NEMA Standards Publication

NEMA SSL 3

High-Power White LED Binning for General Illumination

National Electrical Manufacturers Association

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Foreword

The NEMA Solid State Lighting Section has prepared this standards publication, based on discussions among numerous LED and SSL manufacturers and integrators.

In the preparation of this standards publication, input of users and other interested parties has been sought and evaluated. Inquiries, comments, and proposed or recommended revisions should be submitted to the concerned NEMA product subdivision by contacting:

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Section approval of the standard does not necessarily imply that all section members voted for its approval or participated in its development. At the time the standard was approved, the Solid State Lighting Section was composed of the following members:

Amerlux Global Lighting Solutions
Atlas Lighting Products, Inc.
Cooper Industries plc
Cree, Inc.
Dialight Corporation
EiKO, Ltd.
EYE Lighting International of N.A., Inc.
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Introduction

The binning of LEDs is a practice used by LED manufacturers to manage the variation of LED performance in mass production processes. The inefficiencies of binning may create structural vulnerability in the supply chain for the market. To reduce the risk and at the same time protect product yields, LED manufacturers often choose binning schemes in accordance with their specific or unique mass production process. As a result, the LED components or packages produced by the manufacturers maintain structured variations for their performance characteristics.

Because of the uniqueness of the mass production and quality control process used by each LED manufacturer, the LED products supplied to LED system integrators or assemblers (module makers, luminaire makers, etc.) with similar performance characteristics produced by different manufacturers are binned and labeled differently. The binning structures and labeling (marking) used varies from manufacturer to manufacturer.

Binning structure inconsistency, as a result, requires more effort on the part of LED system integrators and assemblers. More unnecessary testing, verifications, qualification, and validations processes have to take place. As a result, overall solid state lighting (SSL) industry productivity may be negatively influenced. With a rapidly growing SSL market, more LED products will be manufactured and more manufacturers will be participating in the market. This makes it necessary and important to establish industry agreed-upon guidelines to ensure product consistency.

1 Scope

This standard applies to LEDs emitting incoherent, visible radiation in solid state lighting applications. It specifies bins and bin codes for LEDs for the following characteristics:

- Color
- Lumens
- Forward Voltage

2 Normative References

ANSI/NEMA/ANSLG C78.377-2008 *Specifications for the Chromaticity of Solid State Lighting Products*

ANSI/IESNA RP-16 *Nomenclature and Definitions for Illuminating Engineering*

3 Terms and Definitions

3.1 **Bin**: A restricted range of LED performance characteristics used to delimit a subset of LEDs near a nominal LED performance as identified by chromaticity and photometric performance.

NOTE—As the result of small but meaningful variations in the manufacturing process of LED wafers and subsequent dies, the electrical and photometric characteristics of LEDs may vary from LED to LED, even when the dies are from the same wafer.

3.2 **Binning**: The process of sorting and grouping a manufactured distribution of LED packages into smaller groupings.