ENERGY STAR Products Partner Meeting

Dimming LED Lights

Insights & Solutions

Monday October 23, 2017
Chicago IL
Session Schedule

- Introduction from Taylor Jantz-Sell
- Overview of technical requirements Robert Nachtrieb – LUTRON
- Update on NEMA program progress from Jennifer Dolin – LEDVANCE (formerly Sylvania)
ENERGY STAR Lamps Dimming Requirements

- Why do we have them?
- Lamps V1.0 vs V2.0 & V2.1
- Section 12 for Lamps employing controls and ALL Lamps Marketed as Dimmable
- **Maximum Light Output**: Lamp light output on the maximum setting of a dimmer shall not fall below the lamp’s baseline light output when operated without a dimmer by more than 20%
- **Minimum Light Output**: Lamp light output on a dimmer/control shall be no more than 20% of the maximum light output of the lamp on each tested dimmer/control.
- **Flicker**: The following flicker related metrics shall be reported: 1. Percent Flicker; 2. Flicker Index; 3. Lamp light output periodic frequency. **V2.1**: 4. Short Term Flicker Indicator (Pst); 5. Stroboscopic Visibility Measure (SVM); and 6. ASSIST Flicker Perception Metric (MP)
- **Audible Noise**: Lamp shall not emit noise above 24 dBA.
ENERGY STAR Lamps V2.1 Dimming Requirements

• 3 Basic testing pathways
  – Lamps designed for phase cut dimming (and SSL7A) test one lamp with reference circuit using ENERGY STAR Recommended practice for light output on a dimmer, noise and NEMA 77.
  – Lamps designed for phase cut dimming (but NOT SSL7A) test one lamp on 5 different dimmers chosen by the partner. Same as above NEMA 77 can still be used to test.*
    • EPA’s intent is for the dimmers selected to be varied in electrical construction and to represent a wide range of potential consumer situations. For example, a selection of five dimmers might include at least one dimmer specified for use with energy efficient lighting (such as CFL or LED lamps), one that has pre-set levels, one forward-phase dimmer rated 600W, and one reverse-phase dimmer.
  – Lamps that are not designed to work with phase cut dimmer e.g. connected lamp test with provided compatible control e.g. app, remote or custom wall control
Section 12.1 Dimming: New streamlined testing pathway

- Streamlined testing for products now available since NEMA launched lamp + dimmer compatibility marking program
  - Test with SSL7A complaint dimmer or circuit only
  - Sign NEMA MOU for use of trademark
  - Pay NEMA participation fee
  - Comply with NEMA 77 recommended limits for Pst and Svm
Overview of technical requirements for lamp+dimmer program from Lutron

- NEMA SSL 7A for dimmers and lamps for compatibility
- NEMA 77 for dimmers and lamps for flicker
- ENERGY STAR dimming requirements for lamps
- A quick word about testing
Flicker and the Big Picture

Reference: Figure 3 of **CIE TN 008:2017**
# ENERGY STAR Lamps Dimming (and Controls) Requirements

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Comparison of Different Temporal Light Artifact (TLA) specifications

NEMA 77:2017 recommends

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<th>SVM limit</th>
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<tr>
<td>Indoor</td>
<td>$\leq 1.0$</td>
<td>$\leq 1.6$</td>
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One source of TLA: Jitter from two-wire dimmer

a. Dimmer-driver interaction
b. Source voltage changes (noise)
c. Externally coupled noise sources
Questions & Discussion