Solid State Lighting Design

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The Mission of Solid State Lighting Design is to help foster the technical and architectural design innovation needed to propel LEDs and solid state lighting into mainstream lighting applications.

SSL Presents No Special Blue Light Hazard, LRC Says

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Solid-state lighting, because of its easy adjustability has increased the interest in how lighting can provide health, wellness, and productivity benefits to people such as enhanced visibility at night, improved discernment of brightness, increased security, and the use of spectral tuning for circadian rhythm management. However, questions have been brought up about the new LED lights and the potential blue light hazard that they pose.

So, as demonstrated by the release of a recent American Medical Association (AMA) report, the growing popularity of LED lighting is also bringing up new questions and reviving older concerns about unwanted consequences of these LED light sources. Such concerns include discomfort glare, light pollution, circadian disruption, and retinal damage through a process resulting from exposure to blue light. These detrimental effects of blue light are known as the blue light hazard.

A new study from the Lighting Research Center (LRC) at Rensselaer Polytechnic Institute evaluates light sources for their blue light hazard with a practical, quantitative approach. Findings from the study were published in the International Journal of Occupational Safety and Ergonomics.

For the study, LRC researchers John Bullough, Andrew Bierman and Mark Rea examined the spectral radiant power characteristics and the blue light hazard of incandescent, fluorescent, daylight, and LED sources based upon current blue-light hazard calculation procedures from the Illuminating Engineering Society and the Commission Internationale de l´Éclairage.

The paper offers comparative data to permit meaningful and quantitative comparisons among common indoors and outdoor lighting technologies. The study pays particular attention to use cases that could potentially influence blue light hazard.

The study results experimentally confirmed that in the majority of use cases, LEDs do not present an increased risk for blue-light hazard than other light sources, including incandescent bulbs.

Furthermore, natural photophobic responses such as squinting and averting gaze can limit exposure to bright light of all kinds including LEDs, incandescents, and daylight. The researchers warned that where photophobic responses might not occur, such as with premature infants or during eye surgery, caution is required.

Blue Light Hazard Not Related to CCT

The AMA advised against using LEDs with correlated color temperature (CCT) exceeding 3000K. However, the LRC study showed that avoiding the blue-light hazard is principally related to controlling the brightness of light sources, and much less linked to spectral distribution, particularly when the spectral distribution is expressed in CCT.

The LRC study authors point out that CCT should not be used as a metric for defining the potential for blue-light hazard. This reiterates the point given by an April Lighting Industry Association editorial about how not all blue light is the same. The study authors cite the fact that an incandescent filament at 2856K within a clear bulb is linked with a greater risk for blue-light hazard than any white LED source, including one of 6500K.

The team pointed out that spectral radiance distribution must be known to estimate blue-light hazard with IES calculation method, particularly for cases in which photophobic responses might not occur. In such cases, and also for general lighting applications, the researchers recommend the use of diffusers, lenses, and baffles to mitigate glare as the main techniques for lessening the risk of blue-light hazard.

Reference

J. D. Bullough, A. Bierman, & M.S. Rea, “Evaluating the Blue-light Hazard from Solid State Lighting,” *International Journal of Occupational Safety and Ergonomics*, October 2017, http://dx.doi.org/10.1080/10803548.2017.1375172.

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