



December 9, 2011

Mr. Alex Baker  
US Environmental Protection Agency  
1200 Pennsylvania Avenue, NW  
Washington, DC 20460

Subject: ENERGY STAR® Lamps V1.0 Specification Draft 1

Dear Mr. Baker,

Cree has reviewed the ENERGY STAR Lamps v1.0 Specification, Draft 1 received via email on October 21, 2011. We recognize the importance of the DOE/EPA efforts to develop and release a technology neutral ENERGY STAR specification for Lamps in an effort to promote energy efficiency within the lighting industry. CREE respectfully submits the following comments and request that each be carefully considered when revising the document.

Thank you in advance for your consideration. Please contact Tim Henning at (919) 407-5047 with any further questions that you may have.

Sincerely,

A handwritten signature in blue ink, appearing to read "Tim Henning", with a large, stylized flourish at the end.

Tim Henning  
ENERGY STAR Program Manager



**Wattages (Various):** There are a number of requirements throughout the specification that are determined by the wattage of the product. Does the wattage being referenced pertain to the lamps safety rating (with or without tolerance) or the average measured value of the 10 samples?

For example, the Safety rating for a lamp may be 9.9 watts, which is less than the lamp input power requirement of 10. However, when taking into account the tolerance allowed by UL ( $\pm 10\%$ ), the products being tested may vary anywhere from 8.91 watts to 10.89 watts.

CREE recommends that the specification be revised to indicate that the wattage should be based off of the products safety rating.

**Tolerances (Various):** It would be very helpful if a tolerance column were to be added to the specification highlighting the acceptable tolerances associated with each of the requirements. There are many instances where the requirement defines a minimum; however, a tolerance can still be applied. In other areas (i.e. Center Beam Candle Power), the value is an absolute minimum with no tolerance allowed.

**Passing Test (Various):** There are a number of requirements that indicate that for a product to pass a test “*The average of the unit values shall meet the requirement*”. In the event of a product failure during test, is the average an average of all ten samples or an average of the nine remaining samples? This is not consistent throughout the document.

**In Situ Measurements (Various):** Currently the specification requires that the *in situ* measurements be performed by an accredited lab. Given that the Manufacturer defines the measurement point and installs the thermocouple onto the product, CREE recommends that the specification be revised to allow the Manufacturer to generate the *in situ* data and have it formally reviewed and approved by the Certification Bodies.

**Specification Scope and Lamp Classification (Page 1):** The ENERGY STAR brand as it relates to lighting has moved beyond energy efficiency and has expanded to include color quality and consistency measures as well. There are other energy savings that need to be considered that Cree does not feel were evaluated as part of this draft.

The draft specification cites that the energy savings as it relates to low-voltage landscape and low-voltage interior track lighting was evaluated and determined that the energy savings related to these lamps could not be attributed to the product alone, rather the product as well as the transformer. The inefficiencies of the transformers must also be considered when looking at the energy savings associated with LED technology. Assuming that a transformer experiences a 20% loss as the load is stepped down, the magnitude of the losses from an LED

lamp will be significantly less than those of an existing incandescent. Assuming that the incandescent MR16 lamp consumes 50 watts and the equivalent LED MR16 lamp consumes only 8 watts, the power input to the transformer will have to be 62 watts and 10 watts, respectively. There will be 12 watts of power lost with the incandescent version versus 2 watts lost with the LEDs. This represents a significant power savings to the consumer over the life of the product.

**Allowable Variations within Product Families (Page 6):** While there are currently no requirements listed in this draft of the specification, we have carefully considered the allowable variations identified in the previous version of the specification as well as those listed in the Luminaires Version 1.1 and have the following comments:

- The Integral LED Lamps specification currently allows long term lumen maintenance and rapid cycle data to be shared across multiple models so long as there are only dimensional changes to the secondary optics and that the *in situ* data does not show a negative measurable effect. We are currently required to submit an additional eleven samples (one LM-79 and ten photometric) to support any additional product variations. Given the fact that only the secondary optics are changing, CREE proposes that a single sample and corresponding LM-79 report be required to support this product variation in lieu of eleven samples.
- The Integral LED Lamps specification currently allows for lamps with the same bill of materials, but alternate bases, to share test data so long as the *in situ* testing demonstrates that the base does not have a measurable effect at the TMP. If we are pursuing ENERGY STAR certification for a product with multiple beam angles (i.e. 12°, 25°, 40°) and have tested both base types (E26 and GU24) for the parent (i.e. 25°), CREE believes that only one *in situ* sample should be required for the other product variations (i.e. 12°, 40°). We have shown by testing the parent sample that there is no measurable effect on temperature by changing base types. The labs are currently requiring that both base types be tested for all variants.
- The Luminaires 1.1 specification allows for the lowest color temperature to represent a product family so long as the variations do not negatively impact the products compliance with any performance criteria in the specification. Cree strongly recommends implementing this into the Lamps 1.1 specification as well.

**Color Maintenance (Page 12):** Cree fully supports changing the color maintenance requirement from the current 0.007 in the Integral LED Lamps specification to 0.004 during the initial 6,000 hours of lamp operation.



**Color Angular Uniformity (Page 13):** CREE strongly believes that the requirement should only take into consideration the beam angle (50% maximum intensity) of the lamp. A presentation supporting this position is currently being prepared and will be provided to the EPA for review once completed.

**Rapid Cycle Stress Test (Page 18):** The increase in cycle time from 4 minutes (2 on / 2 off) to 10 minutes (5 on / 5 off) will significantly impact the ability of Manufacturers to get products qualified in a timely manner, especially as the rated life for LEDs continues to increase. Additionally, the requirement was also increased to one cycle for every hour of rated life versus one cycle for every two hours of rated life. If the requirement were to remain as written, then it would take 347 days (~ 1 year) to qualify a lamp rated for 50,000 hours. Additionally, this would also prevent any lamps from obtaining early qualification (it would take ~8,000 hours to complete the cycling) unless the rapid cycle requirement were to be waived. CREE strongly recommends shortening the cycle time to 4 minutes (2 on / 2 off) and changing back to one cycle for every two hours of rated life.

**Center Beam Candle Power (Page 19):** Are there defined “nominal wattages” that must be used in the online tool? In Table 1 of ANSI C78.21 they define the nominal wattages for standard lamps. Per the specification, we can designate that it is a replacement for one of the following:

45 Watt, 50 Watt, 60 Watt, 65 Watt, 75 Watt, 85 Watt, 90 Watt, 100 Watt, 120 Watt, 150 Watt

**Start-up Time / Run-up Time (Page 21 and 22):** There are several areas in the specification where other lamps types are omitted from having to meet a requirement. CREE believes that the start-up and run-up time are directly applicable to CFLs, however, not necessarily to LEDs. These tests drive additional cost for both the manufacturer and the lab and CREE recommends making it not applicable to solid state lighting.

**Run-up Time (Page 22):** If the run-up time requirement is left in the specification, further clarification is requested on what “fully stabilized” means. Per LM-79, “stability is reached when the variation (maximum – minimum) of at least 3 readings of the light output and electrical power over a period of 30 min, taken 15 minutes apart, is less than 0.5 %”. This is in conflict with how the requirement is currently written.

**Transient Protection Requirements (Page 23):** Is there a specific reason a sample size of five units is required for the transient protection testing? If there is no technical justification for five samples being required, CREE requests reducing the required quantity to be in line with the Luminaires specification (three samples) or the EMI requirement (one sample).



**Lamp Labeling Requirements (Page 27):** Section 10 of UL1993 defines product marking requirements for self-ballasted lamps. Since there is significant overlap between the ENERGY STAR specification and the UL specification, CREE recommends removing those bullet points that are already identified under UL1993 and provide a reference to the specification.

**Lamp Packaging Requirements (Page 27):** CREE has the following comments relating to the packaging requirements:

- The dimming requirement requires that the website be provided on the outside of the packaging. CREE would like to recommend modifying this requirement to allow for the website to be referenced on the insert that goes inside the box.

**Color Spectrum Educational Tool (Page 28):** CREE strongly objects to including the color spectrum education tool on the outside of the product packaging. Given that real estate on the outside of the box is already at a premium, imposing a requirement to include a second bar which defines the light appearance seems redundant. Additionally, the color spectrum education tool may further confuse consumers driving them to purchase products in the 3500K – 4000K range due to the fact that it appears white versus yellow or blue.



**Hardware Requirements Table (General):** It would be very helpful if a Hardware Requirements Table were to be added to the specification. This would help the Manufacturer identify the hardware that is going to be required and what samples can be used across the different tests. Below is an example of a format that could be used.

	Test Group #1 (LM-79)		Test Group #2		Test Group #3		Test Group #4		Test Group #5		Test Group #6		Test Group #7 (in-situ)		None Required
	1 unit	1 unit	≥ 3 units	≥ 3 units	3 units	3 units	≥ 3 units	≥ 3 units	1 unit	1 unit	1 unit	1 unit	1 unit	1 unit	
	Directional	Non-Dir	Directional	Non-Dir	Directional	Non-Dir	Directional	Non-Dir	Directional	Non-Dir	Directional	Non-Dir	Directional	Non-Dir	
<b>Photometric Performance Requirements</b>															
Luminous Efficacy Requirements	x	x <sup>1</sup>													
Luminous Output Requirements	x	x <sup>1</sup>													
Luminous Zonal Lumen Density Requirements	x	N/A													
Light Source Life Requirements															x
Lumen Maintenance Requirements					x <sup>2</sup>	x <sup>2</sup>							x <sup>2</sup>	x <sup>2</sup>	
Correlated Color Temperature (CCT) Requirements	x	x <sup>1</sup>													
Color Rendering Requirements	x	x <sup>1</sup>													
Color Angular Uniformity Requirements	x	N/A													
Color Maintenance Requirements					x <sup>2</sup>	x <sup>2</sup>							x <sup>2</sup>	x <sup>2</sup>	
Light Source Shipment Requirements															x
<b>Electrical Performance Requirements</b>															
Source Start Time Requirements			x	x											
Source Run-Up Time Requirements			x	x											
Light Source Replaceability Requirements															x
Dimming Requirements (Only Dimmable Luminaires)			x	x											
Power Factor Requirements			x	x											
Transient Protection Requirements (Surge)							x	x							
Lamp Current Crest Factor Requirements															x
Off-State Power Consumption Requirements			x	x											
Operating Frequency Requirements			x	x											
Ballast/Driver Replaceability Requirements															x
Noise Requirements									x	x					
Electromagnetic and Radio Frequency Interference											x	x			
<b>Thermal Performance Requirements</b>															
Maximum Measured Ballast or Driver Case													x	x	
Recessed Downlight Thermal Performance															x
Minimum Operating Temperature Requirements															x
<b>Safety Requirements</b>															
Indoor Luminaire Safety (Portable)															x
Indoor and Outdoor Luminaire Safety (Hardwired)															x
Electronic Ballast or Driver Safety Requirements															x
<b>Product Labeling &amp; Packaging Requirements</b>															
<b>Lighting Toxics Reduction Requirements</b>															
<b>Warranty Requirements</b>															