



By Ira Krepchin

Evaluating LED manufacturer claims

The good, the bad and the exaggerated

Healthcare facility managers are getting bombarded with information from LED manufacturers, but many are at a loss as to how to evaluate the product information they receive. Although there are good products available, the challenge lies in the fact many LED manufacturers are making exaggerated performance claims.

In a recent round of U.S. Department of Energy testing — through the Commercially Available LED Product Evaluation and Reporting program — researchers found more than half of the LED products came with “inaccurate or misleading literature.”

The key to making the right choice is getting accurate information about the products under consideration. A good place to start is the federal government’s

ENERGY STAR program. Products qualified through the ENERGY STAR Program for Solid-State Lighting Luminaires require independent testing based on established standards. Unfortunately, only a handful of applications are covered so far and several dozen products are qualified, but the numbers are growing.

The DOE’s CALiPER program serves as another good source of information. The program runs tests of a many LED products available for general illumination, using industry-approved test procedures. Manufacturers are not allowed to use CALiPER data for commercial purposes, but potential users can check online to see if a specific product has been tested and obtain a report on the results.

Some manufacturers are also participating in SSL Quality Advocates, a voluntary DOE program that uses the Lighting Facts™ label — modeled on the Nutrition Facts label used on food

products — to report data in a uniform, useful way based on established standards. The label provides a summary of product performance data as measured by IES LM-79-2008. It reports product performance results in five areas: light output (lumens), power (watts), efficacy (lumens-per-watt), correlated color temperature (CCT) and color rendering index (CRI). As more manufacturers participate, it will become easier to compare products on a common basis.

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Look for standards-based data

As part of the effort to bring order to the chaotic market for LED light sources, DOE and industry standards organizations have developed several standard procedures for gathering and reporting data. For electric and photometric data, manufacturers should provide information based on test procedures published by the Illuminating Engineering Society. The approved method for electrical and photometric measurements of SSL

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Products (LM-79-08) specifies procedures for measuring total luminous flux, electrical power, luminous efficacy, color temperature and color rendering index of solid-state luminaires and replacement lamp products.

Another key parameter for LEDs is the degradation of light output, or lumen depreciation. Like all light sources, LED output declines over time. IES LM-80-08 is the approved method for measuring lumen maintenance of LED light sources. The LM-80 test procedure applies to LED packages, modules and arrays and requires at least 6,000 hours of testing under specified thermal conditions. LM-80 does not provide a method for predicting LED life (typically defined as 70 percent lumen maintenance or L70). A separate method for extrapolating 6,000-hour LM-80 data (designated TM-21) is under development and it will define how to use LM-80 data to estimate useful life (L70) of LED packages, modules and arrays.

Further, LM-80 doesn't cover measurement of lumen depreciation in luminaires or integral lamps and therefore on its own cannot be used to determine luminaire or lamp life (see sidebar). LED light output is very sensitive to the temperature experienced by the LED and the drive electronics — excessive heat, which can result from local conditions and poorly designed luminaires, can shorten the life of an LED. That phenomenon explains why LED luminaires feature large, finned structures to dissipate heat. The ENERGY STAR program requires data showing the temperature of the LEDs inside the luminaire when installed in its intended application. That information is used to determine whether the luminaire has been designed to keep the LEDs at acceptable operating

LED lamp life

LEDs generally do not fail in the same manner as incandescent, fluorescent or HID sources, which burn out after a certain period of time. For these lamp types, life is typically defined as the hours of operation after which 50 percent of the lamps can be expected to fail. In contrast, LEDs can continue to operate

for long periods, but with ever-decreasing output. The lighting industry initially responded to this phenomenon by defining life for LEDs on the basis of the drop in light output. The effective life of LEDs is set as the time light output had fallen to 70 percent of the initial amount. On that basis, many manufacturers

report a projected life of 35,000 to 50,000 hours or more for high-brightness white LEDs.

Learn more online by visiting the following websites:

www.energystar.gov
www1.eere.energy.gov
www.lightingfacts.com
www.esource.com

temperatures to maintain light output over time.

Product safety is another important issue for LEDs. Underwriters Laboratories recently published a new safety standard (UL 8750): "Safety Standard for Light Emitting Diode Equipment for Use in Lighting Products."

LEDs for use outdoors

Parking lots and other outdoor applications represent a growth opportunity for LEDs for several reasons. LED illumination can be directed so light pollution is minimized. LEDs perform best when they can operate at cooler temperatures and outdoors there is a lot of room to make a fixture that is good at dissipating the heat generated by the LEDs. Also, for most applications, the lamps operate only at night when temperatures are coolest. And, LEDs are easier to control than the HID lighting that is often used outdoors, which means that LEDs can be easily used in adaptive lighting systems where light levels are controlled based on existing conditions.

In evaluating LEDs for outdoor use, the same considerations discussed previously apply, and

there are a few others as well. An ingress protection rating appropriate to the intended application should be chosen. The IP rating refers to the resistance of a luminaire to penetration by both liquids and solids.

It's also important to assess glare. Even though LED luminaires offer the potential for low glare, not all products are created equal. If possible, test at the intended mounting height and under typical nighttime viewing conditions.

Color temperature is also important. LEDs are most efficient at high-correlated color temperatures such as 6,500 K. Light at that temperature exhibits a bluish tint that not everybody likes. Many designers choose a CCT of about 4,200 K — pretty close to the appearance of light from the full moon.

Because LEDs are still a new technology, it's also advisable to run a pilot program to be sure products do what the manufacturer says and to ensure they are right for the intended use. ■

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