

DOCKETED

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Title 20 - GS LED Lamps Including LED Downlight Retrofits

Additional submitted attachment is included below.

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Submitted via email: docket@energy.ca.gov

Docket No.15-AAER-6

Mr. Andrew McAllister
Commissioner
California Energy Commission
1516 Ninth Street
Sacramento, California 95814

2015 Appliance Efficiency Rulemaking - General Service LED Lamps, Including LED Downlight Retrofits

Dear Commissioner McAllister,

Acuity Brands appreciates the opportunity to provide comments regarding the Title 20 Appliance Standard. Acuity Brands has a long history of working with the Commission and contractors to promote the adoption of the state energy standards to promote high efficiency lighting products.

Acuity Brands is the leading manufacturer of luminaries and lighting controls in North America. We operate facilities throughout California under the Peerless, Hydrel, Lighting Control & Design and Sunoptics product brands. In addition, our western region manufacturing and distribution center is located in Ontario, CA. The California appliance standard has a direct impact on our investment of nearly 400 California based employees.

Please contact Cheryl or Tanya to discuss our comments in more detail.



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Acuity Brands is committed to providing innovative products that promote high energy efficiency balanced with quality attributes that are desired by designers and consumers. We applaud the CEC focus to assist manufacturers and retailers in transforming the market place to promote energy efficient lighting while maintaining high quality. The Commission has decided to focused only on energy and color metrics, however consumers rely on a variety of characteristics including cost, ease of installation, light quality, appearance, reliability, brand reputation and other factors. Acuity Brands focuses on designing products based on attributes that customers value. We also focus on innovations in manufacturing efficiency, materials use, and optical design to provide the optimal balance of tradeoffs to meet customer expectations. There attributes are significant considerations that CEC must evaluate in any rulemaking that restricts product availability in the California market place. There have been a variety of comments about promoting innovation in the California standards, and we encourage the Commission to understand that innovation takes many forms and customer preference should be validated with credible and publically evaluated studies before unintentionally restricting consumer choice with new energy regulations.

Our comments specific to this docket focus on two topics of concern.

1) The proposed Title 20 standards for General Service LED lamps result in conflicting standards with the current Title 24 Joint Appendix JA8.

Title 24 is focused on the installed performance of a lighting system for new construction and major renovations. Title 20 is a prescriptive equipment standard for covered products sold in the state of California. Title 20 requirements apply to all covered products for replacement, renovation or new construction. However, differences between Title 20 and Title 24 JA8 result in the unintended consequence for manufacturers to design products to meet the most stringent requirements for both standards. (See Appendix A). Manufacturers could design and market a product to meet only the Title 20 requirements and another product to meet both Title 20 and Title 24 JA8. This solution increases the manufacturer’s engineering time, additional cost associated with the administration of additional SKU models, marketing materials to describe the different products, and creates confusion in the market place. Furthermore, retailers who serve customers in the replacement, retrofit and new construction market are not willing to double the shelf space dedicated to this product type.

At the November 18, 2015 hearing, CEC staff indicated that there was an evaluation of the proposed requirements in Title 20 compared to Title 24 JA8 and concluded that there is no conflict between the two standards. We request that this analysis be made publically available. We further request that the CEC take immediate action to resolve issues associated with more stringent or additional metrics required by Title 20 that are not included in Title 24 JA8. Longer term, we request that CEC take action to remove the redundancy of standards in Title 24 for products that are covered in the scope of Title 20.

2) Screw-based downlight retrofits

This class of product is commonly referred to as a luminaire retrofit since it is designed to replace the light source as well as the reflector/lens optics. This makes a downlight retrofit significantly different from other lamps within the scope of this rulemaking. Acuity Brands had not initially monitored or commented on this rulemaking since luminaires have never been covered under the category of General Service lamps. We recently became aware that the new definition in Title 20 for “State Regulated Light Emitting Diode (LED) Lamps”, which included this class of luminaires in a regulated LED lamp category. No other energy programs recognize this product as a “lamp”. Energy Star recognizes this class of product in their Energy Star Luminaires specification. Furthermore the California Voluntary Quality Specification references the requirements for residential and commercial downlight luminaires. It appears that it was an afterthought to include these products in the scope of this rulemaking since the only reference to them is in the definitions section of the standard. The CEC staff report does not include any details for this class of product other than a graphical image on one slide illustrating the scope of the products covered. There is no evidence that this class of product was included in the data analyzed to establish the product thresholds for this regulation.

A screw-based downlight retrofit is not an omnidirectional lamp and provides radically different optical performance from other LED lamps evaluated by CEC. This class of product is designed with integrated LEDs to provide specific optical distribution using reflectors, lenses or baffles to redirect the light and shield the individual LEDs. One of the higher customer preferences is related to the uniformity of brightness across the downlight lens. Many products also include an adjustable optic for sloped ceilings, grazing textured surfaces, wall washing or highlighting features within the room. These are innovative products by providing the appearance and performance of traditional products installed in homes, with a more energy efficient solution that can easily be retrofit without an electrician. This innovation avoids the negative experiences of the past with the performance and appearance of CFLs, and significantly improves the energy efficiency of lighting in existing residential and commercial installations in the state of California. These products are designed to provide various sizes, splays, trims, baffle styles or colors based on consumer preferences, as shown below.



The type of baffle or trim color can reduce the overall lumens by up to 24%, but provide the appearance or brightness control desired by the designer or consumer. These products are optimized for the LED source with performance that cannot be duplicated by simply replacing a traditional lamp in an existing downlight with an LED lamp. A significant focus of our product design is to provide products that reduce the brightness or glare, and to occlude the image of the individual LEDs. This is a major quality consideration for consumers and often results in a tradeoff in the energy efficiency. As you can see from the images above, some products result in a direct image of the individual LEDs, a flush bright lens, or high brightness from a specular reflector. While these products may result in a higher efficacy, they do not provide a superior customer experience.

In addition, most manufacturers provide these downlights with a screw base adapter to service both the commercial and residential markets. The screw base may, or may not be installed with the downlight, so CEC has unintentionally covered hardwired downlights within the scope of the standard.

We have evaluated over 40 models of screw-based LED Downlight Retrofits and the results of our analysis is as follows:

- a. **Scope of existing products that meet all the proposed performance requirements:** A very limited number of products meet all the requirements outlined in the proposed standard. Those that meet are typically a larger aperture with a white trim. None of the 2700K products meet the efficacy or compliance score. In addition, products with superior brightness control, small apertures or designer styled trims do not meet the requirements. The proposed requirements will result in an unnecessary restriction of energy efficient product offerings.
- b. **Tradeoffs in LPW/Compliance Score versus optical quality:** There is a significant tradeoff in the LPW for downlight retrofit products that provide superior optical control or aesthetic appearance. Products with these features generally have an LPW between 50-55 LPW, which is significantly higher than the Title 24 JA8 requirement but about 25% lower than the 65 LPW proposed in Title 20.

Furthermore, the trim style with a black baffle or designer color can result in a reduction in efficacy from 10-24%. These options align with interior design preference and represent an energy efficient solution that significantly reduces the energy use compared to incandescent or CLF downlights. While a consumer could replace the existing lamp with a standard LED screw based lamp, the overall appearance and optics of the downlight would be compromised. Without the breadth of these options, many consumers will simply maintain their existing, inefficient downlight rather than replacing it with a white trim.

- c. **Color requirements:** We thank the CEC for considering a relaxation of the CRI value since color quality and consumer preference are not well correlated to the CRI metric. Consumers may prefer a light source that is more saturated in a specific hue to match their interior design or skin color. But any product that deviates from the referent illuminant and samples upon which the CRI metric is based will result in a lower CRI. We do agree that the CEC should help prevent the situation where color quality is compromised solely to game higher energy efficacy. However this should be evaluated with a perspective of a breadth of quality attributes and based on “acceptability” rather than “preference” so that unintended consequences do not result from gaming a regulated color metric that results in penalizing other aspects of consumer preference. Because “preference” is very subjective among consumers and intended application, focusing on a minimum level of acceptable performance along with availability of information allowing consumers and designers to easily evaluate color and tradeoffs should be the focus for future CEC standards.

A few downlight retrofit products meet the proposed R8 requirement of 72, and those products that exceed this threshold result in a CRI value of 92 or higher. There does not appear to be a good correlation between the minimum 82 CRI requirement and the R8 threshold. We request that the CEC provide the analysis of the R8 and CRI recommendations.

None of the products met the duv threshold published in the 15-day language. The CEC modified the upper limit for the duv range at the November 18, 2015 hearing. We have reevaluated the performance of these products based on these modifications and the revisions seem to be reasonable. We thank the CEC for reevaluating and modifying the duv requirement.

- d. **Standby Power:** The Tier 2 standby power requirement of 0.2 watts or less will likely limit future innovation for products that provide a variety of smart features, including non-lighting features. While the CEC staff indicated that there are products on the market today that have a standby power lower than this limit, it is unclear whether these products offer robust features and consumer benefits. It would be inappropriate for the CEC to limit the innovation of smart features that can provide additional energy benefits in the future with overly restrictive standby power. We recommend a limit for standby power of 1.0 watts or less. This threshold will limit excessive standby power while maintaining the flexibility to design innovative features into future products.
- e. **Conflicts between Title 20 and Title 24 JA8:** As mentioned above, we are concerned about the conflicting standard between Title 20 and Title 24 JA8, specifically for downlight retrofits. Appendix A illustrates the combined requirements that will be applied to this product class. The cost to provide a product meeting both Standards and the cost to manage the development and administration of different grades of products for each California standard has not been evaluated and diverts manufacturing focus on future energy innovations. Furthermore, retailers who provide products for residential and commercial applications are unlikely to devote shelf space to multiple product offerings based on conflicting standards.
- f. **Awareness of scope including retrofit downlights:** Because of the confusion associated with the inconsistent definition of a “general service lamp”, we believe that many manufacturers of screw-based LED downlight retrofits are unaware of this proposed standard and have not been engaged in the analysis or feedback. This product type has been grouped into the general service LED lamp category

yet they are distinctly different from the general classification of LED lamps. The timing of this standard presents challenges to modify the requirements for this product class within the desired timeframe. We suggest that this product class be removed from the current scope. If there is a desire to impose regulatory requirements on this product class beyond those already in effect for Title 24, Acuity Brands will actively work with CEC staff to develop proposals that are representative of the product performance and are cost justified.

RECOMMENDATIONS:

We recommend that the CEC:

1. Address the conflicts between Title 20 and Title 24 JA8

The CEC must immediately address the conflicting requirements between Title 20 and Title 24 JA8. The analysis mentioned by staff in the November 18, 2015 hearing should be made publically available for industry reevaluation. We strongly urge the CEC to remove prescriptive requirements from Title 24 JA8 if a product is covered in the scope of Title 20. This will streamline the focus on high efficiency retrofit products available in the California market and will eliminate confusion among retailers, designers and consumers. While it is not our recommendation to attempt to harmonize the requirements between these two standards, if the CEC chooses this course of action as a short term solution, the requirements that present the most significant issues include LPW (including the Compliance Score), the color metrics (CRI and R1-R9 values) and standby power.

2. Reevaluate or remove Screw-based downlight retrofits from the scope of this standard

We request that the CEC provide public access to the data used to evaluate this class of product. If these products have not been specifically evaluated as a separate class in making the performance determinations in Title 20, CEC should remove them from the scope of this cycle for Title 20 standards. Furthermore, if the analysis has not included a reasonable breadth of optical and aesthetic options, the product class should be removed from the scope. Acuity Brands will be glad to assist in the evaluation of appropriate standards for a future rulemaking if it is determined that requirements beyond the existing Title 24 JA8 requirements are necessary.

If this class of product has been evaluated with a reasonable breadth of samples in the standards process, then we request access to the analysis for this product class only; specifically the LPW, Compliance Score, color attributes, with an identification of the type of reflector, lens and trim style. We further request a reevaluation of the proposals with the consideration of quality attributes consumers prefer, such as brightness, glare control and aesthetic appearance. As currently proposed, the regulation will restrict California consumers from purchasing many high quality, energy efficient LED retrofit downlights.

3. Longer term focus on “quality attributes”

We support the work in California to prevent the “race to the bottom” to avoid undesirable quality of lighting products in order to maximize energy efficiency. However, we recommend that CEC’s longer term focus on quality attributes include the unintended consequences of the proposed standards on a broader set of quality attributes when establishing energy standards. The attributes should be based on credible data and preference/acceptability studies that have been vetted by a balanced set of industry experts. This action will ensure that the product development and lighting design standards in California will not only improve the energy efficiency of lighting installations, but will expedite the market transformation of products with superior quality attributes without unintended consequences that restrict attributes other than energy and color that consumers value.

Appendix A

Comparison of Title 20 versus Title 24 JA8 Requirements for LED Lamps

	CA T20 Proposed	Title 24 JA8 2016 Requirements	
		Requirements based on an inseparable luminaire	Requirements based on an LED light source
CCT	2000-7000K covered	>=4000	>=3000
Lumens	< 2600 covered	N/A	N/A
LPW	65	45	45
CRI (Ra)	82	90	90
Compliance score	277	N/A	N/A
duv lower limit	-0.0033	-0.0033	-0.0033
duv upper limit	= 57700 x (1/T)^2 - 44.6 x (1/T)+0.01184	0.0033	0.0033
Life (hrs)	10000	15000	15000
PF	0.7	0.9	0.9
Standby W	<0.2w (eff 1/1/19)	N/A	N/A
R1	72	N/A	N/A
R2	72	N/A	N/A
R3	72	N/A	N/A
R4	72	N/A	N/A
R5	72	N/A	N/A
R6	72	N/A	N/A
R7	72	N/A	N/A
R8	72	N/A	N/A
R9	N/A	50	50
Start Time (sec)	N/A	0.5	0.5
Lumen Maint (after 6000 hrs)	N/A	0.867	0.867
LM80 and TM21 hours to L70 (if 6000 testing is not provided)	N/A	25000	25000
Survival Rate (after 600 hrs)	N/A	0.9	0.9
Dimming level (minimum)	N/A	0.1	0.1
Meet SSL7A Type I or Type 2	N/A	YES	YES
Max % flicker at >2000hz	N/A	0.3	0.3
Noise dBA (at 100% and 20% light output 1 meter)	N/A	24	24
Marking	Not specified	JA8-2016 or JA8-2016-E (elevated temp)	JA8-2016 or JA8-2016-E (elevated temp)

Note: Items shaded in green highlight the more restrictive requirements between the two standards.