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Submitted via email: docket@energy.ca.gov

Mr. Andrew McAllister
Commissioner
California Energy Commission
1516 Ninth Street
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California Energy Commission

DOCKETED

15-BSTD-01

TN # 75428

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Proposed Revisions to the California Building Energy Efficiency Standards California Code of Regulations, Title 24, Part 6 and Appendices; 45-Day Language

Dear Commissioner McAllister,

Acuity Brands appreciates the opportunity to provide comments regarding the Title 24 Building Energy Code. Acuity Brands has a long history of working with the Commission and contractors to promote the adoption of the state building code to promote high efficiency lighting installations. We look forward to discussing our comments and working collaboratively on revisions necessary to ensure an effective building code.

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 building code has a direct impact on our investment of nearly 400 California based employees.

Our comments focus on the proposed residential lighting requirements (including Joint Appendices JA8 and JA10), the commercial outdoor lighting requirements and concerns with the procedural processes used in this rulemaking.

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

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1) Section 150.0k Residential Lighting

- a. We are very concerned about the overly prescriptive nature of the requirements for residential lighting. This does not seem to be consistent with the objectives of the California building standard and we have expressed our concerns in the 2013 standards process as well. Acuity Brands certainly encourages the installation of high quality lighting solutions. While we appreciate the Energy Commission's objectives of promoting quality product performance and helping facilitate inspection, the proposed requirements have not considered the utility of the quality attributes in Appendix JA8 for specific areas of a residential installation. The term "quality" has been discussed throughout this rulemaking process without any technical or consumer validation for the thresholds. The simplified approach has shifted the burden of compliance for a design standard from designers and inspectors to the manufacturer. We believe that many of the quality attributes have not been evaluated with fact-based decisions, nor have they been cost justified for all covered products or for applications that do not warrant the proposed performance.

We recommend that the CEC reconsider the application of quality attributes to all areas of a home and provide builders and owners the ability to manage tradeoffs in installations that are less demanding.

- b. It is unclear how the proposed standard will help manage compliance. The proposed standard defines certain technologies as "high efficacy" (such as linear fluorescent, CFL, induction, HPS and pulse start Metal Halide) without meeting any energy or quality attributes. These products will not include a compliance marking since they are not required to meet JA8 requirements, and cannot meet the requirements since the test standards do not apply. Therefore, an inspector will still have to evaluate product compliance based on an understanding of the product technology. Products required to meet JA8 must be listed in the CEC Appliance Database, however there has been no discussion regarding how the CEC will validate the accuracy of those submissions. Furthermore, we believe that the proposed standard has extended the scope beyond lighting products typically considered as "residential" because the building standard includes multi-family and institutional housing. These facilities often utilize commercial, industrial, specification and architectural grade lighting products. Therefore, thousands of products that were never intended to include a compliance marking must be labeled and submitted to the database since manufacturers do not control where luminaires are installed. These requirements will result in significant costs associated with markings and submittals to the database. We believe the cost implications have not been fully evaluated in this context.

We recommend that CEC reevaluate the objectives of inspections for compliance and implement a process based on a submittal package comprised of specification sheets and other documentation rather than markings on the product and submission to the appliance database. We also recommend that CEC make the appropriate investments in training for inspectors to enable them to evaluate compliance for high efficacy products that will not carry a JA8 compliance marking and define how CEC staff will validate compliance of products.

- c. The definition of "recessed lighting" has always been intended to cover only recessed downlights. However the revision in the 45-day language now covers any indoor or outdoor product that is recessed into a ceiling, wall or floor. The result is that products such as

troffers, sconces, steplights and well lights are subject to the requirements intended only for downlights. We understand that CEC has issued “Staff Intended Changes” to the 45-day language to clarify that the requirements in 150.0(k)1C, 150.0(k)1Gi, and Table 150.0-A will apply to only “recessed downlight luminaires”. We appreciate that CEC has recognized this issue and we expect this change to be incorporated into the 15-day language.

Furthermore, the concern with downlight performance in past versions of the code related to the thermal management of replaceable light sources. Recessed downlights with integral LED or OLED light sources are designed and tested for proper thermal management and the consumer cannot change the light source. Therefore recessed downlights with LED or OLED light sources should be exempt from meeting the requirements of JA8 in order to be classified as high efficacy.

We recommend that CEC clarify in the 15-day language that the requirements for recessed luminaires apply only to recessed downlights. Furthermore, we recommend that recessed downlights with integral LED or OLED light sources shall not be required to meet JA8 requirements to be considered high efficacy.

- d. The “Staff Intended Changes” to the 45-day language indicate that the CEC intend to revise Table 150.0A to specify that outdoor luminaires using integral LEDs are not requirement to meet JA8 to be considered high efficacy. We strongly support this revision and expect it to be incorporated into the 15-day language. We have provided comments with regard to residential outdoor lighting and the JA8 requirements throughout our comments to reinforce the need to exclude outdoor lighting from the JA8 requirements.

We recommend that CEC clarify in the 15-day language that the requirements of JA8 shall not apply to outdoor luminaires to be considered high efficacy.

- e. In the March 2015 workshop, CEC staff indicated that they intend to allow GU-24 lamps with LED light sources as high efficacy and are not required to comply with JA8. This is not included in the 2/24/2015 “Staff Intended Changes” to the 45-day language, so it is unclear whether GU-24 LED lamps will be required to meet JA8 or not. The justification provided at the March 2015 workshop was if a resident replaced a GU-24 lamp, it would be replaced with a light source that has high energy efficiency. Throughout this rulemaking, JA8 has been referenced with regard to ensuring that future lamp replacements promote high efficacy lighting. We appreciate the objective to ensure that replacement lamps promote good quality. We are specifically concerned with the market implications to promote luminaires for use with replaceable lamps, because the optical and thermal characteristics of the luminaire is not designed to optimize the performance of the light source. Furthermore, there is a potential snap back after the building is inspected to replace lamps with low cost, low efficacy screw based light sources. Although the cost of LED lamps is decreasing, there is still at least a 10x cost increase compared to a screw based halogen lamp. Promoting replaceable lamp solutions does not promote quality and will financially impact our investments in high quality integral LED and OLED luminaires. Luminaires with integral, non-replaceable light sources should not be required to meet the JA8 requirements to be considered high efficacy. This is consistent with the expected changes allowing outdoor and GU-24 LED products to be exempt from the JA8 requirements.

We recommend that CEC clarify in the 15-day language that the requirements of JA8 shall not apply to indoor luminaires with integral LED or OLED light sources. If CEC decides to continue the requirement of JA8 for indoor luminaires with integral solid state light sources, then we request the technical and cost justification why these luminaires are subject to a different standard from GU-24 base lamps and outdoor luminaires. We would also suggest that additional test requirements be placed on luminaires using a replaceable lamp to ensure high quality photometric and thermal performance.

- f. Appendix JA8 has defined an extensive list of performance attributes that are intended to apply to LED residential products. When asked about the inclusion of these quality attributes, the CEC has indicated the attributes are intended to ensure that homes will be built with products that will be pleasing to the owner. At the March 2-3, 2015 workshop, these products were described as the “gold standard” for products. However, many of the attributes are based on personal preference or the décor of the finishings in the space. The CEC has not provided that technical or consumer preference studies that support the thresholds proposed. We have not been presented with evidence to substantiate the technical or consumer preference thresholds for color rendering, R9, correlated color temperature, Duv, dimming, flicker, noise, rated life or lumen maintenance. Furthermore, these attributes have not been cost justified. While a database of products with performance and cost attributes has been mentioned in the workshops, we believe that the information in this database is focused on light sources and primarily evaluate the cost implications for the CRI threshold. We do not believe the database consisted of a sufficient representation of luminaires with non-replaceable light sources and the Commission has not considered the compounded cost implications when all of the performance attributes are required. Solid state lighting luminaires with integrated light sources perform as well or better in the quality attributes than products that are defined as “high efficacy” in Table 150.0-A that are not required to meet the requirements of JA8.

We recommend that CEC provide the technical and consumer preference studies, as well as the cost analysis for the requirements in JA8 relative to LED and OLED luminaires.

- g. The March 2015 workshop referred to the JA8 requirements as the “gold standard” for quality. These requirements will limit builder and consumer choice. JA8 eliminates the ability for a builder or owner to manage performance and cost tradeoffs within the building and site because the highest standard product must be installed in all locations. It seems that this approach has been implemented to simplify inspections. However, the highest performing color and dimming are not required, or even desired, in certain areas such as closets, workshops and utility rooms. Acuity Brands, as well as the lighting industry in general, have made significant investments in solid state lighting solutions, and we are very concerned that the requirements in JA8 will revert the California market to those technologies that are not required to meet the JA8 performance levels. It will also eliminate differentiation of product choice, ultimately commoditizing premium performing products. This action would have a significantly negative impact on the financial performance of our business as well as the energy use in the state of California.

We recommend that the CEC modify the requirements to only require the highest level of quality attributes in areas of a residence that warrant that quality, allowing builders and owners the choice to install the most effective and efficient products for the intended application.

- h. Joint Appendix 8 (JA8) which defines the qualification requirements of high efficacy light sources installed to comply with the requirements of Section 150.0(k) appears to be closely aligned with Voluntary California Quality LED Lamp Specification used for utility incentives. The Appendix attempts to specify requirements for light sources, but is deficient in specification of test methods for evaluating light sources and luminaires with integrated LED and OLED sources and dimmer controls. The defined test procedures are not uniformly applied to all the products required to meet JA8:
 - i. JA8.2 references the test apparatus in UL 1598, the Safety Standard for Luminaires. While this apparatus is appropriate for luminaires with integrated sources, it is not applicable to independent light sources such as CFL and LED lamps.
 - ii. JA8.3.1(g) references IES LM-79 for evaluating efficacy of induction lamp systems. IES LM-79 is specific to products using SSL sources and is not appropriate test procedure for determining for evaluating an attribute related to measuring light output of an induction system.
 - iii. In general, specifying lamp base orientation for luminaires with integrated SSL sources is unnecessary. See the requirements in JA8.3.2 and JA8.3.4
 - iv. The Energy Star test method referenced for the Ambient Temperature Life test is not appropriate or applicable to luminaires with integrated SSL sources. The test method was developed for lamps and has specific housing, support, and temperature measurement location requirements that have not been accounted for if testing a luminaire.

We recommend that the CEC review the test procedures and requirements in JA8 and make the necessary revisions or exemptions as requires to accurately define the requirements for light sources, luminaires and controls.

- i. Specific comments regarding JA8 requirements:
 - i. Start time – JA8 defines the start time requirement as less than 0.5 seconds, but the compliance table for the appliance reporting in JA8 defines the start time as 0.3 seconds. Since all of the workshop materials have reference a 0.5 second start time, we assume the value in the reporting requirements is incorrect.
We recommend that the 0.3 seconds value in the JA8 reporting requirement be revised to 0.5 seconds.
 - ii. Color Rendering Index – We believe color quality is important in many areas of a residential application. The 2013 standard required a 90 CRI for certain products in areas where color would be an important quality, and only required it for LED lamps and a limited scope of LED luminaires. The 45-day language was modified to exempt outdoor lighting from this level of performance, and we appreciate the CEC efforts in making this correction. We remain concerned that the 90 CRI and 50 R9 requirements have not been established with a solid technical or cost justification since the 2016 proposed standard mandates this high level of performance in all areas of the home and for all LED luminaires. In addition, this action does not align

with the published positions of national and international standards organizations relative to regulating CRI for LED lighting.

If CRI and R9 are to be included in this regulation to promote color quality, we recommend the incorporation of exemptions to allow a more acceptable and cost effective level for areas of a residence that do not require the highest level of color performance.

- iii. CCT – Correlated Color Temperature relates to the color appearance of a light source, which is very subjective to the individual and finishings used in the area. At the June 2014 workshop, we indicated the subjective nature of this attribute relative to ethnicity, age or design preference. The contractors agreed at this workshop that the CCT preference can vary and that this attribute needed to be reevaluated, however no changes have been incorporated to date. We have also expressed concerns that the color requirements in JA8 (CRI, R9 and CCT) will restrict the use of saturated color lighting, color changing and tunable white technologies. Saturated color and/or color changing lighting is often used for aesthetic or decorative purposes for indoor or outdoor lighting applications. These products will no longer be allowed if they exceed 3000K, which would eliminate the use of any shorter wavelength colors. Tunable white technologies would also be restricted if they exceed 3000K. This technology is being used to promote human centric lighting and for health care facilities, many of which are covered in the scope of the residential lighting code. At the March 2015 workshop, CEC staff explained that a product must “be capable” of providing 3000K performance. However the proposed code is very clear that CCT cannot exceed 3000K performance. If the code is changed to “capable of”, this presents a variety of concerns regarding test methods and the potential to game the testing. It is not appropriate for CEC to restrict the use of lighting for decorative or aesthetic purposes. Furthermore, CEC is severely hampering the use of important technologies that are designed to promote human health and well-being. Appendix A at the end of these comments provides some references related to color preference, ethnicity and senior care.

Furthermore, for outdoor applications a higher CCT light source typically has the spectral characteristics that better accommodate the spectral shift in mesopic nighttime vision sensitivity. At the March 2015 workshop, one of the contractors to CEC testified that outdoor lighting wouldn’t have to meet the color requirements since most outdoor residential products use traditional light sources. This simply is not true. There are a wide range of high quality LED outdoor lighting products on the market today, and Acuity as well as other major manufacturers are not dedicating any engineering efforts to develop new lighting products with traditional light sources.

We recommend that CCT requirements be removed from JA8 due to the subjective preference associated with vision or interior design. If the CEC believes that this metric is justified based on technical and financial merit, then it should be modified to allow a broader range of performance. Exemptions must be incorporated for lighting intended for decorative purposes as well as lighting for human health. The 15-day language should specify that outdoor lighting using integral LEDs or OLEDs shall not be

required to meet the requirements of JA8 as indicated in the 2/24/2015 “Staff Intended Changes”.

- iv. Dimming – Acuity promotes the inclusion of dimming in areas where the dimming will add utility to the occupant or where the lighting operates for an extended period of time.
 1. However, the 10% dimming requirement for all areas of the residence does not appear to be a threshold that has been justified technically, financially or based on consumer preference. We are concerned about the lack of data driven decisions in this area. At the March 2015 workshop, CEC staff indicated that the threshold would be modified from 10% to 3%, and when asked for the justification for this change, the CEC responded that the Commission was told that 10% was not low enough. This is not sufficient justification for such a significant change. In addition, we have not seen modified language indicating this revision, so it is unclear whether the CEC is proposing a 10% or 3% dimming level.
 2. The proposed requirement is mandated for areas of a residence that will have virtually no benefit to the occupant of the home or to the energy use of the lighting. We question the benefit and cost justification of dimming in closets, garages, workshops, utility rooms, outdoor porches or other outdoor areas. Builders will likely revert to traditional “high efficacy” light sources, such as linear and pin-based fluorescent, that are not required to comply with JA8 to avoid the added cost of dimming for these areas. Therefore, the proposed requirement hinders the market adoption of LED lighting and controls throughout a home. A builder or owner is not prevented from using low level dimming where it is appropriate, but it is not appropriate to mandate dimming everywhere based on the assumption that it is always beneficial or needed.

Outdoor luminaires are required to have other control mechanisms in section 150.0(k)3. These requirements require a photocell and motion sensor or one of the following: photocontrol/time switch, astronomical time clock or energy management control. Adding dimming control requirements provides little or no additional benefits to energy savings for functionality to the resident. Furthermore, the CEC has not provided a cost analysis to justify dimming for outdoor luminaires in addition to the control requirements already mandated for these products.

We recommend that the CEC:

- ***define specific areas where a luminaire with dimming is required in the residence.***
- ***specify that outdoor lighting using integral LEDs or OLEDs shall not be required to meet the requirements of JA8 as indicated in the 2/24/2015 “Staff Intended Changes” and are therefore not required to provide dimming capability.***
- ***exempt the dimming requirement for luminaires in areas of a home that have very low operating hours. We suggest that the following***

areas should be exempt from dimming: closets, utility rooms, garages.

- **provide an allowance for luminaires in areas of a residence or multi-family facility where visual tasks require full light output the majority of the time. Areas such as bathrooms, basements, cafeterias, entrances and lobbies should provide an allowance for a certain amount of wattage to be exempt from the dimming requirement, such as requiring 50% of the watts to be dimmable. Another approach would be to establish a less aggressive dimming threshold, such as a 50% dimming level.**
- **provide the technical and cost justification for this requirement, in consideration of the combined effect of other quality attributes in JA8.**

- v. Flicker – JA8.4.6 requires the light source to be tested “in combination with the dimmer control” for reduced flicker operation, and Joint Appendix 10 (JA10) states that flicker measurements of all non-incandescent lamp sources controlled by a phase cut dimmer represents only the specific combination of phase cut dimmer, ballast or driver, and lamp and the results cannot be applied to other combinations of dimmer, ballast, driver or lamp. We question the need for such compatibility testing when it is highly unlikely that a light source will be installed in combination with the specific tested dimmer control.

We recommend that the CEC remove the flicker testing requirement for non-incandescent lamp sources intended to be controlled by a phase cut dimmer.

- vi. Lumen Maintenance and Rated Life – As mentioned previously, the Energy Star test method referenced for the Ambient Temperature Life test is not appropriate or applicable to luminaires with integrated SSL sources. Additionally, historically Lumen Maintenance and Rated Life testing for luminaires has been evaluated at the source level using IES LM-80 data, IES TM-21 projections and in situ temperature measurements in the luminaire, not testing a complete luminaire for 6000 hours. The requirement of testing complete luminaires for 6000-hours will create a significant cost burden on luminaire manufacturers, since luminaires are not testing to the referenced Energy Star test method.

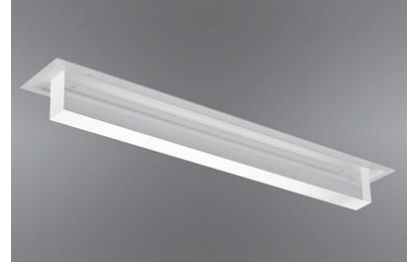
We recommend that the CEC include an option of evaluating lumen maintenance and rated life of luminaires with integrated SSL sources using IES LM-80 data, IES TM-21 projections and in situ temperature data. We also request that CEC provide the technical and cost justification for applying this requirement to luminaires.

- vii. Labeling and database submission –

1. We have provided comments to the CEC and their contractors since the June 2014 workshop with regard to concerns about the labeling and database submission requirements. While the staff and contractors have agreed at the workshops that this requirement is not effective as currently proposed, there have been no revisions to the proposal in the 45-day language.

2. The content required on the label is unreasonable if the intended purpose is to promote compliance and ease of inspection. For products such as luminaires with integral light engines that cannot be replaced, information such as lumens, maximum wattage and color characteristics are of no value to the typical resident. The manufacturing date is already required by UL1598 for luminaires or UL1993 for light sources. It is redundant and unnecessary. Furthermore, there is no reason why the manufacturing date should be required for a building standard since compliance is based on the date of installation/inspection – not the manufacturing date. It appears that this is being put in place to establish the framework for a future appliance standard, and this is simply not appropriate for the building standard.
3. Because of the amount of information required, the label will be large in reference to the shrinking size of lighting products, and will interfere with the aesthetics and/or optical performance of the product. Or they will be placed in a location that is not visible to the inspector. Traditional lighting often had a housing or removable lens, which provided a non-obtrusive location for a label. However LED lighting is typically integrated as one piece, is much smaller and does not have removable parts. The following examples of products illustrate where the label as proposed will have a negative impact on the aesthetics or performance of the product:





The information required on the label is available on product specification sheets, technical data sheets or other publicly available sources such as Energy Star's and DLC's qualified products list and the DOE LED Lighting Facts, as applicable. It would seem to be more appropriate to establish a process for builders to utilize existing references rather than creating a burden for a label and database submission. We would be glad to discuss options for simplifying the validation of product performance to the Title 24 requirements using specification sheets.

4. We appreciate that a JA8 compliant marking could be beneficial to inspectors. Because numerous products designated as "high efficacy" based on the technology type in Table 150.0-A will not be marked, inspectors will still be faced with the challenge of determining whether an installation meets the code. In addition, the exemptions and need to expand the exemptions further complicates the inspection process. Therefore, this proposed language does not simplify the inspection. We believe that in order to implement a building code that promotes efficient and effective installations with consideration of various needs within the residence, inspectors must be committed to establishing the necessary level of information to validate compliance. This cannot be simplified to a compliance marking for all products in all areas of the residence. While we appreciate the interest in simplifying the requirements to reduce the education requirements for inspectors, the residential building code should be inspected with the same process used for non-residential buildings because there is no single solution for all installations.

5. The labeling and data submissions are required for any JA8 product that can be installed in a residential application. This not only includes single-family homes, but also multi-family housing as well as some institutional housing. Manufacturers do not control the type or quality of products install in a residential application. Furthermore, some installations may be designed based on performance or construction quality of a commercial, specification or architectural grade product. Therefore the proposed requirements have incorporated thousands of unintended products into the labeling and database submission requirements. This presents a significant administrative cost burden on the manufacturer. Furthermore, there has not been any discussion about the CEC's ability to validate the use of the label or submissions to the appliance database. This presents an unfair burden on LED and OLED lighting solutions and may inhibit the speed of adoption of these technologies in California.
6. Table JA-8 which outlines the data submittal requirements for CEC certification as a high efficacy light and includes a line item for the measured valued of the Light Output of Elevated Temperature Light Output Ratio test, however this test (method) is not referenced or specified elsewhere in JA8.

We recommend that the CEC:

- ***define alternate methods for inspection and compliance. We reiterate our suggestion from previous workshops to establish a submittal process using manufacturer's specification sheets or technical data sheets in a builder's inspection submittal.***
- ***provide training for inspectors to identify compliant products meeting JA8 as well as high-efficacy products that are exempt from meeting JA8 requirements.***
- ***eliminate the requirement to submit products to the CEC appliance database since the requirements are not consistently applied to all technologies and imposes an unreasonable burden on SSL products including residential, commercial, industrial, specification and architectural grade products.***
- ***remove the line item for the Light Output of Elevated Temperature Light Output Ratio Test from the required information section of Table JA-8***
- ***provide the cost analysis associated with burden on manufacturers to label and submit data for residential, commercial, industrial, specification and architectural grade LED and OLED products.***

2) Section 140.7 - Outdoor Lighting

We have worked collaboratively with the contractors for this section prior to the June 2014 workshop. Acuity was integrally involved with the development of the model used to establish the lighting power allowances for the 2005 standard and we believe that this model provides a good analysis tool for the ongoing updates. We support the 2016 model utilizing LED technology as the baseline for the lighting power allowances. We also support the inclusion of tunnels and bridges not associated with roadway/CALTRANS lighting installations. However we have three concerns with the proposed 45-day language:

- a. The baseline has been described at the workshops as an LED baseline adjusted for expected performance in 2017. We appreciate that the rapid speed in which

technology is changing, however basing a standard on predicted performance is risky and presents concerns. The CEC cannot predict all of the implications that may impact future technology, including availability of materials, supply chain issues or if the assumptions related to the projections by DOE will be valid at a future date.

- b. The lighting power allowances are reduced more drastically for lighting zones 3 and 4, which does not seem to be justified. Our concerns were expressed at the June 2014 workshop. There was discussion regarding the inefficiencies for the 250 watt metal halide used in analysis. However this is not a common baseline product used for lighting zone 3 and 4. Based on current technology, we believe that the LPA values in Table 140.7-A and the LPA values for building entrances and exits in Table 140.7-B for lighting zones 3 and 4 would be difficult to meet for certain applications.
- c. The Illuminating Engineering Society has updated the standard illuminance requirements in Recommended Practice RP-20 for parking lots and parking garages. The revised RP-20 maintains many of the same illuminance requirements, but has differentiated illuminance levels for asphalt and concrete surfaces. We asked a question during the March 2015 workshop if changes had been made from the values proposed at the November 2014 workshop. The contractor indicated that the revisions in RP-20 had been reviewed relative to the model and addressed. Because the requirements for areas with concrete surfaces were revised to require twice the amount of light recommended for those with asphalt surfaces, we do not see how this issue has been addressed in the 45-day language. Concrete surfaces may be common in smaller parking areas and plaza hardscapes, which are the types of applications that present design challenges in order to meet the proposed LPA requirements.

We recommend that the CEC reevaluate the LPA requirements in Table 140.7-A and the building entrance and exit LPA in Table 140.7-B for lighting zones 3 and 4 based on the performance of current LED technology. We also recommend an exception to Tables 140.7-A and 140.7-B for applications using concrete surfaces to allow a multiplier of 2.0 to the LPA values in those tables to support the illuminance recommendations in IES RP-20-14.

3) Procedural Concerns

We have worked collaboratively with the CEC staff and contractors for many previous iterations of the Title 24 code development. However, we are concerned with various issues related to procedures that limit involvement from industry.

- a. Staff changes and an aggressive schedule do not seem to support the consideration of comments from industry provided over the last year from Acuity and NEMA.
- b. Public meetings have been scheduled at times that are known in advance to present significant conflicts for industry members. The November 2014 workshop conflicted with the IES Annual Conference. This not only restricted attendance in person, but also limited involvement in the online webcast. The March 2015 workshop conflicted with an Energy Star lighting specification meeting, and while the workshop dates were posted 14 days in advance, the agenda was not posted until about 7 days prior to the meeting which limits our ability to make reasonable travel arrangements. It

seems that workshops are often scheduled based on when contractors are prepared, rather than on a pre-established timeline for the rulemaking.

- c. The 45-day language seems to be in a continual revision mode. In the March 2015 workshop, there were several references to revisions that CEC plans to incorporate. However we have not seen any published revisions to the 45-day language. It is difficult to formulate comments with the continual reference to potential changes throughout the 45-day process. In addition, CEC staff has indicated that comments provided after 3/17/15 are not likely to be addressed due to the limited schedule, even though the comment period is open until 3/30/15. Because of the changes introduced on March 3, the public only had 14 days to comment in a manner that would allow the CEC to address the comments.
- d. Workshop documents and presentations have not been made publically available at the time of the workshop. Many items posted on the web have not included the date posted or modified.
- e. Historical documents including the June and November case studies, proposed code language, presentations and comments seemed to have been removed or moved to a web location other than within the 2016 proceedings.
- f. Transcripts have not been published within a reasonable amount of time and well after the comment period has ended. When meetings are scheduled with known conflicts and the transcripts are not available, we are unable to provide input within a timeframe to allow for consideration or discussion.

We encourage the CEC to implement collaborative processes that were used in past standards rulemaking processes. This will encourage input from industry since neither the staff nor its contractors may fully understand the technical and cost implications regarding product development, manufacturing processes and sourcing logistics that impact the financial viability of the manufacturing industry. We also have strong relationships with the design community and understand many of the challenges they face regarding code compliance. We also request that workshop schedules and agendas be provided well in advance of 14 days, preferably at least 21 days in advance. While this is longer than the mandated timeframe, when information is posted on a Friday evening Pacific Time Zone, it doesn't actually provide a full 14 days to manage travel logistics. Booking cross country travel less than 14 days advance increases cost and often requires industry members to adjust schedules of other commitments. All information related to previous workshops should be posted to the rulemaking webpage and should include the date posted or updated.

Because we have had good collaboration in the past, we are confident that more dialog and adjustments to processes will improve the efficiency and effectiveness of this standards process for industry members as well as the CEC and its contractors. A collaborative process will help promote more advances in technology, California-based jobs and better adoption of energy efficient lighting systems to achieve California's energy goals.

Appendix A
Notable Technical Papers Related to Color and Color Preference

- Quellman, E. M., & Boyce, P. R. (2002). The Light Source Color Preferences of People of Different Skin Tones. *Journal of the Illuminating Engineering Society*, 31(1), 109-118. <http://www.tandfonline.com/doi/abs/10.1080/00994480.2002.10748376#preview>
- K. Yokosawa, N. Yano, K. Schloss, L. Prado-Leon, S. Palmer. Cross-Cultural Studies of Color Preferences: US, Japan, and Mexico. *Journal of Vision*, August 2, 2011 vol. 10 no. 7 <http://www.journalofvision.org/content/10/7/408>
- N. Park, C. Farr. The Effects of Lighting on Consumer's Emotions and Behavior Intentions in a Retail Environment: A Cross-Cultural Comparison. *InformedDESIGN*, 2007. http://www.informedesign.org/Rs_detail/rsId/3023
(NOTE: While this article focuses on retail settings, many of the findings apply to a residential application associated with aesthetic preferences, mood and emotional state. The article references cultural preferences as well as color preferences for specific finishes or emotional impacts).
- P. Slegers, N. Moolenaar, M. Galetzka, B. van der Zanden. Lighting Affects Student's Concentration Positively: Findings from three Dutch Studies. http://www.academia.edu/1393302/Lighting_affects_students_concentration_positively_findings_from_three_Dutch_studies.
(NOTE: This study focuses on classroom settings but has been referenced for designs for long-term senior care.)
- M. Figueiro. 24-Hr Lighting Scheme for Older Adults. AIA Report on University Research Volume 5. <http://www.aia.org/aiaucmp/groups/aia/documents/pdf/aiab092627.pdf>