

Comments on Draft 2 ENERGY STAR SSL 5/15/07

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Richard Karney
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Dear Mr. Karney,

Thank you again for the opportunity to comment on the Draft ENERGY STAR Language. We will focus the bulk of our comments on the specific photometric targets listed for the Niche Category A applications.

I'd also like to open our comments by again referring to a specific project that we have been working on, namely the Personal Lighting System being developed jointly by Finelite and the California Lighting Technology Center. While experience with this application does serve to inform our opinion, we make an effort to use it as an anecdotal reference only. I share the opinion of many that the ENERGY STAR requirements should not be driven solely by commercial interests, but rather take those interests into account when developing a fair and widely accessible standard.

Comments provided in the following categories:

CRI

There are currently several LED packages and products that have a nominal CRI of 75. It has been my experience that the actual CRI calculation will yield results from 73 – 76 for LED's with this nominal 75 value. The specific LED's used and their location within a color bin can change the CRI value within this range. The color of these products is good, the chromaticity is uniform, and experience has shown the color rendering to be completely acceptable.

We continue to hear examples of 'good' LED systems with low CRI values. RGB systems in particular suffer a disadvantage, and the specification as currently written may result in the exclusion of this technology.

Lumens per Lineal Foot

Under-cabinet and shelf-mounted luminaires can serve at least two purposes:

- 1) They can provide task lighting for the task plane directly below the luminaire.
- 2) They can balance the luminance values of the user's visual environment.

A widely accepted opinion holds that shelf-mounted luminaires make poor task lights. The position of the light source relative to the user almost always results in veiling reflections (glare) that cause visual discomfort. The illuminance values required for proper task function will lead to higher flux levels and higher source/lamp surface brightness levels, increasing veiling



Despite being considered “task lights”, under-the-bin lighting solutions are a major source of glare and are not an adequate alternative to positional task lighting.

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reflections and increasing discomfort. The high surface-brightness of LED sources exacerbates this condition.

Alternatively, under-cabinet luminaires can be used to light the dark spaces that occur with overhead ambient lights and achieve luminance contrast ratios appropriate to the luminous environment. Lower luminaire power levels are adequate, and actually preferred, under this type of approach.

Existing technologies for under-cabinet lighting have often performed poorly in this environment. LED technology may correct this, but following existing fluorescent system design under-serves the industry and the end user. Matching system performance to a lumens per foot metric requires certain minimum power levels or lumen density to be used for these types of fixtures where lower levels would be better. Finelite has a direct example of this in a 6 and 9 watt under-cabinet configuration. These two luminaires use the same physical hardware and are both 19 inches long. The 9-watt luminaire meets the lumens per foot requirement. The 6-watt luminaire runs ~130 lumens per foot. Making the luminaire shorter could meet the requirement, but the flux would be concentrated and the visual environment would have a brighter a hot spot. The 9-watt luminaire

may be appropriate for certain spaces, but the 6-watt is the preferred embodiment and has achieved higher user satisfaction (based on anecdotal surveys). Given LED efficiency improvements, the 6-watt luminaire will soon be able to achieve 150 lumens per foot, but Finelite may prefer instead to lower the power consumption and keep the illuminance values the same. This obviously runs counter to the draft ENERGY STAR requirements, which in this case serve to encourage higher power consumption.

Task Light Lumens and Zonal Lumen Requirements

Minimum lumen requirements effectively set minimum power consumption requirements for luminaires.

Question: Has anyone evaluated the zonal lumen requirements in the ENERGY STAR draft as they pertain to **asymmetrical** task lights?

LED's (with advanced optics) may extend the abilities of asymmetrical systems in novel and useful ways. Ultimately, the performance of any task light is a function of its illuminance capabilities, and these may not conform well to a single zonal lumen metric. If the purpose of the zonal lumen requirement is to provide an effective cutoff angle for the fixture and reduce glare, a requirement that looks at the 60-90 zone may better suit this goal.

As written, the requirements encourage focussed light beneath the fixture. Many examples exist of task lights with tight beam patterns that offer nothing more than a mostly unusable spot of light on the task plane. A maximum zonal lumen density requirement could address this.

Off State Power Consumption

We have discussed this topic extensively and very much agree that the issue needs to be addressed. As an energy efficiency center, we support elimination of power supply loads whenever possible, and agree with CEE's sentiment that zero off state power consumption is a laudable goal.

One concern, however, relates to consumer confusion between existing ENERGY STAR standards for power adapters and how those will relate to power adapters used in SSL lighting products, which are essentially electronic devices.



Ultimately, the requirement for zero off state power consumption seems to be a hardware issue: physical switching of the load requires that AC power is brought to the luminaire.

Color Spatial Uniformity and CCT

Several products currently on the market allow color mixing of cool and warm LED's. Some of these fixtures perform better than others; the poorer examples will often have perceptible,

objectionable color uniformity when the two LED types are mixed. There should be guidance within the ENERGY STAR specification to determine how the color spatial uniformity and CCT requirements apply to these products.

LM 80 Lifetimes

LED arrays can exhibit different temperatures from one LED to another – this is dependent on LED spacing, the type of heat sink used, and other power density issues that may occur. One LED measurement may not be representative of the average or high T_j seen in the system, and therefore the array may not perform consistently with a manufacturer's specification for individually qualified LED's. Testing all of the LED's in an array could be cost prohibitive, so more guidance on where (or which LED) to measure would be helpful.

Thank you again for the opportunity to comment of the ENERGY STAR Draft. We hope our thoughts are useful, and welcome any questions or comments.

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