

SSL Postings

Because solid-state lighting has the potential to last longer than traditional lighting technologies, addressing product reliability or lifetime has been a key issue for SSL. So it's not surprising that lifetime was one of the topics under discussion at the U.S.

Department of Energy's (DOE) sixth annual SSL Market Introduction Workshop, which was held last month in Seattle. Figuring prominently in several discussions was IES TM-21, a much-anticipated method for extrapolating the lumen maintenance of LED products, which a technical committee of the Illuminating Engineering Society of North America (IES) has been working on for some time. But TM-21 was mentioned in Seattle with the caveat that it was not yet approved, which made its inclusion in any sustainability or lifetime equation somewhat premature.

That status has changed, however, with the final IES board approval last week of TM-21. To understand why that's big news for the industry, it's helpful to take a step back and look at two related IES standards: LM-79 and LM-80.

LM-79 is an approved method for taking electrical and photometric measurements of SSL products. It covers total flux, electrical power, efficacy, chromaticity, and intensity distribution - and applies to LED-based products that incorporate control electronics and heat sinks (including integrated LED products and complete luminaires), but not to bare LED packages and modules, nor to fixtures designed for LED products but sold without a light source. Unlike traditional photometric evaluation, which involves separate testing of lamps and luminaires, LM-79 tests the complete LED luminaire because of

the critical interactive thermal effects. While LM-79 doesn't address product reliability or life, it does provide for the important calculation of complete luminaire initial efficacy.

LM-80 is an approved method for measuring the lumen maintenance of LED packages, arrays, and modules at various temperatures. It specifies a minimum testing period of 6,000 hours, although 10,000 hours is preferred, and it requires testing at a minimum of 1,000-hour increments. But LM-80 provides no determination or estimation of expected life or lumen output beyond the test data - which, even with 10,000 hours of testing, falls far short of the claimed lifetimes of most SSL products on the market today.

That's where TM-21 comes in. Whereas LM-80 only defines how to collect LED lumen maintenance data, TM-21 spells out a way to use that data to estimate the lumen output beyond the LM-80 test period. So the two methods are designed to work hand-in-hand, with TM-21 providing a way to project the lumen maintenance of an LED and help estimate the potential useful life of an LED luminaire.

However, it's important to note that TM-21 focuses on a specific light source component (package, module, array), not on an entire luminaire. A complete luminaire is a complex system, with many other components that can affect lifetime - such as the driver, optics, thermal management, and housing. The failure of any one of these can mean the end of the luminaire's useful life, even if the LEDs are still going strong. So any meaningful projection of lifetime has to take all of these components into account, and not just focus on the LEDs.

This means that, in helping to project the expected lumen output of the light source as part of a total system, TM-21 is just the first step. But it's an important first step, and it means that the journey to nailing down the issue of useful SSL lifetime has finally begun.

A dedicated group of professionals has worked long and hard under the IES's Technical Procedures Committee to produce TM-21.

Recognizing the difficulty and importance of their work, DOE lent a hand to their efforts when and wherever it could, providing ideas to help resolve problems, and data analysis to answer questions. The members of this committee, and the whole of IES, deserve recognition for the hard work and long hours they've put in to make this document possible.

As always, if you have questions or comments, you can reach us at postings@lightingfacts.com.
