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LRC group advises on under-cabinet and directional LED lighting

The Lighting Research Center has published two new ASSIST Recommends volumes to help in the selection and evaluation of specific LED lighting products, writes [Jennifer Taylor](#).



An LED-based under-cabinet fixture. ASSIST recommends that the application efficacy is calculated as the total lumens on the task plane, divided by the total fixture input power.



LED downlight on the Philips stand at Lightfair. Surrounding a downlight with ceiling insulation can cause considerable heat build-up inside and around the fixture, affecting the performance.

The Alliance for Solid-State Illumination Systems and Technologies (ASSIST), operated by the Lighting Research Center, has published two new volumes in its “ASSIST Recommends” series. The volumes, each published in three parts, discuss under-cabinet LED lighting and directional LED lighting.

The documents discuss such lighting products in terms of general design and application, and also provide guidance on how to select LED lighting, as well as giving recommendations for manufacturers testing and evaluating their own fixture products. They are available for free download at www.lrc.rpi.edu/programs/solidstate/assist/recommends.asp.

ASSIST’s top priority in developing the new volumes on under-cabinet and directional lighting was to begin public discussion on the need for testing criteria and methods that allow lighting fixtures to be compared on the same playing field, regardless of the type of light-source technology inside, said N Narendran, LRC director of research and organizer of the ASSIST program.

“Right now, it is very difficult for the general public to compare the performance of a fluorescent under-cabinet fixture or directional fixture with that of a similar LED fixture because the evaluation criteria used by manufacturers are different for each light source,” said Narendran. “At the LRC, we have developed technology-neutral, fixture-based testing methods that allow fixtures of the same type but with different light sources to be compared appropriately.”

Criteria based on ‘application’ efficacy

One area of significant concern has been the comparison of fixtures based on luminous efficacy. Using the standard lumens per watt

(lm/W) efficacy metric, one fixture may be considered more or less “efficient” than another fixture of the same type, based on the amount of light produced by the fixture for a given power usage.

However, Narendran said: “What we really have to compare is the application efficacy; that is, how efficient is the fixture for the application and the task being lighted? With application efficacy, we get a better sense of luminous efficacy based on how much light the fixture is putting onto the task itself, rather than just what is coming out of the fixture.” ASSIST’s recommendations provide methods for testing fixtures in their intended application for performance comparison.

Heat affects performance

Another area of concern is heat, especially with directional lighting fixtures, such as recessed downlights, said Narendran. Certain light sources, especially LED and compact fluorescent lamps, are susceptible to shortened life, color shift, and inadequate performance when subjected to high heat. Certain installations can cause a considerable amount of heat to build inside and around the fixture, such as a recessed downlight surrounded by ceiling insulation.

“If the heat isn’t managed properly,” said Narendran, “then the fixture’s performance can be negatively affected.” A particular fixture may be rated for several different types of installation, yet manufacturers may report performance for the product’s operation under ideal conditions only.

In its performance testing recommendations for directional lighting fixtures, ASSIST proposes that fixtures be tested at temperatures similar to the one or more environments for which they are rated, specifically open air, semi-ventilated, and enclosed environments.

Alliance for Solid-State Illumination Systems and Technologies

ASSIST was established in 2002 by the Lighting Research Center (LRC), part of Rensselaer Polytechnic Institute of Troy, New York. As a collaboration between researchers, manufacturers and government organizations, ASSIST has the goal to identify and reduce the major technical hurdles currently facing solid-state lighting. On behalf of ASSIST, the LRC conducts research, demonstration and educational activities.

The first ASSIST Recommends, *LED Life for General Lighting*, was published in February 2005 and revised in April 2006. It provides recommendations to manufacturers for testing and extrapolating the life of LEDs and LED systems used in general illumination applications. Since its publication it has been referenced and quoted by leading standards-setting bodies,

energy-efficiency organizations, and government agencies working on LED lighting criteria.

All ASSIST Recommends publications are available in Adobe Acrobat PDF format for free download at www.lrc.rpi.edu/programs/solidstate/assist/recommends.asp, and are revised and updated from time to time.

ASSIST Recommends is sponsored by Boeing, Cree, Federal Aviation Administration, Lite-On, GE Lumination (formerly known as GELcore), New York State Energy Research and Development Authority, Nichia America Corp., Northwest Energy Efficiency Alliance, OSRAM SYLVANIA, Philips Lighting, Photonics Cluster (UK)/The Lighting Association, Seoul Semiconductor, and the US Environmental Protection Agency.

“Such testing will give users a better idea of how a fixture will perform in their own application,” Narendran said.

Lighting essentials for homeowners

In addition to the testing recommendations written for manufacturers, ASSIST has also published lighting guides for homeowners, electrical contractors and others selecting residential lighting, as part of the two new volumes. General guides provide readers with information about how to get the best lighting from under-cabinet and directional lighting fixtures, including information on the performance of different light sources and their purchase and operational

costs, tips on installation, and things to watch out for. LED-specific guides give readers a checklist of questions to ask when looking for LED-based under-cabinet and directional lighting.

Narendran says that more ASSIST Recommends publications are planned for the future, including recommendations for selecting LED lighting for commercial refrigerators and freezers found in supermarkets, and LED outdoor lighting. ●

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