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VIA EMAIL TO: 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 3

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.

Sincerely,

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

Kyle Pitsor
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NEMA Comments to ENERGY STAR Specification for Lamps Version 1.0 Draft 3

Several areas have been identified by NEMA members as presenting significant problems that need to be addressed by EPA, several of which we believe will have a deleterious impact on the Energy Star program for lamps if not addressed. We have identified 4 policy areas for grouping the comments.

1. Policy area one concerns setting standards so high that they cannot be met technically, which eliminates entire product categories from the market. Example: covered CFLs and dimmable or 3-way CFLs. It makes no sense to eliminate these ENERGY STAR CFL product categories just when Utilities are starting to shift rebate dollars to these specialty areas where fewer consumers have made the switch.
2. Policy area two addresses increasing the stringency of product requirements to a point they can be met, but at significantly higher cost. NEMA's suggested changes will mitigate, to some extent, product cost increases to meet higher standards while balancing product quality and efficiency in the consumer interest. Even with rebates, increasing product costs leads to a reduction in consumer adoption of energy efficient products, fewer products being rebated (due to fixed amounts of rebate funds) and fewer products being installed, all of which lower national energy savings impacts.
3. Policy area three addresses increasing testing and compliance requirements which greatly increases testing costs or increases compliance complexity. Our suggested changes will lower product testing costs and reduce compliance complexity while maintaining program integrity. Increasing testing costs will increase product costs which will ultimately lower national energy savings as already explained.
4. Policy area four addresses important technical or editorial errors or clarifications with the proposed standards. Suggested changes are proposed to provide clarification or correct errors in the proposal.

NEMA believes that addressing these issues will greatly improve the LAMPS 1.0 standard.

- 1 Specification Scope & Lamp Classification
 - 1.2 Excluded products: NEMA disagrees with the decision to not allow lamps with special features. We recommend that they be allowed, and suggest this change to the text: "lamps incorporating power-consuming features in the on or off state which do not provide illumination (e.g. audio functions, air fresheners) are not excluded." Policy 4
- 2 Effective Date - early 2014, manufacturing date.

Since the lamp specification is still in draft form, the proposed effective date of early 2014 is not taking into account the testing time (approx. 8 months) that will be required to recertify products. The proposed time line is already too tight. Manufacturers and labs CANNOT begin testing until the test procedures and requirements are well-understood (they are not now).

Proposal: End new ENERGY STAR certifications under the current specification after January 2014, but allow the previously approved products to maintain their qualification status for a year (e.g. January 2015).

The typical window of 270 days for implementation of an ES specification is insufficient given the extreme changes being required of Lamps. A lamp must be designed (2-3 months), tested (8 months), redesigned and submitted to testing for listing (several months), and none of these can occur until a specification is finalized. Lumen maintenance testing in particular is a long-lead subject. As a result, the effective date of this specification should be one full year from date of publication. Policy 3

3 Future Specification Revisions

3.1.4. Color Quality

We think the EPA will agree that high color quality will not be barrier to broad consumer adoption, but a lack of color quality might be. NEMA reiterates our desire for public discourse on accommodations for high color quality lamps in the Specification. Consumer and commercial lighting user research has indicated that color quality is a top priority for considering energy efficient lighting (McKinsey, Lighting the Way, 2011). Cost is a limiting factor for high-CRI lamps, and cost is already expected to rise due to the numerous changes being brought forth in this specification. Balancing of cost can in part be accomplished by leveling the playing field between lamps with a CRI greater than 90 and lamps with a CRI greater than 80. It is recommended that a separate luminous efficacy table is included for higher than 90CRI. See our comment to section 9.1. Policy 2

Decision criteria for fixture installation in new buildings/structures

What are the most important criteria when deciding on the type of light source technology in a new fixture installation?
Percent. No. of respondents¹ who selected this response as their 1st decision criterion



1 1 respondent could answer up to 3 applications in the survey
2 Incl. design flexibility
3 CRI, color temperature, color consistency, and light distribution
4 Dimmability, color controllability, etc.

Source: McKinsey Global Lighting Professionals & Consumer Survey

4 Definitions (all below Policy 4)

- a) The flicker definition is not correct. We propose the following¹:
 - *Flicker*: the perception of temporal changes in the intensity or chromaticity of the light, which is epitomized by the stroboscopic effect and phantom array effect.
 - *Stroboscopic effect*: the perception that objects illuminated by fluctuating light move discretely rather than continuously (when the observer's eye is still).
 - *Phantom array effect*: the perception of a spatially extended series of spots when making rapid eye movements across a light spot that fluctuates over time (when the light source is still).
- b) Omnidirectional Lamp – Draft 3 contains the text “These lamps can be standard; having an ANSI standard lamp shape of A, BT, G, P, PS, S or T, or non-standard; a self-ballasted compact fluorescent that utilizes a bare spiral, or multiple (twin, triple, quadruple) tube arrangement.” Globe (G) shapes were removed from the omnidirectional category under the scope in draft 3. It is already captured in the decorative definition. Remove “G” from Omni-directional definition.
- c) Dimmable Lamp: A lamp that is capable of producing varying levels of light, for the purposes of this specification, the lamp must be capable of reducing light output to 20% (or lower) when paired with a control or dimmer.
- d) Lumen Maintenance: the definition in draft 3 is inconsistent with IESNA RP-16 and the Lighting Measurement guides (LMs) referenced elsewhere in the specification. Change the definition to read: “The luminous flux or lumen output at a given time in the life of the lamp and expressed as a percentage of the ~~rated~~ initial luminous flux or ~~rated~~ initial lumen output, respectively (~~10CFR430 Appendix W to Subpart B~~).”
- e) Omnidirectional Lamp: The term “non-standard lamp” is used. To avoid confusion with the elimination of “non-standard SSL”, this should be changed to “non-standard lamp form factor (CFL only)”. (This makes the definition match table 1.1)
- f) Solid-State Lighting (SSL): Incandescent lamps generate light from a solid object; tungsten filaments are solid. We recommend “... ..light is emitted from a material by a semiconducting process of electron transition from a conduction band to valence band process whether or not the wavelength of this light is converted by additional components rather than from an electrically heated material or direct emission from an electrically excited gas mixture or indirectly by excitation of a light emitting phosphor from an electrically excited gas mixture.”
- g) The reference to page 30 in the column of Table 1 for non-standard lamp form factors should be to page 27 (in the current draft).

6 Federal Standards and DOE Rulemaking

- 3 Way lamps are regulated by the DOE Rulemaking, however, this section does not clearly state that they are not included in the scope of this section. We propose to modify the sentence accordingly: “The scope of this specification includes bare and covered medium base compact fluorescent lamps which are regulated by the U. S. Department of Energy Code of Federal Regulations CFR Title 10.” Policy 4

¹ Per two International Commission on Illumination (CIE) papers: Modeling the Visibility of the Stroboscopic Effect by Sekulovski, D., Perz, M., Vogels, I. 2012, and Effect of eye movements on perception of temporally modulated light by I.M.L.C. Vogels & I. Hernando 2012

- NEMA appreciates the modifications EPA has made to align ENERGY STAR testing with DOE/FTC testing. We suggest a further alignment for the reporting method concerning base up and base down configurations. Details are provided in our response to section 10.

7 Product Certification

7.1 Product Variations, CCT: NEMA Understands EPA did not receive enough information, or was not swayed by the information provided, regarding the argument that CCT be an allowable factor of SSL product variation. We still contend that for a particular SSL product family with the same LED driver the difference in the Color temp will not impact the rapid cycle test results. We would like to see CCT as an allowable variation criterion for compliance with the SSL rapid cycle test requirement. We request EPA make public the information provided and reasoning, for further discussion on this point. We are also attempting to gather addition data (although not knowing what has already been provided is a hurdle).

Shown below you will find data from one NEMA manufacturer of LED lamps that completed the Energy Star rapid cycle test. The lamps represented multiple color temperatures and accumulated over 1 million cycles. There were no lamp failures and in turn, no difference in performance due to color temperature.

Color Temp	# of Lamps	Cycles	Failures
2700	222	427,475	0
3000	228	476,225	0
4000	72	129,015	0
Total	522	1,032,715	0

Recommend: add to table 2 - Allowable Variations

Lamp Attribute: CCT for SSL

- Allow Variation: Rapid cycle test required only from the tested representative model (independent of lamp's color temp)

- Additional Test Data – none

Policy 3

As to the wording: “The model which the laboratory expects to have the greatest difficulty meeting the performance requirements outlined in this specification shall be tested (—tested representative model).” A laboratory is not qualified to make this determination; this determination can only be made by the manufacturer based on knowledge of the details of design and component variation among models of a type.

Recommend change text to: “The model which the ~~laboratory expects~~ manufacturer identifies as the one expected to have... “

Policy 4

7.1 Table 2: CCT (CFL only) under the additional test data required for each variant – Lumen Maintenance testing to 40% of rated life. This requirement has no benefit. We propose EPA remove this requirement and replace with direction that manufacturers provide 100 hr test data. Policy 3

7.1.2 In-situ temperature testing:

- We are not clear on the intent and the interpretation of this section. It would seem to expand requirements for in-situ testing beyond current requirements by increasing the number of samples to be tested from 1 to 10 for a model with two variants and an increase by 5 for each additional variant. This would add significant testing cost (thousands of dollars per test per lamp). In addition, the number of test temperature locations in each sample is five or more. This often requires major deconstruction of the device and reconstruction, which in the end may not perform so as to reflect the unaltered product performance. The number and location of thermocouple wires could alter the designed thermal management of the device. Furthermore this extends in-situ measurement beyond SSL to all product types.

In-situ testing is performed on products, for safety testing. Testing for UL certification of a variant of a model requires 80-120 hours engineering time and multiple units as some required testing is destructive. A conservative cost for the testing is 8000 – 12000 USD. This section could be requiring cost which would be prohibitive if five units of each variant must be tested.

We also request clarification regarding the definition of “unit” as it relates to “variant.”

Recommend: EPA harmonize the number of samples and the reporting requirements with these existing practices, so as to minimize additional test time and cost burden. Policy 3

- In the NOTE, page 8 top: “Additionally, EPA has proposed altering the in situ tolerance for beam angle and lamp base variations. The proposal allows manufacturers the flexibility of testing the temperature variation of one or more samples for variation testing.”

The intent and implications of this are unclear. Is this referring to in-situ temperatures? EPA is requested to clarify this point and include an example. Policy 4

7.5.2 Significant Digits and Rounding: We suggest adding the direct statement, “Calculations shall be carried out with values as recorded.” since recorded values have been defined in 7.5.1. Policy 4

7.5.5 iii Rounding: Rounding rule for CRI is missing.

Recommend add: “round CRI to whole numbers”

- 8 Methods of Measurements and Reference Documents, references to IES LM-80-8 and TM-21-11: EPA should note that the definitions of lumen maintenance of LM-80-8 and TM-21-11 are different than lumen maintenance of Section 4: Policy 4

“Lumen Maintenance: The luminous flux or lumen output at a given time in the life of the lamp and expressed as a percentage of the rated luminous flux or rated lumen output, respectively (10CFR430 Appendix W to Subpart B). Lumen maintenance is the converse of lumen depreciation.”

In fact the detailed description of the calculation in TM-21-11 very explicitly disagrees with the definition for lumen maintenance used in this document.

This document uses the definition from the CFR which is not the definition used in the referenced test methods. However, the instructions for the actual calculation of the reported lumen maintenance value states: Lamp shall maintain $\geq 90\%$ of *initial* lumen output at 1000-hours; and $\geq 80\%$ of *initial* lumen output at 40% of rated life. Note the inconsistency with the referenced test methods, the definition and the specified reporting.

The value of *initial* across lamp types, CFL, fluorescent, SSL is not consistently provided, e.g. whenever fluorescent lamps are involved, *initial* is taken at the 100 hr point in the Supplementary Test Guidance while in 10.1 Lumen Maintenance for CFL the information is in the Supplementary Test Guidance, but for SSL it is instead Energy Star Requirements text as 0-hour and does not use the term *initial*.

→We have no distinct issue with these variations, but we suggest the EPA and their engineers review the differences and add clarity anywhere they feel it is needed or might be misinterpreted.

9 Photometric Performance

Comment about use of the word “minimum”. EPA uses this word in several requirements columns in this section, but always with other qualifiers like “greater than” and so on. The word “minimum” is redundant and its use is not consistent. This risks confusion.

Recommend: eliminate use of the word “minimum” wherever possible, such as in tables 9.2 and 9.4. Policy 4

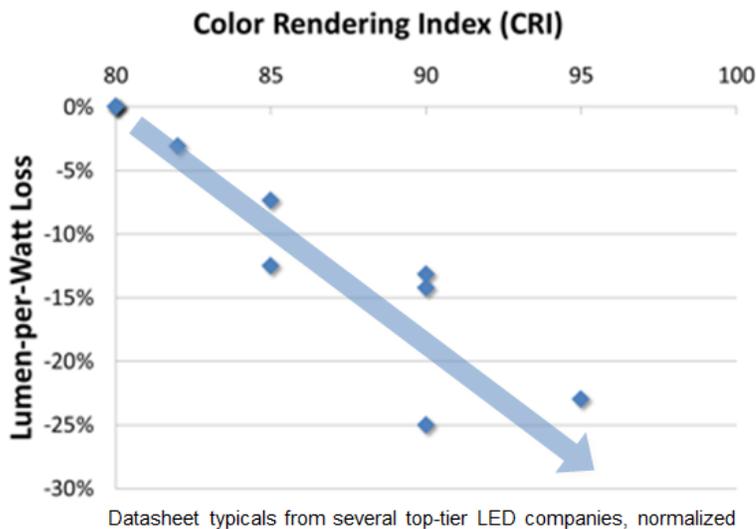
9.1 Luminous Efficacy (CFL) – *This section does not account for dimmable and covered CFL lamps. As proposed in draft 3, dimmable and covered CFLs will not comply with the requirement. They will be eliminated from the program due to the overly strict performance requirements. The California Public Utilities Commission specifically directed utilities to concentrate on specialty CFLSs (ergo, Covered) for CFL rebate programs. We believe the current specification will eliminate those products from the ENERGY STAR program through the combined result of all the new requirements. Propose to add provisions from CFL V4.3 to this document and provide separate requirements for dimmable and covered CFLs (or lower all LPW requirements to these levels).*

Lamp		Med screw	Cand screw	GU24
Bare lamp (Dim/2-way/3-way)	<15W	50 lpw	50 lpw	40 lpw
	>15W	60 lpw	n/a	40 lpw
Covered (no reflector)	<15W	45 lpw	45 lpw	40 lpw
	>15W	50 lpw	n/a	40 lpw
Reflector (dimmable, all)	<20W	38 lpw		
	$\geq 20W$	45 lpw		

Raw data from Energy Star website² shows that only 1% of Aline covered CFLs ≥ 15 w can meet 65 lpw while $>40\%$ of these CFLs would meet 55LPW limit. Any concerns over an overly large qualified product list for this category (ergo $>40\%$) will be meted by other requirements in this specification which will winnow down the final number of qualified lamps. Policy 1

The following comments are related to cost growth concerns; Policy 2

We reiterate our previous comment that high-CRI lamps need a break on efficacy requirements, due to the tradeoff between CRI and LPW. As is shown below, in this case for SSL, current technology limits result in a direct proportionality between CRI and efficacy loss.



The objective of this comment is that >90 CRI lamps become available to the market as a reasonable alternative to 80CRI. In the absence of a lower efficacy tier, >90 CRI lamps have a fundamental cost disadvantage in the market.

In the case of Phosphor based white LEDs, increased CRI from 80 to 90 is achieved by increased spectral emission across a broader wavelength range. This results in a reduction of luminous efficacy of approximately 20% on average for leading LED manufacturers. A lamp specification that allows a 1 for 1 lower lamp efficacy will limit the cost increase for higher CRI lamps and allows manufacturers to offer them at competing prices. This will level the playing field between lamps of different CRI and allows consumers and commercial users to make a balanced choice when they try to find alternatives to replace halogen and incandescent lamps. Otherwise, consumers who demand high-CRI lighting will stick with inefficient sources. Even with a slightly reduced efficacy requirement for >90 CRI, the expected energy savings for replacing an incandescent or halogen lamp is still 75%. The overall impact on energy savings is expected to be positive because the >90 CRI can be adopted in addition to products with lower CRI.

²http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=LB

We do not go into detail in this document for sake of time, but similar challenges exist for CFLs; raising CRI lowers efficacy. For this reason high-CRI CFLs should also be given leeway.

We think all parties concerned want to see high CRI lamps widely available for those who want them (retail, etc.) and ask the EPA to add a table which addresses this need in next draft for public feedback:

All lamps	Lamp Rated Wattage (Watts)	CRI > 90
Omnidirectional	<15	45
	≥15	55
Directional	<20	35
	≥20	40
Decorative	<15	35
	15 ≤ W < 25	40
	≥25	50

9.1 Luminous Efficacy (SSL): NEMA appreciates the attempt to further refine LPW Omnidirectional requirements based on lamp size (wattage). However, the requirement for lamps >15W is too high. If one compares the % LPW increase from V1.4 to V1.0 D3, lower wattage increase by 9% and higher wattage by 18%. From a technical design point of view, one would expect the lower wattage to be higher than the higher wattage products. The reason being, the higher wattage has higher thermals which results in less efficient LED performance or lower LPW. A reduction in LPW for higher wattage products will contribute to reduced product cost increases and better align the % LPW change for both high and low power products.

Recommend: Change back the Omnidirectional LPW for the higher power products to the D2 requirements of 60 LPW. Policy 1

9.1 Passing criteria and reported value shall be aligned. The reference to DOE reported value (as an alternative option) is incorrectly interpreted by EPA. Per 10 CFR 429.35 (a) Sampling plan for selection of units for testing, (2) (i) "Any represented value of efficacy, 1,000-hour lumen maintenance, and lumen maintenance shall be based on a sample randomly selected and tested to ensure that the represented value is less than or equal to the lower of: (A) mean of the sample or (B) lower confidence limit ...of ...mean divided by 0.95."

In this context, a sample means the group of the lamps to be tested, e.g. 5 lamps of a sample.

The DOE uses this approach in Federal rulemakings for reporting and enforcement of lighting products. This allows for production variation and other statistical considerations to be accommodated.

Recommend: Reported value is the average of the lesser of the lumens per watt measured in the base-up and base-down positions or other specified/restricted position.

Policy 3

9.2 Light Output – Directional (R, BR, ER) – EPA’s stated intent for adding the table for all other directional lamps so as to align with EISA and DOE rulemakings is not

appropriate at this time. The regulations have just gone into effect and old PAR inventory is still being sold out of warehouses. After many years of use, the PAR market is still conditioned to expect the wattage and light output of standard lamps. The market is just starting to experience lamps meeting the new standards. If consumers purchased LED or CFL lamps meeting these new comparison standards today, they would view the lamps as too bright, potentially resulting in customer complaints. The proposed lumen values in Draft 3 for reflector lamps are 35% - 45% higher than the older PAR lamps. There will also be a cost impact to the lamp required in order to drive more lumens. We propose that the requirements should continue to reference the wattage/lumen values of the typical PAR lamp performance which is ≥ 10 times the lamp's rated wattage for the referenced PAR lamp for this version of the standard. The chart in draft 3 can be saved for later discussion in the v2 of the Lamps Specification, once consumers have grown familiar with PAR lamps meeting the new specifications. Policy 4

9.2 Light Output: Is there a distinction attempted between omnidirectional lamps and decorative lamps versus directional lamps by use of the phrases "...Lamp minimum initial light output (total luminous flux)" for omnidirectional and decorative and "Lamp initial light output (in lumens)" for directional.

Also use of "minimum" in this column is confusing as it is the *average* of the group that is reported per Supplemental Testing Guidance column.
Policy 4

9.2 Clarifications to Light Output by Lamp Type, Policy 4

- a. Decorative Except Globe(G) Shape - change to Decorative Except Globe (G) Medium Base Shape. This would cover Globe shapes with candelabra bases
- b. Decorative Globe (G) Shape – change to Decorative Globe (G) Medium Base Shape

9.4 Center Beam Intensity – Line Voltage MR lamps: The values for the center beam intensity should depend on the beam angle as well as the wattage. The proposed requirement will present an issue with marketing equivalency claims for any products with a beam angle greater than 35°.

Recommend: utilize the existing calculator with parameters inserted for PAR16 lamps in order to calculate equivalencies for line-voltage MR16s. Policy 4

9.5 Luminous intensity distribution – Decorative lamps: This requirement is placing the same requirement on decorative products as omnidirectional. This requirement will also impact features of decorative products that consumers prefer, such as the sparkle effect.

Recommend: No less than 5% of total flux (lumens) shall be emitted in the 90° to 180° zone. Policy 1

9.6 Passing test for Correlated Color Temperature (CCT)

The requirement to have all lamps fall within 7 steps is too strict, when taking into account normal production variance. The DOE LED Lighting Facts Label and current CFL v4.3 specification both allow for 9/10 samples passing.

Recommend: (per CFL v4.3 pass criteria) "at least 9 out of the 10 samples tested must fall within a 7-step ANSI MacAdam ellipse". Policy 2

9.6 Correlated Color temperature (CCT): As we read the specification;
For CFL: Reported CCT shall be the average of the unit measured values.
For SSL: Reported CCT shall be the average of the passing unit measured values.
For CFLs the word “passing” was missed, and should be returned. This will align the two. Policy 4

9.7 Color Rendering: All Lamps: The structure of the Supplementary Testing Guidance column is such that what the guidance applies to is unclear. If one compares page 15 to page 16, the supplemental guidance for Color Rendering on page 16 is not split into SSL and CFL, and it is not clear if the guidance applies to one or both technologies. EPA is requested to clarify this issue in the next draft. Policy 4

9.7 Color Rendering (CRI): A majority of NEMA companies believe that significant redesign is required in order for 2700K lamps to meet R9>0. This comes at a cost of LPW (decreased). Current coating designs for 2700K are strongly challenged by R>0 color performance. Additional deep red phosphors to meet R9>0 result in lower LPW and higher cost. This higher R9 reduces LPW value by as much as 10LPW (15W spiral) which falls below the directed efficacy requirements. R9 has never been a requirement for CFLs, thus they have not been designed with this in mind (since 1999).
Recommend: remove R9>0 for CFL. Policy 2

9.9 Color Angular Uniformity: (Change text as indicated) Lamp shall be scanned on two vertical ~~axes~~ planes separated by 90 degrees. Policy 4

10 Lumen Maintenance

10.1 CFL – 1,000 hour testing report: Although it is currently in the CFL V4.3 specification, this is no longer necessary, because it is required to be reported to the DOE. Reporting this to ENERGY STAR adds an unnecessary and duplicative requirement.
Remove this requirement. Policy 4

10.1 NEMA Agrees that the lumen maintenance of surviving samples is used for the pass/fail criteria. Policy 4

10.1 SSL – Regarding the requirement that “All directional lamps > 20 watts shall be tested in accordance with the ENERGY STAR Elevated Temperature Life Test using the Option A test method or Option B test method with an operating temperature of 55°C ± 5°C.”

Presumably the thought behind this requirement is that higher power lamps will have higher ambient temperatures. However, in general this is not the case since higher power lamps are generally larger in size and have more extensive heat sinking. Higher power lamps are also being impacted by legislation.

Recommend: change the operating temperature back to 45°C ± 5°C. Policy 2

10.2 Rated Life

- NEMA continues to disagree with EPA's position that all non-reflector lamps be submitted to elevated temperature testing. Use of non-reflector lamps in downlights, when they are not labeled and marketed as such, is a misapplication. Industry should not be held accountable, and forced to redesign all products, due to misapplication by consumers. Manufacturers already label packaging to address this issue. This requirement adds unnecessary redesign and testing costs. Recommend: remove elevated temperature testing requirements for all but reflector lamps. If EPA insists on maintaining this test requirement, test burden can be slightly reduced by permitting test method A for base down applications. Policy 2 and 3
- CFL – rated life requirement of $\geq 10,000$ hrs will present a problem for covered CFLs. The EPA is raising the bar two steps for covered products (Candelabra, Globe and Reflector), raising the lifetime from 6000 to 10000 hours and imposing the elevated temperature life test set up for all covered products. This becomes particularly problematic for Covered CFLs, since they run hotter than bare CFLs. In Energy Star V4.3, the elevated temperature life test requirement was for Reflector lamps only, with a lifetime requirement of 6000 hours. In Draft 3, the requirement has been increased two steps for the Candelabra and Globes and one step for Reflectors, but it is quite a substantial jump (40% more lifetime). EPA's argument that most Covered products comply with 10 K hours lifetime is not valid, because these lamps were under the actual requirement (at 25 °C open burn, not with the elevated temperature set up). The end result will be an increased cost for the products to improve the components of the electronic ballast. This goes against market penetration, especially considering that there are many applications that don't require high temperature. Also, it is challenging to meet this requirement in high power CFLs (e.g. $\geq 20W$). Lastly, as noted in our comments to section 9.1, specialty CFLs are the recommended subject of the latest round of CFL utility rebates, driving cost up or putting harsh requirements both reduce availability, harming rebate plans and energy savings. Proposal: Allow 8000 hours for covered lamps and maintain 10,000 for bare lamps. Policy 1 and 2
- Rated Life SSL - Decorative lamps shall have a rated life $\geq 15,000$ hours. All other lamps shall have a rated life of $\geq 25,000$ hours. Proposal: change rated life to "rated lumen maintenance life". Policy 4

10.1 and 10.2 Lumen Maintenance and Rated life (SSL)

We believe if you see greater than 3% difference in Lumen Maintenance between base-up and base-down it is related to the product's performance. Less than that is uncontrollable testing variation. To account for these uncontrollable influences, we recommend changing the method of calculating Lumen Maintenance for SSL products to the following:

"If units are tested both base-up and base-down, the average of the surviving unit measured values shall be calculated for each orientation, and the reported lumen maintenance shall be (1) If the Lumen Maintenance value between base-up and base-down is 3 or less percent, then all surviving lamps (both base-up and base-down) should be averaged and reported out. Or (2) if the difference in averages is greater than 3%, the

reported lumen maintenance will be lesser of the two averages (base-up and base-down)". Policy 3

10.3 Flicker: As defined in the spec, the flicker frequency has to be measured across the entire dimming range. The proposed maximum flicker index of 0.15 was likely determined based on a set of lamps that have no dimming capability (Miller, Poplawski) and did not include LED lamps.

It is also not reasonable to have a flicker index for dimmable lamps only, and not include lamps that are not dimmable.

Recommend: set a frequency requirement >100Hz without a requirement on flicker % or flicker index. At a frequency of >100Hz, under dimming, the user experience will be more than acceptable.

Note: to date the ENERGY STAR Dimming Range Test Method has not been published. In view of long development cycles and extensive testing that is required, publication of the Test Method is very urgent and a full coherent comment to the proposed requirements in item 12.3 cannot be given.

Until the flicker test method is finished and has been fully tested, we recommend a simple frequency requirement, which will at least set a threshold where there was none. Policy 4

Page 20 Note: We appreciate EPA's action to address this concern.

11 Electrical Performance Requirements

11.2 Power Factor Requirement – Low Voltage Lamps. As we have noted previously, PF for these products is attributable to their power supply, which is not integral and cannot be accounted for in Lamp testing.

Recommend: Exclude low voltage lamps from power factor requirements. Policy 4

11.3 Operating Frequency: The methods of measurement section must be clarified for certification purposes. It shows none, however, under the supplemental testing guidance, a procedure is outlined.

Strike the paragraph in the Supplemental Guidance column. The use of the word SHALL does not imply guidance, and the test method (which is TBD) should address the issue more aptly. Policy 4

11.5 Run-up Time: The proposed 120s run-up for covered lamps is too restrictive. Run-up is a characteristic that suffers as a result of all the additional requirements new, or tightened, in this specification, especially for covered products. A slightly longer run-up time will afford leeway in other areas.

Recommend: run-up time for covered lamps be 150s. Policy 1

11.6 Transient protection: ANSI C62.41.2 *and* C62.45. Both references are appropriate. Policy 4

12 Dimming Performance (impacts all policy areas 1 2 3 4)

EPA should obtain quotes on how much it will cost to complete testing for dimming performance requirements and share with industry before finalizing requirements and test methods. Furthermore, we note that a dimming testing round robin is in progress

(including labs from industry), and until it is completed and analyzed it is impossible to comment constructively on many of section 12's requirements, as they have not been verified as representative or repeatable. (e.g. don't get too far ahead)

As discussed and agree upon in other aspects of this Specification's development, low voltage MR-16 run on external transformers cannot be reasonably tested for certain aspects (i.e. power factor). Another one of these is aspects is dimming, because it depends greatly on the power supply.

Recommend add the exception: Lamps operated from a ballast or transformer (i.e. low voltage MR16). For externally ballasted lamps that are marketed as dimmable, the manufacturer is required to publish on their website or in packaging recommended lamp and transformer dimming guidance.

Predicated upon successful completion of the round robin, from an accuracy and repeatability standpoint, we offer the following considerations:

Sample size is currently TBD.

Recommend: Due to the proposed dimmer testing configuration, we propose to keep the sample size small at two lamps.

The introduction to this section states:

"If lamp is designed for a non-phase cut control device, lamp shall be tested using only the specified control(s). If lamp is designed for phase cut dimming operation, select 10 dimmers for testing. The 10 dimmers shall meet the following conditions:

1. From at least 3 different manufacturers
2. At least one must be specified for use with energy efficient lighting
3. At least one must be of the following types: Single Phase Shift; Double Phase Shift, Microprocessor with Power Supply, Voltage Compensation, Electronic Low Voltage, and/or Reverse Phase

Exception – If lamp is compatible with a limited set of dimmers/controls, the limited set of controls must be listed on the packaging and be tested with the lamp against all dimming performance requirements. An asterisk next to "dimmable" on lamp packaging/online product listing marketing materials must be included and point to an "only compatible with ..." statement."

Regarding item 2 above: we understand EPA's intent. However, dimmers may indicate compatibility with energy efficient lighting in a variety of ways (or not at all) because this aspect of labeling has not been standardized in the industry. This requirement cannot be fully complied with by manufacturers until uniform marking guidance and requirements exist for dimmers. Standards are still being developed for testing dimmer to lamp compatibility for non-tungsten loads. Until these are available, verifiable tests for compatibility are lacking as are related marking requirements. Dimmer manufacturers cannot be obligated to mark dimmers compatible with non-tungsten loads without a reference. Furthermore, dimmer markings and packaging rarely indicate the type of design employed. Dimmer packaging is not the subject of this specification, so EPA cannot mandate changes to it. How does EPA propose that manufacturers, test labs and consumers identify and distinguish one dimmer type from another given the available references and markings?

If EPA cannot issue concrete guidance (arguably for dimmers this exceeds EPA's authority) they must drop this requirement or make it a suggestion and nothing more.

Regarding item 3, this is confusing and the discussion during the webinar may have addressed the intent but it needs to be better documented. One can read this requirement to mean that at least one of each of the listed dimmer types must be in the set of 10 chosen. The webinar discussion seemed to indicate that this interpretation was not the intent. If the intent would permit all 10 dimmers to be just one of the types listed, that needs to be stated. If not, please clarify what is intended. Additionally, much like our preceding comment about dimmer package marking, there are typically no markings on a dimmer package or catalog about which technology type it is. How does EPA intend to facilitate the identification of individual dimmer types in the marketplace by brand and model?

We request EPA clarify in writing what the intent of item 3 is. And we suggest new wording "Must be at least one of the following..."

Regarding the exception, depending on the interpretation of item 3 there could be a problem. If for example a lamp is designed to operate with only a specific type of dimmer (say, reverse phase), it would be compatible with "a limited set of dimmers/controls", and this requirement would have the manufacturer list all such dimmers (in the case of reverse phase, a very long list) on the package, which is not practical. On the other hand, if the interpretation of item 3 would allow all 10 dimmers in the test to be reverse phase, presumably the manufacturer would be permitted to list those products on a website. EPA needs to clarify what is meant by "limited".

Listing dimmers by model on exterior packaging obligates lamp manufacturers to change packaging multiple times a year, and to re-test products on a continual basis. Furthermore, manufacturers cannot control time on the shelf for lamps or the availability of listed compatible dimmers in the market or on individual shelves. The completion of definition of dimmability testing will assist this discussion. For now these requirements must not be mandatory.

Recommend: Lists of compatible dimmers should only be required on manufacturer's websites.

12.2 Minimum Light Output: The discussion during the webinar indicated that manufacturers are encouraged to develop lamps that dim below 20% light output, but in order to mark that lamp with that performance; it needs to pass the dimming tests at the lowest advertised setting. This detail may be included in the test procedures, but it would be good to include a note in the specification, too.

12.3 Flicker: it is not currently specified if Flicker is measured at stabilized operation, or at any point in any condition. NEMA recommends that Flicker be measured at the stabilized condition.

12.3 Flicker requirement. Recommend: set a frequency requirement >100Hz without a requirement on flicker % or flicker index. At a frequency of >100Hz, under dimming, the user experience will be more than acceptable.

12.4 Audible Noise – NEMA recommends that noise measurements be performed at a distance of 1 meter.

We caution the EPA to carefully consider potential locations and installations when setting the testing and dBA requirements. V1 Draft 3 calls for 24 dBA performance at one foot or one meter. The 24 dBA number originated when ballast manufacturers said that a Type A ballast's noise would not be objectionable when used in a room with a 24 dBA background level. Manufacturers did not claim that their ballasts (let alone lamps) would emit less than 24 dBA. The noise level of a ballast in a ceiling fixture 2 meters away could be substantially higher than 24 dBA at one meter and still be suitable for a 24 dBA room.

Additionally: EPA should word the testing guidance to allow for flexibility. It is not feasible to measure sound 1 meter from the lamp in 6 locations 90 degrees apart. This would require a chamber larger than 2 meters in diameter, which would be prohibitively expensive. The test procedure should be scalable so that an affordable, smaller chamber can be used. For example: there's no need to measure the lamp from 6 locations if the lamp can be turned to 6 orientations relative to the microphone. This would reduce the necessary chamber size.

15 Lamp labeling, packaging, and warranty requirements.

15.1 Lamp Labeling: Please clarify the statement "lamps not covered by FTC" as this is confusing regarding what is required on all lamps. Any FTC required labeling should be removed from the Lamps Specification, since it is redundant. Policy 4

15.2 Under application exceptions: Lamp package and product information sheet must include a caution label which indicates the lamp may not be compatible with all low-voltage transformers used in existing light fixtures and which identifies the Web address (URL) to find up-to-date low-voltage transformer compatibility and appropriate use information. This information could be extensive, and it will vary over time.

Recommend: Remove requirement to including a caution label on lamp packaging and product information sheet, deferring to manufacturer's websites for details. Policy 1 and 4

15.2 Packaging labeling requirements (SSL): exclude starting temperature from printing on the outside of packaging. Minimum starting temperature is not a major concern for SSL, and removing this requirement will preserve scarce labeling area. Policy 4

15.3 Warranty: The wording is confusing and can be misinterpreted. We recommend the following text: "...rating and based on continuous operation over the corresponding number of hours per day." Policy 4

General NEMA Comments:

1. NEMA appreciates the extensive coordination and collaboration from EPA and other stakeholders during the development of this Specification.
2. Many of the EPA test methods referenced in the draft are not provided. It is our understanding that these are being reviewed by DOE, in accordance with their responsibilities to the ENERGY STAR program. We assume, and strongly recommend, all test procedures will be subject to public comments and revision before publication.

3. The number of new or enhanced design and performance changes required by this specification is not trivial. EPA has provided limited justification or verification of several key performance parameters when queried, i.e. "The Qualified Products List has lamps which achieve >XX LPW. Logically, this can be a new minimum threshold for that type", etc. These replies ignore the cumulative effect of these numerous changes on cost, efficacy and combined feasibility. Industry has submitted comments here, and in previous comment rounds, that we believe some or many of these parameters are unobtainable as a group. EPA has not responded in a technical manner to these concerns. The EPA has done feasibility studies in other programs, an example being the ENERGY STAR Exit Sign program, in which the EPA conducted feasibility testing before setting the energy consumption requirements at 5 watts per face for Exit Signs. NEMA and its members strongly desire the EPA continue this practice, and test feasibility for the Lamps Specification more positively. We have suggested that some products will become unavailable due to these challenges (e.g. covered CFLs) while at the same time rebate programs are being promoted which would incent these same products. While the EPA is not bound by law to demonstrate feasibility, versus the DOE in their rulemakings, we feel very strongly that the millions of dollars which will have to be expended to comply with these specifications should be guaranteed in some way. Therefore, we challenge the EPA to demonstrate compliant representative lamps for the various classes in the specification and/or the EPA identify products on the market which already fully comply (and report their numbers). A specification which severely restricts market availability (and sales) while significantly increasing participation costs risks strong political and financial backlash from all quarters.