1. Runway approach lighting

This chapter will show the wide variety of approach lighting systems before the runway threshold.

1.1. Simple version of approach lights

A simple version of approach lighting consists of a low intensity white centerline and cross bar. It starts 500m prior to the runway threshold (the green lights).

![Simple Approach Light System](image)

**Figure: simple approach light system**

1.2. Precision version of approach lights

Airfields can have more complex approach lighting systems used mainly in association with ILS equipped runways.

A well-known system is the Calvert Approach lighting system.

The Calvert system consists of a white centerline and 5 white cross bars. It commences 900m prior to the runway threshold (see the next figure).

At aerodromes where CAT II and III approaches are conducted, supplementary approach lights are added to the system. Supplementary approach lights are installed the last 300m prior the runway threshold, consist of a white centerline barrette and two red side barrettes.
Figure: both Calvert approach light systems
2. Visual Approach Slope Guidance

2.1. Precision Approach Path Indicator (PAPI)

The PAPI provides a visual aid to determine the correct approach path. It consists of a single row of 4 red and white lights. The color is depending on the vertical angle as shown in the illustration hereunder.

PAPI’s are not designed to be used outside 15° of the runway centerline.

PAPI’s are usually situated to the left side of the runway. However where this is impracticable it may be installed on the right side of the runway. There also are aerodromes where PAPI’s are placed on both sides of the runway.

Where a PAPI is used together with an ILS, it is located to align both glide slopes as much as practicable. Any additional restrictions shall be published in the appropriate section in the local AIP.

2.2. Visual Approach Slope Indicator (VASI)

A VASI system does much the same as a PAPI system. It is just a different presentation.
It consists of two rows of two red and white lights which the presentation is as shown below:

![Diagram](image1)

On correct approach path, pilot must see a red light row and a white light row.

There also exists a VASI consisting of three rows. For a normal aircraft, the correct approach path in this case would be indicated by two red bars and one white bar. An aircraft with a high cockpit would have to see one red bar and two white bars.

### 2.3. T-VASI

A variation of the VASI is the T-VASI, which presentation is as shown below:

![Diagram](image2)

### 3. Runway lighting
All runways certified for night operations shall have:
- Runway Edge Lights
- Runway Threshold and Runway End Lights

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Note that centerline and touchdown zone lights are additional guidance in support of low visibility operations.
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### 3.1. Runway edge lights

Runway Edge Lights are **white** lights situated along the edges of the declared runway width spaced at 60 meters.

They are **white** except for:

- **Caution Zone Lights**
  Yellow caution zone lights are installed on ILS equipped runways without centerline lights, on the last 600m, or one third of the lighted runway length available, whichever is less.

- **Pre-Threshold Lights**
  On a runway with a displaced landing threshold (an available area in front of the threshold for the take-off run and not the landing), the runway edge lights from the beginning of the pavement up to the displaced threshold are **red**.
  Where the area in front of the threshold is narrower than the associated runway width, the edges are lighted is **blue**.

- **Runway Exit Lights**
  One or two omni-directional **blue** lights may replace or supplement the edge lights to indicate an exit taxiway.

- **Stop way Lights**
  Where a stop way is provided the edge lights are **red** and facing one way so only the landing traffic is able to see them. A stop way is for emergency use only, and not for routine landings.

### 3.2. Runway threshold and runway end lights

Runway **Threshold** lights are always seen **green** by a pilot on final, indicating the start of the available landing distance.
Runway End lights are always seen red, indicating the extremity of the runway available for maneuvering.

Pilots should not land before the green runway threshold lights or not continue the landing roll beyond the red runway end lights.

### 3.3. Runway centerline lights

For runways supporting low visibility operations high intensity runway centerline lights are installed.

Runway centerline lights are color coded:
- From the threshold until 900 meters from the runway end the centerline lights are white.
- The following 600 meters are alternating red and white lights.
- The last 300 meters are only red lights.

Runway centerline lights are spaced each 30 meters. However for CAT III runway operations, they are spaced each 15 meters.

### 3.4. Touchdown zone (TDZ) lights

For runways supporting low visibility operations additional touchdown zone lights, consisting of two rows of white barrettes are installed.
The touchdown zone lights extend from the threshold light bar for 900 meters or the midpoint of the runway, whichever is the shorter distance.

3.5. Rapid Exit Taxiway Indicator Lights (REtil)

Rapid exit taxiway indicator lights consist of six yellow lights in a three/two/one configuration, spaced 100 meters apart (Where the single yellow light is situated 100 meters from the start of the turn).
4. Taxiway Lighting

4.1. Taxiway lights

Taxiway edges are provided with **blue** edge lighting. **Green** taxiway centerline lights are provided for low visibility procedures (Where **green** centerline lights are provided, **blue** edge lights may also be provided).

Some aerodromes where CAT II and CAT III operations take place have Taxiway guidance systems installed. However due to limitations of Flight simulation software and IVAO, this will not be available. Aerodromes without such guidance system, but do have complex taxiway intersections, may provide taxiway intersection lights. They consist of at least 3 steady **yellow** lights, installed symmetrically over the taxiway centerline. Where taxiway centerline lights are situated within an ILS sensitive area, the lights alternate **yellow** and **green**.

4.2. Stop bar, Lead-on and Lead-off Lights
Aerodromes authorized for low visibility operations have stop bars lights. Stop bars lights consist of equally spaced red lights across the taxiway at a 90° angle to the taxiway centerline.

Stop bars are situated at runway entry’s and holding points. They may also be installed at taxiway intersections (e.g. associated with a taxiway guidance system). Normally stop bars are installed associated with green lead-on lights.

### 4.3. Runway guard lights

Runway guard lights are two pairs of alternately flashing yellow lights. Each pair located next to the taxiway indicating close proximity to the runway. Where a taxiway is wider than usual an alternate variation may be installed, where additional pairs of alternately flashing yellow lights are installed into the taxiway across the full width.