

Effective: April 5, 2010

Gessler: LED Spot LS1

Green-Buildings' team of LEED Accredited Professionals performed a benchmark analysis of the LED Spot LS1 and determined that the product will:

- A. **Conserve Energy and Electricity**
- B. **Reduce GhG Emissions and Pollution**
- C. **Improve Building Durability**

Green-Buildings also believes that the use of the Gessler LED Spot LS1 LED is an effective choice when seeking to achieve certification under green building rating systems, such as LEED.



EXECUTIVE SUMMARY

The LED-Spot LS1 System Luminaire (“LED Spot LS1”), manufactured by Gessler, is a multi-purpose, self-ballasted, light emitting diode lamp.

Green-Buildings.com (“Green-Buildings”) worked with Gessler to complete a review and evaluation of LED Spot LS1. Green-Buildings believes that the LED Spot LS1 meets several important accepted green building principles and, as such, the product is applicable to high-performance building.



Green-Buildings’ team of LEED Accredited Professionals determined that use of the LED Spot LS1 will:

- A. **Conserve Energy and Electricity**
- B. **Reduce GhG Emissions and Pollution**
- C. **Improve Building Durability**

Additionally, Green-Buildings believes that the characteristics of the LED Spot LS1 make it an ideal option when seeking to obtain certification through a green building rating system, such as the U.S. Green Building Council’s Leadership in Energy and Environmental Design (LEED) Green Building Rating System.ⁱ

While no single product may guarantee a building certification under LEED, Green-Buildings believes that the use of the LED Spot LS1 may contribute to earning credit(s) in the following LEED categories:

- a. **Energy & Atmosphere (EA): 1-19 Points**

DETAILS

Gessler has developed the LED Spot LS1 as a replacement for the various less efficient, traditional lighting technologies, such as incandescent or fluorescent lighting, commonly found in conventional buildings. The characteristics of the LED Spot LS1 provide several benefits over such conventional lighting. As described below, the LED Spot LS1 provides a long-lasting, energy efficient light which is consistent with green building.

A. Conserve Energy and Electricity:

According to the U.S. Department of Energy, buildings are responsible for approximately 39% of the energy consumed in the United States. Of the electricity used, building operations result in approximately 74% of total U.S. consumption. Lighting in buildings represents approximately one third (28%) of this demand in commercial buildings and approximately twelve percent (12%) in residential buildings.

A key green building principle is the conservation of energy and electricity through the use of energy efficient technologies and controls. The simplest way to reduce electricity demand is to use less of it by making improvements to lighting. Taking steps to replace inefficient lamps and/or lighting components has also been shown to greatly improve the effectiveness of green building efficiency strategies, while simultaneously reducing the demand, and carbon output from, coal-fired power facilities, a common energy source.

High-performance lighting components, such as the LED Spot LS1, may cause a building to use much less electricity because the underlying technological design of the LED Spot LS1 produces light in a far more efficient way than incandescent bulbs or even new fluorescent lighting, such as compact fluorescent lamps. The result is that the same amount and quality of light is delivered from the LED with the use of far less energy.

In the case of incandescents, energy required by the bulb to produce light is lost in the form of heat to the surrounding environment. Additional heat may cause building temperatures to rise putting incremental pressure on AC systems and creating greater demand for increased cooling loads.

LED bulbs, such as the LED Spot LS1, burn very cool and, in the long term, this reduction in incremental heat may significantly reduce the amount of energy required to keep a building cool in warmer climates.

By incorporating the LED Spot LS1 into a holistic, green building strategy, building owners and operators may not only save energy, but also reduce the environmental impacts of greenhouse gas emissions and other harmful pollutants.

B. Reduce GhG Emissions and Pollution:

The vast majority of electricity consumed in the U.S. is initially generated through the burning of fossil fuels, such as coal, at conventional power plants. A byproduct of the operation of coal-fired power plants is the production of a significant amount of greenhouse gases (GhG) and other harmful pollutants.

According to the U.S. Green Building Council and the U.S. Environmental Protection Agency, for each megawatt of coal generated electricity produced, an average of 2,249 pounds of carbon dioxide, 13 pounds of sulfur dioxide and 6 pounds of nitrogen oxides are released into the atmosphere. Indeed, more than 65% of the sulfur dioxide pollution in the U.S., or approximately 13 million tons per year, is the result of coal fired power generation.

i. Reduce GhG Emissions

Using the assumption that the life of the LED Spot LS1 is 50,000 hours, Green-Buildings evaluated the benefits of utilizing the LED Spot LS1 by calculating the total amount of CO₂ that would be saved by replacing one hundred (100) 15 Watt CFLs with an equal number of the 5 Watt LED Spot LS1.

LEDs do not burn out like incandescent or compact fluorescent bulbs, rather, their brightness slowly fades. So, while the lifespan of an LED might be listed at 50,000 hours, that is actually the point at which the bulb is estimated to be shining at around 70% capacity (the industry assumes people notice a decrease in brightness at that point). As such, it may be possible for LEDs to be used longer in some cases, with little reduction in visible benefit.

By using the LED Spot LS1, over its expected lifetime, the bulbs would save approximately 48.56 tons of CO₂¹.

	Full Capacity LED Lifetime (24.03 years)
Energy Saved:	2,680 kWh
Pounds of CO₂ Saved:	97,328
Tons of CO₂ Saved:	48.56

ii. Reduce Pollution

As described above, coal generated power is responsible for a significant amount of pollution in the U.S. and throughout the globe. The use of the LED Spot LS1, as a replacement for less efficient lighting, can contribute to the reduction of sulfur dioxide, nitrogen oxides and carbon dioxide into the environment.

However, measures to reduce indoor pollution are also important because the U.S. Environmental Protection Agency (EPA) estimates that indoor pollution levels may be two to five times

¹ **Assumptions:** LED Spot LS1 estimated life: 50,000 hours; LEDs used an average of 2040 hours per year (52 weeks, 5 days per week, 8 hours per day); 100 bulbs used; 5 Watt LED Spot LS1 Replacement; 2004 lbs of CO₂ per ton

(potentially up to one hundred times) higher than outdoor pollution levels. As indoor pollution levels and exposure to harmful toxins are a major concern, products that help reduce exposure to potential harmful air pollutants and the presence of biological contaminants are an important consideration in green building.

While compact fluorescent lamps (CFL) are significantly more efficient than traditional incandescent bulbs, they also contain mercury. Because CFLs contain mercury, they must be carefully handled and properly disposed of to prevent potential environmental hazards that may occur throughout a product's life. Exposure to mercury poses risks not only to indoor occupants, but also to others in any downstream environment. The LED Spot LS1 contains no mercury and, as such, presents an alternative to the potential dangers associated with CFLs.

The use of energy efficient lighting, such as the LED Spot LS1, reduces electricity demand and, therefore, reduces the amount GhG emissions released into the atmosphere from coal-fired power generation. The LED Spot LS1 also is a safe alternative to energy efficient lighting products that may contain mercury.

C. Improve Building Durability

A key green building principle is to deliver durable, high-performance design and construction to create a built environment that will last as long as possible. Indeed, according to a survey by PPG Industries, architects report that durability is the most important attribute for a green building product. The use of durable, high-performance building materials and construction may result in a building that may require less frequent renovation, repair and replacement.

By reducing the environmental impacts of materials chosen for construction, i.e. by using materials that provide longer life and performance, builders can reduce waste and system failures, enjoy more predictable maintenance schedules and benefit from a lower cost of ownership.

According to the EPA, depending on their environment and use, LEDs are capable of lasting between 35,000 and 100,000 hours. For the purposes of our calculations herein, we assume estimate the life of the LED Spot LS1 to be 50,000 hours. By comparison, the average useful life of a compact fluorescent lamp is 10,000 hours and the life of incandescent bulbs may be as little as 800 hours, with proper use.

	Bulb Lifetime (hours)
Incandescent bulb:	800
Compact Fluorescent Lamp:	10,000
LED Spot LS1:	50,000

The extremely long operating life of the LED Spot LS1 provides real estate owners and operators with the benefit of reduced labor and materials costs while decreasing the frequency and amount of waste from replacement bulbs that would otherwise be sent to landfills.

LEED Scoring and Certification:

Use of LED lighting products, such as the LED Spot LS1, may contribute to earning credit(s) in the Leadership in Energy and Environmental Design® (“LEED®”) green building rating system.

The LEED green building certification program includes a suite of rating systems, each of which addresses the unique aspects of a particular type of building or development. Each rating system includes major credit categories with which projects must comply; the greater the compliance, the higher the level of certification under LEED. While certain LEED systems may include additional or fewer categories, the following are the six categories which may be found in most systems:

1. Sustainable Sites
2. Water Efficiency
3. Energy & Atmosphere
4. Materials & Resources
5. Indoor Environmental Quality
6. Innovation in Design

Green-Buildings believes that the use of the LED Spot LS1 may contribute in the following LEED credit categories:

Energy & Atmosphere: EA (1 to 19 Points)

Energy efficiency reduces the negative environmental consequences associated with the production and use of energy. As buildings are commonly powered by fossil fuels, energy savings are critical to green building. The EA credit category represents the primary area where the inherent efficiencies and long life of the LED Spot LS1 product can deliver significant positive impact. (1-19 Points)

Other LEED Credit Categories

As mentioned above, depending on the LEED rating system in question, the LED Spot LS1 may also contribute toward earning credits in other categories.

For instance, the fastest growing LEED Certification system in the U.S. is LEED for Existing Buildings Operations and Maintenance (O+M). The Materials and Resources (MR) Category of LEED credits includes a credit that may be earned for Sustainable Purchasing. By developing and implementing a purchasing plan that minimizes the amount of mercury in lighting, a building project may earn an additional point.

CONCLUSION

Green Buildings believes that the LED Spot LS1 by Gessler meets three significant criteria used in green building initiatives:

- **Conserve Energy and Electricity**
- **Reduce GhG Emissions and Pollution**
- **Improve Building Durability**

Furthermore, use of the LED Spot LS1 may be an effective choice when seeking to achieve certification under a green building rating system, such as LEED, by potentially earning points in the area of Energy and Atmosphere.

Product Reviewed by: Rob Freeman Jr, LEED AP

ⁱ Green-Buildings.com has evaluated and reviewed this product using its own methodology. While Green-Buildings.com believes that certain products have characteristics that may allow users of the products to earn points in a LEED certification, only the Green Building Certification Institute (GBCI) may award points and grant certification. Accordingly, Green-Buildings.com does not make any assurances, guarantees, representations, or warranties, express or implied, and specifically disclaims all warranties or representations, that products will earn LEED points, or any project that utilizes such products, will receive LEED® certification.