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NEMA Comments on CEC Title 24 Draft Proposals Docket 17-BSTD-01

Additional submitted attachment is included below.

Setting Standards for Excellence

KYLE PITSOR
Vice President, Government Relations

October 20, 2017

Online via: https://efiling.energy.ca.gov/EComment/EComment.aspx?docketnumber=17-BSTD-01

Mr. Payam Bozorgchami
California Energy Commission
Dockets Office, MS-4
Re: Docket No. 17-BSTD-01
1516 Ninth Street
Sacramento, CA 95814-5512

NEMA Comments on CEC Title 24 Draft Proposals Docket 17-BSTD-01

Dear Mr. Bozorgchami,

As the leading trade association representing the manufacturers of electrical and medical imaging equipment, the National Electrical Manufacturers Association (NEMA) provides the attached comments on the draft proposals for California's Title 24 Building Energy Efficiency Regulations. These comments are submitted on behalf of NEMA Lighting Systems Division Member companies.

NEMA, founded in 1926 and headquartered in Arlington, Virginia, represents nearly 400 electrical and medical imaging manufacturers. Our combined industries account for more than 350,000 American jobs and more than 6,500 facilities across the U.S. Domestic production exceeds $117 billion per year. Please find our detailed comments attached.

Our Member companies count on your careful consideration and we look forward to an outcome that meets their expectations. If you have any questions on these comments, please contact Alex Boesenberg of NEMA at 703-841-3268 or alex.boesenberg@nema.org.

Sincerely,

Kyle Pitsor

Kyle Pitsor
Vice President, Government Relations

NEMA Comments on CEC Title 24 Draft Proposals Docket 17-BSTD-01

General Comments:

1. NEMA is concerned that the CEC has decided to migrate Lighting Controls requirements back into Title 24, after significant investments of time and resources to consolidate them in Title 20. Our stronger concern is that this could result in the two regulations, Title 20 and Title 24, drifting apart again and result in different requirements for the same devices.
2. We continue to disagree with the existence of differing requirements for high-efficacy lighting between Title 20 and Title 24 Appendix JA-8. This causes multiple versions of the same product to have to be made, introduced and reported in California, to the ensuing confusion of retailers, inspectors and consumers and a reduction in economies of scale.
3. In such cases, CEC should eliminate differing requirements for product performance by establishing a single set of requirements for each product or device. It is most important that there be only ONE set of requirements. Where they are housed (Title 20 or Title 24) is less important.

Appendix 1A:

1. Changes to References, Appendix 1A

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
The IESNA Lighting Handbook, ~~Ninth Edition (2000)~~Tenth Edition (2011)
Available from: IESNA
120 Wall Street, 17th Floor
New York, New York 10005-4001
(212) 248-5000
Email: iesna@iesna.org

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NEMA SSL 7A-~~2013~~ 2015 "Phase Cut Dimming for Solid State Lighting: Basic Compatibility"
Available from: 1300 North 17th Street, ~~Suite 1752~~ Suite 900
Rosslyn, VA 22209
703-841-3200
www.nema.org

Chapter 1-100:

1. Changes to References

ANSI C82.6-~~2005~~ 2015 is the American National Standards Institute document titled "Ballasts for High-Intensity Discharge Lamps – Methods of Measurement." (ANSI C82.6-~~2005~~ 2015)

NEMA SSL 7A is the National Electrical Manufacturers Association document titled "Phase Cut Dimming for Solid State Lighting: Basic Compatibility," ~~2013~~ 2015. (NEMA SSL 7A-~~2013~~ 2015).

IES LM-66 is the Illuminating Engineering Society document titled, "Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps." (IES ~~LM66-11~~ LM-66-14)

UL 1574 is the Underwriters Laboratories document entitled "Track Lighting Systems," ~~2000~~ 2004.

2. **"Lamp** is an electrical appliance that produces optical radiation for the purpose of visual illumination, designed with a base to provide an electrical connection between the lamp and a luminaire, designed with a base to provide an electrical connection between the lamp and a luminaire, and designed to be installed into a luminaire., A lamp is not a luminaire and is not a LED retrofit kit designed to replace additional components of a luminaire by means of a lamp-holder integral to the luminaire."
   NEMA notes that an "LED retrofit kit" is not defined in Title 24.

3. The term 'narrow band spectrum' does not appear anywhere in the Building Energy Efficiency Standards other than as a defined term in Section 100.1. It should be struck.

4. NEMA agrees with the proposed changes to the definitions for automatic scheduling control, dimmer, motion sensor, partial-on occupant sensor, and partial-off occupant sensor. All of these changes are improvements and clarifications.

Chapter 2-110:

1. Lighting Controls Requirements: the significant additions and modifications to the previously existing text of this chapter seems to be the result of a decision to migrate lighting control device requirements back into Title 24, after the CEC and Industry expended significant time and resources moving them to Title 20. Appliance requirements should be in Title 20. We understand there is some sentiment that there are some people who use Title 24 and are less familiar with Title 20, and as such they might not "speak the language" of Title 20 as fluently. This is one of the specific purposes for the CEC's Title regulation education and outreach office, and complaints of "Why should I have to read Title 20?" should be used as fodder for training materials, not excuses to break the regulations apart and increase the risk of the two documents having different requirements for the same device.

Chapter 4-130:

1. Clause 130.2(b): NEMA opposes the reduction in maximum wattage from 150W to 30W. This appears to be an attempt to encourage the use of SSL products with their typically lower power needs. However, this is short sighted and may eliminate a significant number of decorative and accent products. This proposed change should be struck.

Chapter 5-140:

1. 140.6(a)4. Luminaire Classification and Power Adjustment: NEMA supports the proposed inclusion of an additional lighting power allowance for tunable-white luminaires and dim-to-warm luminaires, this is a positive development.
2. NEMA proposes the CEC expand the above mentioned LPAs for tunable-white products to include office, education, retail, and hospitality applications. While healthcare facilities and hospitals are the primary locations for the installation of spectrally tuned lighting systems for circadian support and wellbeing, there are many more applications where occupants can benefit from tunable systems. Expanding the allowed applications will encourage usage and market acceptance for energy-efficient dynamic lighted environments. When the CEC adds these locations to the list, Table 140.6-C should also be updated accordingly.
3. Clause 140.6(a)4B: There is no reason to restrict this Power Allowance to small aperture products. Tunable-white and dim-to-warm luminaires are available now in many shapes,

sizes and form factors. In real-world installations of multi-channel spectrally tuned LED systems, luminaire efficacy does not follow a predictable pattern and aperture size is not a relevant criterion for efficacy.

Proposed Changes:

"B. Additional Power Allowed for ~~Small-Aperture~~ Tunable-White and Dim-to-Warm Luminaires. For qualifying ~~small-aperture~~ tunable-white and dim-to-warm LED luminaires, the actual lighting power of these luminaires can be calculated by multiplying their maximum rated wattage by 0.75. Qualifying luminaires shall meet all of the following:

~~i. Small-Aperture. Qualifying luminaires longer than 18 inches shall be no wider than four inches. Qualifying luminaires with a length of 18 inches or less shall be no wider than eight inches.~~"

Chapter 6-141:

1. Section 141.0(b)2I and Table 141.0-E: NEMA supports the proposed code language for lighting alterations. Removal of the alteration sub-types (entire luminaire modifications, luminaire component modifications, and lighting wiring modifications) results in language that is significantly simpler and clearer in meaning that the existing language. NEMA thanks the Energy Commission's for its consideration of the California Energy Alliance CASE proposal that generated much of this language.

Chapter 7-150:

1. Clause 150.0(k)1. NEMA Comment: We object to any limitations on correlated color temperature. In particular, we object to 3500K since sales records indicate that higher color temperature lamps are often preferred in California. Since consumers prefer multiple CCT choices, there should be no restriction or de facto government mandate on specific (warm) CCTs. We appreciate that the words "capable of providing" seem to be a nod to allowing color-tunable products, but disagree with CCT limits overall.

   We note that this conflicts with current JA-8 requirements for inseparable luminaires, which are allowed to be 4000K for habitable spaces. The CEC has not offered any cost-benefit analysis of this change for these products.

   (NEMA changes shown in ~~strikeout~~ and underline, blue text)

   B. General Lighting. All general lighting in habitable spaces shall be dimmable ~~and capable of providing a correlated color temperature of 3500K or less~~.

2. Clause 150.0(k)1:

   "~~C~~D.**Recessed Downlights ~~Luminaires~~ in Ceilings.** Luminaires and light fixtures recessed into ceilings shall meet all of the following requirements:"

   NEMA Comment: "Light fixture" is not defined in Subchapter 1 100.

Chapter 10-102:

1. The revisions to clauses 10-106(a)2 and 10-106(b)3 appear to place the two clauses in conflict, but we are not certain what the CEC's ultimate intent is. It appears that the language in 10-106(a)2 needs to be changed to reflect the intent of 10-106(b)3. Regardless, we submit these changes should be improved and clarified.

Joint Appendix 1:

1. Changes to references shown in blue

ANSI C78.377 is the American National Standards Institute document titled "Specifications for the Chromaticity of Solid State Lighting Products." (ANSI C78.377-~~2011~~ 2017).

~~**ANSI C79.1** is the American National Standards Institute document titled "Nomenclature for Glass Bulbs Intended for Use with Electric Lamps." (ANSI C79.1-2002).~~ [Comment: Replaced by C78.79]

~~**ANSI C78.79** is the American National Standard document titled "Nomenclature for Envelope Shapes Intended for Use with Electric Lamps." (ANSI C78.79-2014).~~ [Comment: But C79.1 is not cited in JA-8]

~~**ANSI C82.2** is the American National Standard for Lamp Ballasts – Method of Measurement for Fluorescent Lamp Ballasts (ANSI C82.2:2002).~~ [Comment: Not cited in JA-8]

ANSI C82.77-10 is the American National Standard for Harmonic Emission Limits - Related Power Quality Requirements for Lighting Equipment (ANSI C82.77~~-2002~~ -10-2014).

CODES, CFR is the ~~2014~~ 2017 Code of Federal Regulations.

~~**COLOR RENDERING INDEX (CRI)**. The ability of a light source to reflect the color of illuminated objects with fidelity relative to ideal or natural light sources of the same color temperature. CRI is calculated according to CIE 13.3.~~ [Comment: This is defined in Chapter 1 100]

~~**CORRELATED COLOR TEMPERATURE (CCT)**. Description of color of light relative to the chromaticity of the radiative emission of heated black body and reported in temperature units of Kelvin according to CIE 15.~~ [Comment: This is defined in Chapter 1 100]

~~**DUV** is the closest distance from the chromaticity coordinate of the light source to the Planckian locus on the CIE (u', 2/3 v') coordinates with "+" sign for above and "-" sign for below the Planckian locus.~~ [Comment: This is no longer measured or mentioned in JA-8]

ENERGY STAR Start Time Test Method is the ENERGY STAR program document entitled "ENERGY STAR Program Requirements for Lamps Version ~~1.0~~ 2.1– Start Time Test Method – Final" (~~August--2013~~ June 2017)

~~**ENERGY STAR Ambient Temperature Life Test Method** is the ENERGY STAR program document entitled "ENERGY STAR Program Requirements for Lamps Version 1.0 - Ambient Temperature Life Test Method – Fina"l (August-2013)~~ [Comment: This is not cited in JA-8]

ENERGY STAR Lumen Maintenance Test Method is the ENERGY STAR program document entitled "ENERGY STAR Program Requirements for Lamps Version 2.1 – Lumen Maintenance Test Method – Final" (June-2017)

ENERGY STAR Rated Life Test Method is the ENERGY STAR program document entitled "ENERGY STAR Program Requirements for Lamps Version 2.1 – Rated Life Test Method – Final" (June-2017)

~~**ENERGY STAR Elevated Temperature Light Output Ratio Test Method** is the ENERGY STAR program document entitled "ENERGY STAR Program Requirements for Lamps Version 1.0 – Elevated Temperature Light Output Ratio Test Method – Final" (August-2013)~~ [Comment: This is not cited in JA-8]

~~**ENERGY STAR Elevated Temperature Life Test Method** is the ENERGY STAR program document entitled "ENERGY STAR Program Requirements for Lamps Version 1.0 – Elevated Temperature Life Test Method – Final" (August-2013)~~ [Comment: Reference to this test method has been deleted in the most recent proposal text.]

ENERGY STAR ~~Product Specification for Lamps Noise Recommended Practice~~ Audible Noise is the ENERGY STAR program document entitled, "ENERGY STAR Program Requirements for Lamps Version ~~1.0~~ 2.1– ~~Noise Recommended Practice~~ Audible Noise– Final" (~~August--2013~~ June 2017)

ENERGY STAR Lumen Maintenance Test Method is the ENERGY STAR program document entitled "ENERGY STAR Program Requirements for Luminaires Version 2.0 – Lumen Maintenance Test Method – Final" May 2015)

ENERGY STAR Rated Life Test Method is the ENERGY STAR program document entitled "ENERGY STAR Program Requirements for Luminaires Version 2.0 – Light Source Life Test Method – Final" (May 2015)

IES LM-45 is the Illuminating Engineering Society document titled, "Electrical and Photometric Measurements of General Service Incandescent Filament Lamps." (IES LM-45-~~09~~15)

IES LM-46 is the Illuminating Engineering Society document titled, "Photometric Testing of Indoor Luminaires Using High Intensity Discharge or Incandescent Filament Lamps." 2004. (IES-LM-46-~~12~~04)

~~**IES LM-66** is the Illuminating Engineering Society document titled, "Electrical and Photometric Measurements of Single-Ended Compact Fluorescent Lamps." (IES LM66-11)~~ [Comment: This is defined in Chapter 1 100]

~~**IES LM-79-08** is the Illuminating Engineering Society document titled, "IES Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products." ~~[Comment: This is defined in Chapter 1 100]

~~**IES LM-80** is the Illuminating Engineering Society document titled, "Measuring Lumen Maintenance of LED Light Sources." (IES LM-80-08).~~ [Comment: This is no longer cited in JA-8]

~~**IES TM-21** is the Illuminating Engineering Society document titled, "Projecting Long Term Lumen Maintenance of LED Light Sources." (IES TM-21-11).~~ [Comment: This is no longer cited in JA-8]

~~**ISO/IEC 17025** is the International Organization for Standardization and the International Electrotechnical Commission document titled "General requirements for the competence of testing and calibration laboratories." 2005 (ANS/ISO/IEC Standard 17025:2005).~~ [Comment: This is defined in Chapter 1 100]

~~**NEMA SSL 7A** is the National Electrical Manufacturers Association document titled "Phase Cut Dimming for Solid State Lighting: Basic Compatibility," 2013 (NEMA SSL 7A-2013).~~ [Comment: This is defined in Chapter 1 100]

~~**UL 1574** is the Underwriters Laboratories document titled "Track Lighting Systems.," 2000.~~ [Comment: This is defined in Chapter 1 100]

~~**UL 1598** is the Underwriters Laboratories document titled "Standard for Luminaires," 2000.~~ [Comment: This is defined in Chapter 1 100]

~~**UL 2108** is the Underwriters Laboratories document titled "Low Voltage Lighting Systems," 2008.~~ [Comment: This is no longer cited in JA-8]

Joint Appendix 8:

1. Use of phrase "full light output": Several clauses include this term with respect to test setup and settings. However, only clause 8.3.7 and 8.4.6 have clarifying language that specify whether the Unit Under Test (UUT) should be connected to a dimmer. In contrast, the tests in clause 8.3.1, 8.3.2, 8.4.1 and 8.4.2 lack this clarification. These tests can, and should, be conducted without a dimmer in the circuit. NEMA suggests the CEC clarify this by adding wording to JA-8 to the effect that the UUT be connected to mains power, or that a dimmer is not included or some other clarification, to reduce the potential for confusion.
2. ~~JA8.2 Certification of Test Labs:~~

~~"The light source under test shall be tested at a testing laboratory participating in the ISO/IEC 17025, by the National Voluntary Laboratory Accreditation Program (NVLAP) or other laboratory accreditation body operating in accordance with ISO/IEC 17011 and produced under an ongoing inspection program carried out by a Type A inspection body in accordance with ISO/IEC 17020."~~
~~NEMA Comment: DOE has removed the National Voluntary Laboratory Accreditation Program (NVLAP) participation requirement and replaced it with an International Laboratory Accreditation Cooperation (ILAC) participation requirement (10 CFR 430.25). Furthermore, 20 CCR § 1604 (Title 20) references test procedures in 10 CFR 430 Subpart B which no longer require NVLAP participating laboratories to do the testing. The CEC should update to the latest Federal guidance in 10 CFR 430.25.~~

3. JA 8.3 Tests to be performed:
"Compliance with the requirements of this Appendix shall be determined by performance of the following test procedures, as applicable to the type of light source.
Sample group size ~~for lamps with ANSI standard bases and that are not recessed downlight retrofits, shall be 10 units per model: 5 units tested base-up and 5 units tested base-down unless the manufacturer restricts specific use or position. If position is restricted, all units shall be tested in restricted position. Test units, including low voltage lamps, shall be operated at rated voltages~~ shall be as specified in the referenced test procedures. Where a sample group is not specified for a test, a single unit shall be tested.
~~Sample size for all other sources shall be 3 units, tested in accordance with manufacturer's installation instructions for intended orientation.~~"
NEMA Comment: DOE sample sizes are not located in the test procedures (10 CFR 430 Subpart B). They are located in 10 CFR 429 Subpart B. Sample size requirements for GSFLs, GSILs, and IRLs can be found in 10 CFR 429.27. Sample size requirements for CFLs can be found in 10 CFR 429.35. Sample size requirements for Integrated LEDs can be found in 10 CFR 429.56. Sample size requirements for GSLs can be found in 10 CFR 429.57. High intensity discharge lamps are not federally regulated and thus do not have certification requirements and IES LM-51-13 does not specify a sample size.

4. JA 8.3.1 Efficacy Test. NEMA Comment: DOE has established test procedures for determining efficacy except for high intensity discharge lamps. The following changes should be made.
(NEMA changes shown in ~~strikeout~~ and underline, blue text)
Efficacy at full light output shall be determined by the following test procedures, as applicable to the type of light source:
a) For incandescent and incandescent reflector lamps: 10CFR 430.23(r).
b) For ~~medium base~~ compact fluorescent lamps: 10CFR 430.23(~~w~~ y).
c) For general service fluorescent lamps: 10CFR 430.23(r).
~~d) For fluorescent lamps that are not Medium base compact fluorescent lamps and general service fluorescent lamps: IES LM-9.~~
~~e)~~ d) For LED ~~light sources~~ lamps, ~~IES LM-79~~ 10 CFR 430.23(ee).
e) For LED light sources that are not lamps, IES LM-79.
f) For high intensity discharge lamps, IES LM-51.
g) For induction lamps, ~~IES LM-66~~ 10 CFR 430.23(gg).

5. JA 8.3.2 Power Factor Test. NEMA Comment: DOE has established test procedures for determining power factor for covered products. The following changes should be made.
(NEMA changes shown in ~~strikeout~~ and underline, blue text)
"Power factor shall be measured at full light output in accordance with ~~ANSI C82.77, Section 6 and 7.~~the following test procedures, as applicable to the type of light source:
a) For compact fluorescent lamps: 10 CFR 430.23(y).
b) For LED lamps: 10 CFR 430.23(ee).

c) For induction lamps: 10 CFR 430.23(gg).
d) For all other sources: ANSI C82.77, sections 6 and 7.

For lamps, the reported value shall be the average measured values of the tested units rounded to be the nearest tenth.
For all other sources, the reported value shall be the minimum power factor of the tested units rounded to the nearest tenth."

6. JA 8.3.4 Color Characteristics Tests. NEMA Comment: DOE has established test procedures for determining CCT and CRI for covered products. We do not understand the use of the word nominal, as in "Nominal Correlated Color Temperature". Why are we determining CCT if we are going to report the nominal (3000, 3500, 4000, etc.) value? The following changes should be made.
(NEMA changes shown in ~~strikeout~~ and underline, blue text)
Correlated Color Temperature (CCT), ~~Duv~~, and Color Rendering Index shall be determined by the following test procedures, as applicable to the type of light source:
a) Incandescent and halogen reflector lamps: IES LM-20 .
b) Incandescent non-reflector lamps: IES LM-45.
c) General service fluorescent lamps: 10CFR 430.23(r).
d) ~~Single ended c~~Compact fluorescent lamps: ~~IES LM-66~~ 10 CFR 430.23(y).
~~e) Fluorescent lamps that are not single ended compact fluorescent lamps or general service fluorescent lamps: IES LM-9.~~
~~f~~ e) Induction lamps: ~~IES LM-66~~ 10 CFR 430.23(gg).
~~g~~ f) LED ~~light sources~~ lamps: ~~IES LM-79~~ 10 CFR 430.23(ee).
g) Other LED light sources: IES LM 79.
h) High intensity discharge lamps: IES LM-51.
i) Other applicable test procedure approved by the Executive Director

7. Clause 8.4.2, Power Factor: CEC should encourage and promote consistency between its requirements and those of the ENERGY STAR Program. As such, NEMA recommends CEC distinguish between lamps and luminaires and mimic the requirements of ENERGY STAR®: for lamps, PF ≥ 0.7 (except omnidirectional lamps which have PF ≥ 0.6 for power less than 10W) and for luminaires, PF ≥ 0.5 below 5W and PF ≥ 0.7 above 5W.

Joint Appendix 10:

1. JA 8.4.6(c): We commend the Energy Commission on adopting NEMA 77-2017 as a test method for flicker. We disagree with any attempts to modify its contents which are based on solid research. The Energy Commission should cite the standard accurately, and as such the value of the threshold for Stroboscopic Visibility Measure (SVM) should be 1.6.
A value of 1.0 SVM represents the detection threshold for SVM. This is the point at which 50% of observers would indicate that they do observe the effect and 50% do not observe the effect when required to make a choice. A value of 1.0 does not indicate whether those observers find the observation disturbing, nor does it indicate whether there is a health-related effect. Some detection of stroboscopic effect is acceptable because an object must be in motion in the lit space, in order to detect the stroboscopic effect.
NEMA 77-2017 is the most recent Standard on Temporal Lighting Artifacts (TLA) and it brings together much of the current research to recommend a method of quantifying the visibility of TLA and to recommend initial broad application-dependent limits for TLA. Its photometric recommendations and measurement methods are applicable to any lighting

equipment (e.g., luminaires, light engines, self-ballasted lamps, drivers, and sensors) with any control system.

The application guidance in NEMA 77 for SVM for indoor application areas is a value of 1.6. This limit is a real-world acknowledgement that even if SVM is detectable under laboratory conditions, it is not objectionable in many normal conditions. NEMA member customer experience information indicates that mass-production quantities of LED lamps have been in the market with SVM of 1.6 without complaint. The value of 1.6 is not arbitrary; it is a real-world figure based on research and is the appropriate value for Title 24 until further data indicates otherwise. The Energy Commission should recognize the findings of NEMA-77 and adopt an SVM value of 1.6 for the 2019 Building Energy Efficiency Standards.

It is NEMA's position that the requirements of NEMA 77 differ sufficiently from those in JA10 in stringency and quantity such that an adoption of NEMA 77 is not backsliding flicker requirements in any way. The SVM criterion must be evaluated alongside the other requirements placed on visual performance in NEMA 77, which when taken together are more restrictive, if anything, when compared to today's JA10 requirements. Again, lamps which meet NEMA 77 exist widely in the market today and are not experiencing consumer complaints. Adopting NEMA 77 as an acceptable alternative requirement will not cause any increased burden on consumers or industry. NEMA proposes CEC allow NEMA 77 to satisfy Title 24 JA10 and flicker performance requirements unmodified.