

A Consumer Guide to Buying Good Quality LEDs

Important Note: This document has been prepared through cooperation among a number of the participants in *lites.asia* (see www.lites.asia). It is designed to provide governments, suppliers, retailers and other stakeholders with an independent and unbiased basic text to use in publications to guide consumers in selecting a good quality LED products for appropriate applications. The document is Copyright free and open to use by anyone, but quoting *lites.asia* as the source would be welcomed.

LED lighting is a rapidly developing technology that is already offering useful alternatives to some traditional lighting technologies. Good quality LEDs can provide excellent lighting in a range of applications. However, tests on some LED products found in the marketplace indicate that there is significant variation in product quality. Some lower quality LEDs sold may not provide you with enough light, may flicker when dimmed, change colour through life or fail prematurely. Currently LEDs will be more expensive than traditional lamps and some may not be as energy efficient as you think.

LED products are still in their development stages and consumers are advised to be cautious and have a basic understanding of LEDs before investing in them. Even high-quality LEDs are in a relatively early stage of development and comparatively few have undergone rigorous testing in real-life settings. However:

Quality LEDs are becoming available and buyers can find them if they know what to look for.

This guide provides buyers with some basic advice on how to select a quality LED by looking for the important LED product features summarised below.

Useful Performance Indicators for Good LEDs

1. Incandescent and Halogen Lamp Replacement Claims.

Look for sensible numbers on any claim of equivalence with incandescent and halogen lamps and compare with other products.

Be careful with claims that an LED is equivalent to a common incandescent or to a halogen reflector lamp. The best LEDs are currently approximately 4 to 5 times more efficient than the typical incandescent or halogen equivalent. This means that, for an LED lamp claiming to produce as much light as a 60 Watt incandescent lamp, or 50 Watt halogen reflector lamp, it will need to use at least 10 Watts.

2. Light Output.

Look for a clear statement of light output in lumens (lm) and compare with other products.

The best way to decide whether an LED lamp is suitable as a replacement for an existing lamp is to look for information about the amount of light the lamp produces (this is normally measured in lumens or lm). Lumens are the best, most accurate way to compare two different types of lamp. The higher the number of lumens, the more light is produced. If the lamp or packaging provides information on lumen output, it may also indicate that the lamp was actually tested for this performance which is a good sign of a quality product.

The following table shows the number of lumens that a range of traditional incandescent lamps produce. An LED with the same number of lumens should have a similar light output:

Incandescent Bulb (in Watts)	Light Output in Lumens (220-240V)
25 W	220 lm
40 W	420 lm
60 W	720 lm
75 W	930 lm

For a LED lamp to provide equivalent light to the common 50W halogen reflector lamp it must produce a minimum of 480 lumens.

Unfortunately the information on the LED packaging is not always accurate. Sometimes the information stated on the box or lamp is about the light source within the lamp (the electronic LED chip), not the whole LED lamp. Light sources tested under laboratory conditions will always have a higher light output than the LED lamp used in normal conditions. If you are unsure about the specification you should ask the retailer or contact the manufacturer to understand how the light output was measured.

Best of all, if it is possible, ask the retailer to show you one of the lamps in operation. If this is possible, do not look at how “bright” the LED appear, look at how well the LED illuminates surfaces compared with other lamps on offer.

3. Lamp Lifetime

Look for realistic claims of life and manufacturers that can back up their lifetime claims, either with testing or certification indicated on the product packaging.

Some LEDs are known to have very long claimed lifetimes, sometimes 50,000 hours or more. However, this assumes the lamp is tested *under laboratory conditions*. For high quality LED products the expected lifetime is more likely to be somewhere in the range of 20,000 to 40,000 hours. It is very likely the claimed LED life is not based on testing for the time shown. Rather, life is often based on a minimum operation (for example, 6,000

hours) and then a prediction of the light output decay is used to determine the claimed life. Sometimes claims are made even without this basic level of testing.

4. Lamp Guarantee Period

Look for a guarantee of at least 2 to 3 years, or longer for lamps claiming a lifetime over 25,000 hours.

A good approximation for information on lifetime testing is the guarantee 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 guarantee of at least 2 to 3 years. If a longer lifetime is claimed look for a corresponding longer guarantee of perhaps 5 years.

Light Appearance

5. Colour Temperature:

Choose the lamp colour that you are most comfortable with in the same way you would with a compact fluorescent lamp (CFL) or fluorescent tube.

LEDs are a coloured light source and are designed to produce white light using a number of methods. As a result, they can actually produce white light in a number of “shades” or “colour temperatures” just like a CFL or fluorescent tube – from warm-white (similar to regular incandescent and halogen lamps, 2700 to 3000 Kelvin) to cool-white (around 4000 Kelvin) or bluish white (daylight, 5000+ Kelvin).

6. Colour Rendering Index (CRI):

Choose a CRI number to suit your application. The higher the CRI value the better. Better still, if possible, purchase one LED and try it to see if it makes colours of objects appear appropriate before buying more.

Some LEDs lamps are better at helping the human eye see colours than others, depending on the method used to produce white light. If possible, look for lamps that have a Colour Rendering Index (CRI) of at least 65 for outdoor use, and 80 or better for indoor use. A new international measurement more specific to LEDs is in development, but in the meantime, the best way to judge how well the LED light influences the colour of objects is for you to see them installed in the intended application.

Energy Efficiency

7. Energy Efficiency:

Look for an energy efficiency rating in lm/W on the lamp and compare with other lighting products such as linear fluorescent lamps or CFLs.

Many people assume that LED lamps must 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 the equivalent fluorescent lighting. Some poor quality LED lamps have been found to be only marginally more efficient than incandescent lighting and less energy efficient than other types of lighting such as compact fluorescent lamps.

The energy efficiency of a lamp is measured in lumens per Watt (lm/W). If this efficiency is not marked on the package you can simply divide the number of lumens (light output in lm) by the number of Watts. The higher the number, the more efficient the product.

Safety

8. Safety Rating

Look for confirmation that the lamp has been certified to your national safety standard (eg UL, CE or CCC). At the very least the lamp should claim to comply with the IEC 62560 safety standard.

All lamps must be safe to operate. At a minimum this means they have passed mandatory requirements and earned safety marks such as UL, CE, CCC or other similar national certification which should be shown on the packaging or lamp. At a minimum the lamp should claim to comply with the IEC 62560 safety standard.

Choosing the Right Light

Think about alternatives to LEDs before buying to make sure you are buying the best and most cost effective lamp for your needs.

Today there is a range of efficient lighting products available to the consumer. When you are selecting a lamp, consider all available options as LEDs may not always be the best choice for all lighting tasks. CFLs, fluorescent tubes, and even in some cases halogen lamps, may provide more light, be more efficient and/or be better value for money.

Where to find more information

Many LED lamps contain basic 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 several quality certification programs for LED lamps. The following websites have information about quality LED lamps:

Energy Star: www.energystar.gov/

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

Lighting Council Australia: www.lightingcouncil.com.au

Topten: www.topten.info