

**Guidance Note 5/17**

# **Using LEDs**



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There has been much comment in the media regarding the uptake, use and application of LED technologies, which has fuelled public concerns associated with their use. This guidance note has been written to provide information on these concerns to ILP members and other lighting professionals.

The concerns chiefly relate to the blue light content of a light source and its potential to affect human health, flora and fauna. These concerns are not new but have come to the fore as LEDs are essentially a blue light source with varying coatings applied to produce white light. LEDs are available in a wide range of colour temperatures; from warm through neutral to cool light, with the cooler sources having the higher blue light content.

The choice of colour temperature needs to be made based on the task application. When LEDs first came out there was a high uptake of cool white sources, as these provided a greater energy saving than warm and neutral sources. For a lot of applications energy reduction was the key driver. Research continues into how colour temperature may affect the quality and ambience of the task space being lit, and hence how users or workers may feel. From a retail perspective, research has shown that when lit with a warm or neutral colour temperature it benefits the retail experience, whereas cold colour temperatures create a detrimental effect. Whether this also applies to exterior or other environments is not currently known.

The ILP believes a blanket approach to exclude or recommend certain colour temperatures is not the right path and would limit some lighting applications. The ILP are fully aware of energy and carbon management issues when considering lighting projects and installations, from domestic users to commercial, public realm, and highway authorities. The ILP encourage all designers to ensure that they consider the needs of the task and then examine how this may be best lit with due

colour temperature considerations.

A balanced approach must consider the task and the associated energy costs. For a local authority, the difference between choosing 3000K, 3500K and 4000K LED sources, and their respective efficiencies and performances, can make a difference to the development of an economically affordable business case.

### **The designer's requirements**

It is worth understanding more about blue light and the client and designers' requirements when making design considerations. Blue light or short wavelength light is defined as:

Blue light	400 to 490 nm
UVA	315 to 400 nm
UVB	280 to 315 nm
UVC	180 to 280 nm

This understanding has become relevant as we gain a greater knowledge of how the human eye works. This applies not just to vision but also how other receptors within the eye affect alertness and circadian rhythms.

UV light has the potential to cause eye damage and skin cancer, blue light has the potential to cause retinal damage and short wave light can have a significant detrimental effect on fauna and flora.

The Health and Safety Executive (HSE) 'Guidance for Employers on the Control of Artificial Optical Radiation at Work Regulations' (AOR) requires employers to undertake a risk assessment for people in proximity to an intense source of optical radiation. The requirement is for lamps and lamp products to meet the requirements of BS EN 62471 'Photobiological safety of lamps and lamp systems'. This is not new and is not specific to LED technologies.

BS EN 62471 requires lamp (light source) and lamp systems to be assigned to a risk group by the manufacturer. The risk groups as

shown in Table One define the level of risk and advise on the maximum safe exposure time (tmax) over an eight hour period before that classification of source has the potential to cause harm.

Table One: BS EN 62471 risk groups

Risk Group Number	Risk Group Name	Corresponding tmax
RG0	Exempt	> 10 000 s
RG1	Low risk	100 s to 10 000 s
RG2	Moderate risk	0.25 s to 100 s
RG3	High risk	< 0.25

It is recommended by Highways England that light sources with an RG0 rating be used as much as possible, with due consideration being given to products rated RG1. However, research has shown that RG ratings are not present on all lamp/luminaire packaging.

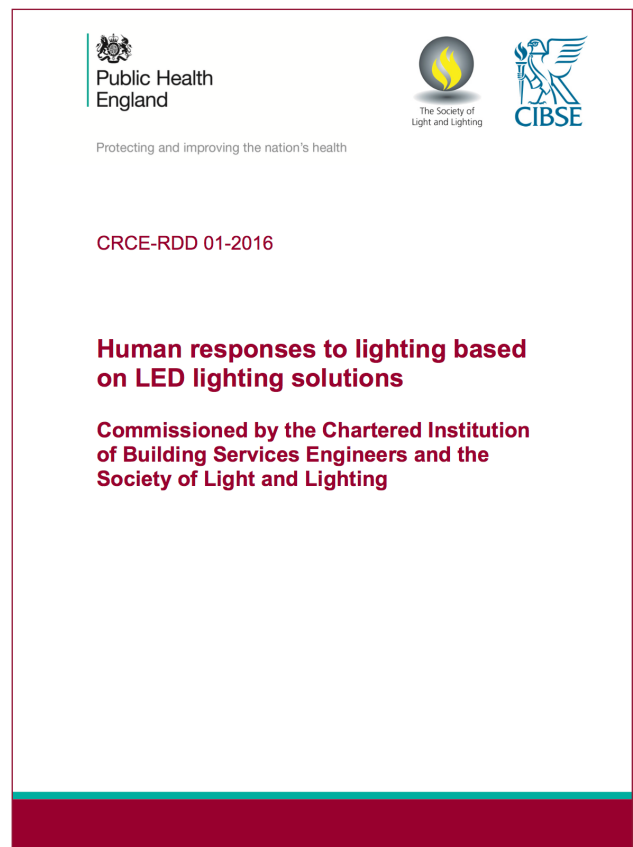
The Health and Safety at Work Act 1974 Section 6 Part 6.1 item c states ‘... the article are provided with adequate information about the use for which the article is designed or has been tested and about any conditions necessary to ensure that it will be safe and without risks to health at all such times’. This places a direct obligation on manufacturers to provide information pertaining to their product.

Designers must also consider the issue of flicker, which can trigger adverse health effects in some people. Health risks can arise from flicker frequency, modulation depth, brightness, lighting application, and several other factors. The National Health Service estimates approximately 25,000 people in the UK have photosensitive epilepsy. Again, this issue is not new and not specific to LED technologies.

There is ongoing extensive research into LEDs by Public Health England, the International Commission on Illumination, and the

University of Oxford Sleep and Circadian Neuroscience Institute. There are existing publications which the ILP feels cover this topic adequately.

A major reference document is ‘*Human responses to lighting based on LED solutions*’. This independent work, undertaken by Public Health England, was commissioned by the Chartered Institution of Building Services Engineers (CIBSE) and the Society of Light and Lighting (SLL). It can be downloaded from <http://www.cibse.org/knowledge/knowledge-items/detail?id=a0q20000008I6z6>



The ILP recommends that lighting schemes should only ever be managed by competent lighting professionals. For more information, education and wealth of resources, visit the ILP website at [www.theilp.org.uk](http://www.theilp.org.uk)

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