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Solid State Lighting for Incandescent Replacement—Dimming

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CONTENTS

Foreword	ii
Section 1 General	1
1.1 Scope.....	1
1.2 Normative References.....	1
1.3 Informative References	1
1.4 Definitions.....	1
Section 2 Requirements to Prevent Damage to Dimmers	5
2.1 Inrush Current.....	5
2.2 Continuous Operating Current.....	5
2.3 Voltage Ring-Up	5
2.4 Current Ring-Up.....	5
Section 3 Requirements to Prevent Damage to Dimmable Integrated LED Lamps	6
3.1 Volt-Amperes Withstand.....	6
3.2 Amperes Withstand	6
3.3 Asymmetric Voltage Withstand.....	6
Section 4 Dimming Performance System Requirements	7
4.1 Manufacturer-Provided Information	7
4.2 Off State.....	7
4.3 Transition from Off to On (Dimmed)	7
4.4 Transition from On (Dimmed) to Standby.....	7
4.5 Maximum Light Output when Operated on a Dimmer	8
4.6 Light Output at Minimum Dimming Level of the LED Lamp	8
4.7 Adjusting Between Maximum Light and Minimum Light	8
4.8 Steady Light Level Between Maximum and Minimum	10
4.9 Quiet Operation	10
4.9.1 Audible Noise.....	10
4.9.2 Current Crest Factor	10
4.10 Off State Power Consumption	10
Figures	
Figure 1 Example Dimming Curve.....	3
Figure 2 Definitions Diagram for Voltage.....	4
Figure 3 Light Output Curves.....	9

Foreword

The NEMA Lighting Controls and Solid State Lighting sections have prepared this standards publication, *Solid State Lighting for Incandescent Replacement—Dimming*. This standard provides interface requirements for dimming control, focusing on integrated LED lamps intended for replacement of general service incandescent lamps. Because it addresses the installed base of incandescent dimmers, this document cannot and does not provide dimmer requirements.

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	Lutron Electronics Company, Inc.
Atlas Lighting Products, Inc.	MaxLite
Cooper Industries plc	Nichia America Corporation
Cree, Inc.	Osram Sylvania Inc.
Dialight Corporation	Philips Lighting Company
EiKO, Ltd.	Ruud Lighting Inc.
EYE Lighting International of N.A., Inc.	Schneider Electric
GE	Soraa Inc.
Hatch Transformers, Inc.	Technical Consumer Products, Inc.
Hubbell Incorporated	TerraLUX Inc.
LEDnovation, Inc.	Toshiba International Corporation
Leviton Manufacturing Co., Inc.	Universal Lighting Technologies
Luminus Devices, Inc.	

At the time the standard was approved, the Lighting Controls Section was composed of the following members:

Acuity Brands Lighting	Lutron Electronics Company, Inc.
Cooper Industries plc	Osram Sylvania Inc.
GE	Philips Lighting Company
Hubbell Incorporated	RAB Lighting
Legrand North America	Schneider Electric
Leviton Manufacturing Co., Inc.	Universal Lighting Technologies

In April 2011, errata was published to the standard. In 4.6, "40 degrees or greater" was changed to "40 degrees or less."

4.5 MAXIMUM LIGHT OUTPUT WHEN OPERATED ON A DIMMER

When operated on a dimmer, the maximum light output of the integrated LED lamp may be no less than 95% of the corresponding relative light output for an incandescent lamp at the maximum phase angle.

4.6 LIGHT OUTPUT AT MINIMUM DIMMING LEVEL OF THE LED LAMP

In the on state, the LED lamp shall dim to 25% or less of the maximum light output level of the LED lamp at a phase angle of the applied voltage of 40 degrees or less.

4.7 ADJUSTING BETWEEN MAXIMUM LIGHT AND MINIMUM LIGHT

Between maximum dimmer setting and minimum dimmer setting, phase angle and relative light output shall vary according to:

Parameter	Incandescent Dimmer	Dimmable Integrated LED Lamp
Instantaneous Current (mA) required by triac to stay on	(Informative—Most 600W triac-based dimmers have less than 50 mA holding current; most 1000W triac-based dimmers have less than 75 mA holding current)	
Maximum time to change light level (ms)		250
Dimming		Smooth, continuous across entire dimming range, Monotonic
Dead Travel within 120-40 deg phase angle (deg)		20 deg max

The maximum relative light output change for a corresponding change in phase angle shall be less than 1.84% per degree of phase angle for relative light outputs of less than 25% and less than 3.67% per degree of phase angle for relative light outputs of greater than 25%.

The result of the interaction between Sections 4.5 through 4.7 is that the dimming curve of the LED lamp must fall within upper and lower bounds illustrated in Figure 3 and the associated table below. In Figure 3, the incandescent dimming curve has been included for illustrative purposes.