

ENERGY STAR. The simple choice for energy efficiency.



# ENERGY STAR® Lamps Version 2.0 Draft 3 Webinar

**August 21, 2015**  
**2 pm – 5 pm EDT**

Peter Banwell, U.S. Environmental Protection Agency  
Daniel Rogers, LC, ICF International





## Webinar Details

- **Webinar slides and related materials to be available on the Lamps Web page:**
  - [www.energystar.gov/revisedspecs](http://www.energystar.gov/revisedspecs)
  - *Follow link to “Version 2.0 is in Development” under “Lamps”*
- **Audio provided via teleconference:**
  - Call in:** +1 (877) 423-6338 (U.S.)  
+1 (571) 281-2578 (International)
  - Code:** 316317#
  - Phone lines will be muted during the presentation
  - Phone lines will be opened for the Q&A and discussion at the end of this webinar
  - Press \*6 to mute and \*6 to un-mute your line
- **Questions/comments**
  - For everyone’s benefit, please state name before commenting
  - Can ask questions via the webinar chat at any time



## Today's Agenda

- Introduction
- Goals
- Specification Development Process
- Draft 3 Changes
- Next Steps
- Discussion

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# Introductions

**Peter Banwell**

**U.S. Environmental Protection Agency**

**Daniel Rogers**

**ICF International**



## Goals of this Specification Revision

- Increase efficacy levels
- Broaden the scope and features
- Provide for use of DOE's pending CFL and LED lamp test methods
- Improve harmonization between ENERGY STAR lighting specifications
- *Intended to avoid the need for partners to retest*
- *Capture improvement in LED lamps*



## Specification Development To Date

Event	Date
Draft 1 Released	February 13, 2015
Draft 1 Webinar	March 3, 2015
Deadline for Draft 1 Written Comments	March 13, 2015
Draft 2 Released	April 10, 2015
Draft 2 In-Person Meeting and Webinar	April 20, 2015
Deadline for Draft 2 Written Comments	May 7, 2015
<b>Draft 3 Released</b>	<b>August 6, 2015</b>
<b>Draft 3 Webinar</b>	<b>August 21, 2015</b>
<b>Deadline for Draft 3 Written Comments</b>	<b>September 4, 2015</b>



## **Draft 3 Changes**

### **Scope**

Future Specification Revisions

Definitions

Test Criteria

Methods of Measurement and Reference Documents

Photometric Performance

Lumen Maintenance

Electrical Performance

Controls Requirements

Lamp Toxics

Labeling & Packaging

## Section 1.1: Included Products

- G4 and G9 added to the list of eligible ANSI standard base types
- ANSI standard ST lamp shape now eligible for Decorative







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## EPA-DOE Coordination

- EPA coordinates on test methods with DOE.
- EPA and DOE both have draft proposals related to CFL and LED lamps.
- Lamps Draft 3 does not refer to DOE's draft test methods.
- Lamps Draft 3 does signal that DOE test methods (once final) will be accepted for ENERGY STAR certification.



## EPA-DOE Coordination

- Until DOE issues their final rules, manufacturers should use EPA's test methods.
- Once DOE rules are final:
  - For new certifications, manufacturers may choose either EPA's or DOE's test methods.
  - For products already certified to V2.0 using EPA's test methods, retesting will not be required.



## Section 3.1: Considerations for Future Revisions

- CRI as an allowable product variation
- Reduced CCT bin size from 7 steps to 4 steps
- New methods for evaluating light source color rendition
- Standby power reduction
- Further increases in efficacy



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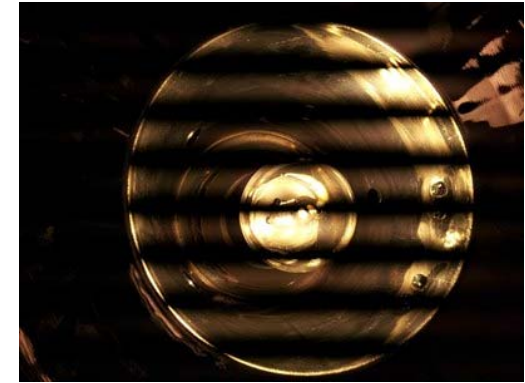
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## Section 4: Definitions

- 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.**





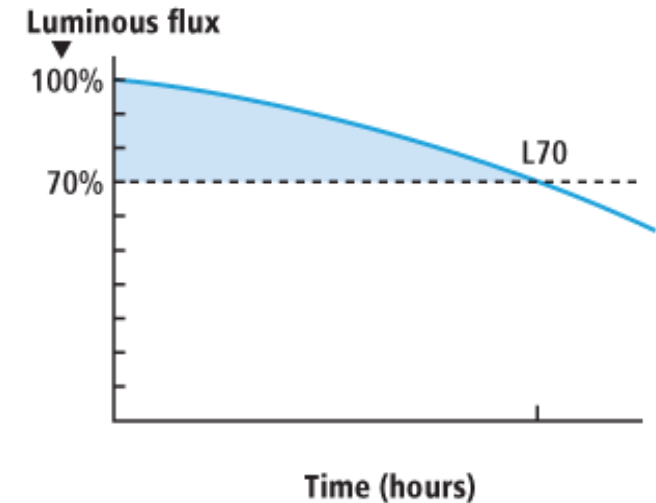
## Section 4: Definitions

- Labeled Wattage (*new*):
  - The highest wattage marked on the lamp and/or lamp packaging.
- Rated Wattage (*revised*):
  - The wattage marked on the lamp (referred to as “labeled wattage” by DOE). (10 CFR 430 Appendix W to Subpart B)



## Section 4: Definitions

- Lumen Maintenance (*revised*):
  - The lumen output measured at a given time in the life of the lamp and expressed as a percentage of the measured initial lumen output. Lumen maintenance is the converse of lumen depreciation.





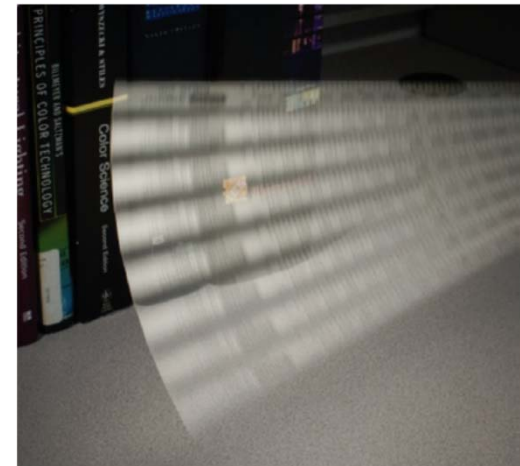


## Section 4: Definitions

- Reported Value (*revised*):
  - 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: Definitions

- Stroboscopic Effect (*new*):
  - The appearance of multiple, discrete images of moving objects as a result of temporally unstable illumination. The effect may also change the appearance of the objects in their motion. (IEEE Std 1789<sup>TM</sup>-2015) This term is for a static observer in a non-static environment.





## Section 4: Definitions

- Temporal Light Artifact (*new*):
  - An undesired change in visual perception induced by a light stimulus whose luminance or spectral distribution fluctuates with time for an observer in a certain environment. Depending on the details of the fluctuations, TLA consists of flicker and/or stroboscopic effect. (NEMA TLAs-2015)



## Section 4: Definitions

- Color Tunable Lamp (*unchanged*):
  - “...has functionality that allows the end user to alter the color appearance of the light generated by the lamp. 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, or may also extend to colors beyond the ANSI defined correlated color temperature ranges (e.g., 2700K and 6500K) outside of the seven step MacAdam ellipse or the ANSI quadrangles.”





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## Section 5.1: Testing Color Tunable Lamps

- All tests and evaluations included in this specification shall be performed at the **most consumptive white light setting** included in this specification.





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## Section 8: Methods of Measurement and Reference Documents

- ANSI C78.376-2014 (formerly 2001)
- ANSI C78.377-2015 (formerly 2011)
  - All references to 2015 in final spec
- IEC 62301 Edition 2.0 2011-01 (updated identifier)
- IEEE 1789-2015 (new)
- IES LM-84-14 (new)
- IES TM-28-14 (new)





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## Section 9.1: Luminous Efficacy

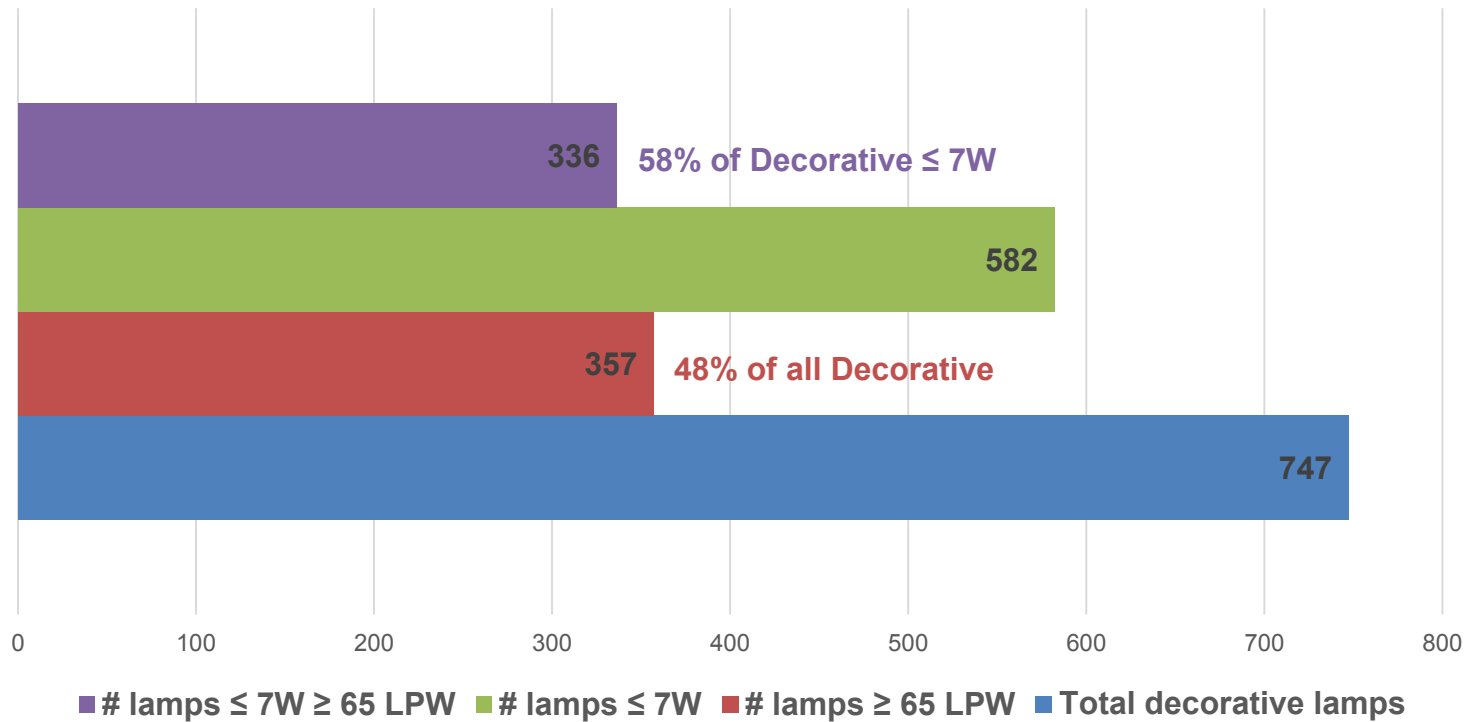
- Decorative
  - EPA proposed 65 LPW in Draft 1
  - EPA proposed setting a different level for lamps  $\leq 7W$  in Draft 2
  - **Based on new information, EPA returned to the 65 LPW value**

	Minimum Lamp Efficacy (initial lm/W)
<b>Omnidirectional</b>	65
<b>Directional</b>	65
<b>Decorative</b>	65



# Section 9.1: Luminous Efficacy

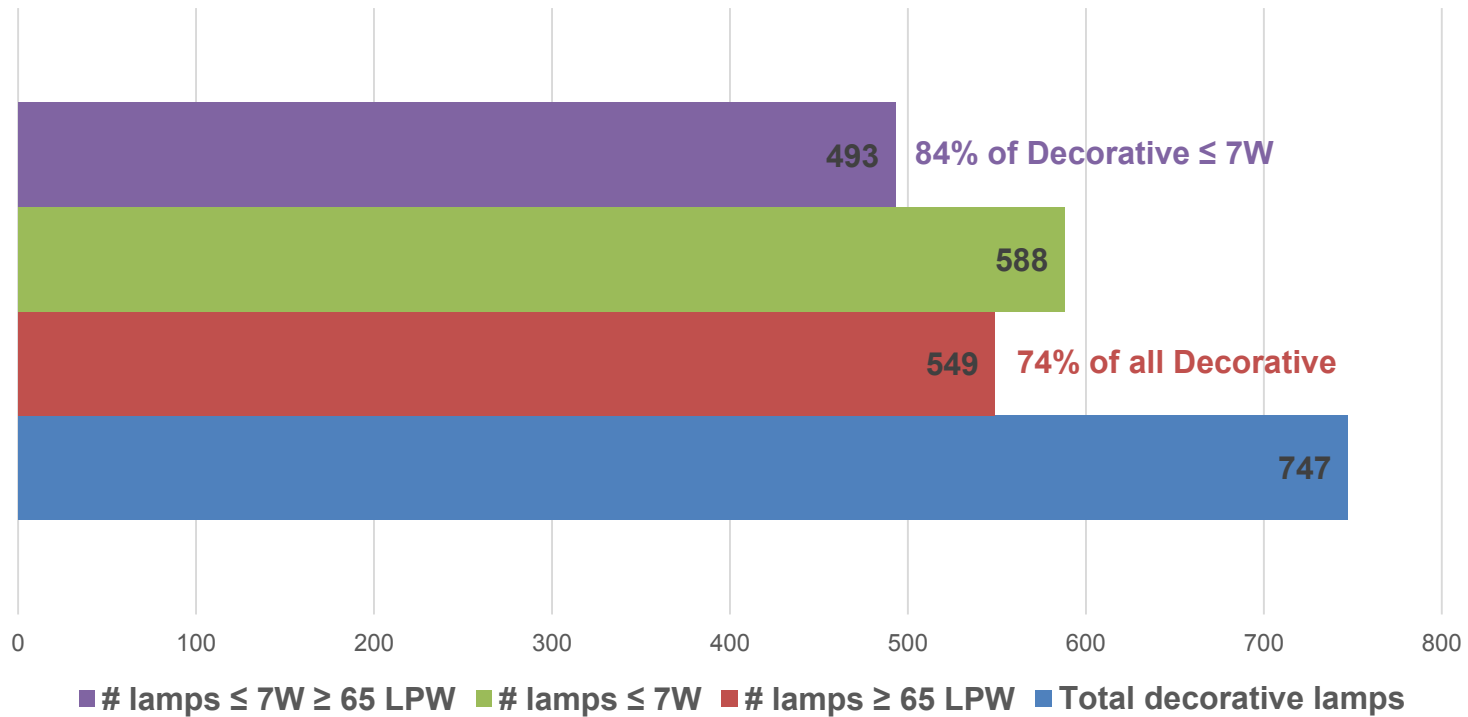
## Rated Data - Decorative Lamps





# Section 9.1: Luminous Efficacy

## Measured Data - Decorative Lamps





## Section 9.2: Light Output

- Omnidirectional
  - EPA revised the Rated Wattage of 100W-equivalent 3-way lamps in response to comments that intermediate wattage equivalency claims vary.

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 30-70-100 40-60-100	1,200-1,999
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.

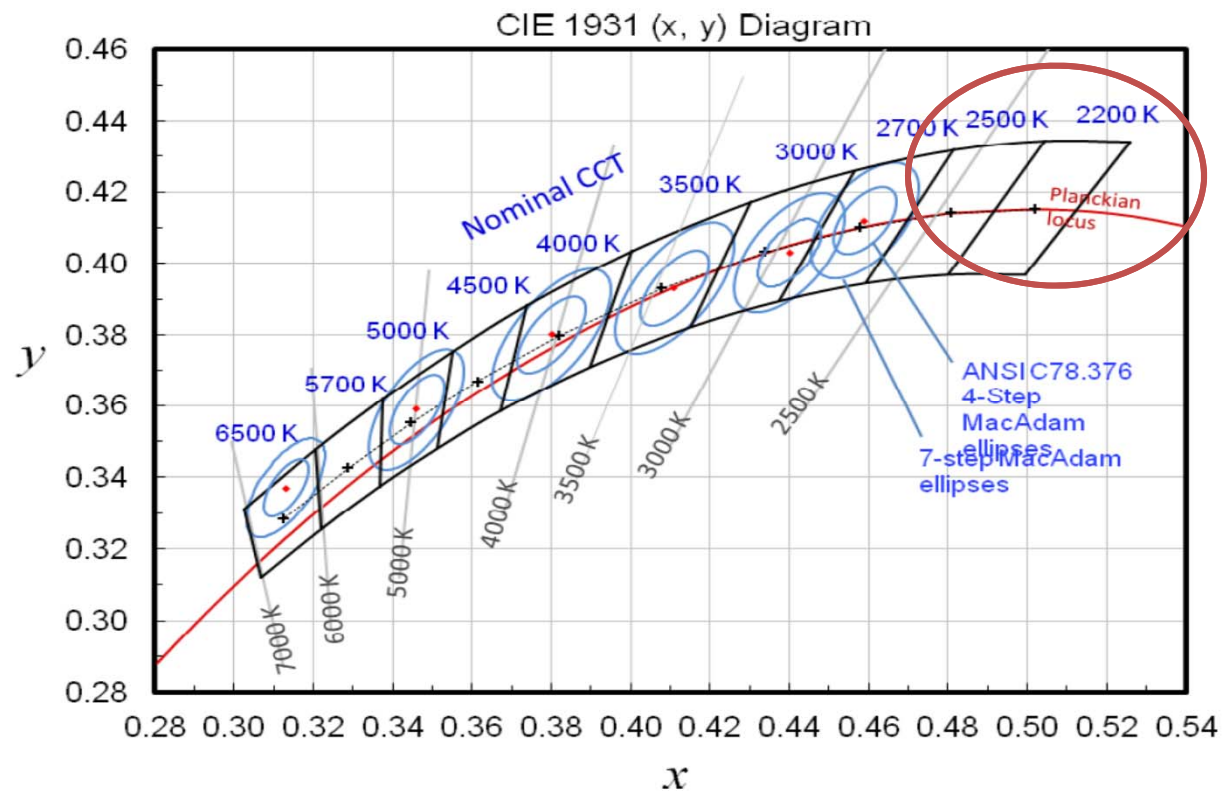
## Section 9.3: Elevated Temperature Light Output Ratio: All Directional Lamps

- Clarified that exemption is for:
  - Omnidirectional, decorative, and lamps labeled “not for use in recessed fixtures” or equivalent statement.



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

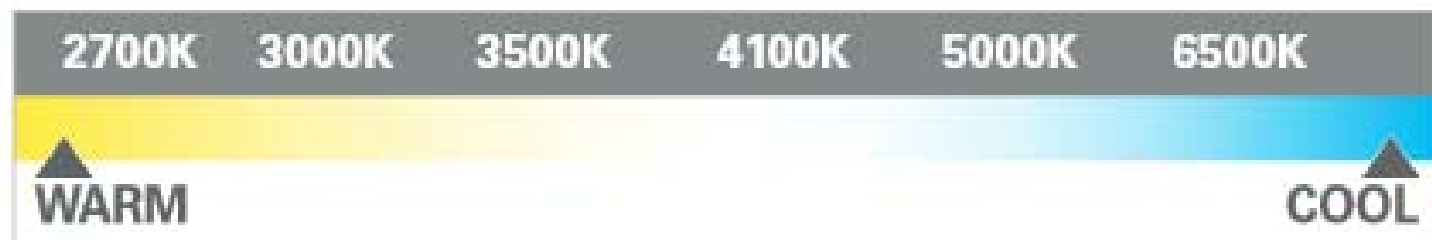
- Added lower nominal CCTs (2200K and 2500K) for solid-state lamps.





## 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 SNOPR and DOE July 2015 CFL TP NOPR:
  - “Reported CCT shall be the average of the unit measured values rounded to the nearest 100K.”







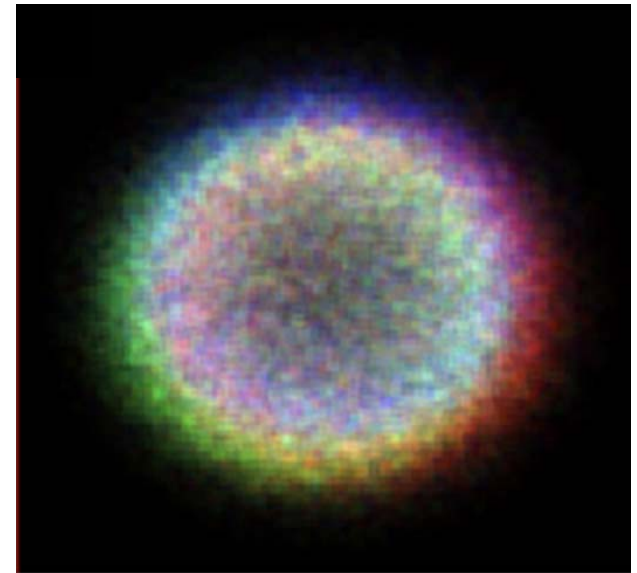
## Section 9.7: Color Rendering: All Lamps

- No specification changes proposed.
- DOE Test Procedures for CFLs (once final) include CRI.

<b>Fair</b> 50–60 CRI Standard Warm White Fluorescent Standard Cool White Fluorescent	
<b>60–70 CRI</b> Premium High Pressure Sodium Conventional Metal Halide	
<b>Better</b> 70–80 CRI Thin Coat Tri-Phosphor Fluorescent	
<b>Best</b> 80–90 White High Pressure Sodium Warm Metal Halide Thick Coat Tri-Phosphor Fluorescent	
<b>90–100</b> High CRI Fluorescents Incandescent and Tungsten-Halogen	

## 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.





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## Section 10.1: Lumen Maintenance

- Reorganized the Requirements and Supplemental Testing Guidance.
- DOE CFL Test Procedures (once final), will cover all CFL lamps.



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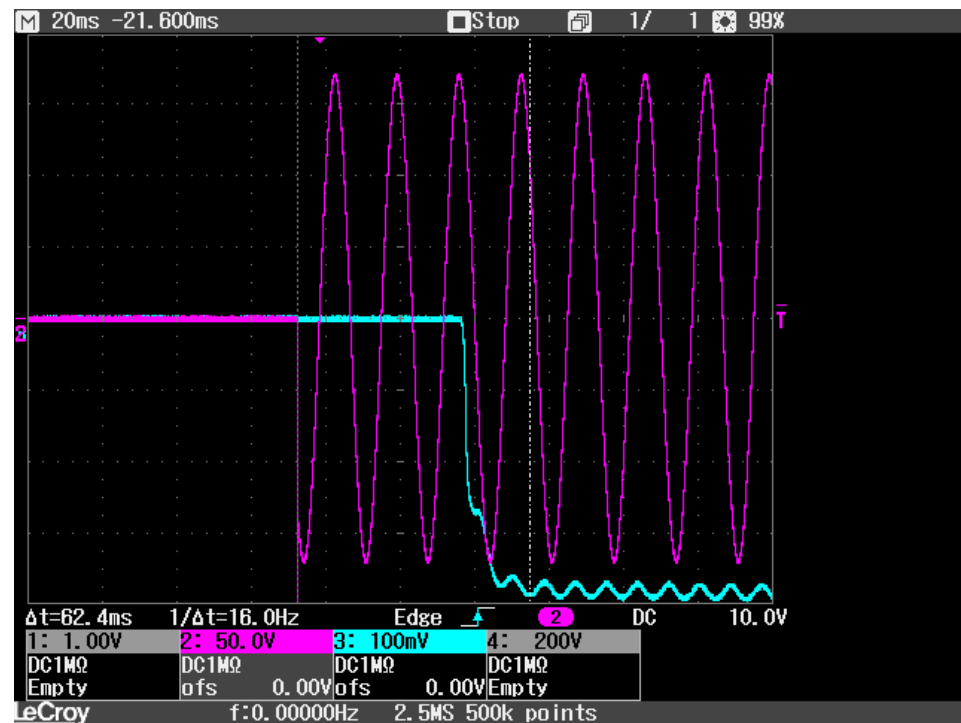
## Section 11.2: Power Factor: All Lamps

- DOE CFL Test Procedures (once final), will include Power Factor.
- EPA is aware that ANSI C82.77-10-2014 refers to C82.16 which has not yet been published.



## Section 11.4: Start Time: All Lamps

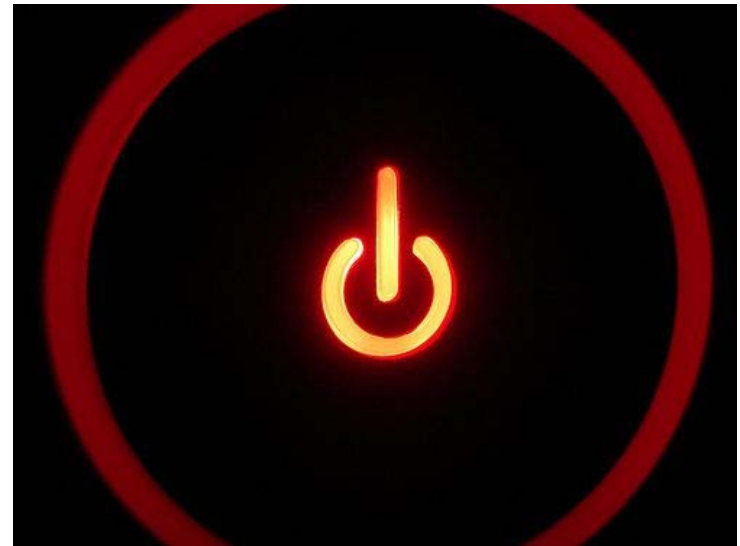
- No specification changes proposed at this time.





## Section 11.7: Standby Power Consumption: All Lamps

- No specification changes proposed.
- DOE Test Procedures for CFLs (once final) will include standby power consumption.







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

- Testing a larger sample size of 4 proved more complex but only marginally more accurate than a sample size of 1.
- Therefore, EPA removed the 4-lamps-per-dimmer testing requirements for §12.2 – §12.5 in order to reduce testing time and cost.

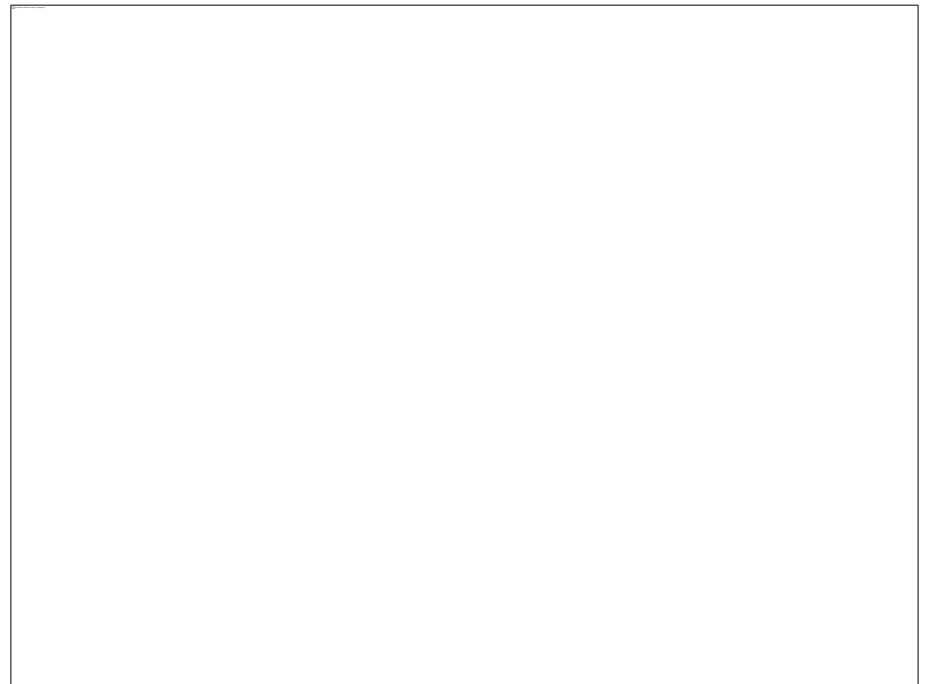
### Supplemental Testing Guidance

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



## Section 12.5: Audible Noise

- Clarified that fully anechoic chambers are not required for noise testing.





## Section 12.8: Open-standards & Open-access

- Clarified the means by which a product enables connectivity:
  - “Where no suitable open standards communication method exists (e.g., an IP interface), an open and documented communication method must be used. In these cases, a manufacturer-specific method shall be published for use with the product.”



## Section 12.9: Energy Consumption Reporting

- Clarified that reporting of estimated power consumption (watts) is allowed:
  - “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 12.11: 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.



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## 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





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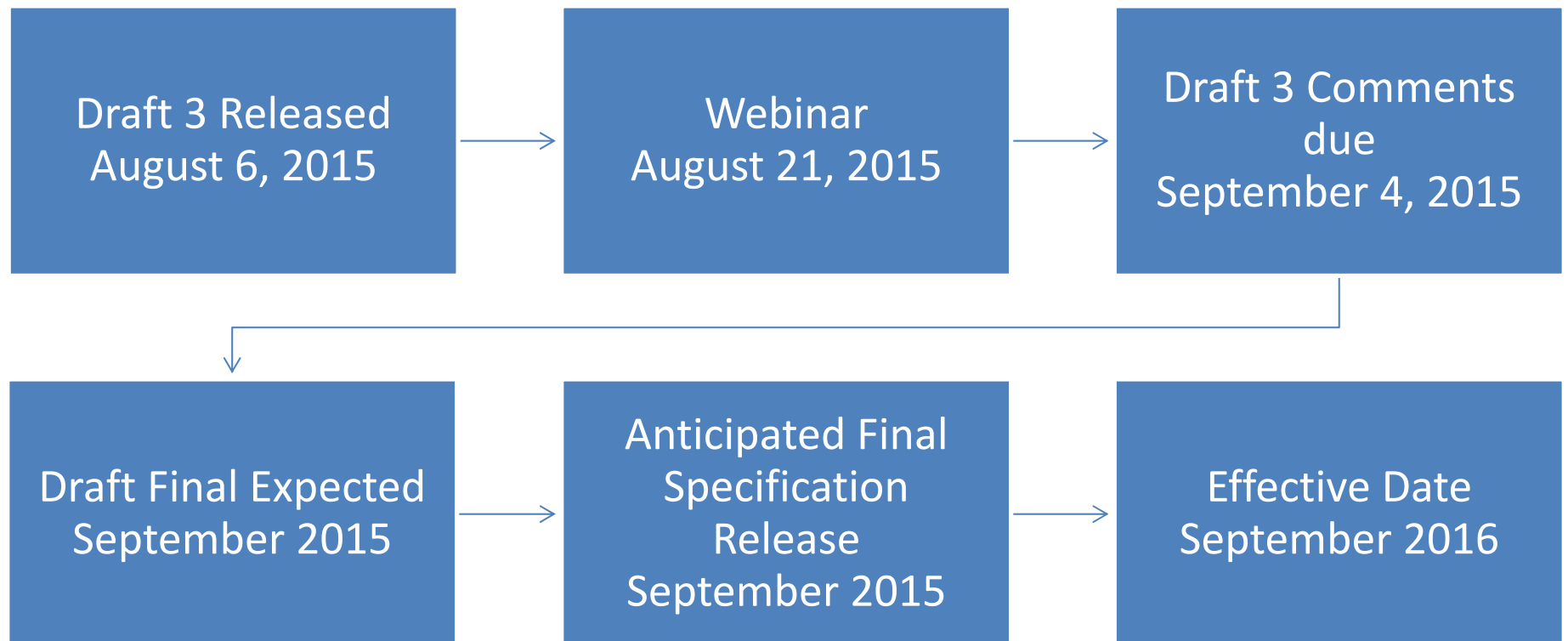
## Section 15.2: Lamp Packaging

- EPA seeks input on recommended nomenclature for new nominal CCTs:
  - 2200K –
  - 2500K –
  - 2700K – Soft White
  - 3000K – Warm White
  - 3500K – Neutral White
  - 4000/4100K – Cool White
  - 5000K – Daylight
  - 6500K – Daylight





# Next Steps: Specification Development Process Overview





## Written Comments

In addition to making verbal comments during today's call, stakeholders are encouraged to submit formal written comments regarding Draft 3 to:

[lighting@energystar.gov](mailto:lighting@energystar.gov)

Please use subject line

**“ENERGY STAR Lamps V2.0 Draft 3 Comments”**

**Comment Deadline**

**September 4, 2015**



## Additional ENERGY STAR Developments

- ENERGY STAR TM-28 Calculator released August 14, 2015
- Posted on the [Luminaires Specification Version 2.0](#) web page



## Discussion Time

- Questions?

