FINAL COMMENTS FROM
NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)[1]
LIGHTING SYSTEMS DIVISION
TO THE CALIFORNIA ENERGY COMMISSION FOR PROPOSED
2008 CALIFORNIA BUILDING ENERGY EFFICIENCY STANDARDS

March 28, 2007

NEMA appreciates the opportunity to offer comments and recommendations to the California Energy Commission's proposed revisions to address 2008 California Building Energy Efficiency Standards (Title 24). These comments address residential, indoor commercial lighting, outdoor lighting and lighting control proposals for the 2008 Title 24 rulemaking.

NEMA respectfully expresses a general concern regarding the development of the 2008 Title 24 Code. Its members make up an essential constituent in building energy efficiency standards. Our members feel that the time provided to evaluate proposed amendments has not always been sufficient to turn around constructive and meaningful comments from a key sector. In order to provide useful feedback, NEMA requires more than a couple of weeks lead time to coordinate among its membership the noteworthy and landmark lighting proposed changes to Title 24. It has been over 9 months since initial comments were remitted to the CEC for the July Workshop, and the CEC revisions to this version are significant. We thank the CEC for recognizing this and granting us additional time to review and comment on the revisions for Title 24-2008.

We appreciate receiving Gary Flamm's notes from the February 2007 workshop. It was indicated at the workshop that presentations would be posted to the CEC website, but it appears these presentations have not been posted to date.

Mandatory Requirements for Lighting Control Devices, Ballasts and Luminaires-Section 119

NEMA provided oral comments to proposed subsection 119(k) at the February 2007 "Lighting Workshop". NEMA provided four comments to this subsection, which pertains to dimmer lighting controls.

Subsection 119(k)

1. 119 (k)(2) NEMA members concerned with CEC use of the word "flicker" as there is no readily available definition in engineering terms. The CEC proposed that dimmers "shall operate so that the light has a visual flicker of less than 30% for frequency and modulation". This is a matter of concern for our members because "flicker" is not defined, and it is not possible to quantify perception of 30% flicker. NEMA realizes that the flicker reference is due

[1] NEMA is the trade association of choice for the electrical manufacturing industry. Founded in 1926 and headquartered near Washington, D.C., its 430 member companies manufacture products used in the generation, transmission and distribution, control, and end-use of electricity. These products are used in utility, medical imaging, industrial, commercial, institutional, and residential applications. Domestic production of electrical products sold worldwide exceeds $120 billion. In addition to its headquarters in Rosslyn, Virginia, NEMA also has offices in Beijing, São Paulo, and Mexico City.

to pre-existing language. However, there is no well-defined meaning for flicker. We also understand that CEC feels strongly about keeping this subsection (k)(2) in this section in order to provide for quality control. You want to guarantee that inferior "bootlegged" products are not exported into the domestic U.S. market.

Recommendation

NEMA proposes that the CEC provide a little more time to determine how to approach this important matter. We are unaware of an official engineering definition. However, we may be able to develop one or suggest a different approach. Thus, we respectfully request to meet with you by phone to refine this concept.

2. 119(k)(3) NEMA members feel this subsection needs more clarification and reference the Underwriters Laboratories (UL). NEMA appreciates that the CEC added language to the original proposed version that dimmers "be UL listed" indicating that it requires testing labs recognized by the International Code Council (ICC). However, the sentence, as re-written, still requires further clarification to indicate that the dimmer control meet UL standards. Therefore, NEMA suggests the following language:

   > "shall be listed by a rating lab recognized by ICC as having been in compliance with UL standards."

3. 119(k)(4) NEMA members recommend greater clarity for wall box dimmers used on circuits. The CEC indicates that: "If the device is used on circuits with more than one switch, it shall not be able to be overridden by any other switches." NEMA recommends the following language to clarify:

   > "If the wall box dimmer is designed to be used in a 3-way circuit with standard 3-way and 4-way switches, the level set by the dimmer shall not be overridden by any of the switches in the circuit. The dimmer and all of the switches in the circuit shall have the capability of turning the lighting OFF if it is ON, and ON to the level set by the dimmer if it is OFF. In any application where the wall box dimmer is connected to a system with an emergency override function, the dimmer shall respond as programmed at the master controller."

4. 119(k)(7) NEMA supports striking this section because it is a safety issue. The CEC deleted this section and NEMA would like the CEC to maintain this strike out. The air gap requirement originally proposed in this subsection can impede the development of better dimming systems. This is a safety issue and not an energy issue, and is appropriately addressed in the national electrical code and UL. This should not be required in an energy code.

Recommendation for Dimmers

We respectfully request that this section be modified to include items 1-4 above.

Subsection 119(n)

5. NEMA members are not in accord on section 119(n) ballasts for residential luminaires. It is our understanding that the intent for this new section is to cover only recessed residential luminaires, or downlighting systems. We note that the CEC proposed alternate language provided on 3/23/07 to clarify the intent of this provision. This revision will exclude surface and pendant mounted residential luminaires from the requirements in 119(n), which is critical to the transition of the residential market to fluorescent technologies.

   NEMA Recommendation for Downlighting Systems

   Unfortunately, NEMA has not reached consensus on a position regarding this section. We respectfully request an opportunity to meet with you by phone to further discuss this provision, particularly with our luminaire and ballast sections.

Outdoor Lighting Controls and Equipment-Section 132(b)

6. Section 132(b) Luminaire Cutoff Requirements are obsolete and put an undue burden on the selection of outdoor optics when the light emitted from the site may not exceed offensive levels. We understand that the recommendation to change the cutoff requirements to include luminaires rated greater than 150 watts is to provide consistency with Title 20, which addresses energy efficiency. The cutoff requirement in this section concerns lighting quality and is not specific to metal halide requirements. Furthermore, the Illuminating Engineering Society of North America (IESNA) disapproves of using cutoff classifications in favor of a new classification system for outdoor luminaires in TM-15-07.

   Here's the reason why. Some outdoor applications have vertical visual tasks that require a light at a higher angle of distribution. We provided data during the development of the 2005 standards to show that in some cases, this requirement can result in higher energy consumption because the Standard forces the use of products with a smaller spacing ratio. The IESNA and International Dark-Sky Association (IDA) are developing a Model Outdoor Lighting Ordinance in conjunction with municipalities to address over-lighting and obtrusive light. We expect this work to be completed later this year.

   This Model will provide flexibility in the type of luminaire optics derived from the application characteristics and the lighting zone—this is based on use type, rather than population density. It further allows for the use of any optical system, as long as it can be illustrated that the light emitted from a site does not exceed offensive levels. Therefore, the Title 24 luminaire cutoff requirements are not only obsolete, but put an undue burden on the selection of outdoor optics when the light emitted from the site may not exceed offensive levels.

   NEMA Recommendations for Outdoor Lighting

   We recommend striking Section 132(b) from the 2008 Standard.

Sign Lighting Controls—Section 133 (c) and (d)

7. NEMA members question whether HID needs to be defined. NEMA has concerns respecting Section 133(c) Dimming, and Section 133(d) Demand Responsive Sign Control. Based on earlier clarification with CEC, we understand that these requirements exempt Metal Halide, High Pressure Sodium and neon light sources. We further understand that the dimming requirement can be met with continuous dimming, step-level dimming or switching lamps in a multiple lamp sign.

   Recommendation for Sign Lighting Controls

   We recommend an evaluation to determine whether a definition of "high intensity discharge lamps" is necessary to avoid a loophole to these requirements.

Prescriptive Requirements for Indoor Lighting—Section 146

8. We have not completed a through evaluation of this section, but we understand the design community has provided significant input in this area. We reserve the opportunity to provide additional comments related to this section once we have more carefully reviewed the recommended revisions.

   Recommendations for Prescriptive Requirements for Indoor Lighting

   We recommend that CEC carefully consider the input provided by design professionals as it relates to section 146. They have significant experience related to customer lighting requirements, lighting technologies and the ability to implement energy efficient designs.

9. **Relative System Efficiency (RSE) for Dimmable Electronic Ballasts Table 146-D**

   The concept of Relative System Efficiency as a metric is new and has not been evaluated by all concerned parties. In addition, the use of an efficiency metric for dimmable ballasts at a single point only reflects the efficiency at full light output and not throughout the dimming range.

   The efficiency of dimming ballasts has improved over the last several years, particularly at ballast factors from 0.75 and up, due to smarter start ballasts that remove filament heat until the ballast is dimmed to a ballast factor less that 0.75.

   If any metrics for T8 Dimming systems are included, we suggest the following.

Lamp	Ballast Factor	BEF
1 lamp 32W T8	0.88	2.84
2 lamp 32W T8	0.88	1.49
3 lamp 32W T8	0.88	1.04
4 lamp 32W T8	0.88	0.79

Note: for universal voltage input dimming ballasts, if the ballast meets the BEF at any input voltage, it is deemed to be in compliance.

Requirements for Outdoor Lighting –Section 147

We recognize that this section has been a challenge since prior to 2005, outdoor lighting was not regulated in California. We appreciate the willingness of CEC and its contractors to consider the input from NEMA members in order to implement energy efficient outdoor lighting that does not impose restrictions on meeting industry guidelines. The revised approach for hardscape lighting appears to address our concerns for complex sites, simplifies the standard and provides more design flexibility.

The volume of revisions in this section has been challenging to fully evaluate, therefore we offer these initial comments but expect our members to conduct a more detailed evaluation in the coming months.

10. Table 147-A Lighting Wattage Allowed for Hardscape Data may limit the ability to meet IESNA guidelines. We appreciate that significant modeling has been completed to support the proposed values. However, we must reiterate that much of the data from the CASE report (Revised Report Outdoor Lighting – February 2007) is inappropriate because it references average and minimum illuminance values between 4 poles rather than what is realized in an actual site. Thus, the analysis in Appendix C is no longer applicable to the requirements in Table 147A based on AWA, LWA and IWA.

    The analysis in Appendix D shows the percentage of new Recommended AWA allowance, however, this is also misleading because many of the applications are less than the industry guidelines for minimum illuminance and the values referenced in tables 12 and 13 in the CASE report. It is very likely that the values proposed in Table 147-A will restrict many designs from meeting IESNA standards. We are further concerned that with a lower power density, and ultimately lower lighting levels, the implementation of curfews is more problematic in meeting safety and security requirements for some applications. Our member companies have run some samples to evaluate the AWA, LWA and IWA in determining the total allowed power for the site and have determined that a high percentage of these layouts that would be considered an energy efficient design do not meet the power limit. More analysis is required to fully evaluate whether the values in this table are too restrictive.

    Recommendations for Outdoor Lighting

    We recommend that more analysis is necessary to justify the values in Table 147-A and will provide the details of our evaluations once they have been fully analyzed.

11. **Building Entrances—Table 147-B**

    NEMA interpretation is that the designer can claim the doorway wattage in addition to the wattage based on the LPD for a non-sales canopy. The power limit for building entrances presents some concerns. First, the power limits seem very arbitrary with no technical justification. The wattage allowance based on the number of doors does not seem to accommodate those entrances where the architecture of the building entrance is larger than the doorways. Furthermore, the wattages listed would not account for ballast losses.

If an entrance is significantly wider than the doorways and includes a canopy, it is our interpretation that the designer can claim the doorway wattage in addition to the wattage based on the LPD for a non-sales canopy. Please confirm that this interpretation is correct. How would this situation be addressed if the entrance includes additional area from the curb to the entrance or adjacent to the entrance and does not have a canopy?

Recommendations

We would like to review the technical support for the wattage values proposed. We suggest that the wattages include additional watts for ballast losses. We also recommend a method to consider a power allowance for entrances that include a significant area in front of or adjacent to the doorways.

12. Alternate Power Allowance for Ordinance Requirements—Table 147-D

The permitted lighting power density for average light levels seems appropriate. We are pleased to see the addition of an allowance when minimum levels are required, since this is predominantly the case. We do not believe it is reasonable to achieve a minimum greater than 2 foot-candles at 0.20 watts/sf. We have difficulty with the fact that the limits for 2 fc is the same as for 3 fc, as well as 4 fc, all at 0.20 watts/sf.

NEMA Recommendation for alternate power allowance for ordinance requirements

We request that the values in table 147-D for a minimum of 3 fc and 4 fc be reevaluated.

13. Multipliers for Special Security Requirements—Table 147-E

Zone 4 should be included in the special security multipliers. In 2005, these multipliers were based on the fact that the power density limits for zone 4 were not restrictive. With the 2008 proposal, the power limits for zone 4 have been significantly ratcheted back. With the revised values, zone 4 should certainly be included in the special security multipliers especially since this zone is typically where security will be a significant concern. We also believe that security requirements for educational facility campuses will require special lighting considerations that will be difficult to meet with the values now listed in Table 147A.

NEMA Recommendations for mulitipliers for special security requirements

- We recommend that Table 147-E include zone 4 for retail parking lots and hardscape within 100 feet of the entrance of senior housing facilities.
- We also recommend an additional special security requirement educational facility campuses be added.

Requirements for Signs—Section 148(c) 2

14. Section 148(c)2 – light sources for signs

Typical pulse start metal halide sign ballasts for lamps 400 watts or greater have an efficiency greater than 85%. For lamps 320 watts and less, 80% should be acceptable.

We do not understand why 175 and 250 watt sources are not being allowed. Title 20 does not stipulate an exclusion for these lamp wattages. Furthermore, lamp companies are introducing new pulse start lamps as a result of the Title 20 requirements. There is no technical basis to suggest that these lamps will be less efficient than other wattages, and excluding these wattages may prevent the use of a more efficient and effective solution for a particular sign design.

NEMA Recommendations for light sources for signs

We recommend that Section 148(c)2.A. be changed from 88% ballast efficiency to 85%. We further recommend that Section 148(c)2.B. simply require that all lamps 320 watts or smaller are served by a ballast that has a minimum efficiency of 80%, allowing the use of 175 watt and 250 watt pulse start lamps.

Residential Lighting - Section 150(k)(7)

15. Lighting in Kitchens—any future revisions that propose the inclusion of more low efficacy luminaires is contrary to the energy objectives of California. We recognize that designers for high-end home lighting have experienced difficulty in achieving aesthetics and controllability using 50% power from high efficiency lighting. We support the addition of exception 1, however, we must reinforce that any future revisions that propose the inclusion of more low efficacy luminaires is contrary to the energy objectives of California, and has a negative impact on the development of future energy efficient residential lighting equipment.

    There is some confusion about the interpretation of the exception 1b in Section 150(k)7 and exception 1 in Section 150(k)9. It is our understanding that if a kitchen lighting design exceeds 50% of the lighting power from low efficacy luminaires (up to 50 -100 watts depending on the size of the kitchen), all permanently installed lighting in garages, laundry rooms, closes greater than 70 square feet and utility rooms must be high efficacy and controlled by a manual-on occupant sensor. This condition would negate the exception in Section 150(k)9 that allows low efficacy luminaires in these rooms of a home.

    NEMA Recommendation for lighting for kitchens

    - We support the inclusion of exemption 1 in Section 150(k)7, however discourage any further allowance of low efficacy luminaires.
    - We would like clarification about the exemptions in Section 150(k)7 and Section 150(k)9, and suggest that exemption 1 in Section 150(k)9 allowing low efficacy luminaires in garages, laundry rooms, etc. Section 150(k)9 may need to be expanded to indicate that the exemption in this section is not allowed if the exemption 1 in Section 150(k)7 is utilized.

Ballast replacement and maintenance for recessed luminaires in insulated ceilings—Section 150(k)11E

16. This requirement is unnecessary if the ballast is required to meet a 30,000 hour life. That is equivalent to about approximately 15 years in a residential application. We believe CEC

should encourage an upgrade to a 15-year old system for improved overall lighting efficiency rather than promoting the ease of ballast replacement for a technology that will be out of date. The homeowner will still have a choice to replace the ballast, but the cost of the electrical work may help justify the replacement with more efficient technologies.

NEMA Recommendation for ballast replacement and maintenance for recessed luminaires in insultaed ceilings

We recommend that section 150(k)11E be removed a 30,000 hour ballast life has been proposed.

SUMMARY OF RECOMMENDATIONS

1. NEMA proposes that the CEC provide a little more time to determine how to approach this important matter. Thus, we respectfully request to meet with you by phone to refine this concept.

2. NEMA proposes the following language for 119(k)(3): "shall be listed by a rating lab recognized by ICC as having been in compliance with UL standards."

3. NEMA proposes the following language for 119(k)(4): "If the wall box dimmer is designed to be used in a 3-way circuit with standard 3-way and 4-way switches, the level set by the dimmer shall not be overridden by any of the switches in the circuit. The dimmer and all of the switches in the circuit shall have the capability of turning the lighting OFF if it is ON, and ON to the level set by the dimmer if it is OFF. In any application where the wall box dimmer is connected to a system with an emergency override function, the dimmer shall respond as programmed at the master controller."

4. NEMA supports striking section 119(k)(7) because it is a safety issue.

5. Clarify section 119(n) to apply only to recessed residential luminaires in an insulated ceiling. We respectfully request an opportunity to meet with you by phone to further discuss this provision.

6. Remove Section 132(b) – Luminaire Cutoff Requirements because it is no longer supported by the IESNA and offensive lighting will be addressed by the IDA/IESNA Model Outdoor Lighting Ordinance.

7. Evaluate if a definition of "high intensity discharge lamps" is necessary to clarify covered signs and clarify the exemption of MH, HPS and neon signs from the requirements in Sections 133(c) and 133(d).

8. CEC should carefully consider the input provided by design professionals as it relates to section 146.

9. If any metrics for T8 Dimming systems are included in Table 146-D, we suggest the following.

Lamp	Ballast Factor	BEF
1 lamp 32W T8	0.88	2.84

2 lamp 32W T8	0.88	1.49
3 lamp 32W T8	0.88	1.04
4 lamp 32W T8	0.88	0.79

10. We recommend that more analysis is necessary to justify the power limits defined for outdoor hardscape in Table 147-A. We will provide the details of our evaluations once they have been fully analyzed.

11. We would like to review the technical support for the wattage values proposed for building entrances. The proposed wattages do not include additional watts for ballast losses and may not address entrances that include a significant area in front of or adjacent to the doorways.

12. We request that the values in table 147-D for ordinance requirements for a minimum of 3 fc and 4 fc be reevaluated.

13. We recommend that Table 147-E for special security requirements include zone 4 for retail parking lots and hardscape within 100 feet of the entrance of senior housing facilities. We also recommend that an additional special security requirement be added for educational facility campuses.

14. We recommend that sign requirements in Section 148(c)2.A. be changed from 88% ballast efficiency to 85%. We further recommend that Section 148(c)2.B. simply require that all lamps 320 watts or smaller are served by a ballast that has a minimum efficiency of 80%, allowing the use of 175 watt and 250 watt pulse start lamps.

15. We support the inclusion of exemption 1 in Section 150(k)7 for residential kitchens, however we discourage any further allowance of low efficacy luminaires. Section 150(k)9 may need to be expanded to indicate that the exemption for low efficacy luminaires in this section is not allowed if the exemption 1 in Section 150(k)7 is utilized.

16. We recommend that section 150(k)11E for readily accessible and replacable ballasts in recessed residential luminaires be removed since CEC is proposing a 30,000 hour ballast life.

We appreciate the opportunity to comment on the proposed lighting requirements for the Title 24 2008 Standard. As you can see from our comments, there are a couple of areas regarding the proposed lighting standards that require further discussion.

If you have any questions, please feel free to call me at (703) 276-3360.

Respectfully yours,

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