



June 21, 2010

Alex Baker
ENERGY STAR Lighting Program Manager
U.S. Environmental Protection Agency
1310 L Street NW
Washington, DC 20005

Subject: ENERGY STAR Luminaires First Draft Comments

Dear Mr. Baker:

On behalf of Cree, Inc., thank you for the opportunity to comment on the ENERGY STAR Luminaires specification. This letter and the attached detailed comments represent the work of a cross-divisional team from both the Cree LED Components division, as well as the Cree Lighting (luminaire) division.

Elements of the draft specification have strong merit, and we'd like to acknowledge both the work that EPA put into preparing this document, as well as the magnitude of the undertaking. We have provided specific comments in the attachment that we hope you find useful. We also must point out a fundamental problem we find with the "technology neutrality" assumption of the draft specification.

Cree's concerns are that CFL and SSL are so different in technological maturity and performance potential that a common specification framework does a disservice to each. SSL has the potential to set a number of high standards that CFLs are incapable of attaining. On the other hand developing a set of performance metrics that will support projected CFL capabilities may impede the pace of innovation in SSL. Examples of this include:

- RoHS Compliance – CFL contains mercury; SSL does not
- Lifetime – CFL ~10k hours; SSL >25k hours
- Replaceability – CFL systems have replaceable light sources; no standard exists for SSL
- Color – CFL and SSL have similar color spaces; but SSL standards are not yet mature
- Warranty – Some CFL categories are 2 years; SSL 3+ years
- CFL is mature with a declining base of fundamental research and a stable, but not expanding manufacturing infrastructure
- SSL rapidly evolving in terms of fundamental and applied research, and a rapidly expanding global manufacturing infrastructure (and one in which the US enjoys a strong position)

For product categories where energy efficiency was a primary metric, the approach of technology neutrality has served the ENERGY STAR program well in the past. However, we

strongly believe the ENERGY STAR for luminaire program is different from these previous ENERGY STAR programs in one critical way: necessarily and correctly, the luminaire program is now specifying many more quality metrics in addition to the energy efficiency metric of previous ENERGY STAR programs.

Our understanding is that the technology neutrality philosophy seeks to “level the playing field” between the technologies, but we find the playing field is inherently skewed due to the fundamental differences and developmental stages of the two technologies. If EPA seeks a truly level playing field, then the ENERGY STAR criteria should be for a luminaire with a replaceable light source that has perfectly specified and standardized color, 50,000 hours of service lifetime, contains no mercury, and comes with a 5 year warranty.

Clearly, no such source exists or will exist in the foreseeable future. We have concluded “level playing field” and “technology neutral” are useful diplomatic concepts, but will be difficult to implement and manage from a practical standpoint.

Our concern is that homogenizing the specifications to the level of technology neutrality could either 1) unfairly penalize one technology in favor of the other, or 2) cause an unwieldy, complex, and difficult to implement document full of footnotes and exception cases. We find none of these outcomes to be in the public interest, and ask EPA to reconsider this underlying assumption in the draft specification. We believe a better outcome, one that complements the mature, high-volume, low-cost orientation of CFL technology as well as the rapid and trend-setting evolution of SSL would be to develop a pair of luminaire specifications, one for each technology, with similar energy efficiency targets but quality metrics appropriate to each technology.

Thank you again for all your hard work and efforts on this, and for your consideration in the important question raised above.

Sincerely,

A handwritten signature in black ink, appearing to read 'Mark McClear', written in a cursive style.

Mark McClear
Director, Applications Engineering &
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CREE Comments on First Draft of Energy Star Luminaires Specification

As stated previously, Cree believe the wisest course for EPA to take would be to establish separate CFL and Solid State Lighting Energy Star programs. If this is deemed unworkable, then the following comments apply to the first draft Energy Star Luminaires Specification:

Definitions – pages 4 and 5

- CREE proposed that Energy Star ensure alignment of the definitions with those similarly used within IESNA RP-16.
- CREE proposes that definitions be provided for EMC Compliance as well as for FCC 47 CFR Part 15 or 18 testing. These definitions should include verbiage distinguishing Class A (commercial) and Class B (residential) type testing.
- CREE proposes that a definition be provided to include Retrofit Downlights. This is a heavily used luminaire type and should be provided and defined as a directional luminaire. This type of luminaire should be added to every section where Solid-State Directional Downlight Luminaires are specifically called out.
- CREE Proposes that the definition for “Inseparable Luminaires” be removed from the document as field-replaceable solid-state circuitry has not been standardized within the lighting industry.

Qualification Process (Directional Luminaire Applications) – page 6

- CREE proposes an addition to the qualification requirements noting that any change that affects the photometric output of a SSL luminaire should be tested and submitted for approval unless it can be clearly identified that such changes would not affect the output.

Sample Size for Testing

- CREE is concerned with the requirement for the test sample size for qualifying products to the ES requirements since it has increased from 1 to 3 samples. With this increase in sample size comes longer leadtimes from the outside agencies performing the tests as well as the additional cost associated with now testing 3 samples, There is also the cost with manufacturing additional samples just for testing.

Luminous Efficacy Requirements: Directional Luminaires, Residential: Fluorescent and Solid State Sources Only – Pages 12 and 13

- CREE proposes that “Retrofit Downlights” be added to the Directional Downlight section as this is a large product area within the current industry and falls completely under the downlight section. Products that fit this description are currently available from several major suppliers.
- CREE does not agree with the new requirements for Inseparable Luminaires as the Solid State Lighting Industry has yet to standardize LED Drivers and Array configurations. Also, we do not agree with the Luminaire Efficacy requirement of 70 LPW for these types of luminaires simply because they are considered as “inseparable”. CREE strongly feels that the requirements for Inseparable Luminaires should be removed from the document.

Luminous Efficacy Requirements: Directional Luminaires, Commercial: Fluorescent and Solid State Sources Only – Pages 12 and 13

- CREE proposes that “Retrofit Downlights” be added to the Directional Downlight section as this is a large product area within the current industry and falls completely under the downlight section.

Light Source Life Requirements: Directional and Non-Directional Luminaires – Page 15

- As stated in the forward section of this response, CREE does not agree with the action of placing fluorescent and Solid State Sources into one document in an effort to make the end product results “technology neutral”. One large difference between fluorescent and SSL sources is the light source life requirements where fluorescents are only required to maintain an average of 10k hours rated life and SSL sources are required to maintain a minimum of 25k hours.

Lumen Maintenance Requirements: Directional and non-Directional Luminaires – Pages 16 and 17

- CREE proposes that the requirements for Lumen Maintenance align with the work being conducted with TM-21-11. Until this work is published, we strongly suggest that Energy Star keep both Option 1 and Option 2 to be consistent with the current Energy Star SSL V1.1. CREE believes that both Option 1 and Option 2 should remain in the document as valid test methodologies for meeting the lumen maintenance requirements. CREE disagrees with the removal of Option 1 as a valid lumen maintenance requirement as Option 2 will require extensive outside testing at agencies that are not yet prepared for performing these types of long-term tests and that extensive work has already been performed at the LED

component level to ensure lumens levels. Requiring manufacturers to perform testing in accordance with Option 2 imposes longer engineering leadtimes in the product development cycles. This type of industry does not need any additional time lags in the product development cycle as Option 2 would require almost 8.5 months of testing before being able to declared any type of Energy Star approval. By the time the approval is actually received, newer technology within the Solid State Industry may be available for use that would provide greater efficacy and power measurements. In lieu of requiring Option 2, maybe Energy Star could require greater warranty periods for products that are Energy Star approved such as 5 years instead of the current 3 year proposal.

Correlated Color Temperature (CCT) Requirements: Directional and Non-Directional Luminaires – Page 18

- CREE agrees with this removal of the CCT values higher than 4100K.

Color Rendering Requirements: Directional and Non-Directional Indoor Luminaires – Page 19

- CREE agrees with the new CRI 80 value as well as the addition of the positive R9 value within the color rendering section. Customer concern over the R9 value has been extremely high and it is clear from an applications standpoint that a positive R9 value is desired and required even for common applications. Cree supports a minimum R9 of +15 for indoor light sources.

Color Maintenance: Solid State Indoor Luminaires Only – Page 20

- CREE proposes that the requirements for Color Maintenance remain as Self-Certify (consistent with the current Energy Star SSL V1.1) until the new requirements for Color Maintenance are provided by the work being conducted with TM-21-11.

Transient Protection: Directional and Non-Directional Luminaires – Page 26

- CREE proposes that the requirements for Transient Protection remain as “Self Certify” (consistent with the current Energy Star SSL V1.1) as most companies have made investments in equipment to perform this testing. Once again, requiring three samples to be sent out for testing at an outside ES approved test agency is both time consuming and costly. This type of testing only proves that the product can pass this testing in a laboratory environment whereas there is no case study performed on the return rate of products based on these types of events. Also, with the provision of a three year warranty as currently stated within the requirements, this would more than cover any type of fault condition failure noted by these types of events.

Ballast/Driver Replaceability: Directional and Non-Directional Luminaires – Page 29

- CREE does not agree with the new requirements for Replaceable ballast/drivers within Solid State Luminaires as the Solid State Lighting Industry has yet to standardize LED Drivers and Array configurations. CREE proposes that Solid State Luminaire be “Exempt” from these requirements until such time that the Solid State Lighting Industry standardizes on ballast and drivers for this industry. Another key issue supporting CREE’s proposal to exempt SSL from this requirement is that the Standards Technical Panel for UL 8750 (the Standard for the Safety of Light Emitting Diode (LED) Equipment for Use in Lighting Products) is just now considering the standardization and substitution requirements for LED Ballasts and Drivers.

Noise: Direction and Non-Directional Luminaires – Page 29

- CREE proposes that the methodology for measuring the noise level should include parameters for the measuring equipment. CREE would suggest that the equipment utilized to measure the noise level of the equipment under test can measure levels down to at least 20 dB.

Minimum Operating Temperature: Directional and Non-Directional Outdoor Luminaires – Page 31

- CREE proposes that the requirements are clarified to state “Outdoor luminaires must have a minimum operating temperature of -20°C or below”.

Indoor Luminaire Safety: Portable Luminaires – Page 33

- CREE proposes that the standard “ANSI/UL 153-2002” be changed to state “ANSI/UL 153”. Additional clarification should be added to state that compliance with the latest revisions of the standard are required. The main reason for the deletion of the edition number is that the edition of this standard may change during the course of the ES requirements and CREE believes that all products should meet the latest edition of the standard including all of the latest revisions.

Indoor Luminaire Safety: Hardwired Luminaires – Page 33

- CREE proposes that the standard “ANSI/UL 1598-2008” be changed to state “ANSI/UL 1598”. Additional clarification should be added to state that compliance with the latest revisions of the standard are required. The main reason for the deletion of the edition number is that the edition of this standard may change during the course of the ES requirements and CREE believes that all products should meet the latest edition of the standard including all of the latest revisions.

Lighting Toxics Reduction Requirements: Directional and Non-Directional Luminaires – Page 35

- CREE agrees with the new requirement that all luminaires must meet the requirements stated in the EU RoHS Directive.

Warranty Requirements: Directional and Non-Directional Luminaires

- CREE agrees with the proposal to update the warranty period of all luminaires to a minimum of three (3) years. CREE would like to propose the removal of the exception of the two (2) year warranty period for luminaires with integrated GU24 lamps and replaceable light engines. This exception does not line up with the intent of the warranty section and a relaxation should not be given to products that can be replaced more readily.

END OF COMMENTS