

Advisory

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note

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LED Lighting Explained

In recent years, LED (Light Emitting Diode) lighting has promised substantial reductions in lighting energy usage and significant improvements in lamp life. However, until recently, this technology has been prohibitively expensive and its introduction has been marred by issues of poor performance and quality.

LEDs are a solid state electronic semiconductor device that converts electricity into light and can last up to 50 times longer than incandescent lamps and two to five times longer than fluorescent lamps. They are durable and can withstand vibration and knocks.



As LED technology has evolved for lighting, there has been a wide variation in the quality of lamps available. Some lower quality LEDs may not provide adequate light, may flicker when dimmed, change colour through life or fail prematurely.

Light Output: Measured in lumens, the light output is the best way to compare lighting types. The more lumens, the more light emitted. Compare the LED output with the current lamp types; be careful that the LED lamp output is referenced, not the output from the LED light source.

Lamp Life: High quality LED products have a lifetime somewhere in the range of 20,000 to 50,000 hours. Look for lifetime claims to be backed up by certification and warranty. A lamp claiming to last 25,000 hours or around three years of continuous operation should have a warranty of two to three years. By comparison, fluorescent lamps last 8,000 to 25,000 hours and halogen lamps 1,000 to 5,000 hours.

Energy Efficiency: It is assumed that LEDs are very energy efficient; however, that is not always so. Some LEDs are less efficient than comparable fluorescent lighting. Energy efficiency is best measured by lumens produced per watt of energy consumed (lm/W). Carefully compare the options.

Colour: LEDs can produce white light in a number of shades, from warm white through to cool white or bluish white. They can also produce coloured light in all visible shades. Picking the right colour for the application is important. Additionally, some LEDs can be better at helping the human eye see colours. LEDs for outdoor use should have a colour rendering index (CRI) of at least 65 and for indoor use 80 or over. LEDs considered for use in some healthcare applications will require a particular CRI. LEDs will also deliver a more consistent light colour when chosen from the same colour spectrum.

Glare: This can be a problem due to the small size and brightness of each LED as compared to say the larger surface area of a fluorescent tube. Good luminaire design will accommodate LED characteristics to reduce or eliminate glare problems in applications such as office lighting.

Lamp or Fixture Change: Retrofit options include replacing existing lamps, or the entire fixture. Replacing 240V halogen or compact fluorescent lamps with a quality drop-in LED option is relatively straightforward; however, issues including glare and physical compatibility do need to be considered. Where the lamp to be replaced uses external control gear, such as low voltage halogen or fluorescent tubes, the situation is more complex and a drop-in replacement is generally not possible without modification.

Alternatively, the entire luminaire or fixture may be replaced with a new fitting designed to fully exploit the benefits of LED technology. This option may also allow the rationalisation of the lighting layout and/or the implementation of lighting control systems or movement occupancy sensors to further improve the lighting and energy outcomes. LEDs coupled to control systems can produce instantaneous light without delay, which can be an advantage over fluorescent or discharge lamps in some circumstances. A whole-of-life assessment should be applied to any LED lighting replacement project.

Whilst LED lighting technology continues to evolve, there are a range of cost-effective opportunities available now. In assessing these, it is important to recognise that lighting systems are long-term investments that should be carefully considered.

For further guidance on lighting upgrades contact:

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