LM 79 compliant
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LM 79 and LM 80

Light emitting diodes (LEDs) are a relatively new and unique source for outdoor lighting. They are more reliant upon effective thermal management than any previous source, more of a directional source, and have to be designed and tested as an entire lighting system.
Therefore, LEDs require new guidelines and practices for testing. There also needs to be a correlation between how LED manufacturers test their LEDs and how fixture manufacturers test their LED fixtures. In response, the Illuminating Engineering Society of North America or IESNA developed LM-79-08 and LM-80-08 for LED fixture and LED device testing.

As a high quality LED Linear lighting module and system supplier, LED Linear remains at the forefront of LED Linear lighting technology.
LED Linear only uses high quality LED from Japanese manufacturers, who apply LM-80-08 to the LEDs delivered to LED Linear.
LED Linear applies LM-79-08 to their LED lighting modules, systems and fixtures.

The IESNA

The IESNA is a 100+ year old lighting industry group with membership that includes manufacturers (both sources and fixtures), lighting in IESNA designers and architects, utilities, and others affiliated with lighting such as consultants, government, researchers and educators.

LM-80-08 for the LEDs themselves

LM-80-08 Approved Method: Measuring Lumen Maintenance of LED Light Sources was published by the IESNA Solid State Lighting (SSL) Subcommittee in the third quarter of 2008. Simply referred to as LM-80, this document covers lumen maintenance measurement for inorganic LED-based packages, arrays, and modules; it does not cover any other aspect of LED performance.
One of the key reasons for the development of LM-80 is due to differences in measuring
LED performance criteria. LED manufacturers typically measure LEDs in pulse mode operation with no heat sink. The pulse is very short - typically 10 or 20 milliseconds (that is, thousandths of a second) - which will not heat up the LED; therefore, no heat sink is required and Tj can be assumed to be equal to ambient temperature TA (typically held constant at 25°C). This is useful for doing high yield LED measurements quickly. This also explains why LED manufacturer datasheets typically show LED performance for Tj = 25°C.
In contrast, LED fixture manufacturers measure LED performance in situ, which means while it is in their fixture. Under these conditions, the LED is operated in constant DC mode and there are typically numerous LEDs configured together often in close proximity to one another, elevating TJ above 25°C. This elevated TJ affects the photometric and colorimetric performance of the LEDs. In order to compare "apples to apples", a new testing criteria needed to be developed - LM-80.

LM-80 prescribes uniform test methods for LED manufacturers under controlled conditions for measuring LED lumen maintenance while controlling the LED's TS or case temperature, the DC forward voltage and forward current to the LED. LM-80 requires 55°C, 85°C and one other TS chosen by the LED manufacturer. It also requires lumen maintenance data out to at least 6,000 hours of constant DC mode (not pulse mode) operation 4.
Many of LED Linear Japanese LED suppliers chose 120°C for the third TS for their LED and they have recorded data out to 10,000 hours which is the preferred duration in LM-80. Based upon LM-80 data, LED manufacturers then extrapolate lumen maintenance out to tens of thousands of hours;
Our LED suppliers go out to 50,000 hours and beyond.
While LM-80 does not specify the extrapolation method, many LED manufacturers use more conservative exponential extrapolation due to the exponential behavior of LEDs and most electronic components. The SSL Subcommittee is working on TM-21 which will standardize this extrapolation method.
The data resulting from LM-80 measurements are matrices of lumen maintenance values. LED fixture manufacturers use this data in combination with their UL in-situ thermal testing to predict the lumen maintenance of the LEDs when used in their fixtures and, subsequently, the lumen maintenance of the LED fixtures themselves. For example, if we measure 85°C TS at the hottest LED Linear LED in one of our fixtures, then we look up that particular data set from our Japanese suppliers to determine the LED fixture's lumen maintenance based upon and correlated with the LED's lumen maintenance at that same TS. Fixture manufacturers also use the data to predict LED color stability over time at the various TS temperatures.

LM-79-08 for the LED fixture

LED lumen maintenance and color stability are only part of the puzzle. It is helpful to characterize the performance of LEDs in fixtures so that the entire system is considered. That's where LM-79 comes in.
LM-79-08 Approved Method: Electrical and Photometric Measurements of Solid-State
Lighting Products was published by the IESNA Solid State Lighting (SSL) Subcommittee in the first quarter of 2008.
LM-79 covers photometric and colorimetric performance as well as electrical power measurements for inorganic LED fixtures 5. LM-79 prescribes uniform test methods for LED fixture manufacturers under controlled conditions using LED fixtures as they would be manufactured for production.
Unlike traditional sources which are typically tested using relative photometry with test lamps and ballasts, LED fixtures are tested using absolute photometry with production LEDs and fixtures in the orientation in which it will be installed to ensure a more true test of LED performance when in situ.
As previously discussed, LEDs operated in situ will perform differently due to the elevated TJ which will be further impacted by fixture orientation and thermal conditions; if the LED array or module were removed from the fixture, its performance would change. This is precisely why absolute photometry is a must for LED fixtures.
LM-79 testing is typically performed with either an integrating sphere for all photometric and colorimetric measurements or an integrating sphere in combination with a goniophotometer. The integrating sphere is recommended for colorimetric measurements; alternately, a goniospectroradiometer or gonio-colorimeter may be used. LED Linear has an integration sphere for all colorimetric, radiometric and photometric measurements for single LEDs and a custom designed goniophotometer lab and equipment where we test LED fixtures following LM-79 procedures. We also test key LED fixtures in independent DOE approved labs – look for the .ies photometric files on our web site that indicate LM-79.