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Vice President, Government Relations

August 24, 2012

VIA EMAIL TO: [lamps@energystar.gov](mailto:lamps@energystar.gov)

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

**NEMA Comments on Draft ENERGY STAR® Program Lamp Specification v1.0 Draft 2**

Dear Ms. Jantz-Sell,

The National Electrical Manufacturers Association (NEMA) appreciates the opportunity to provide the attached comments on the subject proposal. These comments are submitted on behalf of NEMA Lamp and Solid State Lighting Section companies.

As you may know, NEMA is the trade association of choice for the electrical manufacturing industry. Founded in 1926 and headquartered near Washington, D.C., its approximately 450 member companies manufacture products used in the generation, transmission and distribution, control and end-use of electricity.

Thank you for your consideration of these comments. We look forward to working with you further on this important project. If you have any questions on these comments, please contact Alex Boesenberg of NEMA at 703-841-3268 or [alex.boesenberg@nema.org](mailto:alex.boesenberg@nema.org).

Sincerely,

A handwritten signature in black ink that reads "Kyle Pistor". The signature is written in a cursive, flowing style.

Kyle Pistor  
Vice President, Government Relations

**NEMA Comments on ENERGY STAR® Program Requirements  
Product Specification for Lamps (Light Bulbs)  
Eligibility Criteria Version 1.0, Draft 2**

General Comments:

- 1) We appreciate that Energy Star has revised some of the proposed requirements from Draft #1 based on NEMA comments.; however, as we have previously stated (see NEMA comments Lamps Spec draft 1), there are still too many requirements in the current draft specification in which ENERGY STAR proposes to, a) unduly interfere in the manufacturers' marketing and business decisions or b) tighten existing performance requirements to the point of limiting innovation, free trade and consumer choice. Administrator McCarthy acknowledged in her 2011 letters to Senators Bingaman and Murkowski that the widespread use of ENERGY STAR in Federal, State and Local purchasing guidance has made the program increasingly regulatory in nature, viz mandatory. By mandating numerous non-energy performance requirements, ENERGY STAR proposes to tell manufacturers how to design their products resulting in commoditization. EPA should and must recognize the contradiction of mandating numerous performance improvements at a corresponding higher cost, while consumer adoption is influenced most strongly by lowering costs for the product. A few, but not necessarily all, examples of the way design and innovation will be limited by Energy Star's proposal follow: The luminous intensity distribution requirements listed on page 12 of the draft specification for PAR lamps will eliminate flexibility in light pattern designs for LED PAR lamps by mandating a single beam shape for all products. Spot lights and other special pattern lighting are eliminated. The inherent directionality of LEDs provides unique opportunities for light distribution, and manufacturers and designers are innovating to take advantage of this newfound flexibility. These opportunities for innovation and resulting options for consumers will be eliminated from ENERGY STAR products. Another example of design restrictions relates to a conflict between proposed requirements for the rapid cycle stress test, versus its implications for proposed requirements for run-up time and the proposed 10,000 hour lifetime. These parameters and their effects on design options are not exclusive. Please see our comments to page 22 below.

One example that is likely to raise the cost profile of this product is the increased requirements for testing. The Energy Star program should be a vehicle for accelerating the adoption of energy efficient technologies. If the requirements are adopted as proposed, there will be fewer ENERGY STAR-qualified products on the market and a corresponding decrease in consumer adoption of these technologies. The bar is so high for CFLs, which are becoming commoditized, that almost all existing qualified CFLs will not meet the reliability and run-up requirements. This will reduce consumer choice and, in turn, adoption.

- 2) We respectfully express our dissatisfaction that many, if not most, of the new requirements in this specification were added without consensus from the stakeholder forum. The best way to broach a new performance parameter is to do so at in-person forums so differing opinions and feelings can be shared between stakeholders and the Agency and consensus reached before specifics are laid down. We again protest the lack of sufficient public meetings for this program. The written process used today, while it affords some public comment, only adjusts decisions already made without the benefit of Partner consensus. This is evidence that the ENERGY STAR partnership for lighting programs is unhealthy.
- 3) Several of the performance criteria proposed by EPA are unnecessary. For example, many of the complaints the EPA has cited as justification for new or elevated performance criteria in

this draft v1.0 specification relate to telephone and web-based consumer reports that are anecdotal and not rigorous justification for imposing mandatory regulatory specifications that raise the cost to consumers.

Manufacturer call-centers are staffed by technically educated, experienced personnel who are armed with detailed information on product application and they have tools to diagnose and correct poor satisfaction in real time. Manufacturers have invested millions of dollars and hours on consumer satisfaction through their call centers. The call center personnel are not simply noting complaints but also diagnosing causes and offering solutions. From these interactions, manufacturers are able to model performance reports and improve consumer satisfaction and note conditions for design reconsiderations. The EPA's tools are distinctly lacking in this regard, and this is why manufacturer opinions about performance criteria differ so greatly from that of the EPA. We will make several comments on this subject in our following submissions as to which requirements proposed by EPA in this draft should either be struck or significantly modified.

If the EPA wishes their hotline and other reporting tools to be more useful in the area of gauging and understating consumer satisfaction, the EPA must undertake the additional steps necessary to boost the quality of these anecdotal reports to something more actionable.

These steps include;

- asking respondents to supply make and model number for the lamps being reported (in the case of dimming complaints, both the lamp and dimmer model numbers need to be noted)
- asking how many lamps are being operated on a single switch/dimmer
- asking for detailed explanation of the conditions under which issue such as flicker or other dissatisfying performance are noted
- assist in identifying misapplication conditions (thus no report would be logged for poor performance, only instance of misapplication is significant)
- Developing flow charts to diagnose and recommend solutions for dissatisfaction

To accomplish the above, EPA hotline personnel would need to be more adequately trained, and any web-reporting tools similarly upgraded. NEMA offers to work with the EPA on fully fleshing out the above list and assisting EPA in report-taking.

If the EPA is not willing to make these investments, they should recognize that their reports are only anecdotal and should not be used as the basis for specification development.

- 4) Several Tables in the Specification are not numbered or clearly/consistently titled. This should be corrected. The tables should be numbered or otherwise more clearly titled. References to tables or figures should be by number or title, rather than "in the above table", or similar.
- 5) Throughout the specification, ENERGY STAR calls out special requirements for products marketed as "commercial grade", however; there is no definition of "commercial grade". Having a Lamp category called "commercial grade" is outside of ENERGY STAR's mandate and the EPA should not restrict how manufacturers market products. It is very challenging to segregate commercial from non-commercial products. This would result in product SKU proliferation, multiple product packaging changes and duplicate testing of products. The term "commercial grade" should be removed from this Specification. In the following comments we make page and section specific comments to this point.
- 6) While we appreciate that ENERGY STAR has revised some of the SSL and CFL requirements from Draft#1 based on NEMA comments, there were some existing and new requirements that would strongly impact the cost of the product either through product design changes and the way we commercialize the product. This includes the addition of the commercial grade

category and the need to test the product at the elevated temperature of 55°C. For example adding the commercial grade category will increase SKU proliferation, packaging designs, logistic complexity at the retailer and consumer education on YET another category/message. Testing at 55°C to account for misapplication of lamps in recessed downlights will required product overdesign to compensate for additional thermal stress. Design items to change would include; more costly long life components, redundant components to ensure lifetimes, larger heat sinks and increased LED count to counter light loss due to heat. It does not make sense to burden the consumer with additional cost for a test condition that represents a misuse event, where the likelihood of a misuse event according to NEMA member field report data is much less than 1% of the population.

- 7) Reintroducing the Non-Standard category for SSL from draft 1 will increase the likelihood of specification misuse (loop holes) and increased consumer dissatisfaction. Industry understands the need for a non-standard category but ENERGY STAR should limit the changes to exceptions for lamp shape and not introduce new non-photometric performance exceptions. The performance requirements for all non-standard SSL lamps needs to be developed based on use of the product; otherwise this will confuse the end user and disincentive manufacturers to design ANSI standard lamps which the fixture community has used for decades to ensure proper fit and function. For example, the term “Non-standard Semi-directional” is a limitless description for all types of non-standard lamp shapes that do not meet the omni-directional or directional intensity distribution requirements. This will cheapen and demote the products designed and certified to meet both the ANSI shape and current photometric requirements and in the end will increase the number of dis-satisfied end users calling the EPA hotline. In addition, the use of a non-standard lamp designation should be minimized because ANSI has a process in place to readily add new ANSI shapes. For example, ANSI is in process of developing MR-16 extended and GU-10 based lamp descriptions. Recommendations on how to address this concern with non-standard lamps are provided below in our comments
- 8) Add a table of contents as has been done in the Luminaires spec.

### **Comments by Page**

#### **Page 1**

- a) ANSI standard lamp - This term is referenced throughout the document. We suggest this be changed to “ANSI shape lamp”. The term also needs to be defined to as to address who determines this classification; the manufacturer, the test lab, the certification body, or some other entity. NEMA strongly recommends that this be a declaration by the manufacturer when the lamp is submitted for qualification.
- b) Non-standard Omnidirectional – Which shapes are included in the definition of covered lamps in this category? It sounds like a catch-all term, meaning anything not standard, but this risks ambiguity. Does this include SSL products? Only CFL lamp shapes are provided in the draft. The EPA needs to provide a clarification on what is in this category.
- c) ANSI Standard – Decorative – It appears that only ANSI standard lamps are permitted in this category. The EPA should create a separate non-standard category for Decorative Lamps.
- d) Table page 1: If Energy Star retains the Non-Standard Semi directional category the following changes need to take place to reduce specification misuse (loopholes) and to allow ANSI standard semi-directional lamps.
  - a. Column titled – Standard Compliance: add ANSI standard

- b. Column titled - Lamp Shape or description: change text to read – “Lamps which have an omni-like (lambertian) luminous intensity distribution must meet the Light Output requirements for Semi directional lamps (p. 9) and may or may not meet Lamp Shape and Dimensional Requirements (p.29)”
- e) MR-16 Lamps: NEMA thanks the EPA for accepting our request to include MR-16 lamps in the scope of this specification. Recommendations as to how to treat these lamps in the specification are given in our comments below.
- f) MR-11 lamps, with appropriate base, should be included in the specification.

#### Page 2

- a) Excluded Products: the first bullet of this section excludes lamps that operate on an external ballast, transformer, etc. As written, it therefore excludes low voltage MR-16. Remove the word “transformer” or add an exception for the Low Voltage MR-16 to correct this oversight.
- b) Effective Date: We repeat our comment from Draft 1, that the effective date should be 24 months following the publication date of this specification. This period will afford industry the time it needs to redesign, test, certify and market products according to the new specification. This is a significant burden on manufacturers who will not commit money and resources to make products that meet the new requirements until they are finalized. The sheer volume of submissions will add significant administrative and engineering burdens to the Certification Bodies (CBs) as well. We note that a standards development organization such as UL often sets an effective date two or three years out to allow manufacturers adequate time to revise and retest their designs as needed. We further propose that products qualified to the current CFL or SSL specification remain qualified until the effective date, after which their status will change to *retired*, but not disqualified.

#### Pages 3-4

- a) We suggest the following definitions be added:
  - 1) Omnidirectional LED Lamp – A lamp with At least 5% of total flux (lm) in the 135°-180° zone and Luminous intensity (cd) at any angle in the 0°-135° zone shall not differ from the mean intensity for the entire 0°-135° zone by more than 20%. A similar change to Appendix A may need to be made.
  - 2) Semidirectional lamp – A lamp that is neither omni-directional nor directional nor ANSI standard R, BR, or ER shaped, but that has at least 80% of luminous intensity within the 0° to 150° zone (axially symmetrical). At least 5% of total flux (lumens) must be emitted in the 90° to 180° zone.

#### Page 5, Test Criteria

- a) Reference to “commercial grade”: Eliminate the two sentences “Lamps to be marketed as “commercial grade” or the like shall meet all commercial grade requirements detailed in the specification (see Lumen Maintenance and Rated Life Requirements Power Factor Requirements, and Warranty Requirements)” and “Low voltage MR-16 lamps shall meet requirements for commercial grade lamps.”

#### Page 6, Table 2

- a) Lamp Attribute – Paint Color: This appears to apply to both CFL and SSL. The EPA is asked to clarify what this is. Using CFL as an example, if a manufacturer qualifies a CFL with an off-white housing and then switches to another plastic of a slightly different color, that change should not require a resubmittal to ENERGY STAR. If that was the intent, NEMA disagrees and asks the EPA to remove this requirement and/or present substantive justification for why this matters.

- b) Lamp Attribute – Base Type CFL: The intent here appears to be to allow an E12 model to be qualified using some data from an E26 product. The base material, i.e., brass, aluminum, etc., does not significantly affect product performance and this consideration should be removed.
- c) There should be allowable variations within product families for CCTs and driver as long as the following requirements are met (aligning with the Energy Star Luminaires V1.1 product specification criteria): 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. 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.
- d) 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.
- e) This entire section needs to be clarified. As written, one could interpret it to mean that a manufacturer who has qualified an E26 based product with a nickel plated brass base cannot switch to an E26 aluminum base without submitting additional paperwork to ENERGY STAR. An attribute should NOT matter unless it has been evidenced to be of significant influence on product energy performance.

Page 6, Significant Digits and Rounding, Section E

NEMA would appreciate any insight the EPA may offer into their decision to limit the practice of rounding. This method is allowed for submittals to the DOE (10 CFR 430.23), for example, thus we strongly urge the EPA to permit this in the draft specification. Our proposed revised text is as follows:

"E. Significant Digits and Rounding

- a. Record measurements at the resolution of the test instrumentation.
- b. All calculations shall be carried out with directly measured (unrounded) values.
- c. Compliance with the specification limits shall be evaluated using values rounded to the nearest significant digit as expressed in the corresponding specification limit.
- d. If a specification limit is modified by a tolerance, take the tolerance first, and then determine compliance according to c)
- e. Rounding is defined as follows:
  - (i) A fractional number at or above the midpoint between two consecutive decimal places or whole numbers shall be rounded up to the higher of the two decimal places or whole numbers; or
  - (ii) A fractional number below the midpoint between two consecutive decimal places or whole numbers shall be rounded down to the lower of the two decimal places or whole numbers."

Page 8

- a) We recommend a separate set of LPW criteria for CRI>90. This can be more fully explored in draft 3 of the specification, but industry has not been able to fully develop a proposal in the time allotted.
- b) Supplemental Testing Guidance: The Pass Test requirement of the average and 9 out of 10 units must pass is too restrictive. If one unit doesn't pass (individual) and it's included with the average calculation, there is then the possibility of failing due to the wide variance. Change the requirement from an 'and' statement to an 'or' statement. This includes other areas in the specification that have similar Pass Test criteria. Directional lamp performance is measured in the illuminance in the beam and the field, now proposed to be covered by the additional

requirements in Draft 2 for directional lamps. Focusing on total lumens for directional lamps does not cover where these lumens go and can lead to lamps which have unsightly glare with undesirable lumens in the spill and not the beam and field. NEMA recommends elimination of higher efficacy requirements for directional lamps =>10W

Page 9-10, Tables

- a) Light Output Requirements: It is our understanding that under the CFL v4.3 requirements, equivalency claims are optional. The table(s) on pages 9 and 10 should note that wattage equivalency claims are optional.
- b) As written, the table(s) on pages 9 and 10 link the rated light output to the average of the measured photometric data. The FTC indicates that ratings of CFL products be determined by the BU values only. As the rating is a value already regulated by the FTC, the tables in this section should be based on the rated values with no reference to the measured data.
- c) 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. Remove the table.
- d) Add the following table for Semi directional ANSI and Non-standard shape lamps.

Standard Equivalency	Light Output
25	200
40	400
60	750
75	1000
100	1400
125	1800
150	2200

The table values are 10% less than the omnidirectional minimum values shown in the table on page 9. The light output was decreased 10% to accommodate the less required light in an equivalent semi directional light output distribution.

Page 11, Elevated Temperature Light Output Ratio

- a) For SSL products, the rationale for this requirement is not clear and is new to Draft 2. The purpose of having this test seems to be to address the thermal impact of recessed applications.
- b) For SSL products, in most cases, increasing the LED temperature by 30°C (delta between 25°C and 55°C) will not impact the light output by more than 7%. This information is readily available in the LED specifications
- c) Annex C – test procedure – It is not clear on how one is to record the light output via LM-79 or other test procedures at elevated temperatures or inside a thermal chamber. Also in the Annex C it states omni-directional lamps, but on page 11 (Elevated Temperature LOR) omni-directional lamps are not called out. This conflict should be resolved.

Having said the above, adding this requirement for SSL will add test burden and generate limited value to the end users. Remove this requirement for SSL products.

Pages 11-12, CBCP Intensity Calculations

- a) The proposed table for minimum center beam intensity candelas should be removed because it does not consider the beam angle. One could claim a series of equivalent wattages based on the same design with the different beam angle.
- b) These requirements will add complexity and cost to the testing with little or no added value.

- c) For the luminous intensity distribution requirements, 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. NEMA members do not have record of complaints on this subject and request the EPA provide evidence or return the specification to the tolerance of 3 degrees.
- d) Most CFL reflector and PAR lamps have a larger beam angle than their incandescent counterparts. The Lamps specification draft 2 is written so as to force incandescent performance on non-incandescent products, whose physical performance cannot fully replicate incandescent. 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 be confused when they are not able to find an ENERGY STAR CFL PAR lamp.

#### Page 12

- a) Lamp Type - ANSI Standard PAR shapes & Low Voltage MR Lamps: for SSL products, add to the table's Lamp Type column the following: "Non Standard lamps PAR Shape" and "Low Voltage MR Lamps". Adding the non-standard shape lamps will prevent any unintended misuse of the ENERGY STAR requirements.
- b) The existing text for Luminous Intensity Distribution Requirements, ANSI Standard PAR Shapes and Low Voltage MR Lamps should be edited as shown.
  - a. Measured on two rotational planes 90 degrees from each other around and through the beam axis, lamp luminous intensity ~~within each plane shall measure no less than 45% and no greater than 55%~~ shall measure no less than 50% of the center beam intensity on each edge of the beam.
- c) Lamp Type - ANSI Standard Omnidirectional: for SSL products, add to the table's Lamp Type column the following: "Non Standard Omnidirectional". Adding the non-standard shape lamps will prevent any unintended misuse of the ENERGY STAR requirements.

#### Page 15, Color Rendering Requirements

- a) Specific to SSL: to allow continued innovation in the Lamp's color quality; when the Red content is more saturated than the blackbody incandescent test reference point, the R9 value could be negative. Change the requirement to read "R 9 > 0 is required if the red content is less saturated than the Blackbody test reference point and R 9 may be any value if the red content is more saturated than the Blackbody test reference point."
- b) Special considerations for products of CRI>90 and R9>90: There are products with efficacy requirements that are lower (e.g. 30 lumens/W). Many end users, especially in directional lamps, have refused to use LED as the color rendering is not the same as halogen. Offering high CRI and R9 lamps to meet halogen performance will help convince these end users to switch to LEDs, rather than stay with poor energy choices based on color. The tradeoff to improve CRI and R9 is either lower lumens or CBCP. There should be a second standard which allows end users to have an LED choice that meets their needs. End users should have the option of higher quality color rendering products. Many LED manufacturers now offer high CRI and R9 products that are preferred in many applications. However, these high CRI products are slightly less efficient, hence the need for an additional category.

#### Page 16, Color Maintenance Requirement

- 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.

#### Page 17, Color Angular Uniformity

- a) The ENERGY STAR v1.4 requirement for LEDs was  $< 0.006 \text{ Du}'\text{v}'$  within the beam angle (50% of the beam). The new requirement is  $< 0.004 \text{ Du}'\text{v}'$  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 the requirement be  $< 0.006 \text{ Du}'\text{v}'$  within the field 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. Therefore, NEMA recommends this requirement be removed until the work has been completed and a resolution determined.

Page 18, Title to the table

- a) "Lumen Maintenance and Rated Life Requirements" should be change to" Lumen Maintenance Requirements". Based on the type of testing required by ENERGY STAR, the only quantifiable attribute is Lumen Maintenance, not rated life.

Pages 18-19, Elevated Temperature Life test

- a) EPA's rationale to increase the test temperature from 45°C to 55°C is based on end user misapplication and the resulting bad impressions these may have had on the ENERGY STAR brand. The elevated temperature lifetest is currently used for indoor reflector CFLs. Given that these products are designed to operate in recessed luminaires, this test method makes sense. ENERGY STAR has proposed, however, that this method be extended to most CFLs with a rated power  $\geq 10\text{W}$ . The rationale is that the ubiquitous bare CFL, when used in recessed luminaires, may fail before rated life (which is based on in open air). 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 get the products at a lower cost. Misapplication is not the fault of ENERGY STAR partners.
- b) The occurrence of this misapplication is very low. This is because manufacturers have already taken steps to reduce the occurrence by adding cautions and warning both on the lamp and its packaging.
- c) In addition, manufacturers have warranty programs (as required by ENERGY STAR) to address concerns with bad impressions. The ENERGY STAR requirements for SSL have been in place since 2009. The data we have from the field supports we do not have a misuse issue with our end users.
- d) As mentioned in our comments on draft #1, this new lifetest method differs from that required by the DOE, so for the CFL products covered by this requirement, two separate life tests will be required; one that follows the DOE method and another for ENERGY STAR. This will double the testing expenses and stretch existing capacity. Such parallel testing is not needed for reflector CFLs as they are not regulated by DOE.
- e) Manufacturers have found that testing products at the evaluated temperature of 45°C is working well for the end user. If ENERGY STAR insists on tested at 55°C, this will impact lamp designs and the tools used to test products. Lamp designers will have to consider solutions to meet higher temperature testing, such as new phosphors, circuit board materials and electrical components and then test these designs. For those lamps that are limited by the drive electronics, this requires design lifetime to be doubled. Typical derating required for electronics components, such as electrolytic capacitors, yields a decrease in lifetime of a factor of 2 for each 10 degrees of increase in temperature. Addressing all these considerations can only result in product cost going up significantly.
- f) ENERGY STAR is forcing manufacturers to penalize both the end users and themselves with higher costs resulting from changes in the product design and test infrastructure. We propose for CFLs that the requirement remain consistent with the current CFL V4.3 specification. For Bare lamps, Covered (e.g. Globe, Candle, etc.) and Reflector: the testing should continue to

be done in open burn at 25°C. For Indoor Reflector lamps: the testing should continue to be done at 55°C.

- g) Existing CFLs rated at 10K hrs will not meet this elevated temperature requirement. Manufacturers will have to decide whether to redesign the product, derate the life of a 12K or 15K hr product, or develop a new product to meet the requirements. The solution is not straightforward and will increase the cost of the product.
- h) The EPA must keep in mind that manufacturers are not likely to begin overall redesign until all the requirements are finalized, thus redesign and testing will not begin until the final Lamps Specification is published.
- i) Additionally, for elevated temperature room testing, the change from 45°C to 55°C may drastically increase OSHA requirements including medical assessment of operators, time in site recording, etc., as the heat strain index increases significantly with a ten degree increase. This potentially could disqualify existing personnel from performing testing.
- j) EPA's rationale for this change is fundamentally flawed because the true problem is misapplication, not poor product performance. The EPA should support their partners and focus on the problem, not treating symptoms.
- k) NEMA insists the testing temperatures be maintained in accordance with current specifications (i.e. not to exceed 45°C, except for products designed for recessed use).

#### Pages 18-19, Early Qualification Limits ≤ 35,000 Hours

- a) The early qualification limit for 35,000 hours is within the tolerance band of the measurement systems used for LM79. Round robin measurements between NIST and various test labs have shown the lab to lab measurement variation to be around 2% to 3%. This leaves very little margin between the various levels within the first 3,000 hours.
- b) The commercial category requirement of having a 35,000 hour life product can still be achieved by using the life rating tables in ENERGY STAR v1.4 and testing at 45°C. This method has worked since 2009 when the ENERGY STAR requirements were first implemented for SSL. There is no need to have a special category for commercial products.
- c) MR-16 Lifetime: these lamps should not be required to comply with the more stringent commercial grade requirements of 35,000 hours lifetime (if they are maintained in the Specification). These lamps are thermally challenged and the costs of redesign to 35,000 hours will eliminate consumer interest in these lamps due to resulting pricing, thus causing a total loss of potential energy savings. We do not have any evidence that consumers will react negatively to a shorter lifetime for these lamps. NEMA recommends a lifetime requirement of 25,000 hours for MR-16.

#### Page 18, Lumen Maintenance Requirements

- a) It is not clear how EPA intends to apply the -3% tolerance, and we request an example be added to the Annex to explain this.
- b) Annex A: Elevated temperature life test: Lumen maintenance testing must now be done with 3 hours on/20 minutes off for SSL 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.
- c) Eliminate the text "Lamps to be marketed as commercial grade shall satisfy requirements for no less than 35,000 hour rated life claims."

#### Page 19, Life Rating (CFL)

- a) It will be difficult for covered CFL products to meet the requirement of 10,000 hours. Especially when they must also be life tested at an elevated temperature. Keep the CFL life rating at the

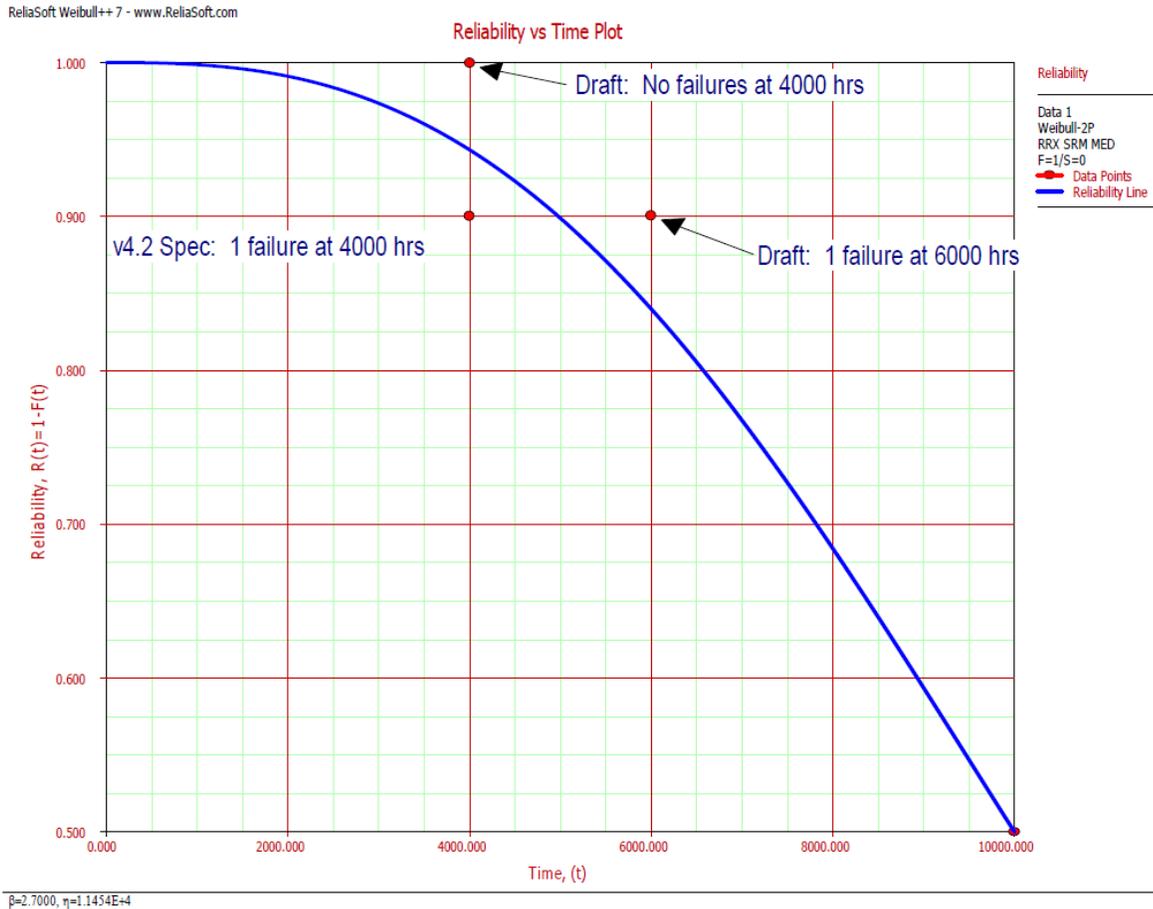
levels of the current CFL 4.3 specification, so as to preserve availability of these products for consumers.

Page 19, Life Rating (SSL)

- 1) ENERGY STAR claims to be striving for a technology neutral specification; however, this is one of several areas in the specification where ENERGY STAR has chosen a different path for CFL and SSL.
- 2) Manufacturers offer both CFL and SSL products via the commercial channel. If there is truly a need for a commercial category then it should be for both CFL and SSL (though we suggest it be *neither*). It is important to note that having a commercial category for SSL would result in additional product cost due to the following:
  - Redesign of the products to withstand the higher test temperatures at 55°C
  - Design change to accommodate the higher CRI and PF requirements
  - Change out of test equipment to accommodate the test temperature of 55°C
- 3) Based on the above, the EPA should remove the “commercial grade” category from this section.
- 4) NEMA understands that this requirement may be tied to definitions intended to satisfy Utility Rebate program needs, and we volunteer to assist the EPA and Utilities in identifying a solution, outside of this Specification.
- 5) We propose the below requirements for LED product life:
  - a. All LED lamps must be operational at 3,000 hours and ≥ 90% at 6,000 hours
  - b. If LED lamps should have a lifetime ≥ 25,000 hours, then the sample group must have all lamps operational at 12% lamp life and ≥ 90% samples still operational at 24% lamp life.

Page 21, Reliability before 40% life

In the draft, ENERGY STAR attempts to define a reliability curve for CFLs with specific reliability targets at 40% of life and 6000 hours. Such a curve is shown in the figure below for CFLs tested under nominal conditions, i.e. 25°C with a B50 life of 10,000 hours. Using this as an example, the figure shows that 6% failures could be expected at 4000 hours. Therefore, it is not realistic and it is unfair to expect zero failures, i.e. 100% reliability, at 4000 hrs. The existing v4.3 specification acknowledges this by allowing at least 1 failure at 4000 hrs for a 10,000 hr lamp. NEMA strongly urges that the CFL reliability requirement be maintained from the ENERGY STAR CFL 4.3 specification.



### Page 21. Rated Life Requirements

Eliminate the text “Solid State: Lamps to be marketed as commercial grade shall have a rated life of => 35,000 hours.”

### Page 22. Rapid Cycle Stress Test for CFLs

- 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.
- The switching test, which has been reduced to a maximum of 15,000 10-minute cycles, is still excessively long at 2,500 hours.
- NEMA recommends 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.

### Page 22. Rapid Cycle Stress Test for LEDs

- This is more rigorous than the test in Integrated LED Lamps spec and is excessive.

- b) The test used to be for 1 cycle for every 2 hours of L70; it is now 1 cycle for every hour of rated life, which means more cycles for lamps rated at 15k or 25k hours.
- c) The cycles are 2.5 times as long, so the test will take longer for all lamps rated up to 37k hours. Under the proposal, one has to test for 15k cycles. This corresponds to switching a lamp on and off 7 times an hour for every hour of assumed life for a 2-year lamp, or 4.5 times an hour for a 3-year lamp, or about once an hour for commercial lamps, which stay on all day.
- d) 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

#### Page 23, Power Factor

- a) For SSL lamps > 5W, the PF should be  $\geq 0.7$  regardless of how they are marketed. Again, the commercial grade category needs to be removed for the reasons stated above.
- b) The PF requirement should be exempt for low voltage MR-16. The MR-16 is powered by a transformer. The transformer has its own PF and this is what the AC mains will see. Requiring a PF test at the lamp level adds extra cost and there is no benefit in the final application.

#### Page 24, Operating Frequency

- a) This section is not defined correctly – LED lamps can operate at different frequencies. For instance: many SSL products operate around 150 KHz.
- b) For CFLs, keep the existing limit of  $\geq 40$  kHz. All screwbase CFLs have been designed to meet this requirement.
- c) Flexibility should be allowed to the manufacturers to set the operating frequency for their products. The EPA should refrain from telling manufacturers how to design the electronics, because this encroaches on numerous concerns such as trade restriction, commoditization of an innovating market (SSL) and the obvious fact that operating frequency is not directly related to energy efficiency.
- d) In light of the above comments; because SSL product standards and test methods are in development, ENERGY STAR needs to wait. Therefore, remove SSL flicker requirements and mention of them from the ENERGY STAR Lamps specification until adequate standards exist.

#### Page 25, Electrical Performance Requirements

- a) Run-Up Time: the requirements in the draft specification 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. Retain the run-up time currently in the CFL V4.3 specification as noted in section c below.
- c) The run-up proposal from draft #1 has been carried over to draft #2. Using current technology, CFLs cannot reach 100% of stable output in the times indicated in the Draft. Significant innovation would be required to meet the proposed run-up times. The EPA must bear in mind and show due deference to consumer’s expectations that CFLs are becoming commoditized and as such they are not willing to pay far greater prices, even for the ENERGY STAR brand. NEMA strongly urges that ENERGY STAR retain the run-up times currently in the CFL v4.3 specification.
- d) NEMA is not convinced this subject is a problem for today’s products, and may refer to older lamps. This subject is one where the anecdotal nature of the current EPA complaint tools falls short of actionable information.

#### Page 26, Dimming Requirements

- a) Because the standards necessary for this section are still in development, this section should be removed until those standards are available and have been evaluated. This section might be restored in future revisions of this Specification.

#### Page 27, Noise requirements

- a) Eliminate this subject until after the Dimming requirements associated with it (page 26) have been finalized.

#### Page 28, Lamp Toxics Reduction Requirements

- a) Testing for toxics is extremely expensive and unnecessary for an energy-efficiency spec. The proposed requirements appear to be aligned with European RoHS. Many manufacturers already have to comply with California RoHS requirements. Thus we suggest that lamp toxics requirements be removed from the specification. Otherwise, this will impact the cost of the lamps.
- b) We do support continuing to reference NEMA's voluntary mercury level commitment for CFLs which, since the last version of the CFL spec was put into place, has been lowered by 20%.

#### Page 29, Lamp Shape Dimensional Requirements and Thermal Temperature

- a) Recommend removing minimum overall length. This typically is not measured.
- b) Add MOD (maximum overall diameter) and add a method of compliance to show a drawing with the lamp dimensions.
- c) The title of the table with Thermal Requirements should be changed to read Operating Temperature

#### Page 29, Minimum Operating Temperature

- a) In CFL v4.3 and in the Lamps Spec draft 1, there was a requirement to state the minimum operating/starting temperature on the packaging. In Lamps Draft 2 the requirement was moved from being an element on the packaging to what could be interpreted as a de facto requirement to start at 0°F. This is a new requirement and no limit on the starting time is specified.
- b) NEMA recommends that minimum starting temperature remain as an item specified by the manufacturer rather than a value subject to qualification and verification.

#### Page 30, Lamp Labeling

- a) For clarification, change "lamp manufacturer or brand name" to "lamp manufacturer (*OEM or CFL manufacturing Partner*) or brand name, either may be represented by their respective Trademark". This makes it clear that the name of the private labeler or their trademark may appear on the lamp instead of that of the original manufacturer.
- b) Change text referring to lamp labeling to "Lamp markings shall comply with UL requirements under UL 1993 and UL 8750. Where physically possible, each of the following shall be printed on the lamp..." Some lamps are too small to reasonably have all the suggested labeling.

#### Page 30, Lamp Packaging Requirements

- a) The text under Model Number should be modified as follows: "*Lamp packaging shall include model number ~~and or~~ retail number (as applicable) as will appear on the ENERGY STAR qualifying product list.*" This reflects current practice which permits either the model number or the retail number to appear on the package.
- b) Labeling
  - 1) The "Lamp Model number" should be called "Lamp Model Nomenclature", which implies an alpha-numeric description.
  - 2) Remove rated wattage in watts, because this is already addressed by UL.

- c) NEMA agrees with the requirements to require Lumens marking on products which are not regulated by FTC, where it is physically feasible to make such markings.
- d) Packaging: Controls and Application Compatibility is already required by other testing and certification programs, and therefore should not be part of the labeling requirements of ENERGY STAR.
- e) Per ENERGY STAR LED v1.4 all SSL can start at -20°C. This value should be added to the packaging.

#### Page 31, Non-standard Light Output Diagram

- a) We do not feel that it is appropriate for the EPA to prescribe icons. This requirement should be removed. As it stands, this diagram is confusing and makes the lamp appear to produce darkness (blackness). In reality, the lamp produces light in the forward direction; whatever background light was behind the light is still there.

#### Page 31, Packaging Label and Warranty

- a) Non-standard Light output logo: if the non-standard lamp is going to mimic a certain ANSI shape, then it should meet all photometric requirements for that shape. The proposed logos allow manufacturers to confuse the end user by implying they meet an ANSI lamp standard light output. The proposed logos place ANSI Standard lamps at a disadvantage when sitting on the shelf together at a point of sale. The same logo should be used for both ANSI and Non-standard shaped lamps.
- b) Warranty: remove the commercial requirements and allow the manufacturer to set their warranties base on competitive positioning in the market place. 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 program requirements.
- c) 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.
- d) Eliminate the reference to the term "commercial grade"; cut the text "Lamps marketed as commercial grade: 5 years 10 hours/day"

#### Appendix A: Omnidirectional Lamp

This must be changed to apply only to LED lamps. No research has been completed yet to determine if CFLs can meet the proposed definition, since this originally applied only to LED lamps. NEMA hopes to be able to answer this question for ES Lamps Draft 3.

#### Appendix B: Luminous Intensity Distribution Diagram for Directional Lamps

The very detailed specifications of beam shape on p. 33 are unnecessary and severely limit manufacturing design decisions. These proposed criteria are entirely new and EPA does not provide adequate justification for their introduction. We refer again to our opening statements about adding non-energy related parameters for sake of self-imposed obligations of consumer advocacy. This is another instance where the 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

Please refer to our comments above for pages 18-19. NEMA opposes this change.

#### Annex C: ENERGY STAR Elevated Temperature Initial Light Output Ratio

The Elevated Temperature Light Output Ratio test (p.11) is new for SSL. The EPA is obligated to offer justification for adding this specification which has historically been in the domain of the manufacturer and submit it to review before adding this requirement.

Annex D: ENERGY STAR Start Time Test

- a) In example 1 (Annex D pg 3), the EPA is asked to identify how 98% was chosen as the start time. A more easily measured number like 90% or 95% could be used. This item requires additional discussion.
- b) 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 therefore be further defined. What if the initial plateau is only a few percent of the final plateau? This requirement raises more questions than it answers. EPA is requested to provide clarification.