Setting Standards for Excellence

October 29, 2010

NEMA Comments on Energy Star Luminaires Specification, Version 1.0, Draft 2

Thank you for the opportunity to provide the following comments on behalf of interested member companies of the NEMA Lighting Systems Division.

General

In the cover letter accompanying the release of this draft, the EPA indicates that it has removed requirements specific to GU24 lamps. While we agree with this action, it would reduce confusion in the industry if EPA inserted a clarifying statement that until the new ENERGY STAR Lamp specification is finalized, the requirements of Appendix A of the Residential Light Fixture specification, v.4.2, are in effect for GU24 products not intended as luminaire subcomponents.

Page 1, Commercial Grade Luminaires

The text states that the specification scope "excludes troffers or linear forms" and yet there are many references in the document to linear fluorescents.

Page 1, Non-Directional

Change "…including by not limited to.." to "…including but not limited to…".

Additional applications were in the SSL Eligibility Criteria such as residential outdoor step and pathway lights and non-residential wall wash luminaires and bollards. Although to date few products have been qualified from these categories, we would suggest including them as well in this specification.

Page 4, Compact Fluorescent Lamp

Twin tube, single end-cap T5 lamps should be specifically included within the definition.

The reference to the IES Handbook 9th Edition under Color Rendering Index and Correlated Color Temperature should be changed to IES RP-16-10.

Page 5, Lamp Current Crest Factor

The definition should be modified to read as follows:

> The ratio of peak lamp current to the root mean square (RMS) lamp current.

The proposed change is consistent with the definition of crest factor in ANSI C82.13-2002.

Page 5, Linear Fluorescent Lamp

The definition should be modified to add "diameter" to the definition so that it reads in part as follows:

> Commonly made with straight, tubular bulbs, with a diameter varying from approximately .25" to 2.125"…

Page 7, Correlated Color Temperature

The general specification, presumably for all light source types, says "Partner shall use different luminaire model numbers to distinguish between models with different CCTs." Below Table 1, it further states the following, "For example, if the representative model tested is 3000 Kelvin, partner may not retroactively add a 2700 Kelvin, as this was not the lowest CCT tested initially."

This requirement would at least triple or quadruple the number of SKUs offered by the luminaire manufacturer, with no apparent benefit to the customer. This is interrelated with the lamp shipment requirements on page 23 of the draft and presents multiple and costly complications. The only situations where there is a variation in efficacy due to CCT are 1) with SSL, lower color temperatures tend to have lower efficacies than higher color temperatures and 2) the opposite is true for fluorescent sources – CCTs at 5000K and above tend to have lower efficacies than the common CCTs of 2700K, 300K, 3500K, and 4100K.

While the rationale for requiring separate SKUs for every different light source CCT would seem to have energy efficiency in mind, the truth is that this requirement is impractical at best. Not only are there no differences at all amongst certain CCTs, it is also likely in the future that a user would replace the original source with one of a different CCT.

We highly recommend that Energy Star review this requirement and revise to accommodate the realities of small LPW differences caused by CCT differences.

Page 8, Effective Date

There needs to a sunsetting provision to allow current Energy Star qualified luminaires to be re-qualified. There are literally thousands of SKU's that would need to be processed through third party certifiers under the new qualification procedure, so we suggest at least a two year retroactive qualification period for products qualified prior to release of this specification.

Page 9, Reference Standards and Test Procedures

Five IESNA documents cited in this section are more than 10 years old, have not been re-affirmed or revised and, per IES policy, have automatically been withdrawn from the IES website and store: LM-10-96, LM-16-93, LM31-95, LM-41-98, and LM-58-94. These also have been removed from the current IES "Lighting Library" at www.ies.org/PDF/IES

LightingLibrary.pdf and are not generally available. Their status should be noted as withdrawn (as the status of TM-21 is shown as "in draft").

LM-15-03, "IESNA Guide for Reporting General Lighting Equipment Engineering Data for Indoor Luminaires" is current and covers some of the issues in the above withdrawn documents, so it would be a helpful addition to the list of reference documents.

Add IES LM-35-02, "Approved Method for Photometric Testing of Floodlights using High Intensity Discharge or Incandescent Filament Lamps".

Page 10 (and other similar pages), Source Efficacy

The column heading "Energy Star Requirements" for source efficacy and minimum light output should state that these are initial values (before lumen depreciation).

For certain types of luminaires in this revised specification, there are minimum system efficacies set for the lamp/ballast or lamp/driver combination. Looking back to the last Residential Luminaire Specification Version 4.2, many of these system efficacy requirements were set at 50 LPW minimum. This revised version sets 65 LPW as the minimum until 2013 and 70 LPW as the minimum thereafter. We would like to point out that there are several light sources that will be eliminated from Energy Star Luminaire consideration if these LPW values stand:

a. Circline fluorescent: Even the most efficient T5 circline products, using a 1-lamp system as the norm, are less than 65 LPW, and that is with the use of premium tri-phosphor blends in the lamp and a highly efficient electronic ballast. It would seem that this requirement effectively eliminates circline fluorescent products from consideration.

b. GU24 based CFLs: 13W lamps are less than 65LPW today and there is no reason to assume that efficacy will rise. They already use premium tri-phosphors. The higher wattage products, such as 23W, are above 65 LPW but will not achieve 70LPW. Again, these minima seem designed to eliminate this product category from consideration for Energy Star.

c. Pin-based compact fluorescent: 4-pin lamps for use on electronic ballasts can barely achieve 65 LPW for the higher wattages, such as 42W. However, the 18W and 26W lamps, in combination with their electronic ballasts, cannot achieve a 65 LPW efficacy, and these are the wattages most commonly used in residential applications. It would seem that pin-based CFLs are being eliminated from consideration – if not now, at least after 2013.

We recommend that Energy Star re-consider source efficacy requirements to ensure choice in technologies.

We would also like to recommend that Energy Star consider including induction technology as a source type throughout this specification. Induction is another energy efficient alternative that will help with the overall goal of increasing energy efficiency in lighting.

Page 10, Supplemental Testing Guidance

Under Supplemental Testing Guidance for fluorescent sources the draft indicates that luminaires that do not ship with lamps shall be tested with lamps compliant with ANSI or IEC standards. This guidance should be clarified to allow for the manufacturer's self-declaration that the lamps comply with the standards. If not, the implication is that the certification body will have to test the lamps for compliance.

Under the source efficacy exception for GU24 based lamps, it is not clear where to find the qualification requirements for those lamps.

Page 12, Cove Mount, Zonal Lumen Density Requirement

The Zonal Lumen Density Requirement for Cove Mount lighting is ambiguous: "35% of total lumens within the 120-150° zone (vertical angles)". It is not clear whether this is asymmetric or symmetric. Per the IESNA definition in LM-15-03 of vertical angle, 120-150° would be symmetric and behind the luminaire, where there is negligible output. Communication with D&R International suggests that this should be interpreted as an asymmetric beam from 30 to 60° off center. Either interpretation would disqualify a large percentage of cove lights, including some Energy Star-approved cove lights which are advertised to have a "wide beam angle", and some of the examples described and illustrated in the IES Handbook (9th edition, pages 7-11 and 7-12).

We recommend that cove lighting be allowed to have either narrow asymmetric beam angles or wide symmetric beam angles. For example, a luminaire producing 65% of its lumens with a 120° symmetric beam (i.e., within 60° of the center line) should be allowed. In any case, a drawing similar in concept to the zonal lumen diagram for under-cabinet products, Figure 1 on page 6 of the Energy Star Manufacturer's Guide for Qualifying SSL Luminaires (April 2010), should be included to clarify the text.\

The reference to IES LM-41-98 (withdrawn) should be reconsidered and LM-15-03 added.

Page 12, Supplemental Testing Guidance

The Supplemental Testing Guidance section indicates that the results shall be produced using the specific lamp and ballast that will be used in production. It would be clearer if it read the specific lamp and ballast models.

This change would need to be repeated in a couple of locations in the document.

Page 13, Inseparable SSL Luminaire

As currently specified, the required efficacy will drive the market toward the cooler colors since the efficacy is easier to obtain. We recommend the efficacy be specified by color temperature such as 47 lm/w for CCT <3500K and 60 lm/W for CCT between 3500K to 6500K.

Page 15, Luminaire Efficacy and Minimum Light Output

The column heading "Energy Star Requirements" for luminaire efficacy and minimum light output should state that these are initial values (before lumen depreciation).
The reference to IES LM-41-98 (withdrawn) should be reconsidered and LM-15-03 added.

Page 17, Lumen Maintenance Requirements

For HID Lamps, industry recommends that the average rated lumen maintenance be 65% for quartz Metal Halide lamps and 70% for Ceramic Metal Halide lamps. The highest rating that could be considered for Ceramic Metal Halide lamps would be 75%.

Page 19

In the note box, EPA indicates that data will no longer be accepted from ISO 9000 facilities. For some lamp types, this may require that new tests be started at an ISO 17025/NVLAP facility now in an attempt to avoid supply disruption to OEMs that are expecting subcomponents that meet the requirements of the standard. If tests are started now, in facilities with the proper accreditation and scope of accreditation, will the EPA direct the Certification Bodies to accept data from tests started before the facility is recognized by EPA and the Certification Body? Even if this is allowed, the effective date will need to be at least 12 months after the standard is published. If it is not allowed, we request an effective date of at least 15 months after the standard is published.

The note also says "Option 1 requirement has been revised to require submission of a photo of any holes placed in tested units to allow for insertion of thermocouples". The language on page 17, "All thermocouple attachments shall be photographed", does not clearly indicate that these access holes need to be photographed.

The note also refers to guidance to certification bodies on lumen maintenance testing. The Energy Star Manufacturer's Guide for Qualifying SSL Luminaires (page 4) allows provisional qualification after 3,000 hours of LM-80 lumen maintenance testing if the luminaire uses "successor" LEDs similar to LEDs that have passed 6,000 hours of LM-80 testing. In order to allow energy-efficient products to come to market relatively quickly, this flexibility should be maintained, preferably explicitly in the Program Requirements.

Pages 20 and 21, CCT and CRI Requirements

The requirement to use a commercial ballast for the measurement of color (CRI and CCT) is not consistent with the cited IES methods of measurement. Nevertheless, the commercial ballast will not affect the lamp spectral distribution. Therefore, it should be noted that the measured color parameters are acceptable if they are measured with the proper meters from the IES-LM standards.

Many Ceramic Metal Halide lamps have CCT of either 4000K or 4200K. The standard should allow use of these lamp types. Industry recommends that a footnote be added for Ceramic Metal Halide that states that CMH lamps with a Chromaticity of 4000K to 4200K are acceptable. Energy Star should also consider a similar range of 200K for SSL, since a range would be better suited for product management, marketing and manufacturing than a nominal specification with a tolerance.

The CRI for high bay industrial and warehouse applications should be ≥65. The currently specified CRI of 80 needlessly increases cost for these applications where CRI is not critical.

Furthermore, we believe that limitations on lamp color choices do not belong in a luminaire specification.

Page 23, Lamp Shipment Requirements

The requirements indicate that the lamps shall utilize an ANSI/IEC standardized base. In support of this, the Supplemental Testing Guidance section should allow for a manufacturer's self-declaration that the bases comply with the standards. If not, the implication is that the certification body will have to test the base for compliance.

The requirements on this page also include a requirement that the lamp or lamp base be labeled with the CRI and CCT among other items. These items are typically embedded in the description printed on the lamp. The Supplemental Testing Guidance section should indicate that: *"If the manufacturer's lamp description marking is indicative of CCT and CRI, it shall be deemed acceptable."*

Pages 24 and 25, Source Start Time and Run-Up Time

As stated in its comments on the first draft, 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.

Alternatively, the run-up requirement should be struck as discrete lamp/ballast systems are not currently engineered to achieve a specific run-up time and the use of amalgam lamps in residential applications is severely limited.

The Source Run Up time of one minute for HID sources is too extreme. The applicable ANSI standards (ANSI_ANSLG C78-43-2007 for MH lamps and ANSI_ANSLG C78.42-2009 for HPS lamps contain requirements for run up times that are dependent on the type and wattage of

HID lamp involved and range from 2 to 10 minutes. We are not sure what is behind the 1 minute proposal contained in the draft, but any attempt to drive down the run-up time typically has an adverse affect on lamp life. Energy Star standard should allow at least two or three minutes given today's lamp-ballast technologies. Revise to read: HID Light Source shall reach 90% of rated lumen output within two/three minutes of application of electrical power. For amalgam fluorescent, ≤ 3 minutes to reach 90% of rated lumen output is specified. The requirement for HID should not be more restrictive.

Page 26, Source Replaceability Requirements

Non-directional SSL luminaires (but not directional ones) are required to have consumer replaceable light engines. The extra connectors and consumer safety design requirements would greatly increase cost and reduce reliability for little apparent benefit. A luminaire lasting 25,000 hours is likely to outlast the rest of a typical home renovation project. This requirement has little if any net benefit and should be made optional or deleted.

Page 27, Dimming Requirements

In the requirements on dimming, it is not clear what is intended by smooth dimming and total light output. We suggest that smooth dimming be changed to continuous dimming and that the phrase "... of total light output." be changed to "... light output."

Step dimming should also be allowed as an acceptable dimming technique at one or more reduced levels of light output.

Page 29, Power Factor Requirements

The draft sets the performance requirements for power factor and the method of measurement is clear. Thus a performance standard is unnecessary.

Page 31, Lamp Current Crest Factor Requirements

While lamp current crest factor is an appropriate metric for a system comprised of components from different manufacturers, a self-ballasted GU24 product is engineered and warranted as a system and should be exempt from the lamp current crest factor requirements. It would be appropriate, however, to place such a limit on GU24 based two-piece lamps.

Page 32, Operating Frequency Requirements – Solid State

Modulation depth is not defined in the document. Is it peak current/average or peak-peak/avg. etc.? There is no consensus on the metric or measuring method. Moreover, we understand that this item is still under debate within the IEEE 1789 Committee. LRC is also researching flicker and modulation depth.

Page 33, Driver Replaceability Requirements

SSL luminaires are required to have removable ballasts or else be classified as inseparable, with an efficacy requirement that is about double that for non-inseparable luminaires. Please see comment above regarding replaceable light engines on page 26. Integrated LED luminaires may have non-serviceable drivers; in these cases complete modules need to be replaced.

EPA seeks industry input on specific solid state directional luminaire types which could not reasonably meet this requirement: There are two categories that we would like to allow this: Cove Lighting and Undercabinet/Shelf lighting. The small form factor for these types makes it impractical to design with replaceable drivers.

Page 33, Noise

This appears to be a new requirement with the 2nd draft. Ballast manufacturers already conduct this type of testing on their products, thus it should be sufficient to require that the ballasts and drivers in the specification have a Class A sound rating. One ballast company reports they test at 3 feet, not 12 inches.

Moreoever, we believe there may be a misinterpretation of what Class A means. Class A rated ballasts are typically suitable for applications with quiet ambient environments that are normally in the range of 20-24 dBA – it seems that this should not be about the noise generated from the ballast at 20-24 dB, but rather the suitability of ballasts in certain ambient environments. For example, fluorescent dimming ballasts are Class A rated but the sound level from the ballast itself is not below 24 dBA.

Page 33, Noise – Solid State

It is not clear whether SSL luminaires can be made compatible with many dimmer types to meet the stringent noise spec at low light levels. This requirement puts the entire burden on the luminaire, and none on the dimmers. This requirement to meet the noise level at all dimming levels should be relaxed or deleted.

Page 34, EMI and RFI Supplemental Testing Guidance

The Supplemental Testing Guidelines should direct the Certification Body to accept test reports or DoC's from labs properly accredited and recognized by the FCC.

Page 35, Thermal Performance Requirements

The exception in this section needs to be expanded to include all GU24 products. The external hot spot is not a parameter that is neither identified nor measured by the GU24 manufacturer. These products already pass the ACTV test which thermally stresses the product.

Page 36, Minimum Operating Temperature Requirements

We propose in the "Energy Star Requirements" column, to add "exception: CFL outdoor luminaires" in order to allow CFLs installed in higher outdoor ambient not restricted to -20 ° C or lower requirements.

Page 38, Safety Requirements

The lamp EOL requirements are not applicable to luminaires and should be moved to the electronic ballast section on page 39.

The 2008 edition of NFPA 70 (NEC) is referenced. Since this specification is expected to issue next year, the 2011 edition of NFPA 70 (NEC) would be current. Also, ANSI/UL 1598-2008 also applies to the outdoor (wet location) luminaires covered by the scope of this specification.

Page 39, Electronic Ballast Requirements

As indicated in our comments on the 1st Draft, self-ballasted CFLs are currently being evaluated against UL 1993. Compliance with the 3rd Edition of UL 1993 is not required until Feb. 28, 2012. Requiring compliance before then would favor manufacturers whose testing has been completed by UL.

No LED driver safety specification is provided. UL8750 – 2009 is the appropriate reference.

Track lighting is now included in the scope, the appropriate safety specification is ANSI/UL1574-2004.

Page 40, Product Labeling and Packaging Requirements

Under the requirements for luminaires shipped with lamps, there is a note specific to GU24 base integrated lamps. This note should apply to all mercury containing products, not just GU24 integrated lamps.

The requirement states that external packaging shall list compatible dimmers and incompatibilities with dimmers, sensors and controls. This could be a lengthy list that changes frequently and it may not fit on the package. To allow consumers access to current, legible information, we recommend instead that the packaging have a link to a web page holding compatibility information. Luminaire manufacturers could state compatibility with a few (not all) controls in the space available on the package.

Add clarification to the term "air tight" in sample language now used: "Certified Air Tight (or similar designation) per ASTM E283-04" . "Air Tite" is a trademark used by a company, using "air tight" exclusively in this specification may create confusion in the marketplace. The NEMA Luminaire section is developing a white paper explaining reduced air infiltration luminaires and this suggested clarification will align with that document. This is already incorporated in the language under "Recessed Downlight Thermal Performance Requirements" on page 37.

Under Solid State and for Outdoor luminaires, it states, "Product packaging shall indicate the minimum (lowest) starting temperature of the luminaire." We believe this requirement is not justified, since most electronic components are rated from minimum -40 deg Celsius. Even in Northern Quebec, we expect the outdoor LED luminaires to operate fine.

Page 41, Content Requirements

We appreciate that the specific European Union RoHS requirements EPA proposed to adopt in Version 1 are spelled out in detail. However, we remain troubled that EPA is referring to foreign legal instruments. Moreover, the hyperlink to the list of excepted applications is likely insufficient, since the list is expected to change over time.

Finally, does EPA fully intend to cap all fluorescent lamps covered by the specification at *5 mg* of mercury, including 4-foot and 8-foot linears? (Is this what is intended by "all types"?)

If you have any questions on these comments, please contact Craig Updyke, cra_updyke@nema.org, 703 841 3294.