

PHILIPS

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Ms. Taylor Jantz-Sell
Environmental Protection Agency
ENERGY STAR Lighting Program Manager
1200 Penn. Ave NW 6202J
Washington, DC 20460

Subject: Comments on Energy Star Lamps Specification V1.0 Draft 2

Dear Ms. Jantz-Sell,

Philips has reviewed the Energy Star Lamp Specification V1.0 Draft 2 and as a stakeholder, appreciates the opportunity to provide comments.

If you have any questions, feel free to contact me at the information below.

We look forward to working with the EPA on the development of this Energy Star Lamp specification.

Sincerely,

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General Comments

We would like to express a few concerns with the proposed requirements in Draft 2. One concern is that the proposed requirement raises the bar of lamp performance for CFLs, which is a technology that has become commoditized. Consumers expect the prices for CFL lamps to decrease. The stringent requirements could reduce the availability of affordable CFL products in the market to consumers.

The second concern is the program's emphasis on lamp quality and product reliability. We feel that it is the manufacturer's domain to provide the expertise on product testing and guaranteeing reliability. As Energy Star encroaches more into the manufacturer's domain, testing costs will increase and competitive advantages disappear. The EPA should work with stakeholders to determine the criteria that should be included in the specification that promotes energy efficiency and remove criteria that significantly increase product costs.

Another concern is the program's scope creep into commercial applications with its introduction of a "commercial grade" category. We feel that this reference to a "commercial grade" product should be removed. The definition of what is considered a commercial grade product is not clear. It should be left up to the manufacturer to determine what channel or application they will market their product.

It appears that the Energy Star program is deviating from its main purpose of certifying and promoting products that will provide substantial energy savings to consumers. The Energy Star program should be a vehicle for accelerating the adoption of energy efficient technologies. If the requirements are adopted as proposed, we feel this will result in fewer energy saving products on the market and a decrease in consumer adoption of these technologies.

Comments by Page

Page 1- 2: Scope

- 1) The designation of "semidirectional" is vague. A clear definition is should be provided by the EPA.
- 2) The definition of non-standard omnidirectional should be clarified to specify what shapes are included in the definition.
- 3) MR16 lamps should be included in the scope of the program, but not be required to comply with the more stringent commercial grade requirements of 35,000 hours lifetime, 0.9 power factor, and longer warranty. Because MR16 lamps are thermally challenged lamps it will be very difficult and costly to meet these specifications.

Pages 3 – 4: Definitions

- 1) The definition for Omnidirectional LED lamp should be added to reflect the definition found in the current Integral LED lamp specification v1.4.

Page 5 – 6: Product Qualification

- 1) Product Variations
 - a) There should be allowable variations within product families for CCTs and drivers as long as the following requirements are met (aligning with the Energy Star Luminaires V1.1 product specification criteria)
 - i) CCTs: Allowed so long as LED package/module/array series (and associated drive current), ballast or driver, and thermal management components are identical, and so long as variations will not negatively impact lamp's compliance with any performance criteria in this specification. The representative model shall be the version within the product family with the lowest CCT. Partners will use different lamp model numbers to distinguish between models shipped with light sources of varying CCTs. This will reduce the testing cost. If the base platform is approved then all color temps should be approved.
 - ii) Driver: Allowed so long as variations will not negatively impact lamp's compliance with any performance criteria in this specification. Thermal measurements of each variation may be required.
 - b) CCT variations should be allowed for CFL product families as long as the basic model has been qualified by Energy Star. The representative model shall be the version within the product family with the lowest CCT.
 - c) Under section 4. We propose that the tested representative model and variant (s) demonstrating that variant performance for the following parameters varies by no more than +/- 5% MOL and MOD; +5% for input current and input wattage; and - 0.05 for power factor.
- 2) Significant Digits and Rounding
 - a) Align with DOE (10 CFR 430.23) rounding requirements.

Photometric Performance Requirements

- 1) Page 10: Light Output Requirements
 - a) The proposed light output requirements for the directional lamp type do not reflect current market conditions. We propose the requirement should be lamp initial light output shall be greater than or equal to 8 times the incandescent lamp's rated wattage for all directional R, BR, and ER lamps. The table should be removed.

2) Page 11: Center Beam Intensity Requirements

- a) The table on p. 11 for line-voltage MR16s gives a single value for wattage. These values should depend on the beam angle, not only on the wattage. Please provide values for different typical beam angles.
- b) We propose allowing use of the existing calculator with parameters inserted for PAR16 lamps in order to calculate equivalencies for line-voltage MR16s.

3) Page 12: Luminous Intensity Distribution Requirements

- a) These requirements will add complexity and cost to the testing with little or no added value.
- b) The EPA has not adequately justified the tightening of beam width from a tolerance of 3 degrees to 0.5 degrees. This is unnecessarily tight. Return the specification to the tolerance of 0.5 degrees.
- c) The Luminous Intensity Distribution Requirement of the Energy Star V1.0, draft 2 norm says: "Lamp luminous Intensity distribution shall emulate that of the referenced incandescent lamp, including nominal beam angle..." Most CFL-I Reflector and PAR lamps do not comply with the nominal beam angle of incandescents. Normally, the beam angle of CFL Reflectors and PARs tend to be bigger than the one for incandescents. CFL PAR lamps will not be able to meet this requirement and would have to be labeled as an R lamp in order to qualify for Energy Star. Customers look for direct replacements and will have an issue not being able to find an Energy Star CFL PAR lamp.
- d) Would like to propose that the luminous intensity distribution requirements for both CFL and LED directional lamps be removed from the specification due to added cost implications to the product in order to meet the requirement. This will align with both the CFL and LED current specifications.

4) Page 14: CCT

- a) The requirement that 10 of 10 lamps must pass the test leaves no room for any tolerance or premature failures. It should be returned to 9 of 10 due to variability during lamp manufacturing. This requirement will translate into a higher cost for product as more inspections and checking will be necessary.

5) Page 16: Color Maintenance Requirements

- a) Since the lamp manufacturer may be uncertain whether the lamp will meet the Color maintenance specification (LED manufacturers give no guarantees for color maintenance), the manufacturer will effectively be forced to do both the lifetime and color maintenance tests simultaneously to avoid losing time, should the lamp fail the color maintenance test at the elevated temperature. This will increase testing cost.

6) Page 17: Color Angular Uniformity Requirements

- a) The ENERGY STAR v1.4 requirement for LEDs was < 0.006 Du'v' within the beam angle (50% of the beam). The new requirement is < 0.004 Du'v' within the field angle (almost the full beam). This new requirement will be difficult to meet with the current lamp optics designs. There is inadequate justification presented for this change. As a compromise, we propose < 0.004 Du'v' within beam angle.
- b) As noted in the text box in the proposed draft, there are groups, such as the IES LM-79 working group and the Lamp Testing Engineers Conference (LTEC), exploring the reliability of measurements. We propose that this requirement be removed until the work has been completed and a resolution determined.

Lumen Maintenance and Rated Life Requirements

1) Page 18: Lumen Maintenance Requirements

- a) Subjecting bare CFLs to the elevated temperature test (same as Reflectors, which are intended for this application) will increase the cost of the product and the testing. This is going in the opposite direction of people's expectations; to purchase products at a lower cost.

- 2) Page 20: It appears that the box on p 20 will require elevated temperature lifetime testing of SSL lamps to be done at 55°C . Presently, version 1.4 requires testing at 45°C . For those lamps that are limited by the drive electronics, this will double the design lifetime. Typical derating required for electronics components, such as electrolytic capacitors, yield a decrease in lifetime of a factor of 2 for each 10 degrees of increase in temperature. We oppose this increase in design lifetime.

3) Page 21: Rated Life Requirements

- a) It will be difficult for CFL reflectors and covered products to meet the requirement of 10,000 hours. Especially when they must also be life tested at an elevated temperature.
- b) We propose a two tier requirement for CFLs.
 - i) Medium screw based, candelabra-based covered, globe and outdoor reflector CFLs, and GU24-based covered, dimmable and reflector CFLs : $\geq 8,000$ hours
 - ii) Medium screw-based bare CFLs and GU24-based bare lamp CFLs: $\geq 10,000$ hours
- c) The requirement that all lamps must be operational (zero failures) at 40% lifetime is not realistic for CFLs. An incidental early failure can always occur for a variety of reasons.
- d) The requirements for LED lamps and CFL lamps are not aligned.
 - i) All LED lamps must be operational at 3,000 hours and $\geq 90\%$ at 6,000 hours

- ii) If LED lamps should have a lifetime $\geq 25,000$ hours, then the sample group must have all lamps operational at 12% lamp life and $\geq 90\%$ samples still operational at 24% lamp life.
- iii) We propose that the equivalent requirement for CFLs of all lamps operational at 1,200 hours and $\geq 90\%$ samples still operational at 2,400 hours be used.
- e) The excessive 35,000 hour lifetime for MR-16 lamps will require larger components and more heat sinking in order to meet this specification, challenging the design even further. Our recommendation is a lifetime requirement of 25000 hours.

4) Page 22: Rapid Cycle Stress Test

- a) For CFLs:
 - i) The requirement of one cycle per hour of rated life ($> 10,000$ switchings) will eliminate instant start CFLs from the program. Consumer desire for instant start should not be ignored. Instant start CFLs (which usually start in < 100 msec), can only withstand 5000 – 6000 switchings. This is the limitation of the CFL technology. If CFLs need to provide $> 10,000$ switchings, pre-heat for the lamp cathodes must also be provided. This will add cost to the lamps and will make lamps to have a starting time of 500 – 700 msec. We emphasize that a lot of people prefer that the lamps have an instant start (< 100 msec), instead of a 500 – 700 msec delay for starting.
 - ii) The switching test, which has been reduced to a maximum of 15,000 10-minute cycles, is still excessively long, at 2,500 hours.
 - iii) We recommend a return to 1 switching per every 2 hours of rated life. People that need lamps for operation with occupancy sensors or other type of intensive switching must buy lamps that incorporate pre-heat in the ignition. This is better than imposing a cost increase and a delay in starting for lamps that do not require this feature.
- b) For LEDs:
 - i) The number of cycles should be equal to half the rated life and a cycle defined as 2 minutes on 2 minutes off, as it is currently in the LED Lamps Specification v1.4

Electrical Performance Requirements

1) Page 23: Power Factor Requirements

- a) The power factor requirement has little benefit in the market, since it is actually the transformer that has greatest impact on the power factor of the low voltage system. It will require more electronics, reduce efficacy in the lamp and increase the thermal challenge in order to meet the power factor requirement.
- b) The PF requirement should be exempt for low voltage MR-16.

- c) If the power factor requirement on the low voltage MR-16 lamp is maintained in the specification, there are clarifications that must be resolved.
 - i) Method of measurement must be specified,
 - ii) Is the measurement at the lamp level or system level,
 - iii) Does it account for dimming

2) Page 25: Run-Up Time Requirements

- a) The requirements are not in alignment with the note in the support box. It is unclear why the requirement was raised to >80% of stabilized output in <45 seconds and 100% stabilized light output in <60 seconds, when the analysis results were “An analysis of currently certified CFLs found that 70% of bare lamps were qualified with a run-up time of 45 seconds and 92% were qualified with a run-up time of 60 seconds.”
- b) The requirement of 100% stabilized light output will create problems for CFLs.
- c) We propose to retain the run-up time currently in the CFL V4.3 specification.

Page 28: Lamp Toxics Reduction Requirement

- 1) Although the proposed requirements are aligned with ROHS 2, there is concern on max lead concentration requirement of 0.1%. ROHS 1 has an exemption to allow lead in CFL amalgams. ROHS 2 removed this exemption. So in order to be ROHS 2 compliant, CFLs have to have lead-free amalgams.
- 2) The implied compliance with ROHS 2 should be removed from the specification so as to permit amalgam lamps to contain lead (as in ROHS 1). Otherwise, this will impact the cost of the lamps.

Thermal Requirements

1) Page 29: Minimum Operating Temperature

- a) The minimum ambient operating temperature of 0 deg F is too low for indoor applications and too high for outdoor applications. It will increase cost unnecessarily for indoor applications and provide a false sense of security for outdoor applications, if manufacturers adhere to it.
- b) Remove this specification and let manufacturers specify it.

Lamp Labeling, Packaging & Warranty Requirements

1) Page 31: Non-Standard Light Output Diagram

- a) We do not feel that it is appropriate for the EPA to mandate icons.
- b) This requirement should be removed.

2) Warranty Requirements

- a) Warranty is a commercial decision owned by the manufacturer. We oppose the warranty requirement and would like it to be removed. If the utility companies need a warranty statement for their programs, then it should be specified by them in their program guidelines and not included in the Energy Star specification.
- b) If a warranty requirement is required by the EPA we would propose that it is based on burning hours and not years. Burning hours reflect the warranty based on the application.

Page 33: Appendix B: Luminous Intensity Distribution Diagram for Directional Lamps

- 1) The very detailed specifications of beam shape on p. 33 do not add value.
- 2) EPA needs to share evidence of legitimate complaints from customers which might then be discussed with the stakeholders as to whether or not they justify additional new performance attributes.

Annex A: Energy Star Elevated Temperature Life Test

- 1) Lumen maintenance testing must now be done with 3 hours on/20 minutes off for all lamps. This increases testing time by 11% for an already long testing period. Unlike other sources where power cycling adversely affects lifetime and performance, LEDs can be modulated (turned on and off) at high rates with little effect on lifetime. We propose continuously operating the LED lamp during the life test and support the requirement not to season the lamp. The test begins once the lamp is turned on.
- 2) Because the 55°C level is not justified, the EPA should return the elevated test temperature to 45°C for LED lamps.
- 3) We propose for CFLs that the requirement is consistent with the current CFL V4.3 specification.
 - a) For Bare lamps, Covered (e.g. Globe, Candle, etc.) and Outdoor Reflector: The testing is done in open burn at 25 °C.
 - b) For Indoor Reflector lamps: The testing is done at 55 °C.

Annex C: Energy Star Elevated Temperature Initial Light Output Ratio

- 1) The Elevated Temperature Light Output Ratio test (p.11) is new for SSL.
- 2) Please provide justification for adding this specification that is in the domain of the manufacturer.

Annex D: Energy Star Start Time Test

- 1) Please provide an explanation for how 98% was chosen as the start time in example 1 (Annex D pg. 3). We propose a more easily measured number like 90% or 95% be used.
- 2) In example 2, for instance, is the start time determined at 98% of the RMS value of the initial plateau, at the minimum value in the initial plateau, at the maximum value in the plateau? Since the plateau is not constant, and since 98% is such a tight

specification, “98%” must be further defined. What if the initial plateau is only a few percent of the final plateau? This specification raises more questions than it answers.