



Halogen vs Power LED Spotlights Comparison

	Dichroic Halogen Spotlight	Power LED Spotlight
Product Picture		
Light Source	Quartz Halogen Bulb	Power LED
Average Source Life	2000 hours	50,000 hours
Lamp Life Expectancy	1X	25X
Lamp Temperature	250°C	70°C
Power Consumption	20W (5X)	4W (1X)
Luminous Flux @ 1 meter	200 LUX (using 3500K warm white)	100 LUX (using 6500K white)
Luminous Efficacy	12 lumens/watt ^[*]	25 lumens/watt
Color Selection	Single Color	Many Color Choices
Color Stability Over Time	Poor	Good
UV or IR Radiation	Yes	No
Mercury or other contaminants	Yes	No
Shockproof	No	Yes
Initial Product Cost	Low	High
Long Term Operating Cost	High	Low

Notes: [*] Data taken from famous halogen manufacturer's catalogue.

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6 Major Advantages of LED Spotlights over Halogen Spotlights

- **Lower Heat** – Halogen spotlight generates excessive heat (>250°C) that could potentially damage objects illuminated by these sources. Obviously, these temperatures can be dangerous if the lamp comes in contact with skin or flammable materials (Rea 2000). The heat produced by halogen lamps should be accounted for when considering using them in heat-sensitive applications such as in museums or art galleries. **LED based MR16 average reflector temperature is only 70°C. It is safe to touch and it will not burn your fingers. Lower heat released to the room also means lesser air conditioning is needed to cool down a room installed with LED spotlights. Thus, saving extra energy.**
- **Higher Energy Efficacy** – Halogen spotlights are not as energy efficient as LED spot lamps. For example, the 4W LED MR16 can produce a directional light equivalent to a 20W halogen MR16. Halogen lamps also produce IR radiations where most of the energy is wasted as heat. **Simply because, LED based MR16 can produce mono-chromatic light and uses collimator lens to project the light in a precise direction, thus no energy is wasted as heat. LED spotlights can save up to 80% of your lighting cost!**
- **No UV Radiation** – Quartz filament in halogen MR16 emits high UV radiation, thus require additional glass cover in luminaries to provide the required safety protection. **LED based MR16 does not produce any UV radiation, therefore, no additional safety precaution is need and the light is safe for skin.**
- **Longer Life Expectancy** – According to major halogen manufacturers' catalog, the average rated life of the halogen MR16 is between 2000 hours and 5000 hours. **The average life expectancy of LED based MR16 is 50,000 hours (that is 5 years and 8 months!). Therefore, lower maintenance cost.**
- **Wider Correlated Color Temperature (CCT) and Color Selection** – Halogen spotlights only have a **CCT** of between 2800 K and 3200 K depending on the manufacturer and type of lamp. Some manufacturers managed to obtain CCT of up to 4700 K. **LED based MR16 offers many color selections, such as warm white (2800K – 3800K), cool white (4000K – 7000K), red, blue, green, amber and even RGB color mixing.**
- **No Non-Passive Failures** – The filament capsule of a halogen lamp is pressurized and it is very fragile. The quartz capsule should not be touched with bare hands because the oil and salts from the fingers can corrode the quartz and weaken it. At the end of life, the broken filament coil within the capsule may touch the quartz and melt into it while it is still hot. This event will create defects on the quartz envelope, and defects of this sort can make the capsule shatter. Failure can also occur if the lamp is accidentally struck. **Thanks to the feature of solid state technology, LED based MR16 does not have any fragile or moving parts, therefore making the lamp robust, shockproof, and safe to touch.**

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Return of Investment (ROI) Calculation for LED Spotlight Systems

Case Study Example

Project name: Major ABC Retail Group Showcase Lighting
Number of chain stores: 50
Number of lamps used: 100 pcs per store

Proposed initial lighting investment per store:

If using halogen MR16 bulbs:

- (a) 20W Halogen bulbs: 100 pcs X \$3.00 = \$300.00
- (b) 300W 120V/12V AC/AC Transformer: 10 pcs X \$75 = \$750.00
- Total initial investment (a + b) = \$1050.00

If using LED MR16 bulbs:

- (a) 4 W LED bulbs: 100 pcs X \$30.00 = \$3000.00
- (b) 300W 120V/12V AC/AC Transformer: 2 pcs X \$75 = \$150.00
- Total initial investment (a + b) = \$3150.00

Initial investment cost difference = \$3150 - \$1050 = \$2100.00 extra (for choosing LED spotlight)

[Note: All pricing figures used in this illustration are based on market price assumption]

Electricity Bill Calculator Formula

Monthly Bill = Number of lamps used X (Watt/1000) X (Monthly Usage Hours) X (Cost per KWH)

Bill Calculation Factors (Assumed for the sake of easy calculations)

Monthly usage Hours: 30 days X number of hours (12 hours per day)
Electricity cost per KWH: US\$1.00
LED MR16 wattage: 4W
Halogen MR16 wattage: 20W



Fig 1. MR16 lamps used in retail applications



Fig 2. MR16 lamps used in residential applications

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Monthly Electricity Bill Comparison	1 Month (US\$)	1 Year (US\$)	5 Years (US\$)
Halogen MR16 Electricity Bill Calculation: 100 pcs X (20W/1000) X (30X12) X \$1.00	\$720.00	\$8,640.00	\$43,200.00
LED MR16 Electricity Bill Calculation: 100 pcs X (4W/1000) X (30X12) X \$1.00	\$140.40	\$1,684.80	\$8424.00
LED MR16 Electric Bill Savings Over halogen MR16 (\$720.00 – \$140.40)	\$570.60	\$6,847.20	\$34,236.00
Halogen MR16 replacement cost every 6 months 100 pcs X \$3 = \$300 (Therefore 1 month average = \$50) <small>Note: Assuming each Halogen life is 2000 hours and Halogen bulb is \$3.00/pc</small>	\$50.00	\$600.00	\$3,000.00
Total Savings	\$620.60	\$7,447.20	\$37,236.00

Remark: The electrical bill savings will pay for the initial LED bulb investments itself in less than 6 months.

Accumulated Cost Savings for LED spotlight system (Possible cost savings for installation period of 5 years)

Number of Chain Stores	Total Amount of Savings (in US\$)
10 stores	\$370,236.00
25 stores	\$930,900.00
50 stores	\$1,861,800.00
100 stores	\$3,723,600.00

NOTES:

- 1) Above illustration does not take into account the additional savings from lower air conditioning bill.
- 2) The above illustration is for the reference only. Manufacturer does not guarantee the actual amount of savings nor the actual results.
- 3) Actual savings may vary depending on factors, such as location and temperature where the lamp is installed, and conditions of the local electricity.

Conclusion

The outstanding feature of the innovative power LED technology is the increased luminous efficiency - i.e. the same amount of light is produced using less power, therefore saving energy. Power LED spotlights also cut down on air conditioning costs, because the lower power consumption (for the same amount of light produced) generates less heat, and therefore reduces the cooling requirement. That means cash in your pocket - without having to do without brilliant light. All power LED spotlights provide many color selection and also a high level of light intensity and color consistency over their entire life of up to 50,000 hours!