

BINAY
LED-based Pendant Eagle-Eye High Bay Luminaires

BINAY's LED-based Pendant High Bay Luminaires offer low power consumption and a maintenance-free long life – a true 'GREEN' lighting product

The BINAY PowerLED Eagle-Eye High Bay Lighting Luminaire is a long-life LED-based luminaire unit designed particularly for replacement of High Pressure Sodium Vapour (HPSV) lamps **in indoor high bay lighting in factory sheds, industrial shop floors, warehouses, power station turbine halls etc.** (which are normally lighted with HPSV lamps of 400W, 250W, 150W or 70W ratings).

The Luminaire utilises Power Light Emitting Diodes (LEDs) of high efficiency (100 lumens per watt), with a life duration of 50,000 hours (to 70% lumen maintenance) and 100,000 hours (to 50% lumen maintenance). It has more than seven times the visual efficiency of HPSV (which has a life of only 12,000-20,000 hours), and can withstand wide variation in input voltage. The light emitted has no infrared or ultraviolet radiation content.

On account of the 180°-directivity property of LEDs, (enabling the LEDs to be directed where required in the workspace), no reflector is required in the luminaire itself. This ensures that there is no loss of luminous energy in reflection (as happens in the case of HPSV and other light sources which radiate all around, thus requiring reflection downwards, resulting in lower luminaire efficiency of less than 70%). LEDs can be provided with optics, and being point source light, can be directed where it is wanted avoiding light pollution. **The unique Eagle-Eye design eliminates the main problem of conventional design with LEDs (i.e., directional light output directly below the LEDs only, or 'shower' effect),** and allows wide-angled, highly dispersed light output.

Due to various power-saving features, the power consumed can be as low as just 25% of an HPSV bulb of equivalent illumination.

THE PROBLEM WITH HPSV LIGHT

The HPSV lamp is being increasingly eliminated all over the world because of the property of the human eye in regard to night/indoor vision. The human eye has got two photoreceptors:

- (A) Cones, which are active in daylight.
- (B) Rods, which are situated at the periphery, and are active at night in ambient light which is less than 3 candela/sq. m. This region of eye sensitivity is known as the Mesopic region, and is active at night time and in indoor locations.

The sensitivity of the Cones is at a maximum at the yellow wavelength, and tapers down towards blue and red wavelengths. The sensitivity of Rods is maximised at blue wavelengths.

HPSV lamps emit their maximum energy in the yellow region, with practically negligible energy in the blue-green region (where 'Rods' are active). The blue portion of the spectrum, which is abundant in sun-, moon, and starlight, is needed for the proper function of the human eye, and it appears that its importance to a person's vision increases as light levels decrease. **Blue-deficient light sources like HPSV do not provide the same amount of visual stimulation as sources that produce spectra rich in blue.** Consequently, in the Mesopic region (as in indoor locations), very few Rods are activated by HPSV light. As such, in HPSV, while in the Photopic vision area (which is not active in indoor locations) the efficiency is more than 100 lumens/watt, this efficiency reduces to only 22 lumens/watt in Mesopic region. This leads to the following basic disadvantages:



BINAY's 'Eagle-Eye' LED Pendant High Bay Luminaire has an arrangement for adjusting the beam pattern, which allows wide angle dispersion of light



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I N V E N T I N G N E W T E C H N I Q U E S O F P R O D U C I N G L I G H T

- Efficiency: The visual efficiency of the HPSV lamp falls by 7 times, in comparison to Scotopically enhanced white light from LEDs.
- Focus: The pupil of the eye is activated by blue wavelengths, and in its absence (as in HPSV light) the pupil is wide open. This affects the depth of focus of the eye, making it difficult to focus on precision tasks. It is estimated that productivity falls by 50%, as compared to Scotopically enhanced white LED light.
- Peripheral vision: The 'Rods', which contribute to peripheral vision, are not activated by HPSV light. Activities occurring at the periphery of vision may not register properly, resulting in an accident. As such, HPSV can be a safety hazard.
- Colour Rendering Index (CRI) of HPSV is only 22 (CRI of sunlight at noon is 100). Colours are not seen properly, creating an unpleasant visual ambience.
- High-pressure discharge lamps require time to attain full light output on restarting (after power is recycled). This can be a security hazard.

As such, HPSV lamps are a very poor source of outdoor lighting in indoor locations.

On the other hand, the spectrum of the LED output is continuous and it is more prominent in the blue region. Moreover, since the LED itself (in LED-based lights) is operated on direct current, LED-based lights have no stroboscopic effect (as with HPSV and fluorescent tubes, which run on AC current).

The **BINAY PowerLED Eagle-Eye High Bay Lighting Luminaire** is constructed completely with aluminium of high heat conductivity. High efficiency power LEDs are mounted on three linear LED modules, each of which has a wide emission angle, and with overlap achieves an emission of 160°. The two side modules can be rotated axially to allow adjustment of illumination to the sides as required, thus providing highly dispersed, wide-angle illumination.

Power input is by means of an integrated constant-current SMPS controlled LED driver, which allows for any input varying from 90V to 260VAC. As LEDs have no catastrophic failure, and being in modules each of 1.2 watt, the possibility of total light failure is virtually eliminated – thus further contributing to safety and security.

All of the above reasons result in a radical decrease in the wattage of an LED-based High Bay Light required for equal visual performance.

While the initial capital cost is high, the lifetime cost of ownership is extremely low. **The payback period can be as low as 3 to 4 years (after which the product essentially becomes 'free' for the next 10 to 15 years).**

The BINAY LED-Based Pendant Eagle-Eye High Bay Luminaire is available in three models:

- BINAY High Bay Light Luminaire model BE-DX-36L** (Power consumption 48W; replaces HPSV of 70W-150W)
- BINAY High Bay Light Luminaire model BE-DX-54L** (Power consumption 75W; replaces HPSV of 250W)
- BINAY High Bay Light Luminaire model BE-DX-90L** (Power consumption 125W; replaces HPSV of 350W)
- BINAY High Bay Light Luminaire model BE-DX-126L** (Power consumption 165W; replaces Metal Halide of 350W)

Technical Data

Voltage Input	:	90VAC - 240VAC
Environmental Protection	:	IP65
Dielectric Protection	:	1.5KV
Designed life	:	100,000 hours (L ₅₀)

All BINAY LED Luminaires are covered under a warranty of 5 years.



THE VISUAL PERCEPTION PROBLEM: A warehouse illuminated with HPSV lighting



Same warehouse illuminated with white scotopically enhanced light