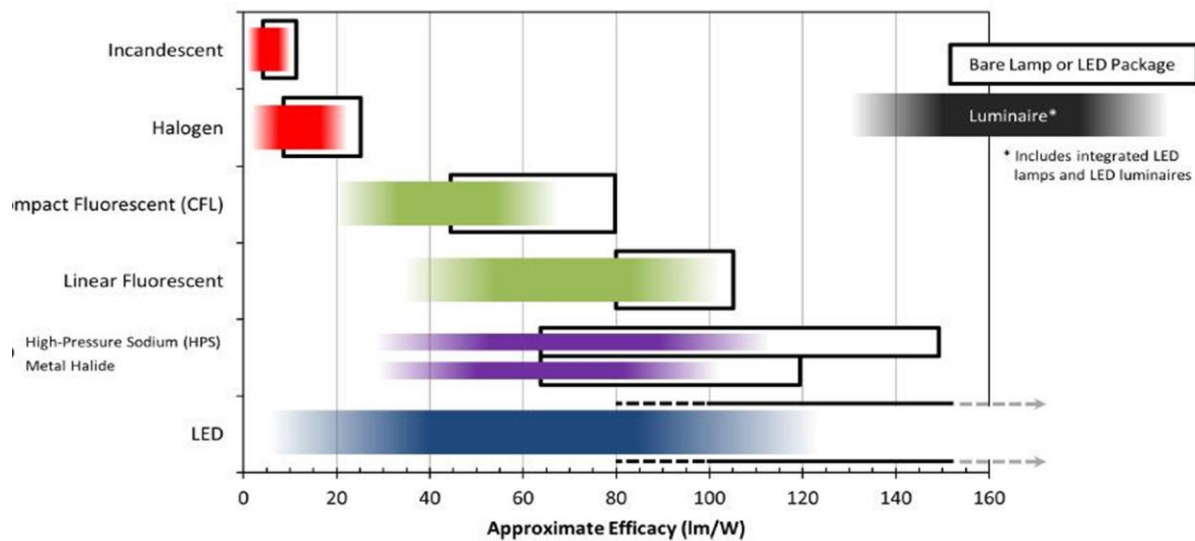


LED Lighting

Introduction

LED is the acronym for Light Emitting Diode and it designates a semiconductor diode that emits light when a voltage is applied to it.

LED based lighting products and solutions are becoming increasingly popular among consumers due to their low power consumption and long service life when compared to traditional light sources such as incandescent bulbs, halogen lamps and even compact fluorescent lamps.



Efficiency of LED light sources

The efficiency of LED products has significantly improved since their introduction in the lighting market and will further improve in efficiency in the future.

The following figure ⁽¹⁾ shows the luminous efficiency, measured in lumens per watt (lm/w), of LED light sources compared to various light sources, as of January 2013.

Components:

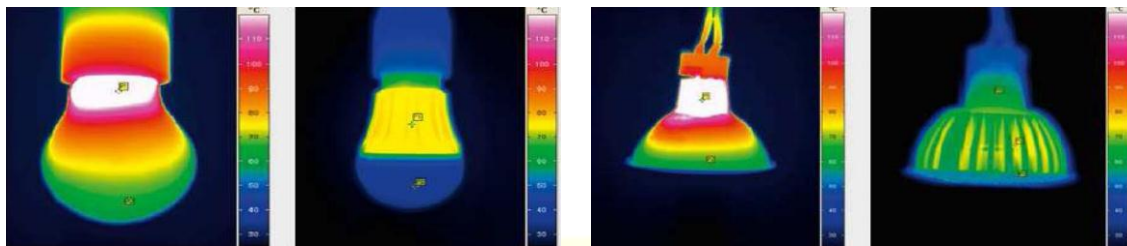
The part marked as “Luminaire” considers an entire system which composes a LED fitting, namely the driver, optical device and heat sink. The combination of these parts will contribute in delivering the most efficient light source.

The luminous output of a LED component depends mainly on the LED chip used, its driving current and heat dissipation. Lower temperature levels have a positive impact on the LED light.

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Heat generation of LED light sources

The following thermal images ⁽²⁾ compare the heat generated by different types of traditional lamps against their respective LED equivalent. These pictures confirm one of the key benefits of LED based products which is their low heat emission.



Incandescent "A" Type vs. LED "A" Type

Halogen "MR16" Type vs. LED "MR16" Type

Lifecycle Cost

The unit price of LED based products is higher when compared to traditional lamps. Nevertheless, the longer lifetime and greater efficiency of LEDs will result in rapid payback for the consumer. Hence when a LED light source is applied, the return benefit is better than other types of lighting fixtures.

Advantages of LED compared to conventional lamps

- Low energy consumption with power savings of up to 80%.
- Longer service life reaching 25 times higher.
- Maintenance free for around 50,000 hr.
- Low heat generation.
- No health concerns, as it is a mercury free product and fully recyclable
- No UV radiations emitted .
- Instant ignition of light. 100% luminous flux on switching.
- Unlimited switching of the LED source without impact on its lifetime.
- Can be dimmable.

Design and installation tips

- Request detailed datasheet of LED product from supplier mentioning : Luminous Output (in lm-lumens or cd-candela), Power Consumption (in W) and CRI. (CRI is the Color Rendering Index and it measures the ability of a light source to reproduce true colors.)
- Do not accept to buy such high-tech product without the relative datasheet where you can find the needed auxiliaries as well as installation and operation recommendations for proper usage.
- Select products with high luminous efficiency greater than 70 lm/w or 100 cd/w.
- Choose products that provide a high CRI (greater than 80).
- Verify if heat dissipation is achieved. All LED based products must be delivered with sufficient heat sink. For example LED flexible strips (used mostly in indirect lighting) must be assembled on aluminum profiles and must be placed in ventilated areas.

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- Do not install LED based products near heat generating devices or in high ambient temperature. This will have a negative impact on the product's lifetime and light output.
- LED light sources and drivers (or transformers) must be clearly labeled and must mention the operating output voltage or current.
- Installation must be made by a qualified electrician.

References

- (1) Source: U.S. Department of Energy
- (2) Source: Radium Lampenwerk GmbH

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