



High Bay Metal Halide vs Fluorescent

Over last few years there has been a lot of attention placed on phasing out all High Intensity Discharge (HID) lamps and replacing them with energy efficient alternatives such as linear fluorescent, compact fluorescent, induction lamps or LED lamps. Proponents of this wholesale shift away from HID claimed low efficiency, poor color, quick lamp lumen depreciation among the failures of HID. Some of the claims were valid for fixtures with magnetic ballasts, also known as core and coil ballasts. Some of the claims do not take into account deficiencies of fluorescent and LED technologies.

However, if you include in the conversation electronic HID ballasts with pulse start Metal Halide lamps, particularly Ceramic Metal Halide lamps, HID is still the best high bay lighting solution on the market when all things are considered.

Below is a product comparison of fluorescent T5HO lamps, 400W Metal Halide with magnetic ballasts and, 320W Metal Halide with GLV electronic ballasts for a High Bay Skating Rink Application.

The results can be summarized in the table below:

| | 400W MH with Magnetic Ballast Hi Bay (Thomas Ltg HBO400MMT-AR19T) | Hi-Bay 6-54W T5HO Hi Bay Thomas Lighting (FBF654HO-347-1/42EB) (Low end/cost Hi Bay Fluores) | Hi-Bay 8-54W T5HO Hi Bay The Light Edge RAP8 (High end/cost Hi-Bay Fluores.) | 320W MH with Electronic Ballast Hi Bay with (GreenLight Ventures GLV HBO320PUM-EBD-AR22) |
|---------------------|---|--|--|--|
| Light Level (Fc) | 35 | 36 | 35 | 35 |
| No of Fixtures | 27 | 40 | 27 | 27 |
| Watts/Fixture | 465 | 330 | 450 | 325 |
| Watts Total | 12,555 | 13,200 | 12,150 | 8,856 |
| Watts/sq ft | 0.59 | 0.62 | 0.59 | 0.44 |
| Fixture Cost | 270.00 | 357.00 | 564.00 | 500.00 |
| Cost Total | 7,290 | 13,880 | 19,200 | 14,580 |
| Lumen/Watt | 77.9 | 80.0 | 90.9 | 100.9 |
| Life expectancy hrs | 15,000 | 20,000-24,000 | 20,000-24,000 | 30,000 |

Assumptions:

1. Calculations have been made for a skating rink for 4 types of fixtures:
 - a. High Bay fixture with 400W Metal Halide lamp and Magnetic Ballast (Thomas Lighting)
 - b. Low cost High Bay Fluorescent Fixture with 6 54W T5HO (Thomas Lighting)

- c. High cost High Bay Fluorescent Fixture with 8 54W T5HO (The Light Edge)
 - d. Hi Bay fixture with 320W Metal Halide lamp and Electronic Ballast (GreenLight Ventures)
2. Target initial light levels have been set to 35 Fc (foot candles) for all fixtures
 3. Target number of fixtures have been set to 27 (3 rows of 9), except for low cost fluorescent high bay which required more fixtures to get to target light level

Results:

1. Watts per fixture: GreenLight Ventures fixture used the lowest amount of power per fixture (325W)
2. Watts Total: GreenLight Ventures fixtures used about 70% of power as compared to other fixtures to achieve the same illumination levels, providing for the user the highest energy savings
3. Cost Total: Initial cost of GreenLight Ventures fixtures was reasonable, comparing to low end T5HO solutions and much lower than high end T5HO solution
4. Lumen per Watt: GreenLight Ventures fixtures achieved the highest amount of light generated per unit of power
5. Life expectancy: GreenLight Ventures fixtures have the highest life expectancy, providing to the user the lowest labour re-lamping cost. While T5HO life expectancy is comparable, each fixture contains 10 lamps which translates to higher re-lamping costs

Conclusions:

The results show that using T5HO for high bay applications does not necessarily bring any energy savings when compared to MH with magnetic ballasts (unless fixtures with magnetic ballasts are purposely over engineered to compensate for high lumen loss over life, which is often the case). To get reasonable efficiency results with T5HO, high end fixtures need to be used, but even these produce much lower energy efficiency than GreenLight Ventures ballasts. Using cheaper T5HO fixtures turn out being more expensive as more of them have to be used to get the same illumination effect. With more fixtures wiring costs will increase considerably. Metal halide fixtures with GreenLight Ventures electronic ballasts will produce the best energy saving results while initial cost will be comparable to cheap T5HO solution.

Here is some general comparison between Metal Halide with Magnetic Ballasts, T5HO and Metal Halide applications with Electronic Ballasts

| | | High Bays with MH lamps and Magnetic Ballasts | Fluorescent High Bays with 4ft T5HO | High Bays with MH lamps and Greenlight Ventures Electronic Ballasts |
|----|--------------------------------|--|--|--|
| 1 | Energy Efficiency | 77 lumen/W | 90 lumen/W | 100 lumen/W |
| 2 | Life Expectancy | 10,000-16,000 h | 20,000-24,000 h | 20,000-30,000 h |
| 3 | Initial Cost | Low | High | Moderate to High |
| 4 | Cost of Maintenance | Average | High cost (8-10 times more lamps to replace) | Low cost |
| 5 | Temperature performance | Very good | Poor start at low temperature, low lumen output when outside of range 20-45C | Very good and even through temperature range -30 to 60C |
| 5 | Color | Moderate to Good | Good | Very good especially with Ceramic Metal Halide |
| 6 | Light Distribution | Very good control | Very poor control over light, lots of light wasted | Very good control |
| 7 | Lamp Lumen Loss over lifetime | High | Low | Low |
| 8 | Dimming control | None | Good: 0-10V technology or DALI, 100%-1% | Good, mostly for bi-level, 0-10V allows 100-50% control |
| 9 | On/Off control | Needs 15 min delay | Instant On/Off | Needs 3 min delay |
| 11 | High Bay Retrofit Applications | N/A | Moderate | Very Good |
| 12 | Low Bay Applications | Moderate | Good | Very Good |
| 13 | Parking Garage Applications | Moderate | Moderate (temperature problems) | Very Good |
| 14 | Area Lighting Applications | Moderate | Moderate | Very Good for all wattages |
| 15 | Sports Applications | Good | Moderate | Very Good |
| 16 | Roadway | Moderate | Unacceptable | Very Good |