

binay
PowerLED Dome Type High Bay Luminaires

BINAY's PowerLED Dome Type High Bay Luminaires are a one-to-one replacement for existing HID High Bay Luminaires, and offer low power consumption and a maintenance-free long life in an economical form factor

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

The Luminaire utilises Power Light Emitting Diodes (LEDs) of high efficiency with a life duration of 50,000 hours (to 70% lumen maintenance) and 100,000 hours (to 50% lumen maintenance). It can withstand a 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 60%). LEDs can be provided with optics, and being point sources of light, can be directed where it is wanted, thus avoiding light pollution.



Saves Money

- Typical payback in 3-4 years. 30%+ typical IRR
- 65-70% energy savings over comparable metal halide or HPS lamps
- 10 to 15-year life. Eliminates annual bulb and ballast replacement costs.
- Eco-friendly (no mercury, no lead). Eliminates hazardous disposal costs.

Saves Energy

- Save 65-70% of energy vs. 175-400W MH or HPSV. Can also save energy vs. fluorescent, inductive, or low-pressure sodium.

Better, Clearer, Spectrally Enhanced Light

- Full spectrum white light provides greater clarity and visual acuity
- High colour rendering improves visibility and safety
- Smooth and even light distribution

Designed for Long and Reliable System Lifetime

Primary heat dissipation is through a thick aluminium heat sink which is ultimately connected through special heat-conductive compounds to the metal down light body, thus providing full dissipation of heat from the LED junction to the ambient air. An ingenious convection current heat transfer system is also designed to carry hot air from the heat sink to the open top. The LED driver electronics are enclosed in a cast metal box (rated to IP65).

As LEDs have no catastrophic failure, and being in separate units of light, the possibility of total light failure is virtually eliminated – thus further contributing to safety and security.

| BINAY Model | REPLACES CONVENTIONAL HID BAY LIGHT | WATTAGE |
|---|---|---|
| Model 24H-DM-BL Warranty 5 years | <ul style="list-style-type: none"> • 150W MH (Metal Halide) • 250W HPSV (High Pressure Sodium) | LED wattage: 65W System wattage: 78W |
| Model 28HH-DM-BL Warranty 3 years | <ul style="list-style-type: none"> • 250W HPMV (High Pressure Mercury) | LED wattage: 90W System wattage: 110W |
| Model 40HM-DM-BL Warranty 3 years | <ul style="list-style-type: none"> • 250W MH • 350W HPSV (on Scotopic visual effectiveness basis) | LED wattage: 110W System wattage: 130W |
| Model 40HH-DM-BL Warranty 3 years | <ul style="list-style-type: none"> • 325W MH • 400W MH (on Scotopic visual effectiveness basis) | LED wattage: 135W System wattage: 155W |
| Model 63HH-DM-BL Warranty 3 years | <ul style="list-style-type: none"> • 400W MH | LED wattage: 210W System wattage: 230W |

...contd.

Technical Data

AC Input Voltages: 100 – 260V @ 50Hz
CCT: 6500°K
LED Operating $T_j \leq 100^\circ\text{C}$

Dielectric Protection: 1.5KV
CRI ≥ 70
Designed life: 100,000 hours (L_{50}); 50,000 hours (L_{70}) (LM-80)

THE PROBLEM WITH HPSV LIGHT

It has been observed at various installations that occupants find that LED lighting gives better clarity and sharper vision, even when light levels are reduced. This is a unique advantage of this product, and follows from the particular combination of the following factors – the LED emission characteristic and the Scotopic vision attributes of the human eye. These two factors allow for enhanced activation of the ‘Rod’ cells inside the eye, enabling greater control of the eye’s pupil size. Smaller pupil size provides an improved focus, leading to sharper vision and better visual clarity, and **thus allowing greater visibility even at lower light levels.**

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:

- 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).

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.



THE VISUAL PERCEPTION PROBLEM: A warehouse illuminated with HPSV lighting



Same warehouse illuminated with white scotopically enhanced light



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