

28 February 2018

VIA EMAIL TO: [lighting@energystar.gov](mailto:lighting@energystar.gov)

Ms. Taylor Jantz-Sell  
ENERGY STAR Lighting  
Environmental Protection Agency  
1200 Pennsylvania Ave NW., MC 6202J  
Washington, DC 20460

**ENERGY STAR Luminaires 2.1 Draft 1 Comments**

Dear Ms. Jantz-Sell,

Lutron thanks you for the opportunity to provide the attached comments on the ENERGY STAR Luminaires 2.1 Draft 1 Specification.

As you may know, Lutron was founded in 1961 and is headquartered in Coopersburg, Pennsylvania. From dimmers for the home, to lighting management systems for entire buildings, the company offers more than 17,000 energy-saving products, sold in more than 100 countries around the world. In the U.S. alone, Lutron products save an estimated 10 billion kWh of electricity, or approximately \$1 billion in utility costs per year. The company's early inventions - including the first solid-state dimmer invented by Lutron's founder Joel Spira - are now at the Smithsonian's National Museum of American History in Washington, DC.

Please find our detailed comments below. We look forward to working with you further on this important project. Please contact Steve Irving at (610) 282-6468 or at [sirving@lutron.com](mailto:sirving@lutron.com) if you have questions or would like more information on these comments. Thanks again for your consideration.



Pekka Hakkarainen, PhD  
Vice President  
Lutron Electronics Co., Inc.

1. Coordination with other ENERGY STAR Lighting specification

Lutron supports harmonized requirements among the Lamps, Luminaires, and CFLK specifications whenever possible. This helps provide consistent interpretations of requirements to all stakeholders (in particular to test labs and manufacturers) and provides opportunities for reducing unnecessary testing burden (as have been proposed by expanding the acceptance of luminaires using certified lamps). EPA is doing well here.

2. Flicker

There are two separate requirements intertwined in the new Flicker section:

- i. Operating Frequency, and
- ii. Flicker metrics (Pst and SVM) according to NEMA 77.

For clarity, we recommend separating them into two sections. As proposed, referenced documents and testing notes can become ambiguous.

Lutron supports the adoption of the NEMA 77-2017 TLA standard. NEMA 77 provides the best public method of flicker measurement available today. Recommended Pst and SVM metrics address visible flicker and stroboscopic effects through frequencies up to 2 kHz. This standard properly defines the interface between lamps and dimmers; dimmers are tested on a synthetic load, lamps on a synthetic waveform, and dimmable lamps on a synthetic phase-chopped waveform. This results in highly repeatable measurements, and based upon manufacturer experience, *provides practical levels of acceptability*. Additionally, the light measuring equipment is very well defined and the sensitivity curve is well matched to the sensitivity of the human eye.

Clarity is needed under which dimmed conditions flicker is to be measured. We believe the note regarding dimmed operation in the draft specification (“Dimming operation shall meet the requirement at all light output levels”) is intended to go with the Operating Frequency requirement. For flicker metrics according to NEMA 77, we recommend testing at the same points recommended in NEMA 77, namely 130°, 90°, and 40° conduction angles.

Recommended language follows:

**11.6 Operating Frequency: All Luminaires (Except: Luminaires shipped with ENERGY STAR certified Lamps)**

Source Type	ENERGY STAR Requirement	Method of Measurement and/or Reference Documents	Supplemental Testing Guidance
Fluorescent - compact - circline	Frequency = 2 to 33 kHz or ≥ 40 kHz	<b>Method of Measurement:</b> ANSI C82.2-2002 (R2016)	Laboratory test results shall be produced using the specific ballast model that will operate in the luminaire.  <b>Sample Size:</b> 1 sample of each ballast model shall be tested.  <b>Passing Test:</b> Sample shall pass.
Solid State	Frequency ≥ 120 Hz  <b>Note:</b> This performance characteristic address problems with visible flicker due to low frequency operation and applies to steady-state as well as dimmed operation. Dimming operation shall meet the requirement at all light output levels	<b>Method of Measurement:</b> None Referenced  <b>Reference Documents:</b> IEEE 1789-2015	Laboratory test results shall be produced using the specific luminaire, or LED light engine used in the luminaire.  <b>Sample Size:</b> 1 luminaire, LED light engine, or retrofit kit shall be tested.

**11.6 Flicker: All Luminaires (Except: Luminaires shipped with ENERGY STAR certified Lamps)**

Source Type	ENERGY STAR Requirement	Method of Measurement and/or Reference Documents	Supplemental Testing Guidance
Fluorescent - compact - circline  Solid State	Optional: Meet NEMA 77-2017 for temporal light modulation limits.  The following flicker-related metrics shall be reported for certification as of June 1, 2018: - Highest measured Short Term Flicker Indicator (PST) - Highest measured Stroboscopic Visibility Measure (SVM)	<b>Reference Documents:</b> NEMA 77-2017	<b>Test dimmable luminaires only at the dimmed levels recommended in NEMA 77.</b>  <b>Sample Size:</b> 1 luminaire, LED light engine, or retrofit kit shall be tested.