



# Lamps V2.0 Final Specification

**January 29, 2016**

**1:30 PM – 3:00 PM EST**

The webinar will begin at 1:30 PM

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# Introductions

**Taylor Jantz-Sell**

U.S. Environmental Protection Agency

**Daniel Rogers**

ICF International



# Today's Agenda

- Goals of the revision
- Key changes
- Specification Roll-Out Timeline
- Run-through of the major changes between Lamps Specification V1.1 and V2.0
- Future activities
- Quick Recap
- Q & A



# Specification Revision Primary Goals

1. Increase efficacy levels to capture greater energy savings and progress in SSL.
2. Broaden the scope and the features.
3. Provide for use of DOE's pending LED lamp test method.
4. Improve harmonization between ENERGY STAR lighting specifications.



## Key Changes

- Efficacy increases
- Connected & Color Tuning Lamp guidance
- New lamp types and bases
- Methods of measurement updates
- SSL Lumen/Lifetime & color maintenance
- Distribution for Omnidirectional
- Power Factor
- Spectral Power Distribution reporting requirement
- New & updated tools: CBCP/Luminous Intensity



# Specification Roll-Out Timeline

- Lamps V2.0 Specification was released on **December 31, 2015**.
- The effective date is **January 2, 2017**.
  - Any lamp manufactured as of **January 2, 2017** must be certified to V2.0 to bear the ENERGY STAR mark.
  - All certifications to Lamps V1.x will expire on this date
  - There IS NO GRANDFATHERING – this means all lamps need to be recertified in order to maintain certification – this does not necessarily mean products need to be retested
- Manufacturers may now certify their eligible products to the Lamps Version 2.0 requirements.
- After **July 1, 2016**, no new certifications to Lamps V1.1.
- Models already certified to V1.1 will maintain their certification status until **January 2, 2017**.

## Section 1.1: Included Products

- New eligible ANSI standard bi-pin base types: G4 and G9
- New ANSI standard lamp shape: ST style
- New eligible technologies:
  - Induction-driven electrodeless fluorescent lamps
  - Connected lamps
  - Color tunable lamps





## Section 1.2: Excluded Products

- Lamps, other than MR *and halogen capsule* replacements, that operate only on an external (i.e., not integral to the lamp) ballast, driver or transformer, e.g., pin-based fluorescent lamps (linear and compact) or their solid-state replacements.

## Section 4: New Definitions

- **Color Tunable Lamp**: allows the end user to alter the color appearance of the light generated by the lamp, including any of the following features:
  - **Color Shifting Dimmable (aka Dim-to-Warm)**: correlated color temperature (CCT) is automatically reduced as the product is dimmed.
  - **Full-Color-Tunable**: allows the end user to adjust the light output to create white or colored light. This tuning must include white light that is capable of meeting the specification's color requirements, and can alter the color appearance along the black body curve, and also extend to colors beyond the ANSI defined CCT range.
  - **White-Tunable**: allows the end user to adjust the light output over a range of CCTs. This tuning must include white light that is capable of meeting the specification's color requirements along the black body curve.





## Section 4: New Definitions

- **Connected Lamp**: An ENERGY STAR eligible connected lamp includes elements (hardware and software or firmware) or instructions required to enable communication in response to consumer-authorized energy or performance related commands and complies with all requirements for connected lamps in the specification. These elements may reside inside or outside of the base lamp.
- **Active Mode**: The state where the energy using product is connected to a mains power source and the primary light producing function is activated.
- **Off Mode**: The state where the energy using product is connected to a mains power source and is not providing any standby mode, network mode, or active mode function.
- **Standby Mode**: The condition in which the energy-using product is connected to a mains power source; and offers one or more of the following user-oriented or protective functions: to facilitate the activation or deactivation of other functions (including active mode) by remote switch (including remote control), internal sensor, or timer; or continuous functions, including information or status displays (including clocks) or sensor-based functions. (US DOE definition)

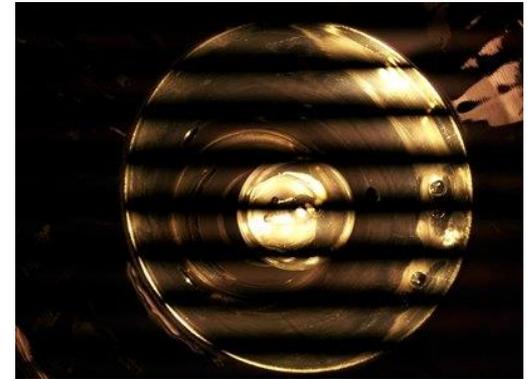


## Section 4: New Definitions

- **Device Under Test (DUT)**: An LED lamp under test.
- **Induction Driven Electrodeless Fluorescent Lamp**: A fluorescent lamp that uses electromagnetic induction to generate a discharge current, forming a closed loop inside the tube structure which excites internal gases and converts this into visible light through phosphor. For purposes of this specification, these lamps include integral electronic ballasts and are equipped with an ANSI standard base, and are also referred to as “induction lamps”.
- **Labeled Wattage**: The highest wattage marked on the lamp and/or lamp packaging. (US DOE definition)
- **Measured value**: The directly measured value from testing equipment for a given unit under test.
- **Reported value**: The value reported for purposes of compliance with DOE (referred to as “represented value” by DOE) and/or ENERGY STAR requirements according to the criteria in each applicable section.

## Section 4: New Definitions

- **Flicker (expanded)**: The impression of unsteadiness of visual perception induced by a light stimulus whose luminance or spectral distribution fluctuates with time. (CIE 17.443 e-ILV) **This term is for a static observer in a static environment.**

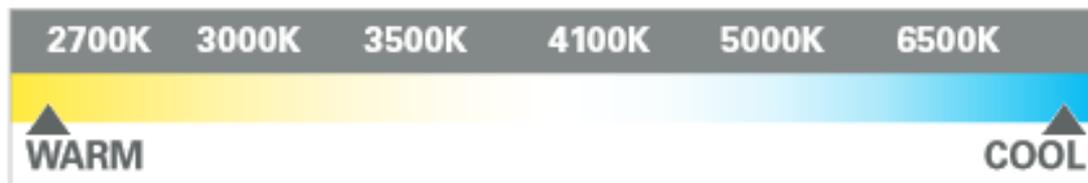


## Section 5.1: Testing Color Tunable Lamps

**NEW**

For full-color-tunable and white-tunable lamps:

- All tests and evaluations included in this specification shall be performed at the **most consumptive white light** setting covered by this specification; and
- Watts, lumens, chromaticity, and CRI shall be tested and reported for **default** and **most consumptive white light** setting covered by this specification.



## Section 8. Methods of Measurement, Updated References

- **ANSI C78.376-2014** Specifications for the Chromaticity of Fluorescent Lamps.
- **ANSI C78.377-2015** Specifications for the Chromaticity of Solid State Lighting Products.
- **ANSI C82.77-10-2014** Harmonic Emission Limits-Related Power Quality Requirements for Lighting Equipment.
- **ASA S12.55-2012 / ISO3745:2012** Determination of Sound Power Levels of Noise Sources Using Sound Pressure.
- **IES LM-65-14** Life Testing of Compact Fluorescent Lamps.
- **IES LM-66-14** Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps.

Organization	Identifier	Description
ANSI/IEEE	<a href="#">C62.41.2-2002</a>	IEEE Recommended Practice on Characterization of Surges in Low Voltage (1000V and Less) AC Power Circuits
ANSI	<a href="#">C78.20-2003</a>	Electric Lamps – A, G, PS and Similar Shapes with E26 Medium Screw Bases
ANSI	<a href="#">C78.21-2011</a>	Electric Lamps – PAR and R Shapes
ANSI	<a href="#">C78.50-2014</a>	Electric Lamps – Assigned LED Lamp Codes
ANSI	<a href="#">C78.79-2014</a>	Electric Lamps – Nomenclature for Envelope Shapes Intended for Use with Electric Lamps
ANSI	<a href="#">C78.23.1995 (R2003)</a>	Incandescent Lamps – Miscellaneous Types
ANSI/ANSLG	<a href="#">C78.357-2010</a>	For Incandescent Lamps: Tungsten Halogen Lamps (non-vehicle)
ANSI	<a href="#">C78.376-2014</a>	Specifications for the Chromaticity of Fluorescent Lamps
ANSI/ANSLG	<a href="#">C78.377-2015</a>	Specifications for the Chromaticity of Solid-state Lighting Products
ANSI	<a href="#">C79.1-2002</a>	Nomenclature for Glass Bulbs Intended for Use with Electric Lamps
ANSI/ANSLG	<a href="#">C81.61-2009</a>	Specifications for Bases (Caps) for Electric Lamps
ANSI	<a href="#">C82.77-10-2014</a>	Harmonic Emission Limits – Related Power Quality Requirements for Lighting Equipment
ANSI/IES	<a href="#">RP-16-10</a>	Nomenclature and Definitions for Illuminating Engineering
ANSI/UL	<a href="#">1993-2012</a>	Standard for Safety of Self-Ballasted Lamps and Lamp Adapters
ANSI/UL	<a href="#">8750-2009</a>	Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products
ASA	<a href="#">S12.55-2012 / ISO3745:2012</a>	Determination of Sound Power Levels of Noise Sources Using Sound Pressure - Precision Methods Anechoic and Hemi-Anechoic Rooms
CIE	<a href="#">013.3-1995</a>	Method of Measuring and Specifying Color Rendering of Light Sources
CIE	<a href="#">15-2004</a>	Colorimetry
DOE	<a href="#">10 CFR 429</a>	Certification, Compliance, and Enforcement for Consumer Products and Commercial and Industrial Equipment
DOE	<a href="#">10 CFR 430</a>	Energy Conservation Program for Consumer Products
DOE	<a href="#">TBD</a>	Energy Conservation Test Procedures for Compact Fluorescent Lamps
DOE	<a href="#">TBD</a>	Energy Conservation Test Procedure for Integrated Light-Emitting Diode Lamps
IEC	<a href="#">62321 ED 1.0 B:2008</a>	Electrotechnical Products – Determination Of Six Regulated Substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)
IEC	<a href="#">62301 Edition 2.0 2011-01</a>	Household electrical appliances - Measurement of standby power
IEEE	<a href="#">1789-2015</a>	Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers
IES	<a href="#">LM-20-13</a>	Photometric Testing of Reflector – Type Lamps
IES	<a href="#">LM-54-12</a>	Guide to Lamp Seasoning
IES	<a href="#">LM-65-14</a>	Life Testing of Compact Fluorescent Lamps
IES	<a href="#">LM-66-14</a>	Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps
IES	<a href="#">LM-79-08</a>	Electrical and Photometric Measurements of Solid-State Lighting Products
IES	<a href="#">LM-80-08</a>	Measuring Lumen Maintenance of LED Light Sources
IES	<a href="#">LM-82-12</a>	Method for the Characterization of LED Light Engines and Integrated LED Lamps for Electrical and Photometric Properties as a Function of Temperature
IES	<a href="#">LM-84-14</a>	Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires
IES	<a href="#">TM-21-11</a>	Projecting Long Term Lumen Maintenance of LED Light Sources
IES	<a href="#">TM-28-14</a>	Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires
IES	<a href="#">TM-30-15</a>	Evaluating Light Source Color Rendition
ISO	<a href="#">7574-4:1985</a>	Statistical Methods for Determining and Verifying Stated Noise Emission Values of Machinery and Equipment
NEMA	<a href="#">SSI 7A-2013</a>	Phase Cut Dimming for Solid-State Lighting – Basic Compatibility



## Section 8. Methods of Measurement, Updated References (Continued)

- **IEC 62301 Edition 2.0-2011-01** Household electrical appliances – Measurement of Standby Power.
- **IEEE 1789-2015** Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers.
- **IES LM-82-12** Method for the Characterization of LED Light Engines and Integrated LED Lamps for Electrical and Photometric Properties as a Function of Temperature.
- **IES LM-84-14** Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines, and Luminaires.
- **IES TM-28-14** Projecting Long-Term Luminous Flux Maintenance of LED Lamps and Luminaires.
- **IES TM-30-15** Evaluating Light Source Color Rendition.
- **NEMA SSL 7A-2013** Phase Cut Dimming for Solid-State Lighting – Basic Compatibility.
- **IES TM-27-14** Standard Format for the Electronic Transfer of Spectral Data



# Section 9.1: Efficacy

## (Previous) Lamps V1.1

	Lamp Rated Wattage (watts)	Minimum Lamp Efficacy (initial lm/W)
Omnidirectional	<15	55
	≥15	65
Directional	<20	40
	≥20	50
Decorative	<15	45
	15 ≤ W < 25	50
	≥25	60

## Lamps V2.0

	Minimum Lamp Efficacy (initial lm/W)	
	CRI ≥ 90	CRI < 90
Omnidirectional	70	80
Directional	61	70
Decorative	65	



## Section 9.2: Light Output

- **For LED lamps**
  - Consistent with proposed DOE rulemaking, the reported value shall be the average of the unit measured values rounded to three significant figures. **No tolerances shall be applied.** **NEW**
- **Omnidirectional**
  - EPA revised the Rated Wattage of 100W-equivalent 3-way lamps since intermediate wattage equivalency claims vary.
- **Directional (PAR, MR and MRX)**
  - Lamp initial light output (in lumens) shall be reported as the average of ten units.

Rated Wattage of the Referenced Incandescent Lamp (watts)	Light Output (Lumens)
25	250–449
40	450–799
60	800–1,099
75	1,100–1,599
100	1,600–1,999
125	2,000–2,549
150	2,550–3,000
200	3,001–3,999
300	4,000–6,000
30-60-100	1,200–1,999
30-70-100	
40-60-100	
50-100-150	2,150–3,000

3-way lamps shall be evaluated for equivalency claims based on tested results at the highest input (i.e., highest light output) setting.

## Section 9.3: Elevated Temperature Light Output Ratio: All Directional Lamps

- Clarified that exemption is for:
  - Omnidirectional, decorative, and lamps labeled “not for use in ~~enclosed or~~ recessed fixtures” or equivalent statement.
- **All directional lamps** must pass this test UNLESS they are marked “not for use in recessed fixtures” or equivalent statement.





# Section 9.4: Center Beam Intensity: PAR, MR and MRX Lamps

## NO CHANGE TO REQUIREMENTS

- [ENERGY STAR Center Beam Candle Power \(CBCP\) Tool](#) updated
  - Wattage equivalencies must be in table 1 of the CBCP tool.
  - For equivalency claims not supported by this tool, lamp must meet or exceed the measured center beam candlepower (CBCP) of the referenced incandescent or halogen product with the same nominal beam spread.

**NEW**

**Only the wattages listed below can be entered as the nominal lamp wattage for each respective diameter.**

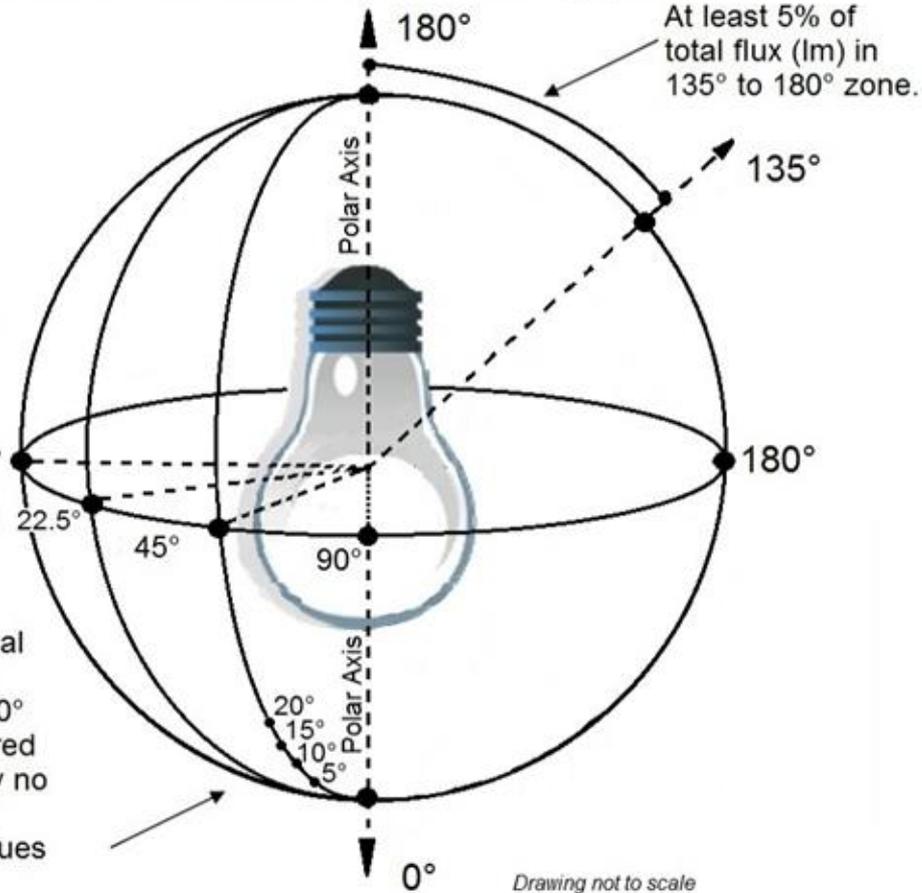
Lamp Class	Diameter	Permitted Wattages
16	16	20, 35, 40, 45, 50, 60, 75
20	20	50
30S	30	40, 45, 50, 60, 75
30L	30	50, 75
38	38	40, 45, 50, 55, 60, 65, 75, 85, 90, 100, 120, 150, 250

# Lamps V1.1

Omnidirectional lamp in base-up position

Measurements repeated in vertical planes about the lamp (polar) axis in maximum increments of 22.5° from 0° to 180°

Luminous intensity (cd) is measured within each vertical plane at a 5° vertical angle increment (maximum) from 0° to 135°. 90% of the measured intensity values may vary by no more than 25% from the average of all measured values in all planes.

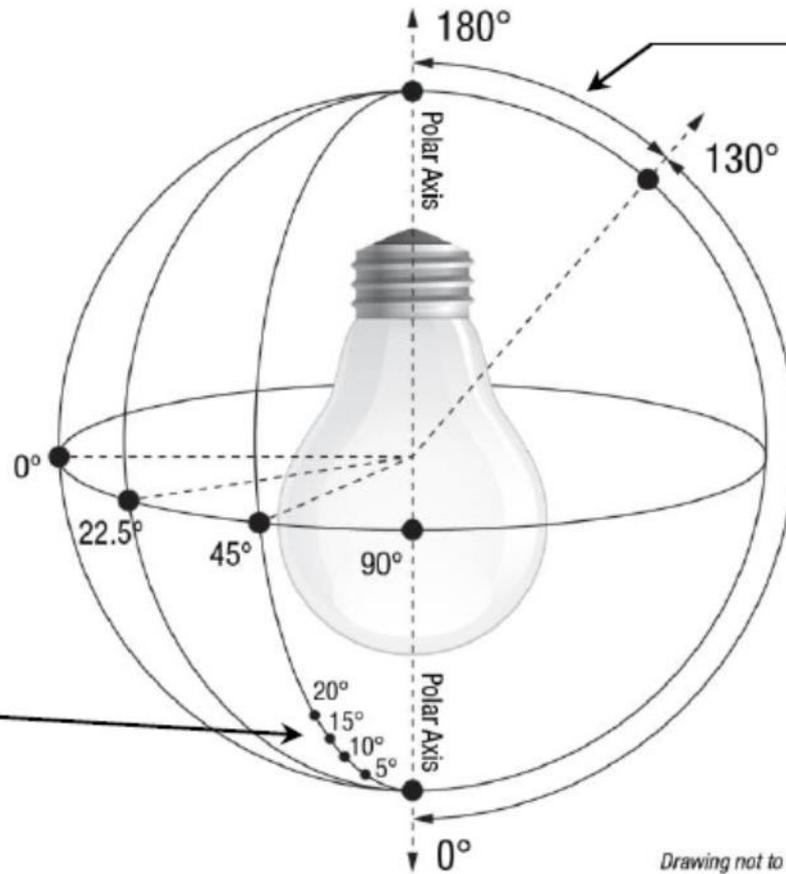


# Section 9.5: Luminous Intensity Distribution

**REVISED**

Luminous intensity (cd) measurements repeated in vertical planes about the lamp (polar) axis in maximum increments of 22.5° from 0° to 180°.

Luminous intensity (cd) is measured within each vertical plane at a 5° vertical angle increment (maximum) from 0° to 180°.



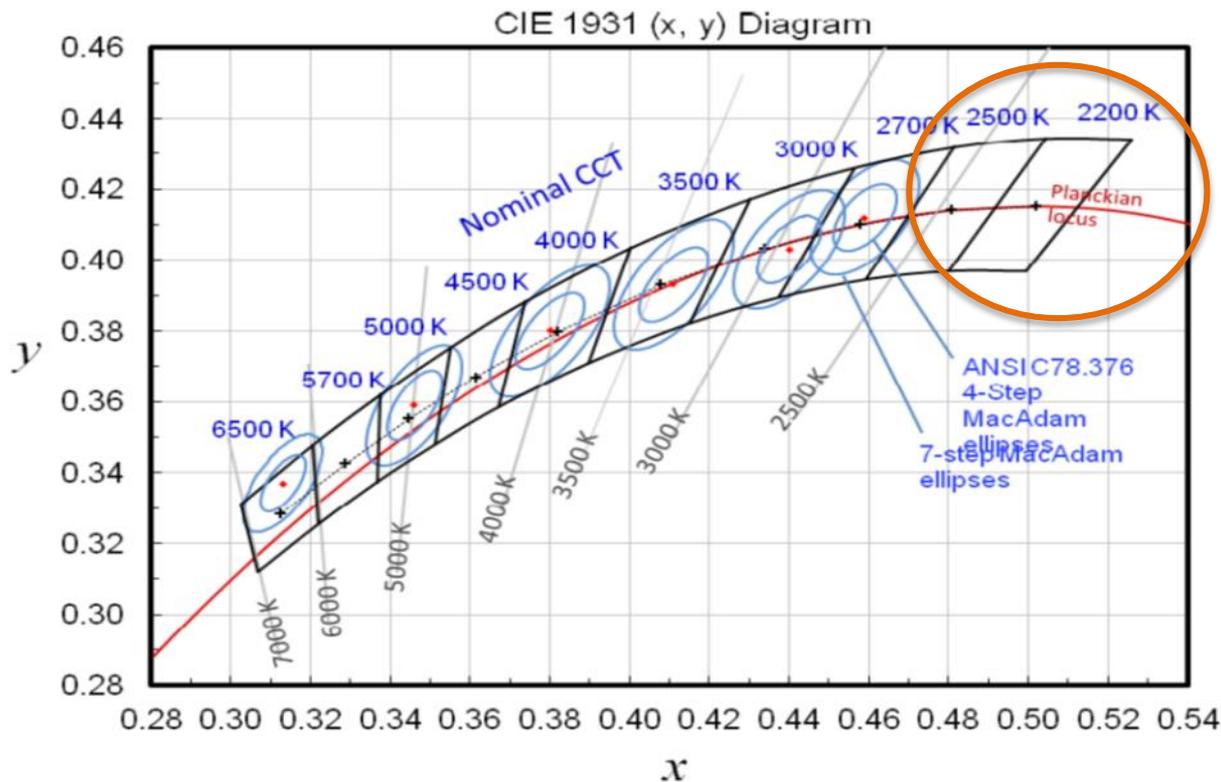
At least 5% of total flux (lm) shall be produced in the 130° to 180° zone.

80% of the measured luminous intensity values may vary by no more than 35% from the average of all measured values in all planes in the 0° to 130° zone. All measured values (candelas) in the 0° to 130° zone shall vary by no more than 60% from the average of all measured values in that zone.

*Drawing not to scale*

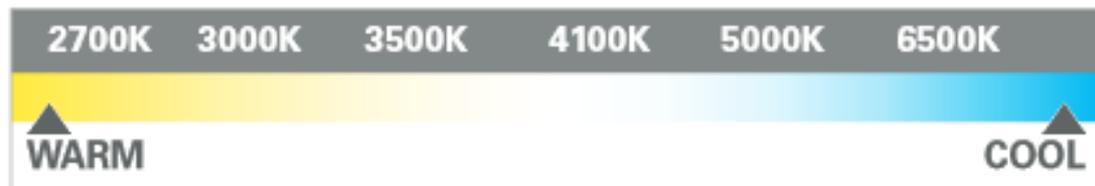
# Section 9.6: Correlated Color Temperature (CCT): All Lamps

- Added lower nominal CCTs (2200K and 2500K) for filament style lamps for full certification.



## Section 9.6: Correlated Color Temperature (CCT): All Lamps

- Reported value rounding requirement has been updated to align with the DOE June 2015 LED TP SNO PR and DOE July 2015 CFL TP NOPR:
  - “Reported CCT shall be the average of the unit measured values rounded to the nearest 100K.”





## Section 9.7: Color Rendering

### NEW

- Spectral Power Distribution shall be reported for all lamps.
  - Wavelengths from 380 nm to 780 nm (at a minimum)
  - Interval  $\leq 5$  nm
  - IES TM-27-14

### UNCHANGED

- Lamp  $R_a \geq 80$ . The average of units tested shall meet the requirements and no more than 3 units shall have  $R_a < 77$ . No unit shall have  $R_a < 75$ .
- (CFL) Lamp  $R_g$  value shall be reported.
- (LED) Lamp shall have an  $R_g > 0$ .

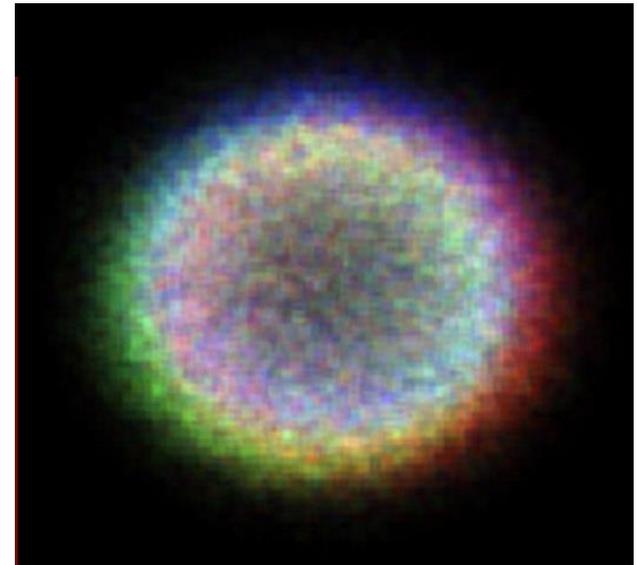


## Section 9.8: Color Maintenance: All Solid-State Lamps

- Lamp change in chromaticity coordinates from 0-hour measurement, *at any measurement point* required by the specification or reference test method during operation, shall be within a total *linear* distance of 0.007 on the CIE 1976 u'v' diagram.
- All units shall meet this requirement.

## Section 9.9: Color Angular Uniformity: Solid-State Directional Lamps

- Clarified that the color angular uniformity requirement is based on the total linear distance of the color coordinate from the weighted average point on the CIE 1976 (u'v') diagram.





## Section 10.1: Lumen Maintenance (CFL)

- CFL Requirement currently reads:
  - “The reported value shall be the average lumen maintenance of 10 units, and shall meet the requirement for the designated life claim”
- For CFLs only, EPA is revising this requirement to read:
  - “The reported value shall be the average lumen maintenance of  $\geq 9$  surviving units, and shall meet the requirement for the designated life claim”

**CORRECTION NEEDED**



## Section 10.1: Lumen Maintenance

- Supplemental Guidance currently reads:
  - Lamps labeled “not for use in totally enclosed luminaires” and/or “not for use in recessed luminaires” or equivalent statement on lamp and lamp packaging
- To clarify, EPA is revising this guidance to read:
  - Lamps labeled 1) “not for use in totally enclosed luminaires” (or equivalent statement), and 2) “not for use in recessed luminaires” (or equivalent statement) on lamp and lamp packaging

**CLARIFICATION NEEDED**



# Section 10.1: Lumen Maintenance

Lamp Type/Wattage	Methods of Measurement and/or Reference Documents*	Operating Temperature
Lamps labeled 1) “not for use in totally enclosed luminaires” (or equivalent statement), <b>and</b> 2) “not for use in recessed luminaires” (or equivalent statement) on lamp and lamp packaging	ENERGY STAR Ambient Temperature Life Test	Between 20°C and 35°C
Directional lamps ≤ 20 watts	ENERGY STAR Elevated Temperature Life Test	Option A or B or C at 45°C ±5°C
Directional lamps > 20 watts	ENERGY STAR Elevated Temperature Life Test	Option A or B or C at 55°C ±5°C
All other omnidirectional and decorative lamps	ENERGY STAR Elevated Temperature Life Test	Option A or B or C at 45°C ±5°C

**HIGH HEAT TESTING UNLESS SPECIALLY MARKED**



## Section 10.2: Rated Life (LED)

- Omnidirectional  $\geq$  15,000 hours **(reduced from 25,000)**
  - Decorative  $\geq$  15,000 hours
  - Directional  $\geq$  25,000 hours
- NO CHANGE**
- **All tested units shall be operational at all applicable lumen maintenance measurement points. (changed from 90% at 6,000 hours)**



# Section 10.3: Rapid Cycle Stress Test

- Revised to only apply to CFLs
- No more rapid cycling for LED lamps.

## NO CHANGE TO THE TEST

Lamp Type	ENERGY STAR Requirements
Compact Fluorescent	<p>Lamp, when cycled at 5 minutes on, 5 minutes off, shall survive the lesser number of cycles: one cycle per hour of rated life or 15,000 cycles. At least 5 units shall survive the minimum number of cycles.</p> <p>CFLs with a start time <math>\leq 100</math> milliseconds, shall survive cycling once per every two hours of rated life, at 5 minutes on, 5 minutes off.</p>

## Section 11.2: Power Factor

- Lamps  $\leq 5$  Watts exempt
- CFL  $\geq 0.5$
- LED:
  - Omnidirectional lamps with rated/reported input power  $\leq 10$  watts shall have a reported value  $\geq 0.6$
  - All other lamps shall have a reported value  $\geq 0.7$

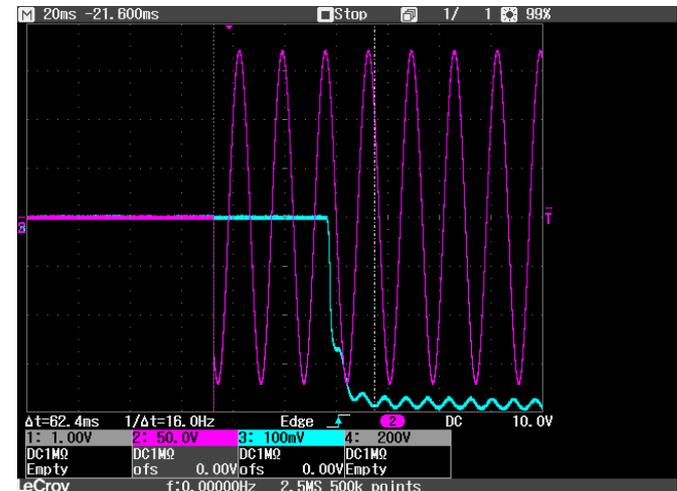
**NEW**



# Section 11.4: Start Time: All Lamps

Lamp Type	ENERGY STAR Requirements
Non-Connected Lamps	Reported value of time for lamp to remain continuously illuminated shall be within <b>750 milliseconds</b> of application of electrical power.
Connected Lamps	Reported value of time for lamp to remain continuously illuminated shall be within <b>1 second</b> of application of electrical power.

**REDUCED FROM 1 SEC**





## Section 11.5: Run-Up Time (All CFLs)

- Reported value of time for lamp to achieve 80% stabilized light output shall be  **$\leq 45$  seconds**.

**REDUCED FROM**

- **60 SECONDS FOR BARE LAMPS; AND**
- **120 SECONDS FOR COVERED LAMPS**

## Section 11.7: Standby Power Consumption: All Lamps

- Lamps without integral controls can not draw power in the off mode.
- Lamps with integral controls may draw up to 0.5 Watts.
- **Standby power (if applicable) shall be reported for equipment (outside of the lamp)** required for connectivity (e.g., gateways, hubs, and network controllers, excluding equipment typically found in the home such as a Wi-Fi router).



**NEW REQUIREMENT**



## Section 12.2 – 12.5, Dimming Performance

- Sections 12.2-12.4: Maximum Light Output, Minimum Light Output, Flicker **NO CHANGE**

**REMOVED 4-LAMPS-PER-DIMMER REQUIREMENT**

Supplemental Testing Guidance

**Sample Size: 1 lamp per dimmer.**

- Section 12.5: Audible Noise
  - Clarified that fully anechoic chambers are not required for noise testing.



# Section 12.6: Products with Connected Functionality

## NEW SECTION

Source Type	ENERGY STAR Requirements
<p><b>All source types</b></p>	<p>Product must continue to comply with the applicable product safety standards – the addition of the functionality shall not override existing safety protections and functions.</p> <p>Product must comply with Section 11.7 Standby Power Consumption.</p> <p><b>Power consumption (if applicable) shall be reported for equipment (outside of the lamp) required for connectivity (e.g., gateways, hubs, and network controllers, excluding equipment typically found in the home such as a Wi-Fi router).</b></p>



## Section 12.7: Connected Product Criteria

### NEW SECTION

- To be recognized as connected, a “connected lamp” shall include elements (hardware and software or firmware) or instructions required to enable communication in response to consumer-authorized energy or performance related commands (e.g., instructions for downloading a mobile application, Bluetooth syncing guidance) and shall meet the requirements in Sections 12.8-12.12.
- These elements may reside inside or outside of the base lamp. For example, a “base lamp” may connect wirelessly via a home gateway or network controller to a cloud service that implements energy estimation functions.



## Section 12.8: Open Access

### NEW SECTION

- Where no suitable open standards communications method exists (e.g., an IP interface), an available and documented communication method must be used. In these cases, a manufacturer-specific method to implement the functions in sections 12.9, 12.10, and 12.11 shall be published for use with the product.



# Section 12.9: Energy Consumption Reporting

## NEW SECTION

- The lamp, or the gateway device or cloud service connected to it, shall be capable of interconnecting with consumer authorized entities to communicate data representative of its interval energy consumption.
- It is recommended that data be reported in watt-hours for intervals of 15 minutes; however, representative data may also be reported in alternate units and intervals as specified in the product manufacturer's interface specification or API.
- If the lamp does not provide power consumption directly in watts, the manufacturer shall make available a method for estimating power consumption, in watts, from the representative data that is provided by the lamp.



## Section 12.10: Operational Status Reporting

- At a minimum, the lamp, or the gateway device or cloud service connected to it, shall be capable of providing the following information to energy management systems and other consumer authorized devices, services or applications via a communication link: operational status (e.g., on/off).

## Section 12.11: Remote Management

- EPA's intent is for the product to provide the ability to receive and respond to signals from at least one device, service or application.

**NEW SECTIONS**



## Section 12.12: Information to Consumers

### NEW SECTION

- If additional devices, services, and/or infrastructure are required to activate the product's connected capabilities, prominent labels, or other forms of consumer notifications shall be displayed at the point of purchase and in the product literature. (e.g., “This product has Z-wave control capability and requires interconnection with a Z-wave controller to enable local lighting control.”).



## Section 13.1: Lamp Toxics Reduction: All Lamps

- Added two new exemptions consistent with EU RoHS:
  - Lead as an alloying element in aluminum containing up to 0.4% lead by weight
  - Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses



## Section 14.1: Dimensional Requirements

**NO CHANGE**

- Decorative Lamps
  - Lamp shall comply with ANSI minimum overall length (min OAL), maximum overall length (MOL) and maximum lamp diameter values, where they exist.
  - Where no ANSI maximum lamp space drawing exists, lamp maximum outside diameter shall be within  $\pm 15\%$  of an ANSI standard lamp space drawing.

**DESIGNATE SPECIFIC ANSI SHAPE FOR QPL**



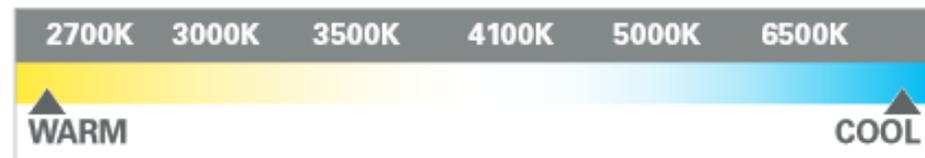
## Section 15.2: Lamp Packaging

- Packaging and marketing claims shall represent the product consistent with its certification.
- Lamp packaging exterior shall clearly state specific application restrictions (e.g., totally enclosed luminaires, recessed luminaires, insulated ceiling air-tight (ICAT) recessed downlights, damp locations) that would compromise the performance of the lamp and could result in a lamp's noncompliance with the ENERGY STAR specification performance requirements. All application exceptions that appear on the lamp shall also be listed on the lamp package exterior. ( $\geq 8$  point type and/or bold text is recommended.)



## Section 15.2: Lamp Packaging Recommended CCT Terminology

- 2200K – Amber White\*
- 2500K – Sunrise/Sunset White\*
- 2700K – Soft White
- 3000K – Warm White
- 3500K – Neutral White
- 4000/4100K – Cool White
- 5000K – Daylight
- 6500K – Daylight





# Quick Recap

- **Key Dates**

- **December 31, 2015** – Lamps V2.0 Specification was released.
- **July 1, 2016** – No new certifications to Lamps V1.1.
- **January 2, 2017** – Effective date. Models certified to V1.1 maintain their certification status *until* this date.

- **Recap of Key Goals**

- Increase efficacy levels to capture greater energy savings and progress in SSL.
- Broaden the scope and the features.
- Provide for use of DOE's pending LED lamp test method.
- Improve harmonization between ENERGY STAR lighting specifications.



# Looking to the Future

## Technical Discussion Webinars

Last Thursday of the Month (except April, October, and November)

- 1. Understanding and Addressing Flicker**
- 2. Evaluating Color Quality**
- 3. Latest Trends in Connected Lighting**
- 4. The State of Dimmable LED Lamps**
- 5. The Quest for a Short Term Reliability Test**



# Quick Marketing Reminders

- **Resources For Consumers:**

- [Renovate with LED Lighting Factsheet](#)
- [Dimmable ENERGY STAR Infographic](#)
- [Lighting Made Easy Infographic](#)
- [Light Bulb Purchasing Guide](#)
- [ENERGY STAR Lighting FAQs “Ask the Expert” Video](#)
- [Light Bulbs Product Finder](#)
- [Light Fixtures Product Finder](#)
- [The Energy Source](#)

- **Partner Training Resources:**

- [ENERGY STAR Products Partner Meeting](#)
- [“Illuminated” – EPA’s Lighting Podcast](#)
- [ENERGY STAR Lighting Training Center](#)



# Discussion Time

- Questions?





# Section 10.1: Lumen Maintenance (LED)

Lamp shall maintain minimum percentage of 0-hour light output after completion of the 6000-hr test duration per the table(s) below:

**Early Interim Certification:**  
To qualify for Early Interim Certification after 3,000 hours:

**For Extended Lifetime Claims:**  
lamp shall maintain  $\geq$  91.5% of 0-hour light output after completion of the test duration corresponding to lamp's life claim per the table below.

Maximum Life Claim (hours to L70)	Minimum Lumen Maintenance After Test Duration	Status After Completion of Test Duration
15,000	86.7%	Final certification testing completed.
20,000	89.9%	
25,000	91.8%	
30,000	93.1%	Interim certification; continue testing per below.
35,000	94.1%	
40,000	94.8%	
45,000	95.4%	
50,000	95.8%	

Maximum Life Claim (hours to L70)	Minimum Lumen Maintenance After 3,000 Hours
15,000	93.1%
20,000	94.8%
25,000	95.8%

Maximum Life Claim (hours to L70)	Test Duration (hours) *
30,000	7,500
35,000	8,750
40,000	10,000
45,000	11,250
50,000	12,500

**NO CHANGE**



## Section 12.1: Dimming Performance: All Lamps Marketed as Dimmable

- Lamps compatible with a non-phase cut control device (e.g., a dimmer that does not alter the line voltage to the lamp, **such as wireless controls**), shall be tested with the control device(s) and application(s) specified by the partner against all dimming performance requirements.

**NO CHANGE**