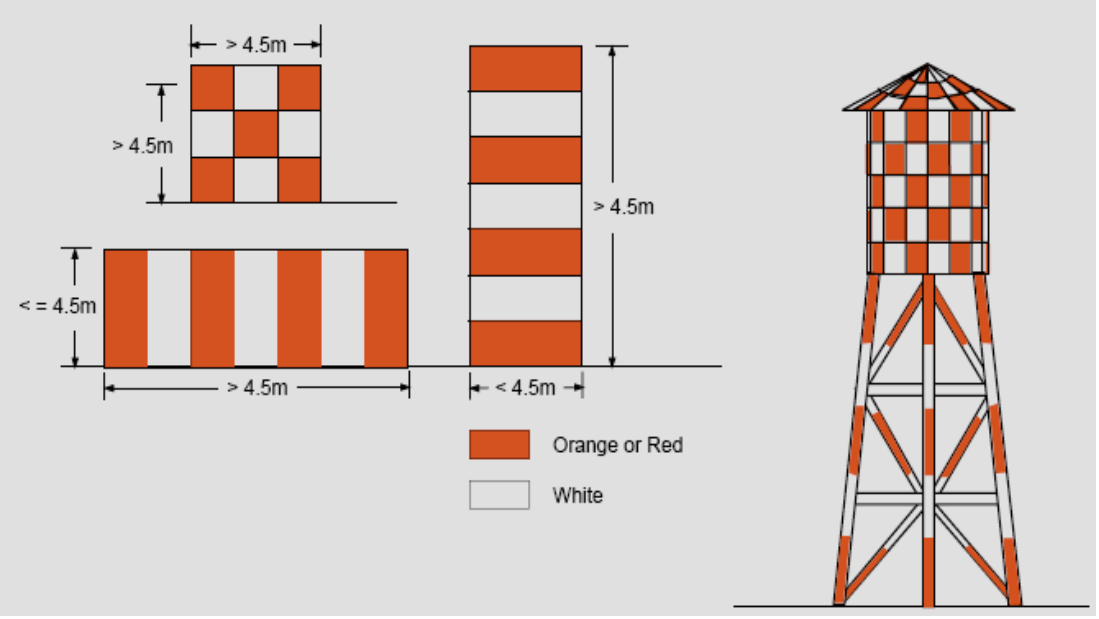


Figure 1 (a) – Basic Marking Patterns

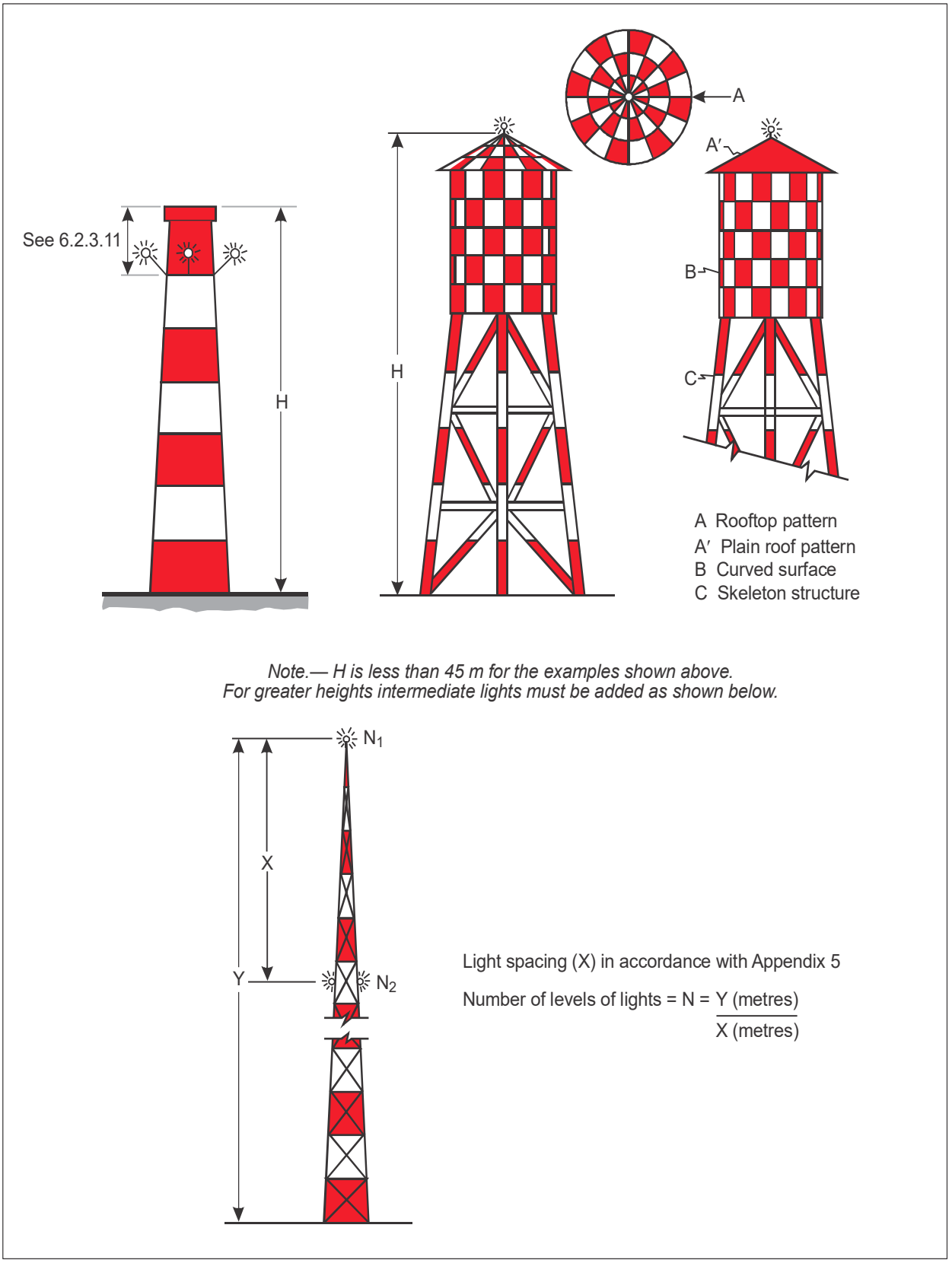
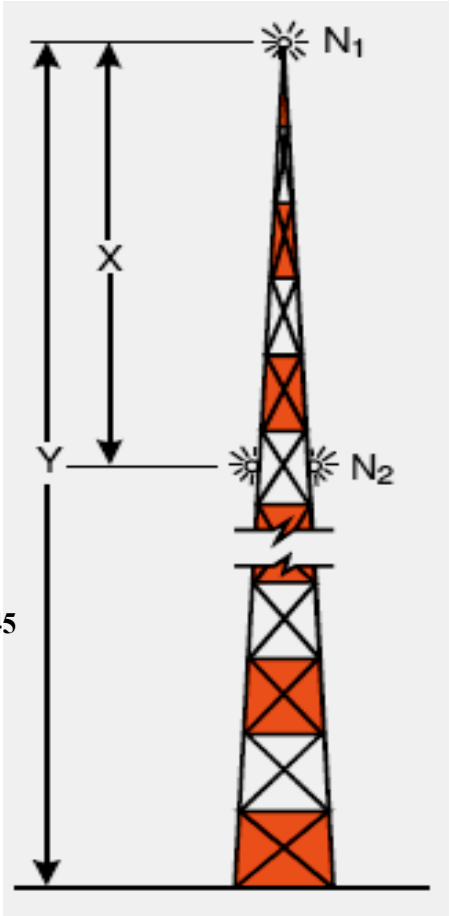


Figure 1(b) – Marking and lighting of tall structures



Note. 1:- *In the case of chimney or other structure of like function, the top lights should be placed sufficiently below the top so as to minimize contamination by smoke etc.*

Note. 2:- H is less than 45 m for the examples shown above. For greater heights intermediate lights must be added as shown Figure 2 (a).

Number of obstruction lights to be placed on tall structures can be calculated by the following formula:

Number of levels of lights = **N = Y (metres)**

Light spacing = **X = Y ≤ 45m**
N

Figure 2 (a) – Lighting of tall structures (No. and Spacing)

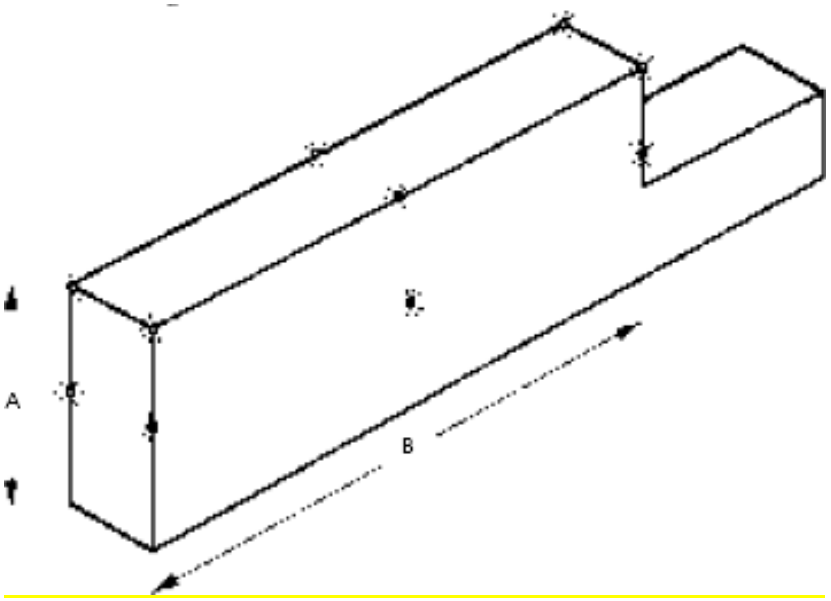


Figure 2 (b) - Lighting of buildings

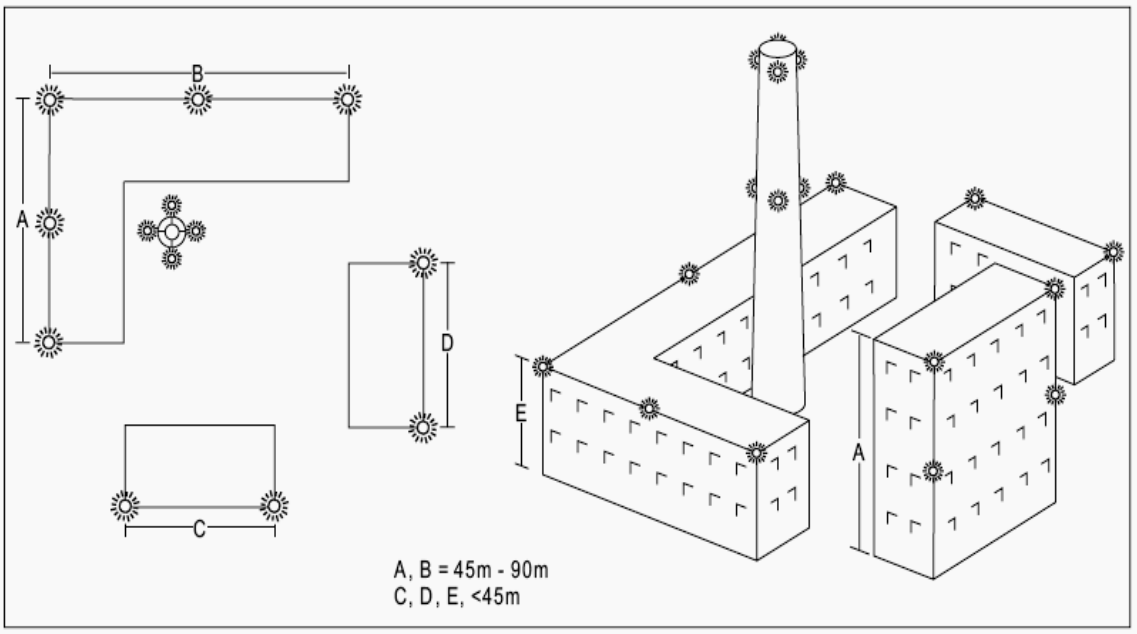


Figure 2 (c) – Lighting of extensive buildings

5.2. Overhead wires, cables, etc., and supporting towers Markings

Aerial/Obstruction warning is primarily meant to help pilots see the lines to avoid flying into them. Aerial/obstruction marker balls shall be displayed on the following along the flight path to warn pilots during the day;

a) High-rise Power Transmission Lines
b) Ropeway cables
c) Guyed Wires

Note: The warning sphere shall conform to the specifications in the Regulations.

In addition to being used for protection of airports, the red balls are used in other areas where aircraft frequent and to delineate power lines that cross rivers, canyons or ravines. For instance, some larger hospitals offer helicopter transfer of patients. Since a hospital is not set up in the same way that an airport is, the balls may be installed on powerlines near the hospital to help guide the pilot. If there are any areas where emergency medical evacuations are common, the balls may be used on lines in these areas as well.

The support towers are obstruction painted. When painting the support towers is not practical, or to provide added warning, shore markers painted orange and white will be displayed. In some cases, older marker panels that have not been updated are of a checkerboard design.

An alternative method of marking is to use strobe lights on shore-based cable support towers. Normally three levels of lights are installed as follows: one light unit at the top of the structures to provide 360° coverage; two light units on each structure at the base of the arc of the lowest cable; and two light units at a point midway between the top and bottom levels with 180° coverage. The beams of the middle and lower lights are adjusted so that the signal will be seen from the approach direction on either side of the power line. The lights flash sequentially: middle lights followed by the top lights and then the bottom lights in order to display a “fly up” signal to the pilot. The middle light may be removed in the case of narrow power line sags; in

this case the bottom lights will flash first then the top lights will flash in order to display a “fly up” signal to the pilot. When determined appropriate by an aeronautical study, medium-intensity white flashing omnidirectional lighting systems may be used on supporting structures of suspended cable spans lower than 150 m (500 ft) AGL.

5.4. Specifications for aerial/obstruction marker balls

Obstruction markings on aerial cables (i.e., marker balls) that define aeronautical hazards are generally placed on the highest line for crossings where there is more than one cable. In this case, the marker balls are placed on the lowest power line and are displayed to water craft as a warning of low clearance between the water and an overhead cable. See figure 3 for illustration.

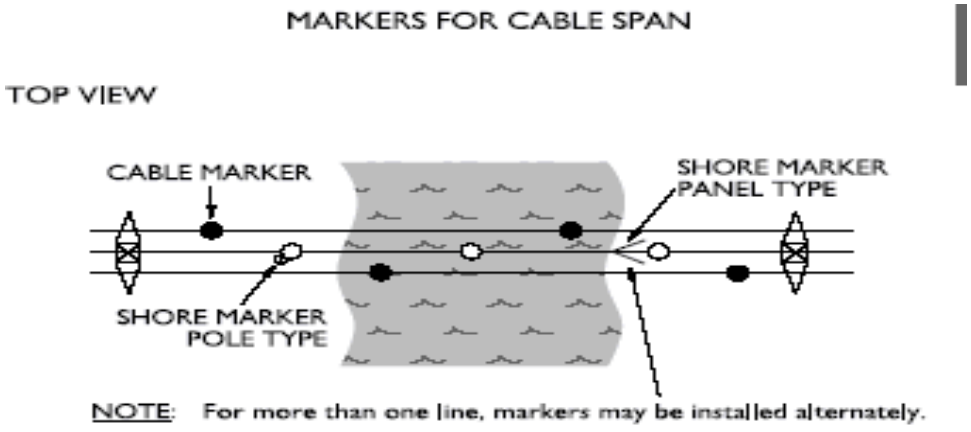
In accordance with the foregoing, pilots operating at low levels may expect to find power line crossings marked as either an aeronautical hazard. They may be unmarked if it has been determined by the CAA that it is not an aeronautical hazard. Pilots operating at low altitudes must be aware of the hazards and exercise extreme caution.

Each ball shall be of a single solid colour. When installed, white and red, or white and orange markers should be displayed alternately. The color selected should contrast with the background against which it will be seen.

Each ball shall not have a diameter less than 60 cm.
The spacing between two consecutive markers or between a marker and a supporting tower should be appropriate to the diameter of the marker, but in no case should the spacing exceed:

a) 30 m where the marker diameter is 60 cm progressively increasing with the diameter of the marker to
b) 35 m where the marker diameter is 80 cm and further progressively increasing to a maximum of
c) 40 m where the marker diameter is of at least 130 cm.

Where multiple wires, cables, etc., are involved, a marker should be located not lower than the level of the highest wire at the point marked.



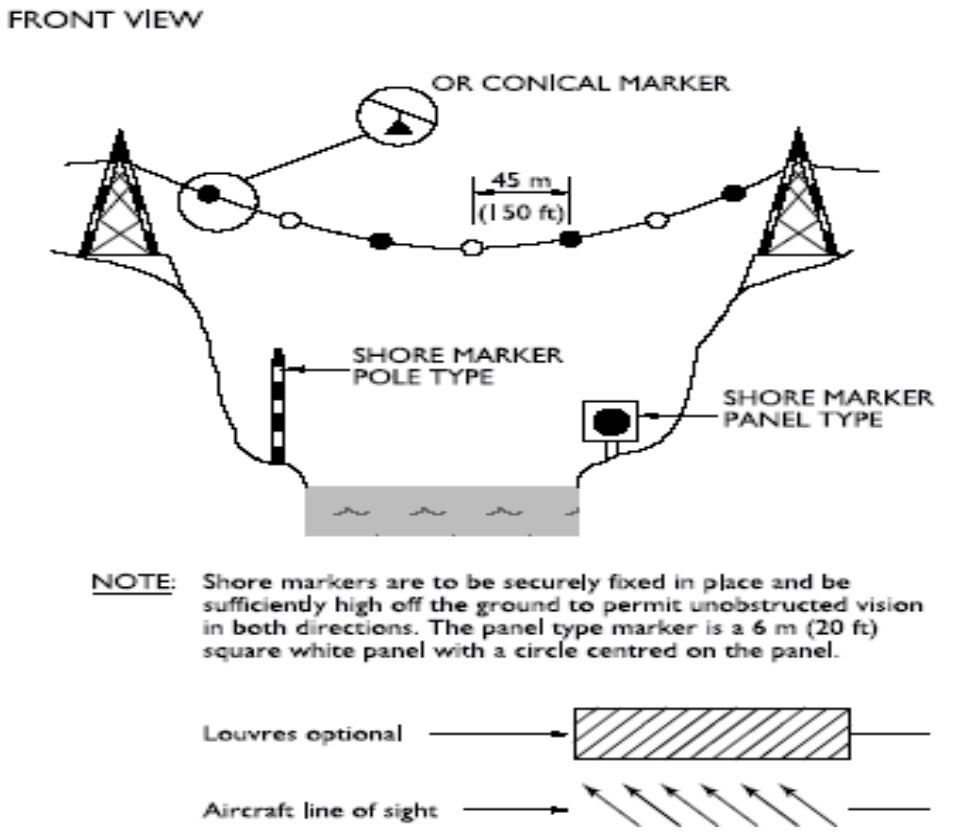


Figure 3 – Marking of aerial cables

5.5 Wind turbines

A wind turbine shall be marked and/or lighted if it is determined to be an obstacle.

Note 1:-Additional lighting or markings may be provided where in the opinion of the State such lighting or markings are deemed necessary.

The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines should be painted white, unless otherwise indicated by an aeronautical study.

When lighting is deemed necessary, in the case of a wind farm, i.e. a group of two or more wind turbines, the wind farm should be regarded as an extensive object and the lights should be installed:

a) to identify the perimeter of the wind farm;

b) respecting the maximum spacing, between the lights along the perimeter, unless a dedicated assessment shows that a greater spacing can be used;
c) so that, where flashing lights are used, they flash simultaneously throughout the wind farm;
d) so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located; and
e) at locations prescribed in a), b) and d), respecting the following criteria:
    i). for wind turbines of less than 150 m in overall height (hub height plus vertical blade height), medium-intensity lighting on the nacelle should be provided;
    ii). for wind turbines from 150 m to 315 m in overall height, in addition to the medium-intensity light installed on the nacelle, a second light serving as an alternate should be provided in case of failure of the operating light. The lights should be installed to assure that the output of either light is not blocked by the other; and
    iii). in addition, for wind turbines from 150 m to 315 m in overall height, an intermediate level at half the nacelle height of at least three low-intensity Type E lights, as specified in 5.5 e) should be provided. If an aeronautical study shows that low-intensity Type E lights are not suitable, low-intensity Type A or B lights may be used.

Note: -The above 5.5 (e) does not address wind turbines of more than 315 m of overall height. For such wind turbines, additional marking and lighting may be required as determined by an aeronautical study.

The obstacle lights should be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching from any direction.
Where lighting is deemed necessary for a single wind turbine or short line of wind turbines, the installation should be in accordance with section 5.5 (e) or as determined by an aeronautical study.

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Civil Aviation Authority