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Standard for Replacing HID Lamps with LED Lamps: Light Output Equivalency Claims

National Electrical Manufacturers Association

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CONTENTS

Figures

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1 Overview

Light-emitting diode (LED) lamp products designed to replace high-intensity discharge (HID) lamps are becoming common in the marketplace. However, there are large variations in the luminous flux of LED lamps that claim to be equivalent to a particular HID lamp. These variations are leading to confusion for customers and an uneven playing field for manufacturers. For other lamp types, the variation in claimed equivalency is not presently a concern. The Energy Star lamps specification carefully defines equivalency to incandescent or halogen lamps. With LED replacement lamps for linear fluorescent lamps, there is also limited variation in the light output of the linear fluorescent lamps that are being replaced. HID equivalency is more difficult to define. Because of the large variation in lamp wattages, light output, and directionality provided by the luminaire, the concept of equivalency is more complicated for HID lamp replacement.

We expect manufacturers to use this Standard during the preparation of their HID equivalency claims and to reference it as support for those claims. End users, specifiers, and entities establishing requirements may also use it to ensure that sufficient light output is obtained in their applications.

2 General

2.1 Scope

The purpose of this Standard is to describe a method to establish reasonable claims of initial light output equivalency for single-ended omnidirectional LED replacement lamps that are intended to replace HID lamps.

The method accounts for two factors that influence the equivalency claims:

a. Improved lumen maintenance vs. HID. Because LED lamps have a longer useful life and their light output degrades more slowly than most HID lamps, this factor results in initial luminous flux for an LED replacement lamp that is lower than the equivalent HID lamp. This factor is independent of the luminaire.
b. The spectrum of the light, in the case of outdoor (or other low-light-level) applications. In darker environments, reaction time is faster, recognition of objects and people is more accurate, and the perception of brightness is higher if the light source has high color rendering. This factor depends on the spectrum of the light and is independent of the luminaire.

The Standard does not address other lamp characteristics, such as safety, physical dimensions, other light quality parameters, or reporting requirements. Because of the strong dependence on applications, it also does not provide corrections for the directionality of a light source, though an informative appendix addressing directionality is included.

2.2 References

This Standard incorporates undated reference provisions from other publications. These references are cited at the appropriate places in the text within square brackets, [ ], and are listed below. For undated references, the latest edition of the publication referred to applies (including amendments).

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