

NEMA SSL 6

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# Solid State Lighting for Incandescent Replacement - Dimming



**NEMA SSL 6**

**SOLID STATE LIGHTING  
FOR INCANDESCENT  
REPLACEMENT—  
DIMMING**



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*Solid State Lighting for Incandescent Replacement—Dimming*

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## 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:

Vice President, Technical Services  
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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.”

## Section 1 GENERAL

### 1.1 SCOPE

This standards publication provides interface recommendations for dimming control of integrated LED lamps intended for replacement of general service incandescent lamps operating at 120 volts, i.e., for operation with the majority of installed incandescent dimmers. LED lamps intended for operation at 12 volts are not covered by this standard.

### 1.2 NORMATIVE REFERENCES

The following normative documents contain provisions, which through reference in this text constitute provisions of this standards publication. By reference herein these publications are adopted, in whole or in part as indicated, in this standards publication.

*NEMA 410 Performance Testing for Lighting Controls and Switching Devices with Electronic Fluorescent Ballasts*

### 1.3 INFORMATIVE REFERENCES

*ANSI/IESNA RP-16-10 Nomenclature and Definitions for Illuminating Engineering*

*IESNA Lighting Handbook, Ninth Edition, 2000, Chapter 6*

*ENERGY STAR® Program Requirements for Integral LED Lamps, v1.1, amended March 22, 2010*

*UL 1472 Solid-State Dimming Controls*

*UL 8750 Light Emitting Diode (LED) Light Sources for Use in Lighting Products*

*IEEE PAR 1789 Recommended Practices of Modulating Current in High Brightness LEDs for Mitigating Health Risks to Viewers*

### 1.4 DEFINITIONS

**Crest factor:** Ratio of peak current to rms current drawn by the lamp, over a line cycle in steady state.

**Dead travel:** A range of dimmer settings that produce the same light output. Refer to Figure 1.

**Dimmer setting:** Adjustment to the incandescent dimmer intended to achieve a value of perceived light output, and results in a particular value root-mean-square voltage phase cut of the ac signal applied to the lamp. A dimmer setting of unity corresponds to the maximum light output that can be requested. A dimmer setting of zero corresponds to the minimum non-off light output that can be requested.

**Flicker:** Unintended, perceivable modulation of light output.

**Forward phase:** Phase description of wave-form for phase-cut dimmers that apply line voltage sometime after the zero cross until the subsequent zero cross. Most commonly obtained in triac-based dimmers.

**Incandescent dimmer:** Phase-cut dimmer intended for incandescent lamps.