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June 21, 2010

## **NEMA Comments on First Draft of Energy Star Luminaires Specification**

Thank you for the opportunity to provide the following initial comments on the first draft of the Energy Star Luminaires Program Requirements, Version 1.0, released on May 10 for public comment. These are submitted on behalf of the member companies of the NEMA Lamp, Luminaire, Ballast and Solid State Lighting Sections. We look forward to assisting further work to refine this draft specification.

### **Scope – page 1**

Several applications for SSL luminaires are included in the current Energy Star specification but are not included in the proposed scope for Version 1.0. These applications are outdoor step and pathway lights (residential) and wall-wash luminaires and bollards (non-residential). Why is Energy Star proposing to exclude these applications from eligibility for Energy Star recognition going forward?

In the directional category, some of the applications (downlights and surface mount) can also appear outdoors. Is the scope limited to indoor applications?

### **Definitions – page 4**

Some of the definitions in this section are not consistent with those which appear in IESNA RP-16-05 or the IEC. We welcome the opportunity to work with ENERGY STAR to identify and harmonize those terms.

The definition of lumen maintenance in this section was taken from IES LM-80-08 and appears to be unique to SSL products. A new definition should be added as follows:

**Lumen Maintenance:** The luminous flux output remaining (typically expressed as a percentage of the initial output) at any selected elapsed operating time.

The key difference is the word initial instead of the word maximum.

The Energy Star proposal uses “Class A” to denote commercial & “Class B” to denote residential. This implies a reference to FCC class here. However, in the specification Energy Star does not use “A” or “B” in the context of EMC compliance. For clarity, we suggest that Energy Star insert “Class-A” and “Class-B” in the specification where they make reference to residential or commercial use in context of FCC 47 CFR Part 15/18.

## **Qualification Process for Directional Luminaires – page 6**

Directional luminaires typically do not use a diffuser or shade. The variations of these elements as well as the reflector can affect the luminaire performance and efficacy. Therefore, it should not be generally allowed but should only be allowed conditionally.

Housing/chassis changes should be allowed if they are aesthetic and mechanical changes (e.g. latched door vs. screw closure).

Variations in heat sink/heat management should be accepted if the partner can demonstrate LED temperature is at or below previous editions.

Changes in reflector or trim should be allowed with conditions as long as efficacy still meets the minimum requirement.

## **Technical Notes**

In Item 8, “GU24” should be replaced with “Lamp”.

## **Reference Standards and Test Procedures – page 8**

While it is common practice for most standards to have the year appended to the end of the name of the standard, such as IES LM-80-08, where 08 stands for 2008, UL standards are commonly referred to by their edition, not the year it was published. For example, the version of UL 1993 that was published in August of 2009 is referred to as UL 1993, 3rd Edition, not UL 1993-2009. It is suggested to adopt the naming convention used by the rest of the industry when referring to these standards.

## **Luminous Efficacy and Output Requirements**

### **Non-Directional Luminaires – page 10**

The limit of 70 LPW will exclude viable energy saving pin-based lamps from consideration. Additionally, we request clarification as to whether the LPW applies to the lamp alone or to the system (lamp + ballast).

We question whether the exception for source efficacy should not be limited to covered and dimmable GU24 lamps but should be technology neutral, to include HID and SSL lamps.

Regarding self-ballasted CFLs with GU24 base:

≥ 70 LPW is too high and may be impossible to meet with many standard 13W integrated CFLs. It is, in effect, higher than the highest bin in the Energy Star Program Requirements for CFLs, Version 4.0, which is 65 LPW for bare lamps ≥ 15W.

Our recommendation: use the same efficacy levels as Energy Star for screw base lamps to avoid need for development of separate lamp models for GU24 (other than base change). This will help lower costs and provide a wider selection of models for consumers.

**Minimum Light Output:**

The CFL/Incandescent Equivalency Chart in the Energy Star Specification for CFLs, Version 4.0, for screw base lamps has a minimum of 800 lumens for a 60W incandescent equivalent. The 850 lumens for GU24 CFLs appears arbitrary. We recommend using the Energy Star CFL value for screw base lamps for the reasons listed above.

**Luminous Efficacy and Output Requirements  
Halogen Incandescent – page 11**

Under the Halogen Incandescent requirements, the last item includes the statement that “Luminaires may not offer any form of motion sensor override.” This restriction would eliminate a feature that is required in some situations related to safety and security.

Some outdoor motion sensor products have the ability to be triggered into a mode that allows them to energize the load for up to 24 hours when signaled by the power switch controlling the circuit. After a maximum of 24 hours, the sensor returns to normal operation. This mode is of particular importance when the owner is aware of a potential safety problem in the area that may not be triggered by the sensing of motion. The lights can be turned on (and off) manually to help secure the area or allow the owner to assess a potentially dangerous situation. Allowance of this temporary override is similar to that specified under the photosensor controls on page 24.

We urge the EPA to allow luminaires with motion sensors to have the option of a temporary override mode with an automatic return to normal mode within 24 hours.

**Luminous Efficacy Requirements: Directional Luminaires  
Residential: Fluorescent and Solid State Sources Only – page 13**

For Inseparable Luminaires, the proposed efficacy minimum is an excessively high value when compared to other technologies. It should be reduced to 45 LPW.

**Luminous Efficacy Requirements: Directional Luminaires  
Residential: Fluorescent and Solid State Sources Only  
Outdoor Post- or Arm-Mounted Decorative Luminaires -- page 13**

The specified uplight requirement is too strict for a decorative luminaire. It will result in closer luminaire spacing and typically more luminaires on the site, resulting in increased energy consumption. Consumer feedback has also indicated a preference for some glow in the roof of the luminaire; otherwise the luminaire looks incomplete (as if it is missing its roof). We suggest Energy Star revert to the current provision in the SSL V1.1 specification.

**Luminous Efficacy and Output Requirements: Directional Luminaires – page 14**

This requirement appears to be for fluorescent and solid state sources only. Self-ballasted HID lamps would seem an appropriate light source in a downlight application (i.e. recessed can). We recommend including PAR20, PAR30 and PAR38 HID light sources.

**Light Source Life and Lumen Maintenance Requirements: Directional and Non-Directional Luminaires – pages 15 and 16**

The requirement is  $\geq 10,000$  hours for outdoor use. Assuming HID lamps can qualify, some low wattage quartz metal halide lamps and lamps designed for universal operation may have an issue with this 10,000 hour requirement.

The requirement is average rated lumen maintenance of at least 80% of initial lamp lumens at 40% rated lamp life for outdoor use. Assuming that HID systems are good candidates for incorporation into certain Energy Star luminaires, we recommend a different lumen maintenance profile be used for these sources, particularly for metal halide.

In the section on required documentation, it is noted that a fourth option has been dropped which was available in the current RLF v4.2 spec, i.e., the ability to use data from an ISO 9000 facility. We understand Energy Star's desire to use accredited facilities, there are certain product types, namely pin-based CFLs, which are not regulated for energy efficiency and thus may not be tested in a NVLAP facility. In order to obtain data from an EPA recognized laboratory, we ask that the effective date for the requirements be set at least 15 months after the requirements are published.

**Lumen Maintenance Requirements: Directional and Non-Directional Luminaires: Solid State Option 2 – page 17**

The exponential decay can not generally describe the LED package lumen degradation behavior. Therefore, the values specified here (91.8% and 94.1%) may not be the real indication of LED package lumen maintenance. The following text should be added: "or other means to prove the lumen maintenance of the LED can achieve the specified number of hours for L70 value."

A new IESNA TPC workgroup has just been formed to address long-term LED luminaire lumen maintenance measurements and it has begun work on a document tentatively entitled "*LM-xx-xx Lumen Maintenance Testing of LED Luminaires*". It is intended that this LM will include LED luminaire lumen maintenance testing out to at least 6,000 hours (recommend 10,000 hours) to mirror the long-term device testing of LM-80. Until this document is published, we strongly suggest that Energy Star keep both Option 1 and Option 2 to be consistent with the current Energy Star SSL V1.1.

While acceptable for fluorescent systems, these same 80% lumen maintenance requirements applied to High Intensity Discharge lamps are extremely high and would be difficult for any HID system to qualify, especially metal halide or ceramic metal halide systems at an 80% passing rate. Industry recommends that HID systems have a rated lumen maintenance requirement of 65% at 40% rated life. The passing test requirement for HID lamps should indicate that greater than or equal to 50% of the samples must achieve the required lumen maintenance value in order to qualify for Energy Star. HID lamps are infrequently used in residential applications; however, they represent a substantial energy savings for outdoor applications over incandescent technology and should not be eliminated from consideration over an extremely high lumen maintenance requirement.

## **Correlated Color Temperature Requirements: Directional and Non-Directional Indoor Luminaires – Solid State – page 18**

Ceramic metal halide lamps are available in 3000K CCT, so it would seem that this HID source should be eligible for consideration in the new Energy Star Luminaire specification; however, it is typical for metal halide to have CCTs of 4000K or 4200K rather than 4100K. If metal halide is considered for these specifications we recommend that metal halide CCTs be specified as 4000K to 4200K.

There is no reason that SSL should only be limited to the 4 selected CCTs here. Instead, Energy Star should specify the luminaire or light engine “should meet any nominal CCT values specified in ANSI C78.377-2008”. Adding the 4500K, 5000K, 5700K and 6500K bins back in will not complicate the specification and will ensure alignment with the ANSI standard. It will also give luminaire manufacturers the options for cooler CCTs, which are still being requested by our member companies’ customers in outdoor lighting applications.

Part of the rationale for proposing to exclude these CCTs is that few products qualified under the current SSL V1.1 are outside the 2700-4000K range. In our view, this is not sufficient to limit consumer choices. We look forward to further discussion on the linkage between CCT and efficacy.

ANSI C78.377 allows for CCTs in 100K increments. Alternatively, Energy Star could allow manufacturers to offer any CCT between 2700K and 4000K in 100K increments.

LM-79-08 test procedures should be used for all SSL products.

## **Color Rendering Requirements: Directional and Non-Directional Indoor Luminaires – page 19**

At this time, the requirement that a fluorescent lamp achieve an R<sub>9</sub> greater than 0 is technically feasible only through the use of special phosphors. These special phosphors are less efficient and have lower lumen maintenance than those commonly used today. For these reasons, we ask that the requirement be removed.

Ceramic metal halide lamps have  $R_a \geq 80$ , which make them good candidates for consideration by Energy Star; however, only fluorescent and LED systems are acknowledged.

The  $R_a \geq 80$  and  $R_9 > 0$  requirement poses problems for Linear Fluorescent lamps and for many CFL lamps as well. In particular, for self ballasted CFLs, most 2700K lamps and some 3000K lamps use phosphor blends that achieve an R<sub>9</sub> between -5 and 0. Should this requirement stay in the specifications, NEMA believes that GU24 based CFLs will all have to be redesigned with special phosphor blends that they do not use today, thereby increasing the cost. The highly efficient linear T8 lamps that are used in the Energy Star program for luminaires today do not have  $R_9 > 0$  and would therefore be eliminated from the program. NEMA recommends removing this requirement.

The requirements for Solid State should reference ANSI C78.377-2008 for limits on CRI. Regarding the sample size of 3, per C78.377-2008, Energy Star should require that the average meet or exceed 80 and that no individual unit should be less than 77.

### **Color Maintenance: Solid State Indoor Luminaires – page 20**

The specified value of 0.007 for u'v' is arbitrary and too restrictive. More study should be done to obtain an acceptable color change range. Meanwhile, the requirement should be consistent for both SSL and fluorescent.

### **Lamp Shipment Requirements – page 21**

In the second column, the 4th paragraph down states:

“Fluorescent and high intensity discharge lamp bases must be labeled with the lamp manufacturer name, wattage, correlated color temperature, and color rendering index.”

Energy Star RLF Version 4.2 indicates that this information can appear on the lamp or the lamp base. We suspect that the word lamp was unintentionally omitted from the v1.0 luminaire draft and ask that it be changed to read lamps or lamp bases.

“[H]igh intensity discharge lamp bases must be labeled with the lamp manufacturer name, wattage, correlated color temperature, and color rendering index.” NEMA recommends that for certain small based products, including bi-pin HID lamps, that this information be allowed in the packaging, or at a minimum, that coding be allowed.

### **Source Run-up Time – page 22**

The present draft is worded: “The time needed after switching on the lamp to reach full rated lumen output...” NEMA recommends that this wording be changed to “stabilized lumen output,” as not all lamps will reach rated lumen output. Also Energy Star for screw base lamps defines run-up time to reach 80.0% of its stabilized luminous flux. We recommend staying with the 80% requirement for stabilized lumen output.

In the existing Version 4.2 RLF specification, run-up requirements only apply to self-ballasted GU-24 products. This requirement is in place as self-ballasted CFLs (GU-24 or otherwise) may use an amalgam to control the mercury vapor pressure in the lamp. It is well known that the use of an amalgam may increase the run-up time of the lamp, however, as this is a self-ballasted product, the manufacturer can engineer the lamp/ballast system to the requirement.

Energy Star could consider striking this requirement because it would burden a system that has not been engineered for it. In addition, while amalgams are used in some types of plug-in CFLs and some linear fluorescent lamps, the use of these lamp types in residential applications is severely limited.

### **Lampholder Requirements: Directional and Non-Directional Luminaires – page 23**

“[L]uminaires employing screwbase lampholders (i.e. E26, E26d, E12, E17, E39, E39d) are not eligible to earn the Energy Star.” If HID lamps are to be considered for inclusion in this specification, these types of bases are common. NEMA understands the reasoning for this requirement, in that luminaires with no ballasts and with screw bases can accommodate incandescent light sources; however, this requirement could be re-worded to say that” luminaires without dedicated ballasts and employing screwbase lampholders.....”. This would open the door for inclusion of efficient metal halide systems.

### **Photosensor Controls: Directional and Non-Directional Outdoor Luminaires – page 24**

In the note block at the bottom of the page, comments are requested on the potential to remove photosensors for outdoor luminaires, citing a number of factors cited by partners.

While some members favor eliminating this requirement, others believe this requirement should remain in the specification for Energy Star outdoor luminaires. Controls provide the greatest potential for energy savings, exceeding the gains provided by higher efficiency components. California has already mandated such controls and having this capability definitely segregates out energy saving products.

### **Power Factor – page 25**

Item 4 under required documentation – add the words ‘lamp or’ between the ballast, so it reads the lamp or ballast ... This would clearly allow the GU24 manufacturer to provide the data.

### **Lamp Current Crest Factor – page 27**

This item appears in the current version under the requirements for electronic ballasts. While it is an appropriate metric for a system comprised of components made from different manufacturers, a self-ballasted GU24 product is engineered and warranted as a system and thus should be exempt from the lamp current crest factor requirement.

### **Operating Frequency – page 28**

The method of measurement should be the same whether the source is fluorescent or solid state. Thus an oscilloscope or frequency counter can be used to measure the frequency fluorescent systems.

### **Ballast/Driver Replaceability: - Page 29**

NEMA requests re-wording language in this section so that GU24 base CFLs are exempt. Ballasts in self-ballasted lamps cannot be replaced.

## **Electromagnetic and Radio Frequency Interference – page 29**

Change the required documentation to read:

Test report or Declaration of Conformance must be provided ...

The FCC permits consumer devices covered under Part 18 to be tested by the manufacturer who can then issue a Declaration of Conformance certifying that the product has been tested and found to comply with the FCC requirements. A test report is not required to be submitted to the FCC.

## **Noise: Directional and Non Directional Luminaires: - page 29**

The requirement is for Class A sound rating for electronic ballasts & drivers within the luminaire not to exceed a measured level of 24 dBA (audible) when the ballast or driver is installed in the luminaire. This could be an issue when using a passive front end ballast.

The above may also be an issue with dimming ballasts as well, especially if they use phase cut control. NEMA would like clarification as to whether this measurement is to be made at full light only or at all levels for a dimming ballast.

## **Maximum Measured Ballast or Driver Case Temperature during Normal Operation Inside Luminaire – page 30**

Under the Fluorescent Source Type, two exceptions are listed under the requirement that ballast case temperatures are not to exceed manufacturer's recommendations for indoor portable luminaires using GU24 bases, and outdoor luminaires.

From one perspective, the exception in this section should be expanded to include all GU24 products. The rationale is that while it is common for discrete ballast manufacturers to measure the case temperature, this is not a parameter that CFL manufacturers measure. Thus little data exist that could correlate life with housing temperature. GU24 products already need to pass the ACTV test which thermally stresses the product.

From another perspective, the maximum rated temperature of any component of a luminaire should not be exceeded under normal use. To allow such an exemption for an Energy Star product seems contradictory to the efforts to identify top performing equipment. EPA could consider removing the outdoor exemption from the requirements to maintain at least minimum life expectancies and performance for this upper tier of products.

## **Minimum Operating Temperature: - page 31**

The proposed requirement is -20°C or below. NEMA proposes changing this requirement to 0°F or below to prevent unnecessary product retesting.



### **Safety Requirements – page 33**

The required documentation for all the luminaires and ballasts listed on this page should be as flexible as allowed for GU24 products. Suggest that the safety portion from page 39 be merged in to the required documentation requirements on page 33.

### **Lighting Toxins Reduction Requirements – Reference Standards – page 35**

For all source types, the requirements state that luminaires must meet the EU Directive 2002/95/EC.

The U.S. electroindustry, through NEMA, has submitted a hazardous substances bill similar to the European RoHS requirements. Although H.R. 2420 has the same basic stipulations as its European counterpart, there are a number of important modifications in the bill that tailors it to the U.S. marketplace.

Although the proposal in H.R. 2420 has not yet become law, NEMA is hopeful its passage will occur prior to the effective date of Version 1.0. We recommend that the Energy Star luminaire specification be changed to reference the U.S. legislation rather than the European requirements.

### **Warranty Requirements – page 36**

The following language in this section is not clear:

“Lamps which are not self-ballasted are not included in this requirement.”

It appears to read that self-ballasted lamps, i.e., GU24 are included. Please clarify as they have separate warranty requirements in Appendix A.

### **System Efficacy – page 37**

We note that the efficacy requirement for bare GU24 lamps has been raised from 50 to 70 LPW. We are disappointed that Energy Star did not take this opportunity to harmonize the requirements with those for screw base product. We strongly urge Energy Star to either leave the efficacy limits as they are now, or harmonize with screw base product. Introducing new efficacy limits at this time will only create confusion in the industry.

### **Color Rendering Index – page 37 (same comments as page 19)**

At this time, the requirement that a fluorescent lamp achieve an R9 greater than 0 is technically feasible only through the use of special phosphors. These special phosphors are less efficient and have lower lumen maintenance than those commonly used today. For these reasons, we ask that the requirement be removed.

**Safety – page 39**

The draft indicates that GU24 products should comply with UL 1993-2009. This revision to the standard, commonly known as the 3rd Edition of UL 1993 was published in August of 2009, however, the effective date of some of the major changes is February 28, 2012. At this time, UL is going through an evaluation of existing products to the new, revised edition. Thus compliance with the new edition will not be assured until after February 28, 2012. Thus we strongly urge that Energy Star delay implementation of this requirement for GU24 products until February 28, 2012.

Thank you again for the opportunity to provide these comments. If you have any questions, please contact Craig Updyke at [cra\\_updyke@nema.org](mailto:cra_updyke@nema.org) or 703 841 3294.