

**Quality Guidelines for Light-Emitting Diodes (LEDs)
GLS Lamp Replacement
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A Consumer Guide to Buying Good Quality LEDs

NB: This document is a draft for discussion only. Your views on the relevance of the guidelines for your country and the content (whether the correct information has been included, if the level of detail is appropriate for consumers and any other sources of information which should be included) would be very welcome. Any comments should be emailed to info@lites.asia.

Overview

LED lighting is a rapidly developing lighting technology that is already offering useful alternatives to some traditional lighting. However, testing of some LED products found in the marketplace indicates that there is a wide variation in quality. Some of the lower quality LEDs sold may not provide sufficient light, or the light may not be of a good quality. In many cases they may even be less energy efficient than other types of lighting such as compact fluorescent lamps.

Because LED products are still passing through the development stages, consumers need to become educated before investing in LEDs. Even high-quality LED lamps are in a relatively early stage of development and few have undergone rigorous testing in real-life settings. However better quality LED lamps are becoming available in the market. Consumers can find them if they know what to look for.

This guide gives you some basic advice that can be passed on to consumers to help in the selection of a quality LED.

LEDs Performance and Quality Characteristics

Some key indicators of a quality LED are price, test reports or certification, and a lack of extravagant claims regarding performance. However, these do not guarantee the product is high in quality. It simply indicates it might be better than a product without the label.

Common Performance Indicators

1. Incandescent Lamp Equivalence Claims

Be careful with claims that lamps are equivalent to common incandescent lamps. The best LEDs are currently about 4 to 5 times more efficient than its typical incandescent lamp equivalent. This means that for an LED lamp claiming to produce as much light as a 60W incandescent lamp, it will need to use *at least* 12W.

2. Light Output (lumens)

Another way to determine whether a LED lamp is suitable is to look for information about the brightness of the light, which is measured in Lumens (lm – the higher the number, the more light is emitted). Lumens are the best, most accurate way to compare two different types of lighting. If

the lamp carries a lumen output rating, it may also indicate that it was actually tested for this performance, a good sign.

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The following is a table that shows the number of lumens that a range of traditional incandescent light bulbs produce. An LED with the same number of lumens should be of a similar brightness:

Incandescent Bulb (Watts)	Light Output (Lumens)
25W	220 lm
40W	420 lm
60W	720 lm
75W	930 lm

Unfortunately, for some LED lamps the information on the product packaging is not always particularly accurate, often because the information stated on the box is about the light source *within the lamp*, not the lamp itself. Light sources tested in laboratory conditions will always have a higher light output than the LED lamp used in normal conditions. If you are unsure about the specifications you should ask the retailer or contact the manufacturer to understand how the light output of the product has been measured.

3. Lamp Lifetime (hours)

Some LEDs are known to have very long rated life, 50,000 hours or more – under the best laboratory conditions. For high quality LED products, the expected lifetime is more likely to be in the range of 10,000 to 20,000 hours. Manufacturers must be able to back up their lifetime claims, either with testing or certification indicated on the product packaging.

4. Lamp Warranty Period (years)

A good approximation for information on lifetime testing is the warranty period that a manufacturer is willing to provide. For a lamp claiming to last 25,000 hours (about 34 months of continuous operation, or 22 years of regular nightly use), a manufacturer should be able to provide a warranty of at least 2 to 3 years.

Light Appearance

5. Color Temperature

LEDs are colored light sources, and are (generally) designed to produce white light using a number of methods. As a result, they can actually produce white light in a number of 'shades' just like fluorescent lamps – from warm-white (similar to a regular, incandescent lamps) to cool white or bluish white (daylight). Make sure to choose the color that you are most comfortable with.

6. Color Rendering Index

Some LEDs lamps are better at helping the human eye to see colors than others, depending on the method used to produce white light. If possible, look for lamps that have a Color Rendering Index, (abbreviated CRI) of at least 65 for outdoor use and 80, or better, for indoor use. A new international measurement more suitable for measuring the colour of LEDs is under development, but in the meantime, the best way to judge is to see how the LED lights influence the colour of objects, and in the intended application if possible.

7. Energy Efficiency

Many people assume that LED lamps must all be very energy efficient; however this is not always the case. Many LEDs currently on the market are similar to, or a little less efficient than, equivalent fluorescent lighting. Some poor quality LED lamps have been found to be only a little more efficient than incandescent lighting.

The energy efficiency of a light is measured in *Lumens per watt* (lm/W). If it is not marked on the package you can simply divide the number of Lumens by the number of Watts. The higher the number, the more efficient the product.

Safety

7. Safety Rating

All lamps should be safe to operate. At a minimum this means that they have passed mandatory requirements and earned their safety marks, such as UL, CE, or national certification. At a minimum, they should indicate compliance with IEC 62560 Ed. 1.

Where to find more information

Many LED lamps contain the basic quality information on the product packaging. You can also look on the manufacturer's website for further information, or ask staff in specialist lighting stores.

There are already some quality certification programs for LED lamps. The following websites have information about quality LED lamps:

Energy Star: <http://www.energystar.gov/>

Topten: <http://www.topten.info/>

Energy Savings Trust: <http://www.energysavingtrust.org.uk/In-your-home/Energy-Saving-Trust-Recommended-products>

Choosing the Right Light

Today there is a range of efficient lighting products available to the consumer. When you go to select a light that is right for you, and where you want to use it, you should take into account that LED lights may not always be the best choice for all lighting tasks. Compact fluorescent lamps (CFLs) and even, in some cases, halogen lamps may provide you with more light, more efficient lighting and/or better quality lighting.