IESNA Approved Method for Lumen Maintenance Testing of LED Light Sources

Introduction

This approved method, LM-80, covers the measurement of lumen maintenance of inorganic LED-based packages, arrays and modules.[1] LM-80 does not attempt to induce any failure modes other than the maintenance of lumen output. In this document the use of the term 'sources' refers to packages, arrays and modules only.

This approved method describes the procedures by which LED light sources can be operated under controlled conditions to obtain optimally comparable data on changes in light output during the life of the lamp. These sources must be operated on external auxiliary devices.

LEDs typically exhibit very long operational life characteristics and, depending on drive current and use conditions, can be in use for 50,000 hours or longer. Like all light sources, the light output from LEDs slowly decreases in output over time. Unlike traditional light sources, LEDs do not tend to fail catastrophically. Therefore, over time, lumen maintenance can result in lower light output than intended in the specification or required by codes, standard practices or regulations.

LEDs may also undergo gradual shifts in the emitted spectra over time that may result in unacceptable appearance or color rendering. These changes may affect the lumen maintenance due to changes in the lumen output resulting from a varying spectral power distribution.

It is important to know the light output, efficacy, and lumen maintenance as well as the life of these light sources. For information on the photometry of the LED light source, see Reference 2.1.2, LM-79. The term 'lifetime' is often used to describe end-of-life criteria such as when lumen maintenance falls below a defined threshold. This standard establishes procedures for the measurement of lumen maintenance.

Performance of LED light sources is typically affected by variables such as operating cycle, conditions imposed by auxiliary equipment and fixtures, ambient temperature, airflow and orientation. Test conditions and programs should be designed to give comparable results when adopted by various laboratories. The recommendations of this approved method have been made with this objective.

[1]See IES Publication RP-16-05 Nomenclature and Definitions for Illumination Engineering. Addendum A.

1.0 SCOPE

This approved method is one of a continuing series of IESNA Approved Methods, which are written to permit reliable comparison of test results among laboratories by establishing uniform test methods. It addresses the measurement of lumen maintenance testing for LED light sources designed and certified to meet lighting industry standards.

This document provides the methods of the measurement of lumen maintenance of sources including LED packages, arrays and modules only. Lumen maintenance is a characteristic measured under controlled conditions. Performance in a particular application may be different. This approved method does not provide guidance or make any recommendation regarding predictive calculations or extrapolation for lumen maintenance beyond the limits of the lumen maintenance determined from actual measurements.

2.0 REFERENCES

2.1 Normative References

2.1.1 Measurement of LEDs (2nd ed.), CIE 127:2007, ISBN 978 3 901 906 58 9

2.1.2 IESNA Testing Procedures Committee. IESNA LM-79-2008 *Approved Method for the Electrical and Photometric Measurements of LED Light Sources*, New York: Illuminating Engineering Society of North America, 2008.

2.2 Non-Normative References

2.2.1 ASSIST Recommends: *LED Life Testing.* Vol. 1-6, 2005. Lighting Research Center, Rensselaer Polytechnic Institute, Troy, NY, 2005.

2.2.2 ANSI/IESNA Testing Procedures Committee, IESNA RP-16-07, *Nomenclature and Definitions for Illuminating Engineering*. See also Addendum A on solid-state lighting (Document is now continuously updated)

2.2.3 IESNA Testing Procedures Committee, IESNA LM-40-01, *Approved Method for Life Performance Testing of Fluorescent Lamps*, New York: Illuminating Engineering Society of North America, 2001.