Lighting Up The Future

BINAY

LED-based AVIATION OBSTRUCTION LIGHTS (Under Patent)

Binay's LED (Light Emitting Diode) Aviation Light is a "fit-and-forget" solution that utilises the latest InP LED technology to eliminate the cost, hazard, and aggravation of frequent replacement – an inherent feature of the conventional filament bulb or neon spiral units used in this application

High-rise buildings and structures such as chimneys and towers are potential hazards to aircraft. As such, regulations prescribe the provision of Aviation Obstruction Lights (AOLs) for hazard indication on tall structures.

The International Civil Aviation Organization (ICAO) specifies the **mandatory** use of aviation obstruction lights as per the following nomenclature for installation on structures of different heights (ICAO standard Annexure 14, Paragraph 6.3.13):

- Below 45 meters: **Low Intensity AOLs** – A minimum directional (radial) light intensity of 10 candela (cd) in red. (Recent requirement for 3G cellular towers is 32cd.)
- From 45m to 150m: **Medium Intensity AOLs** – A minimum directional (radial) light intensity of 1600cd (in each direction), in *flashing* red
- Above 150m: **High Intensity AOLs** –

  EITHER: White light of 200,000cd for DAYTIME visibility, white light of 20,000cd for twilight, and red light of 2000cd for night (all flashing at 20 to 60 flashes per minute).

  OR: If the structure is painted with red/white bands as prescribed by ICAO/DARA, this satisfies the requirement for daytime visibility; **in this case, for night-time visibility, the use of just 2000cd Medium Intensity lights (in flashing red) may be acceptable above 150m as well.**

The above requirements are statutory, and are also mandated by the regulatory agency in India, the Directorate of Air Routes and Aerodromes (DARA).

The BINAY **LED-based Aviation Obstruction Light** has been evolved in keeping with our philosophy of perfecting an LED replacement for every incandescent light source. This is **an original development — a world-wide first from the inventors of the Integral LED Pilot Light — and utilises patented BINAY technology.** High luminosity LEDs are used in the unit, which offers the following advantages:

- A long life of 1,00,000 hours (11 years calculated on a continuous burning basis, thus requiring ***no further replacement once fitted;*** we guarantee for five years)
- Low power consumption of 10 to 15 watts only in Low Intensity models, giving significant reduction in energy costs
- Solid-state reliability; built-in fail-safe feature
- Shock-proof, vibration-resistant construction
- Ability to withstand voltage fluctuations
- Improvement in power factor
- A short payback period

In Low Intensity lights, a 100-watt incandescent bulb has been conventionally used as the light source. This has an average life of 1000 hours, and a mean spherical candle power (which measures light energy output) of 100cd. As these filament bulbs emit white light, and since the red waveband forms only about one-seventh of the total colour spectrum, the final light output in such lights is actually only about 12cd. Due to its limited life, the bulb has to be changed every three months; and at extreme heights (such as in industrial chimneys) this is a hazardous and complicated procedure, involving considerable expense in either the use of outside contractors or additional insurance and allowances if employees are utilised for the job.

Neon discharge tubes are used in these lights as an alternative, in an effort to increase the life. However, these suffer from the disadvantage that the costly high voltage transformers used in these lights require replacement due to frequent failure. Moreover, the life is dependent on the quality of neon spirals available (which have a high failure rate and may not conform to even the specified life of 5000 hours). Finally, the higher wattage (VA) and low power factor of the transformer also leads to increased operating costs.

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The LED AOL eliminates the possibility of prosecution from the Civil Aviation Board for non-compliance due to a failed warning light.

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BINAY LED Aviation Lights embody the following features:

Enhanced Light Intensity (TWICE the minimum requirement): It should be noted that the life of the LED is dependent on the inherent LED characteristic which dictates that all LEDs depreciate steadily in light output during the course of their life. Accordingly, the C.I.E. (the international body on illumination) has denoted that the life of an LED ends when the light output depreciates to 50% of the initial value. (When the LED degrades to half of its original intensity, it is at the end of its useful life, although the LED will continue to operate as output diminishes.) As such, the initial intensity must be maintained at a much higher level than minimum to allow for normal LED intensity depreciation over its lifetime. (NOTE: The intensity of our LED AOL is tested and certified by the National Physical Laboratory, Govt. of India)

EMI/RFI Protection: LEDs are sensitive semiconductor devices, and are liable to be damaged by electromagnetic and radio frequency interference, and random line noise. To protect against the same, an EMI/RFI filter is incorporated.

Low Power Consumption: Less than 15 watts for Low Intensity models, and less than 85W for Medium Intensity models.

InP LED Technology: These LED AOLs are constructed of special industrial-grade LEDs utilising the latest **InP LED technology** (universally specified for outdoor LED applications). InP Technology LEDs can withstand high humidity and high temperature conditions, and are also protected from UV-A and UV-B solar radiation (which can cause deterioration in the epoxy encapsulation of the LED). Moreover, InP technology LEDs do not degrade as rapidly as the cheaper AlGaAs LEDs, thus ensuring a longer effective lifetime for the AOL.

Fail-Safe Design: LEDs are configured in multiple series-parallel circuits; As such, **fail-safe redundancy is built in** – even if one circuit fails, the other circuits will still provide adequate visibility.

Rugged Heavy Duty Construction: The body of the AOL is constructed in LM-6 alloy cast-metal, and is sealed against dust and water ingress. The dome is made of toughened clear borosilicate hard glass, which can easily withstand dusty and abrasive environmental conditions

BINAY LOW* INTENSITY LED AVIATION OBSTRUCTION LIGHT *For structures ranging in height up to 45 meters*
(*As per the ICAO definition, with a requirement of 10 candela minimum lifelong RADIAL intensity in steady red)

Binay MODEL 'A': Multiple-LED unit fitted in an LM-6 alloy cast metal AOL body. Toughened clear borosilicate hard glass cover. InP technology LED design. Designed radial (directional) intensity of 25-35cd in any direction in the horizontal plane (total 360° integrated designed luminous intensity of all LEDs nominal 600cd). (Intensity higher than the requirement is provided to allow for light depreciation/reduction over life and during low voltage conditions, as well as for maintaining intensity above 10cd in case of failure of any parallel LED circuit.) ***Other technical data*** – Please see page 3.

BINAY MEDIUM* INTENSITY LED AVIATION OBS. LIGHT BEACON *For structures ranging in heights of 45m and above*
(*As per the ICAO definition, with a requirement of 1600 candela minimum lifelong RADIAL intensity in flashing red)

- **Binay MODEL 'ST' Medium* Intensity:** Comprising of multiple ultra high intensity **InP technology** LEDs placed in columns, connected in multiple series-parallel circuits. Typical flashing designed **radial** (directional) intensity of 3000cd in any radial direction in the horizontal plane. LM6 cast aluminium alloy body, painted aviation yellow with epoxy paint, sealed with neoprene gasket and heat sinking top cover. Terminals fitted in a weatherproof box on body of unit. Complete with solid-state flasher unit with adjustable flash rate of 40 to 60 flashes per minute. Life more than 50,000 hours (10 years at 12 hours daily burning).
  Other technical data – LED type: InP (Indium Phosphide) technology; Maximum forward current: 750mA; Power factor leading; Typical power consumption: 62 watts; Allowable input voltage variability: +10% max.; Insulation resistance: More than 10 megohms; Dielectric strength: 2.5KV; Ingress Protection: IP54; Dimensions (approx.): 25cm (diameter at maximum point) x 56 cm (total height); Weight: 5 kg approx.

- **BINAY MODEL 'DX' Medium* Intensity:** Comprising of multiple high-power high-current Superflux (Spider Piranha packaging) InP technology LEDs in modular epoxy fire-retardant PCB strip construction, connected in multiple series-parallel circuits. Superior wide-angle dispersion. Typical flashing designed **radial** intensity of 4000cd in any radial direction in the horizontal plane (satisfying both ICAO and DARA requirements). Rustproof LM6 alloy base and body. IP54 protection. Heat sinking top cover. Complete with solid-state flasher unit with adjustable flash rate. Life average 100,000 hours (20 years at 12 hours daily burning).
  Other technical data – LED type: InP (Indium Phosphide) technology; Maximum forward current: 1200mA; Power factor leading; Typical power consumption: 72 watts; Allowable input voltage variability: +10% max.; Insulation resistance: More than 10 megohms; Dielectric strength: 2.5KV; Ingress Protection: IP54; Dimensions (approx.): 50cm (diameter at maximum point) x 68cm (total height); Weight: 15 kg. approx.

These LED lights can be supplied in either 24V or 48V/50V AC or DC for solar-powered battery operation, or in 110V or 230VAC ratings for mains operation. For Low Intensity models, a solid-state Flasher unit can also be provided if desired, at extra cost.

Model 'A' and Model 'DX' units are covered under a warranty for five years (Model 'ST' for three years) against manufacturing defects. Normal life is 20 years on a 12-hour per day burning basis.

THE BINAY LED OBSTRUCTION LIGHT DESIGN IS UNDER ACCEPTED PATENT, AND AS SUCH IS A PROPRIETARY PRODUCT

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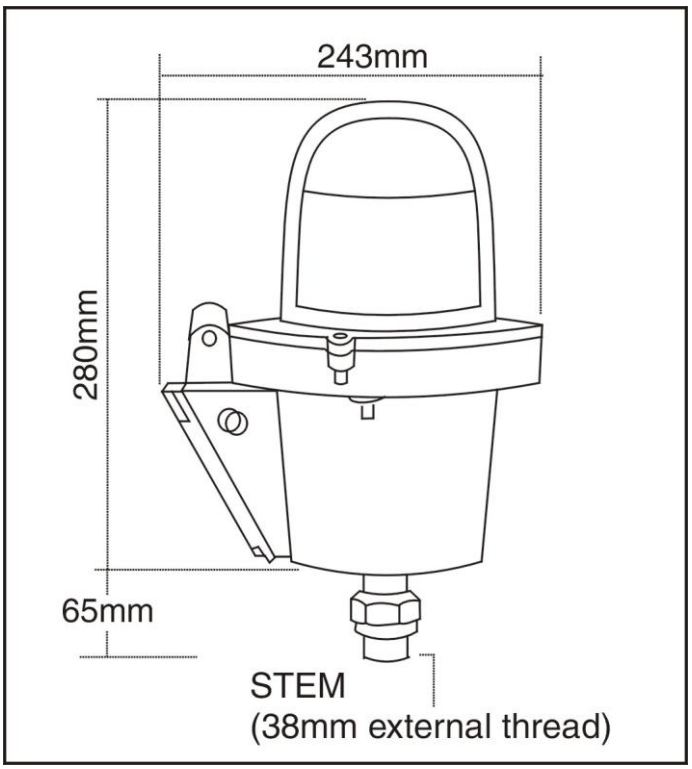
TECHNICAL SPECIFICATIONS
BINAY Model 'A' Low Intensity LED Aviation Obstruction Light
(under ACCEPTED Patent)

BINAY **Model 'A'** LED Aviation Obstruction Light (replacement for GEC neon spiral type AOL), having an operating life in excess of 100,000 hours (11 years on a continuous burning basis), with a power consumption of less than 15 watts.

PHYSICAL DATA

Enclosure: Model 'A' design (as per diagram)
Protection: Weatherproof IP 65
Construction: Cast metal LM-6 alloy
Dome: **Toughened** clear (transparent) borosilicate hard glass
Gasket: Endless neoprene
Finish: Aviation yellow epoxy paint or powder coated
Weight: 4.5 kg. (approx.)
Cable entry: ET 19mm
Terminals: Fitted in a weatherproof box on the body of the unit. Earth terminal provided externally



LIGHT SERVICE DATA

LEDs: Multiple ***InP technology*** LEDs
Colour: Red (wavelength: 615-650nm)
Total designed integrated candela: 600 candela nominal, resulting in a ***relevant designed radial (directional) intensity*** of 25-35cd in any direction in the horizontal plane (as essentially required by ICAO/DARA/FAA) (Intensity tested and certified by National Physical Laboratory, Govt. of India.)

ELECTRICAL DATA

NOTE: Each 240VAC unit is tested at 300VAC (25% over voltage) for 100 hours or seven days to ensure reliability. *(This also serves as a test for verification of use of InP Technology LEDs, as well as for a technically sound circuit design.)*

No. of circuits: Five (in parallel)
Maximum forward current: 160mA
Power factor: 0.05
Typical power consumption: 15W maximum at 230V AC (wattage consumption tested at ERTL, Department of Electronics, Government of India).Input voltage variability: Can withstand a fluctuation of ±25%PIV protection: LEDs internally protected against reverse voltages of up to 1 kV
Insulation resistance: 10 megohms at 500VDC
Dielectric strength: 2.5 kV
Earthing: Terminal provided on body
Spike Protection: Surge protectors provided
EMI/RFI Protection: Filter incorporated for protection against electromagnetic and radio frequency interference and random line noise
Lightning Protection: Gas discharge tubes can be provided to protect against the indirect effect of lighting strikes

(NOTE: No equipment can be designed to protect against the effect of a direct lightning strike. Such protection requires specialised protection equipment such as special down conductors, neutralizers, chemical earth treatment, etc. Specialist lightning protection experts should be consulted for proper lightning protection.)

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