

Comments

Energy Star Program Requirements for Luminaires, Version 1.0 Draft 1

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Luminous Efficacy and Output Requirements: Non-Directional Luminaires

1. The requirement to produce a minimum light output intrudes upon application design approaches and will result in poor luminaire design and application to meet the standard.
 - a. The specification precludes the use of multiple sources within a design to reach an objective result – even if this approach would result in superior performance and efficiency
 - b. The specification would likely result in the use of diffuser materials with low transmission to reduce or avoid glare and too-high brightness. In many decorative designs, the use of 40W or lower wattage lamps is desirable over 60W A19. This specification will require inefficient luminaire designs to eliminate excess brightness.
2. Applying the same LPW standard to an LED module as is applied to CFL will result in the deployment of less efficient LED module applications, favoring designs that deliver highly diffuse wide distribution outputs over any use of focused optics, to attain module efficacy at the cost of optical control. The end result will be fewer products using LED modules to deliver highly efficient new directional designs, to proliferate high efficacy modules with lower optical efficiency. This is counter-productive, supports the continuation of poor incandescent style approaches, and unfairly punishes approaches that attempt to deliver illumination through direct optical control at the module level.

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3. Inclusion of any source with an efficacy of less than 20LPW should be excluded from any Energy Star participation, including all halogen or incandescent lamps of any description. As long as the lower efficiency sources are supported with Energy Star labeling, their use will continue to short circuit all efforts to deliver higher applied efficiency in the residential market.
 - a. Unless there is an enforceable and un-tamperable component to support the timed-occupancy sensor “off” function, this feature can and will be defeated by both contractors and home owners and does not represent a realistic approach to energy efficiency.
 - b. If the use of controlled operating time can be applied to incandescent sources, then it should also be equally available to all other sources that fail to meet other qualification LPW requirements. Failure to allow this establishes an unfair precedent that does not reflect accurate comparison of products with the ES label.

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4. As it is in non direction products, the minimum lumen output requirements will favor products using low transmissive materials to control brightness over those that utilize lower output sources and efficient optical design to produce the best lighting result.
5. The requirement for inseparable SSL products to meet an efficacy of 70LPW, while all other sources may be approached at LPW ratings of less than half of this, appears to show a specific prejudice against these SSL designs, and is counter productive to the end goal of realizing new products of high efficiency reaching the market.
 - a. The decision to choose a product with or without replaceable LED sources should remain with the customer. With L50 service performance of 35,000 hours, and use of <1,200 hours per year in most cases, luminaire life with integrated SSL components will likely exceed 30 years. Holding these luminaires to a higher LPW standard is an arbitrary requirement that does not reflect any real value to the end use customer.
 - b. Luminaires using separable components with poor lumen maintenance performance will not produce any advantage to those that have non separable designs of higher life expectancy.

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6. Undercabinet: The requirement to deliver a set percentage of illuminance within a 0-60 zone with bilateral symmetry precludes the design of any other performance under-cabinet task lighting with more effective asymmetric distribution.
 - a. The asymmetric requirement to have a minimum of 12.5% of lumens delivered in the 60-90 zone does not make sense, and arbitrarily establishes optical design without consideration of unique and novel approaches that will deliver superior performance outside of this requirement.
7. Portable Task: The requirement to deliver 85% of total lumens within a zone 0-60 establishes a fixed orientation and positioning of the optical head in relation to the task surface and a set vertical height over the target surface in order to produce functional illumination.
 - a. This severely limits design freedom to produce asymmetric, wide angle / low position, diffuse distribution, and indirect/direct approaches that are used to reduce shadows, move the luminaire from offending brightness zones, and to mitigate shadowing.
 - b. This requirement does not produce a superior product, while favoring poorly design products that comply through use of crude cutoff reflector designs.
8. Minimum lumen output, regardless of directional optical efficiency favors products of poor optical control to gain higher efficacy, over those that utilize more sophisticated optical control designs that control glare. The result will be lower end product efficiency and higher energy use.

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9. The inclusion of LED arrays and LED packages in energy star requirements and the use of LM80 data herein is not a valid standard.

- a. ES products should only be approved based on the luminaire and light module/engine performance, not on the LED sources used inside. The use of LED data alone does not reflect luminaire performance.
- 10. Option 2 life testing should apply to all light sources employed, including CFL lamps at a % of their rated life. All tests should be based on an initial and over a set period based on light source (6,000 hour LED, 3,000hr CFL?) absolute photometric test of the samples provided. Application of this standard without consideration of the effect of poor luminaire design around CFL sources unfairly singles out SSL product. All products should deliver a life predictable and supported by test data, and not assume any superiority of one source over another in this regard.
 - a. This approach should also be applied to color CCT and maintenance within the same test protocol and periods used.
 - b. The color maintenance should also consider maintenance of CRI rating in addition to base CCT

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- 11. The requirement of $\geq 120\text{Hz}$, should apply to all light sources. Low cost fluorescent systems operating at 60Hz would not be eliminated by this limited specification, nor are incandescent lamps using diodes to cut half of the AC sine wave to produce higher efficiency – producing a 60Hz operating frequency.
- 12. based on measurement of electrical frequency using an oscilloscope without consideration of photonic light deliver, its modulation, LED pitch spacing, brightness ratio, capacitor/inductor circuiting employed, and other factors that aggravate or mitigate perception of flicker is a meaningless standard.
 - a. In low end DC systems. switching duty power supplies delivering crude DC power exhibit low level flicker at a frequency of 120Hz, regardless of the square wave form they might produce otherwise.
 - b. Dimmers do not reduce frequency of any system, but do significantly shorten duty cycle, and if improperly applied will generate significant and annoying flicker characteristics, within the 120Hz requirement.
 - i. Special attention must be paid to dimming of line voltage and low frequency systems to mitigate flicker visibility
- 13. This requirement should either be applied to all light sources, include greater detail in definition and test requirements, or be eliminated altogether. In its current form it is at best misleading and ineffective at producing the stated goal of reducing visible flicker in ES approved products.

Not included:

The general specifications for ES products should include a requirement of a maximum allowable THD. THD creates interference in electronic devices, specifically audio communications equipment. As more energy efficient products are employed to meet energy standards, the increase in THD and the

combination of complex distortions resulting from multiple products exhibiting poor THD controls will increase and produce highly undesirable and difficult to correct issues in both commercial and residential electrical systems. This has been a complaint of many in application of electronic lighting from CFL to LED, as it interferes with audio equipment and communications equipment performance. Dimming further aggravates this issue. As a minimum, a THD of no more than <32% with a maximum triplens not to exceed 30% per ANSI C82.11 should be established as criteria for ES. This should be applied to all fluorescent, SSL, and halogen sources utilizing diode current trimming, in both dimmed and undimmed operation using manufacturer specified dimmer equipment for the products submitted.