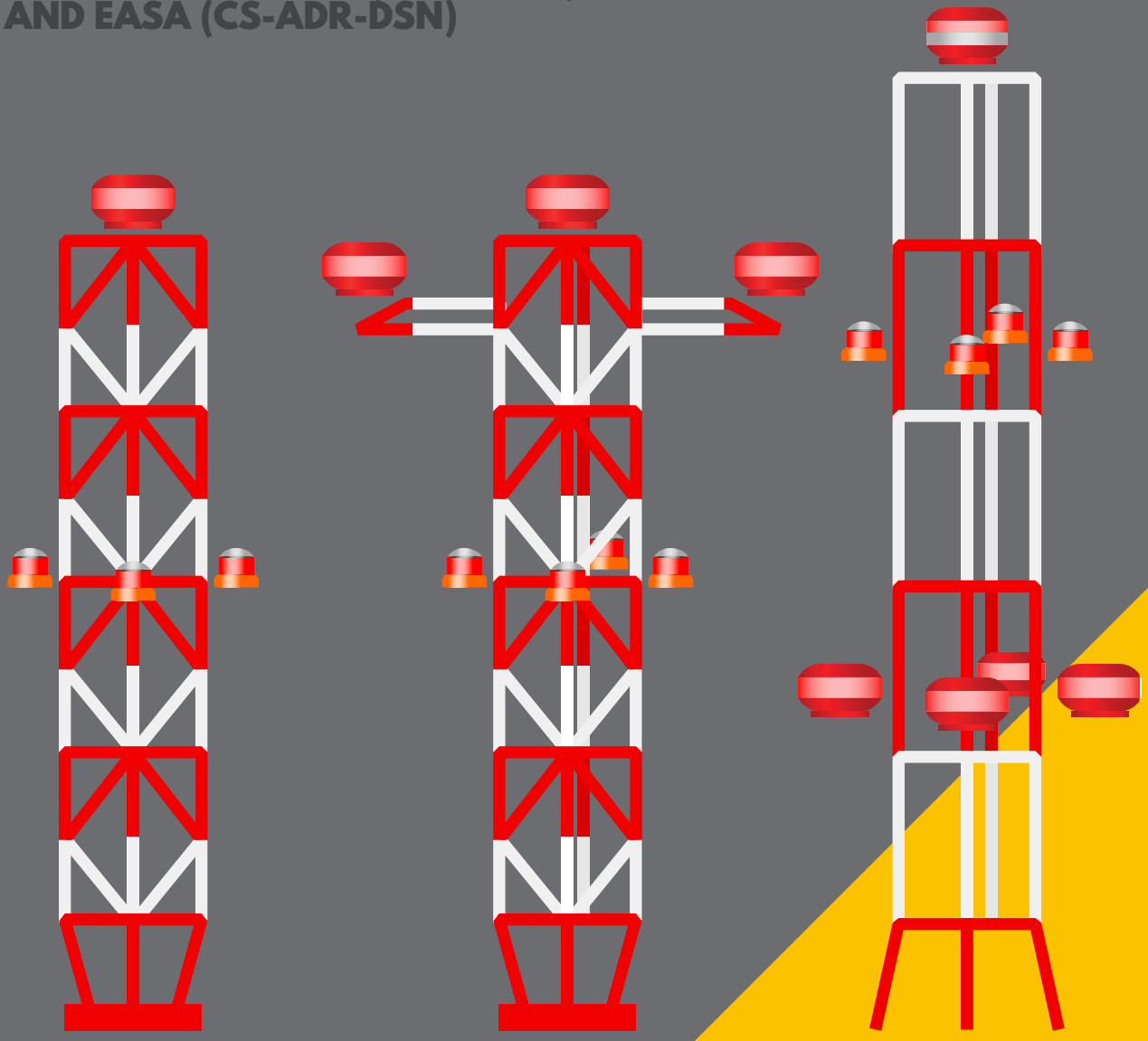
INSTALLATION GUIDE OF LUMINOUS BEACONS FOR OBSTACLE SIGNALING

BASED ON THE ICAO (ANNEX 14)
AND EASA (CS-ADR-DSN)



CONTENTS:

1.APPLICABLE REGULATIONS:

Annex 14 of the International Civil Aviation Organization (ICAO)
Reglamentation 139/2014, Q, CS-ADR-DSN (EASA)

2.WHEN AND WHERE LIGHT BEACONS SHOULD BE USED:

Structures that may constitute, temporarily or definitively, an aeronautical obstacle in the following places must be indicated:

- In the vicinity of aerodromes.
- In zones of aeronautical servitude.
- Outside of these places, obstacles of height greater than 100m should always be marked, both on land and in jurisdictional waters.

3. WHAT TYPES OF BEACONS ARE USED IN EACH CASE:

3.1 OBSTACLES UP TO 45 M.

When the obstacle is up to 45m high, low intensity lights will be installed.

The lights have to be visible in the 360° azimuth.

In towers, antennas, etc. a light will be installed at the highest possible point.

In tower cranes, one light at the top, one at the tip of the pen and another light at the counterweight.

3.2 OBSTACLES BETWEEN 45 AND 105 M.

Medium intensity lights will be installed at the highest possible point.

With a vertical separation never exceeding 52m, **intermediate lighting levels** must be installed. These will be evenly spaced between the top lights and the floor. The different levels of intermediate lights **will alternate Low and Medium Intensity lights.**

The lights should be installed so that they are visible from all azimuth points.

The lights must define the profile of the structure: for example, installed at the 4 corners of a 4 faces tower, or in the 3 corners of the three-sided towers, etc. In tower cranes, one light should be positioned at the top, another at the tip of the pen and third light at the counterweight.

In chimneys and cylindrical obstacles lights might be installed on the outer perimeter so that they are visible from 360° azimuth.

Depending on the external diameter, lights must be installed according to the following table:

DIAMETER	NUMBER OF LIGHTS PER LEVEL	PLACEMENT OF THE LIGHTS
6 m or less	3	
6 m to 30 m	4	
30 m to 60 m	6	
>60 m	8	

In case of buildings, the beacons will be installed so that they reveal the profile of the obstacle.

3.3 OBSTACLES BETWEEN 105 AND 150M

Medium Intensity Type A lights (white flashing light) will be installed at the highest possible point.

With a vertical separation never exceeding 52m, intermediate lights must be installed, following the same criteria as in the previous point.

3.4 SUMMARY TABLE:

OBSTACLE HEIGHT	NUMBER OF LIGHT LEVELS
Up to 45 m	**1 Level:** at the highest point: Low Intensity
45 to 105 m	**2 Levels:** 1st at the highest point: Medium Intensity 2nd at intermediate level: Low or Medium Intensity
105 to 150 m	**3 Levels:** 1st. at the highest point: Medium Intensity 2nd. first intermediate level: Low or Medium Intensity 3rd. second intermediate level: Medium Intensity
>150m	Ask to the Local Aviation Authority

Warning: These configurations may vary according to the criteria of the Air Authority.

4. MOST FREQUENT TYPES AND THEIR MAIN CHARACTERISTICS:

4.1 LOW INTENSITY OBSTACLES LIGHTS

Low Intensity Type A or B obstacle lights are used when the object is "less extensive" and its height above the ground is less than 45m.

Low-intensity Type B (fixed) obstacle lights should be used alone or in combination with Medium Intensity Type A or B lights (flash).

In large obstacles, (for example, in a building), the maximum longitudinal distance between low intensity beacons is 45m.

LOW INTENSITY OBSTACLE LIGHTS TYPE A:

- >**10Cd**, 360° azimut
- Red Fix Light
- Twilight and night performance

LOW INTENSITY OBSTACLE LIGHTS TYPE B:

- >**32Cd**, 360° azimut
- Red Fix Light
- Twilight and night performance

LOW INTENSITY OBSTACLE LIGHTS TYPE E:

- >**32Cd**, 360° azimut
- Red Flashing Light
- Twilight and night performance

4.2 MEDIUM INTENSITY OBSTACLES LIGHTS

Should be used if the object is large (eg a set of buildings), or if the height above the surrounding terrain **exceeds 45m.**

Medium Intensity Lights Type A and C should be used alone.

Medium Intensity Lights Type B might be used alone or combinated with low intensity obstacle lights.

MEDIUM INTENSITY OBSTACLE LIGHTS TYPE A:

- 2.000/20.000 Cd (+/- 25%), 360° azimut
- Flashing White light (20 to 60 flash per minute)
- Working 24h: 20.000 Cd Day/2.000 Cd in twilight and night

MEDIUM INTENSITY OBSTACLE LIGHTS TYPE B:

- 2.000 Cd (+/- 25%), 360° azimut
- Flashing Red Light (20 to 60 fpm)
- Twilight & Night

MEDIUM INTENSITY OBSTACLE LIGHTS TYPE C:

- 2.000 Cd (+/- 25%), 360° azimut
- Fix Red Light
- Twilight & Night

MEDIUM INTENSITY OBSTACLE LIGHTS TYPE A + B OR C:

- 20.000 Cd (+/- 25%), 360° azimut) during day, flashing white
- 2.000 Cd (+/- 25%), 360° azimut) in twilight & night, Red Light (flashing or fix)

4.3 HIGH INTENSITY OBSTACLES LIGHTS:

High Intensity Obstacle Lights Type A should be used to signal the presence of an object of height on the surrounding terrain **higher than 150 m** and aeronautical studies indicate that these lights are essential to recognize the object during the day.

High Intensity Type B obstruction lights should be used to indicate the presence of a tower that supports power lines or cables, when:

a) An aeronautical study indicates that these lights are essential for the recognition of power lines or cables.

b) It has not been considered convenient to install beacons on the wires, cables, etc.

When a **Dual obstacle lighting System is provided**, the system must be composed of:

- High Intensity Type A or B lights or Medium Intensity Type A lights, as appropriate, for daytime and twilight use.

And

- Medium Intensity Lights, Type B or C for night use.

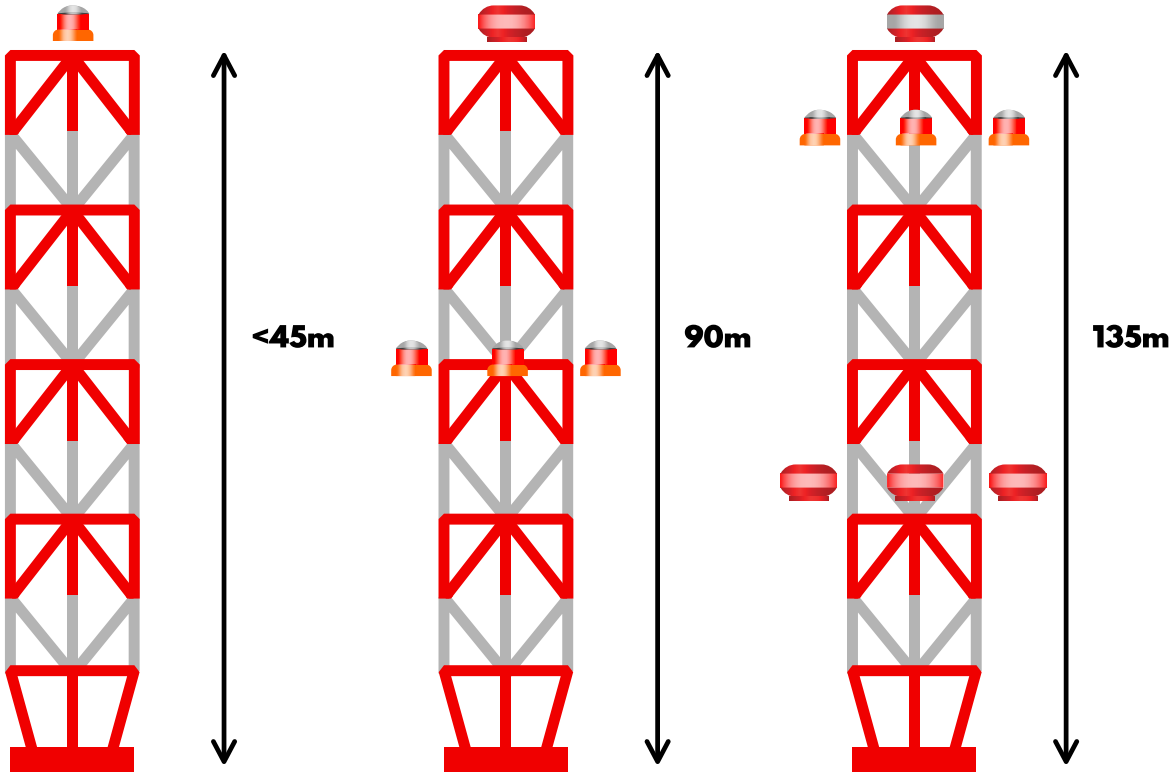
HIGH INTENSITY OBSTACLE LIGHTS TYPE A:

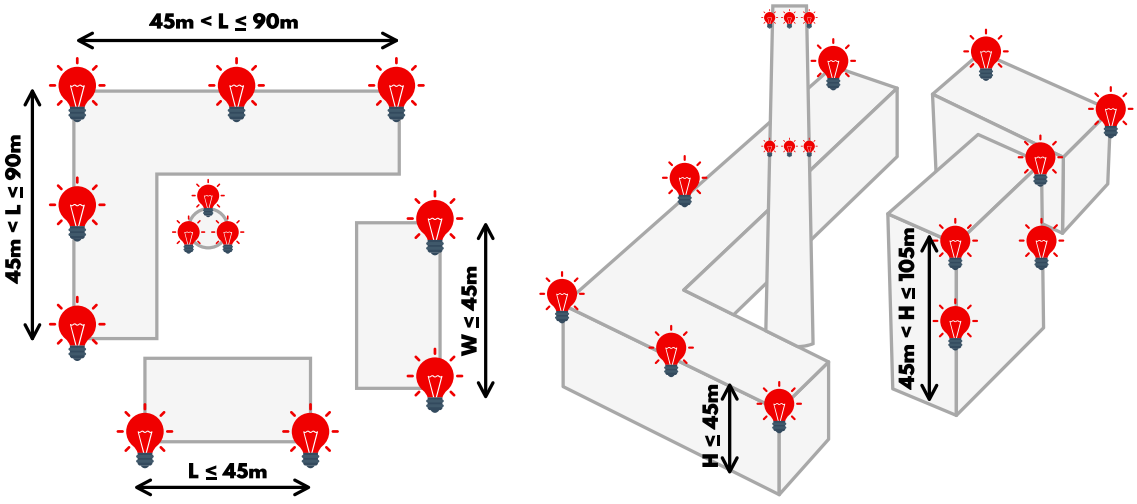
- 200.000 Cd (+/- 25%), 360° azimut
- White Flashing Light (40 to 60 fpm)
- Performance: 200.000 Cd day/20.000 Cd twilight/2.000 Cd night

HIGH INTENSITY OBSTACLE LIGHTS TYPE B:

- 100.000 Cd (+/- 25%), 360° azimut
- Flashing White light (40 to 60 fpm)
- Performance: 100.000 Cd day/20.000 Cd twilight/2.000 Cd night

5. EXAMPLES OF BEACON CONFIGURATIONS DEPENDING ON THE OBSTACLE:





6. TRANSITORY SITUATIONS

When the construction or installation of an obstacle exceeding 45m is carried out, during its execution it must light up transiently until its completion. Once the work is finished, lighting and / or definitive signage will be available.

The vertical position of the lights should be modified as the height of the structure increases, showing the upper part of the structure always illuminated.

Besides, additional lights will be placed at intermediate levels, with a maximum separation between beacons of 52 m for Medium Intensity lights type B or C, and 105 m for Medium Intensity Type A.

6.1 AUXILIARY ELEMENTS

In areas affected by aeronautical servitude, **fixed cranes** should be signaled as long as they cannot be shielded by adjacent obstacles. Medium or low intensity A and C will be used.

The beacon should be placed at the highest point of the crane. If necessary, it should be placed another one at the end of the pen.

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ANNEXED:

TECHNICAL PANEL SUMMARY:

	A	B	C	E
LOW INTENSITY	Objects <45m height Red / Fix >10Cd	Objects <45m height Red / Fix >32Cd		Objects <45m height Red / Flashing >32Cd
MEDIUM INTENSITY	Objects >45m height White / Flashing 20-60 FPM Synchronized 20.000 Cd Day 2.000 Cd Night	Objects >45m height Red / Flashing 20-60 DPM Synchronized 2.000 Cd only Night	Objects >45m height Red / Flashing 2.000 Cd only Night	
HIGH INTENSITY	Objetos >150m height White / Flashing Synchronized 40-60 FPM 200.000 Cd Day 20.000 Cd Twilight 2.000 Cd Night	Electric Cable Towers White / Flashing Synchronized 40-60 FPM 100.000 Cd Day 20.000 Cd Twilight 2.000 Cd Night		

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