

ENERGY STAR[®] Lamps V1.0 Specification Draft 4 Webinar

May 13, 2013

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Webinar Agenda



Topics

- Spec Activities & Comment Period
- Draft 4 Clarifying Updates
 - Definitions and Test Criteria
 - ENERGY STAR & Federal Regulations
- Draft 4 Changes in Requirements
 - Efficacy reported values
 - Product Variations
 - Light Output
 - Luminous Intensity Distribution - Omnidirectional & Decorative
 - Color Metrics – CCT, CRI and CAU
 - Lumen Maintenance
 - Lamp Toxics Reduction
- Draft 4 Dimming Requirements
- Test Methods
- Next Steps and Q&A Session

Specification Activities & Comments



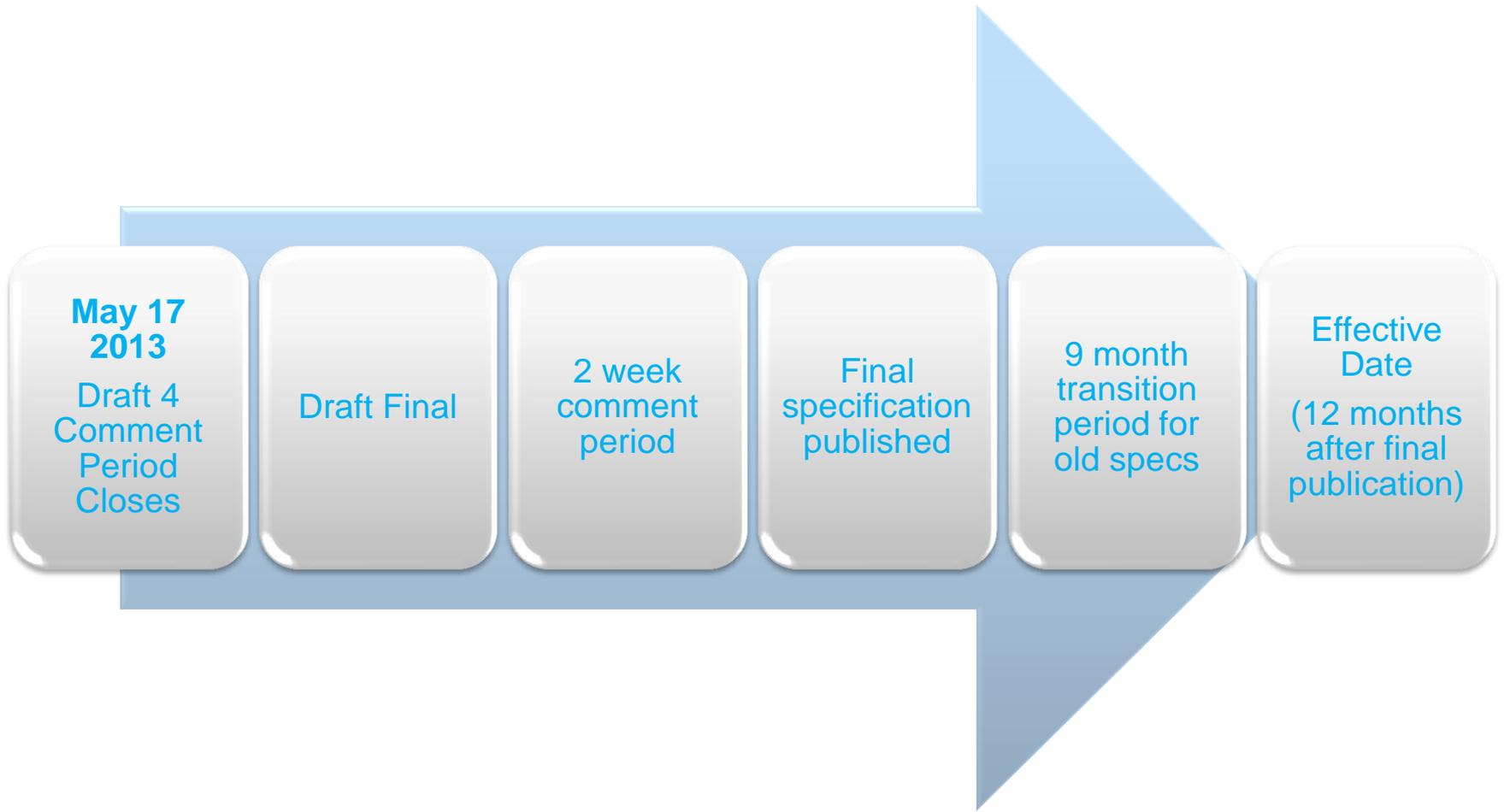
- Stakeholders are encouraged to ask clarifying questions during the webinar
- Please send comments to: lamps@energystar.gov

Comment Deadline

May 17, 2013

- Comments will be posted at www.energystar.gov/lamps unless noted “DO NOT POST”
- Next: Draft Final, 2 week comment then final specification

Timeline



Effective Date & Timeline



- Lamps V 1.0 effective 12 months after final publication.
 - Manufacturers are encouraged to begin testing & certifying products to V1.0 as soon as it is final.
 - EPA recognized certification bodies will be asked to stop certifying products to the ENERGY STAR Compact Fluorescent Lamps V4.3 and Integral LED Lamps V1.4 specifications **9 months** after the release of the final Lamps V1.0 specification.
 - As of the Version 1.0 effective date, only those products that have been certified to the new requirements will appear on the Qualified Product List.
 - No “grandfathering” but products that don’t get redesigned may be able to leverage some existing test data – contact your EPA recognized certification body for details



Clarifying Updates

Section 4: Definitions



- Updated:

- **Decorative Lamp**: A lamp with a candle-like or globe shape envelope including shapes B, BA, C, CA, DC, **G** and F as defined in ANSI C79.1-2002. For purposes of this specification, lamps with candelabra bases and **compact fluorescent lamps with purely decorative envelopes may be categorized as decorative lamps.**
- **Directional Lamp**: ANSI standard PAR and MR lamps having at least 80% light output with a solid angle of π sr, corresponding to a cone with an angle of 120° , self-ballasted compact fluorescent forms that utilize a reflector, and **ANSI standard R, BR and ER shapes.**

Section 4: Definitions



- Updated:
 - **Omnidirectional Lamp**: A general service replacement lamp with an ANSI standard base that emits the majority of light produced in an even distribution about the lamp with **90% of measured intensities in the 0° to 135° zone varying by no more than 25%** from the average of all of measured values, with **no measured values more than 50% from the average of all measured values** and having at least 5% of the total flux (lumens) emitted in the 135° to 180° zone. These lamps can be standard; having an ANSI standard lamp shape of A, BT, P, PS, S or T, or non-standard, such as a self-ballasted compact fluorescent that utilizes a bare spiral, or multiple (twin, triple, quadruple) tube arrangement.
- New definitions:
 - **Flicker index, percent flicker, periodic frequency, and reflector**

Section 5: Test Criteria



- Guidance for testing dimmable and multi-power lamps moved from various sections to test criteria section
 - **Note:** Dimmable and multi-power (3-way) lamps are eligible under this specification.
 - “For dimmable or multi-power lamps, measurements shall be taken at the highest wattage setting listed for the model, unless otherwise specified.”

Section 6: ENERGY STAR & Federal Regulations



- Further clarification for compact fluorescent lamps & updated references to 10 CFR Part 430.
 - Certified ratings & reported values for metrics referenced within the appropriate CFR (e.g. efficacy, lumen maintenance, etc.) and the ENERGY STAR specification must be identical and based on the same test data.
- If ENERGY STAR requires 10 samples to be tested in specific positions, and DOE requires 5, the larger ENERGY STAR data set must also be used for DOE regulatory purposes.
- Any DOE issued guidance for medium base CFLs must be used in determining ratings.
 - NVLAP accreditation is required for DOE



Requirement Changes

Section 7.1: Product Variations



- Expanded the proposed CCT allowable variation to include the following: sharing of safety, electrical, and dimming performance test data.

Lamp Attribute	Allowable Variation	Additional Test Data Required For Each Variant
Correlated Color Temperature	<p>This allows sharing of specific test data for CFL and SSL lamps where the only variation is in phosphor:</p> <ul style="list-style-type: none"> Safety Electrical - Rapid Cycle Stress, Power Factor, Transient Protection, Operating Frequency and Start Time Dimming Performance– Minimum and Maximum Light Output, Audible noise, and Flicker Lamp Shape Dimensions Lamp Toxics Reduction <p>For CFLs – Only the representative lamp model needs to complete full rated life testing.</p>	<ul style="list-style-type: none"> Luminous Efficacy Light Output Elevated Temperature Light Output Ratio (as applicable) Center Beam Intensity (as applicable) Luminous Intensity Distribution (as applicable) Correlated Color Temperature Color Rendering Color Maintenance (SSL only) Color Angular Uniformity (SSL only and as applicable) Lumen Maintenance and Rated Life testing to 40% of rated life (CFL only) Lumen Maintenance testing to 3,000, 6,000 hours, and final certification test duration (SSL only) Run-Up Time (CFL only)



Section 9.1: Luminous Efficacy



- **For lamps not covered by DOE's regulatory program, all calculations of efficacy values shall be carried out on a per unit basis with directly measured (unrounded) values.**
- A 3% tolerance may be applied to the initial luminous flux value of each unit
 - (e.g. [initial luminous flux of a unit X 1.03]) prior to the calculation of efficacy for the unit.
- No other tolerances should be applied and the reported value for the sample shall be the average of the calculated efficacies for all units in the sample.
- In general, guidance on reported values, including applicable rounding and tolerances, where allowed, have been added to each requirement.

Section 9.2: Light Output - Decorative



- Covered A-lamps added to decorative section
 - May be evaluated as omnidirectional or decorative
 - Equivalency claims must be consistent with omnidirectional light output levels

Rated Wattage of the Referenced Incandescent Lamp (watts)	Light Output (Lumens)		
	Decorative ¹	Globe (G) Shape	Covered A-Lamp
10	70-89	--	--
15	90-149	--	--
25	150-299	250-349	250-449
40	300-499	350-499	450-799
60	500-699	500-574	800-1099
75	--	575-649	1100-1599
100	--	650-1099	1600-1999
150	--	1100-1300	2550-3000



¹ Includes all candelabra base (E12) lamps

Section 9.2: Light Output - Directional



- Simplified to include light output multiplier for all E, BR and ER lamps.
- Multiplier based on efficacy standards for lamps manufactured after November 1, 1995 shown in the table. See [10 CFR 430.32](#).
- Minimums light output values benchmarked to traditional incandescent reflector lamp performance.

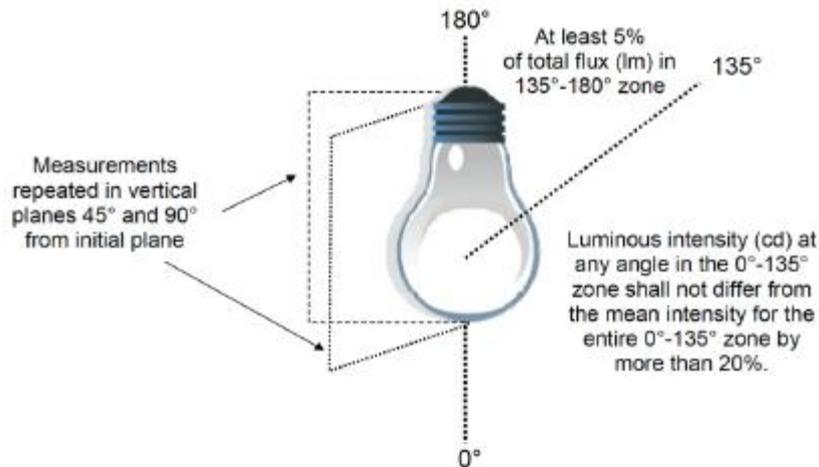
Rated Wattage of the Referenced Incandescent Lamp (watts)	Light Output Multiplier
40 – 50 W	10.5
51 – 66 W	11.0
67 – 85 W	12.5
86 – 115 W	14.0
115 – 155 W	14.5
156 - 205 W	15.0

Section 9.5: Luminous Intensity Distribution - Omnidirectional



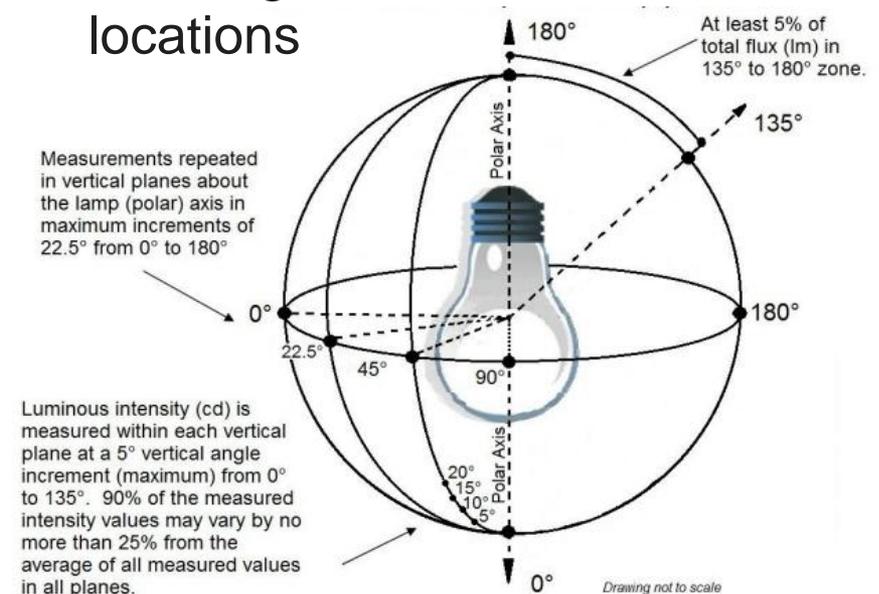
Existing

- All intensity values within 20% of the mean
- Readings taken in three vertical planes (0°, 45°, 90°)



Proposed

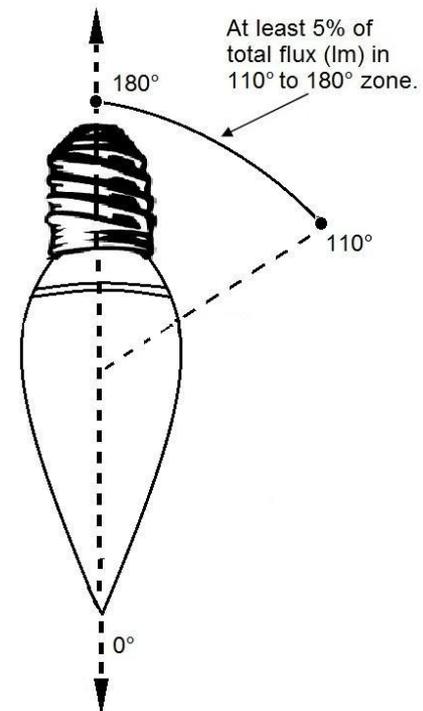
- 90% of intensity values within **25%** of the mean
- All intensity values within 50% of the mean
- Added guidance on measurement locations



Section 9.5: Luminous Intensity Distribution - Decorative



- Adjusted intensity distribution requirement decorative lamps to include flux requirement in the 110° to 180° zone instead of 135° to 180° zone.
 - Included illustration for clarification



Drawing not to scale

Sections 9.6, 9.7, 9.9: Color Metrics



- **CCT:** Revised passing criteria to 9 out of 10 samples due to stakeholder feedback on manufacturing variances.
- **CRI:** Removed the positive R9 requirement for CFLs due to increase in cost and loss in efficacy.
- **CAU:** Increased maximum scanning resolution to 2° for beam angles less than 15° and 5° for beam angles 15° or greater.

Section 10: Lumen Maintenance and Rated Life



- Supplemental Testing Guidance updated to exempt omnidirectional lamps labeled “not for use in enclosed fixtures” and all lamps labeled “not for use in recessed luminaires” from lumen maintenance testing in an elevated temperature environment.



Section 13: Lamp Toxics Reduction



- Eight (8) exemptions added for lead and cadmium content in alignment with the EU RoHS directive. Such as:
 - Copper alloy containing up to 4% lead by weight
 - Lead in dielectric ceramic in capacitors
 - Cadmium and its compounds in electrical contacts
 - Lead in white glass used for optical applications
 - Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit chip packages



Dimming Requirements

Section 12: Dimming Performance



- Reporting Requirement
 - Test using Recommended Practices
 - Not required to be done at EPA-recognized laboratory for Third Party Certification
- Technology-Neutral
 - Applicable to CFL and LED lamps
 - Applicable to lamps utilizing phase-cut and non-phase cut dimming
- Based on manufacturer claimed dimming level
 - Proportional / relative value
 - Can be measured with:
 - Integrating Sphere equipment or
 - Photodetector

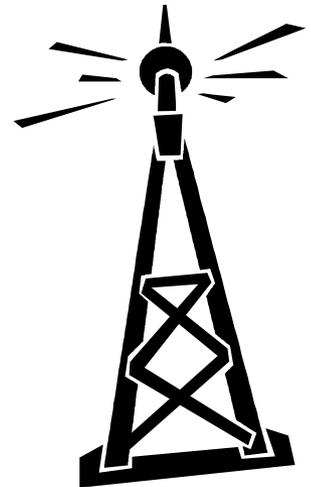


Section 12: Dimming Performance

Dimmer Selection – Non-Phase Cut Dimming



- Non-Phase Cut
 - Does not alter the line voltage to the lamp
 - Examples:
 - Wireless controls, adjustment control on lamp, or power line communication
- For lamps designed for non-phase cut dimming, **testing is limited to** manufacturer listed compatible controls.
- Packaging:
 - Compatible controls must be listed on packaging
 - Must have an asterisk (*) next to the word “dimmable” in packaging and marketing materials
 - Point to “*only compatible with...” statement

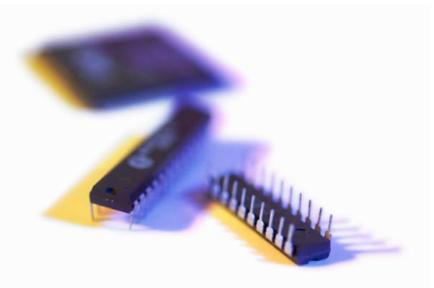


Section 12: Dimming Performance

Dimmer Selection – Phase Cut Dimming



- For lamps designed for phase-cut dimming, must be tested on 10 dimmers from at least 2 different manufacturers
- One dimmer must be specified as compatible for use with energy efficient lighting
 - CFL and/or LED
- At least one dimmer must have one of the following features:
 - Microprocessor with Power Supply
 - Voltage Compensation
 - Pre-set levels



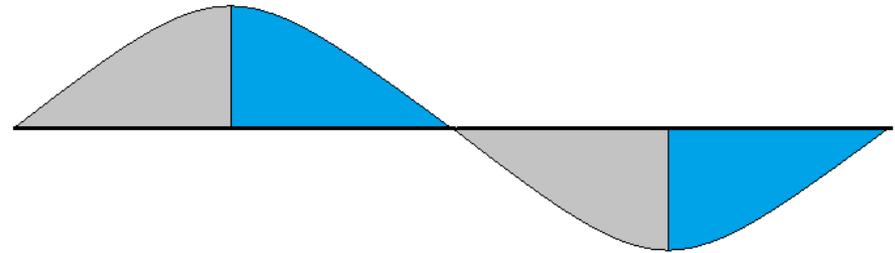
Section 12: Dimming Performance

Dimmer Selection

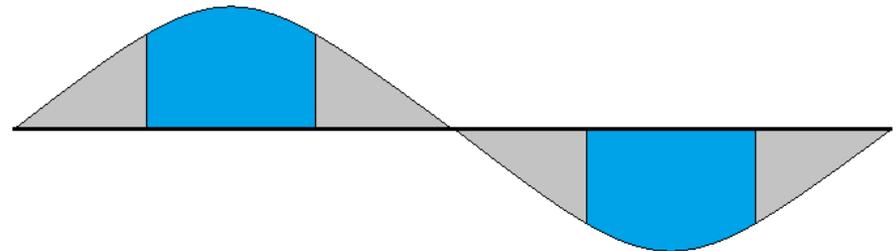


- At least one dimmer must be of one of the following types:

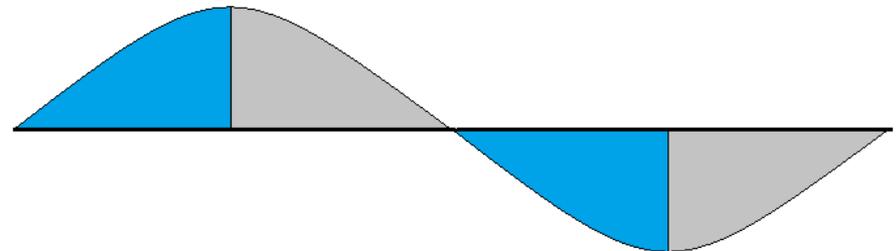
- Single (Forward) Phase shift



- Double Phase Shift



- Electronic Low Voltage/Reverse Phase



Section 12.1: Maximum Light Output



- Lamp light output on the maximum control setting of a dimmer/control must be:
 - No less than 20% below the light output of the lamp without a dimmer
 - No more than 10% above the light output of the lamp without a dimmer
- 80% of tested lamp/dimmer combinations must meet the requirement
- Example:
 - If a lamp produces 1000 lumens without a dimmer, it must produce between 800 and 1100 lumens at the maximum control setting when on a dimmer



Section 12.2: 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
 - If no specific level claimed, must test at 20%
 - If a manufacturer claims a lower level, test at the claimed level
 - E.g. if a lamp claims to dim down to 5%, test at 5% of the maximum light output on a dimmer.
- 80% of tested lamp/dimmer combinations must meet the requirement.
- Example:
 - If a lamp produces 1000 lumens without a dimmer, produces 900 lumens on a dimmer at the maximum control setting, and claims dimming down to 5%, it must meet reach down to 45 lumens, and meet flicker and noise



Section 12.3: Flicker



- Lamp shall have a light output with a:
 - Waveform periodic frequency of ≥ 120 Hz and
 - Have a flicker index less than or equal to the values in the table below when evaluated at dimmer's maximum setting and dimmed conditions.

Light output waveform periodic frequency (in Hertz)	Flicker Index
120 – 800	(0.001 times the periodic frequency)
Greater than 800	Not applicable

- The flicker requirement is not applicable to lamps waveform periodic frequency of > 800 Hz
- Can be measured simultaneously with light output



Section 12.4: Audible Noise

- Lamp shall not emit not emit noise above 24dBA at 1 meter.
 - Tested at six points about the lamp
 - Can be tested stationary with 6 microphones
 - Can be rotated using 1 microphone
 - Testing is sound of one lamp only
 - Dimmer and any additional lamps on circuit external to measurement area
- 80% of tested lamp/dimmer combinations must meet the requirement.





Test Methods

Test Methods



- Test Methods released in January 2013
 - Start Time
 - Run Up Time
 - Elevated Temperature Life Testing (ETLT)
 - Ambient Temperature Life Testing (ATLT)
 - Elevated Temperature Light Output Ratio (ETILOR)
- Minor updates and changes in Draft 4
 - Socket spacing reduced for ATLT and ETLT
 - Removed testing apparatus with baffles option from the ATLT since it is not applicable
 - Updated applicability section
 - Update IES LM references

Recommended Practices



- Added Recommended Practices for evaluating dimming performance
 - Flicker
 - Light Output on a Dimmer (Minimum and Maximum)
 - Noise
- Developed in cooperation with stakeholders
 - Round robin testing with EPA-recognized laboratories.
- Reported performance values
 - Does not require 3rd party laboratory or accreditation

Recommended Practices



- All Recommended Practices (RPs):
 - Measurement on single lamp
 - Tested with 10 dimmers, 1 and 4 lamp circuit configurations
 - 3 measurement points
 - Without a dimmer
 - On a dimmer at maximum control position
 - On a dimmer at minimum claimed dimming level

Next Steps



- Comments due May 17 lamps@energystar.gov
- Summer 2013
 - Final Lamps Specification V1.0
 - Updates to product lists and searches on ENERGY STAR website
- October 7-9, 2013 ENERGY STAR Products Partner Meeting: New Orleans
www.energystar.gov/partnermeeting



Questions?



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