DOCKETED

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Setting Standards for Excellence

KYLE PITSOR
Vice President, Government Relations

April 15, 2015

Submitted via email: docket@energy.ca.gov

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

NEMA Comments on Proposed Amendments to Appliance Efficiency Regulations

Dear Commissioner McAllister,

The National Electrical Manufacturers Association (NEMA) appreciates the opportunity to provide the attached comments on the California Energy Commission's Proposed Amendments to Appliance Efficiency Regulations with respect to Fluorescent Dimming Ballasts. These comments are submitted on behalf of NEMA Lamp and Ballast Product Sections.

As you may know, NEMA is the trade association of choice for the electrical manufacturing industry. Founded in 1926 and headquartered near Washington, D.C., NEMA represents nearly 400 electrical and medical imaging manufacturers. Our combined industries account for more than 400,000 American jobs and more than 7,000 facilities across the U.S. Domestic production exceeds $117 billion per year.

Please find our detailed comments below. We look forward to working with you further on this important project. 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 Proposed Amendments to Appliance Efficiency Regulations

NEMA thanks the Commission for the opportunity to comment on and participate in their efforts to develop and adopt energy standards for Fluorescent Dimming Ballasts. NEMA supports practical, feasible energy performance requirements for electrical products and shares the Commission's desire to save energy in the State of California. We understand the Commission's desire to establish standards for fluorescent dimming ballasts since newly adopted Title 24 Building Energy Efficiency Regulations will begin to proliferate them more widely beginning this year.

In our comments to the November 3rd CEC Staff Workshop[1] NEMA noted several reservations with the draft proposal as written and we requested the Commission closely review our comments in effort to avoid potential pitfalls and confusion that could result if the proposal was to be adopted as written. We thank the Commission for restricting the scope of product slightly, partly in response to our comments.

We resubmit the following comments, considerations and proposals.

1. Scope. The CEC still has not restricted the scope of products impacted by the proposal to sufficiently reflect the limited data sets provided for analysis. NEMA disagrees with the IOU comments[2] of November 18th 2014 which attempted to rebut our assertions that their submissions and proposal were not representative or statistically significant. The cited data sets of products actually tested and evaluated are very limited in scope, by both their technology and the number of lamps driven, and are not representative or statistically significant. When more test data becomes available for additional products in terms of manufacturer, number of lamps, and control types, NEMA is happy to collaborate with CEC staff and IOU representatives to expand the scope and applicability of the standard as the data and evidence suggests is appropriate.

   Proposal: Limit the scope of this first iteration of the regulation to ballasts designed for use with 4' linear T8 or T5 one and two lamp systems employing continuous dimming technology.

2. Standby power allowance. NEMA cautions the CEC from setting standby power allowances too low. Standby power is directly tied to functionality and flexibility for communicating ballasts. Consumer demand for wireless control, utility demand response, and other connectivity pathways is becoming increasingly important in the building landscape and NEMA is concerned that 1W of standby power is too low and will stifle innovation and flexibility in lighting control. It is important to note that the variety of protocols and internal differences within protocols greatly affects overall standby power consumption. That is, most protocols involve the flexibility to use less or more standby power depending on the degree of connectivity needed for the product and the system the product is part of. Thus we cannot state that certain protocols will be unavailable, or

[1] http://www.energy.ca.gov/appliances/2014-AAER-01/prerulemaking/comments/14-AAER1_NEMA_Comments_on_Title_20_Dimming_Ballast_Proposal_2014-06-18_TN-73229.pdf

[2] http://www.energy.ca.gov/appliances/2014-AAER-01/prerulemaking/documents/2014-09-29_workshop/comments/California_IOUs_Response_to_Drat_Regualtions_RE_Dimming_Ballasts_2014-10-27_TN-73896.pdf

that there is some specific trigger point at which connectivity is overly throttled. At the same time, there is growing global interest in the "Internet of Things" and much of this connectivity is expected to be wireless, escaping the confines of specific physical connections and hard-wired protocols. Low standby power stifles this flexibility. Likewise, the CEC can already discern that hard wired lighting controls have become a challenge in California, as evidenced in the vocal expressions of concern from lighting retrofitters during the Title 24 March 2-3, 2015 hearings. These retrofitters have specifically cited the cost of controls, particularly hard wired controls, as a hurdle that stops lighting retrofit. Wireless controls greatly reduce the need for pulling additional wiring, yet too-low standby power will eliminate many of these products. While existing buildings can make controls wiring part of the design, retrofitting existing buildings is more challenging. We hope the CEC will afford consumers and contractors as much flexibility as possible as they pursue energy-efficiency lighting retrofits in the State. The Commission should take this larger, holistic view into account in this rulemaking.

Proposal: Raise the maximum allowance for standby power to 1.5W

3. Standby Power Test procedure: The CEC procedure is not aligned with long-established Federal test procedures. This mismatch will unnecessarily increase burden on manufacturers for testing and reporting.

   Proposal: Eliminate the P_0 power level test procedure and test standby power in accordance with U.S. 10 CFR 430 Appendix Q (which references ANSI C82.2).

4. NEMA thanks the CEC for incorporating our comments and concerns regarding the definition of Arc Power. We agree with the proposed changes.

5. NEMA thanks the CEC for maintaining the lowest arc power efficacy test point at 50% arc power, in keeping with our stated concerns regarding test measurement accuracy variations at lower points of test. We reiterate our position that energy efficiency test points below 50% arc power are not practical and could cause significant disruption, particularly in terms of enforcement and that test points lower than 50% arc power should not be incorporated in future revisions of California Efficiency Regulations.

6. Power Factor, Flicker or other Quality parameters. During the May 9th Workshop meeting and webinar, CEC staff mentioned interest in receiving PF, flicker and other quality parameters and requirements to consider adding to the proposed regulation. For the record, NEMA disagrees with setting any requirements beyond those addressed in the Staff Report, with our above comments taken into account. Power factor is not an effective energy efficiency metric, and there are no reliable, effective, repeatable test methods for flicker. Manufacturers today address these issues through consumer satisfaction processes and internal (proprietary) striation and flicker testing and we contend that they are sufficient.

   Proposal: No additional quality metrics be added to the proposed regulation.

7. Cathode Cutout and Lamp-to-Ballast Compatibility. NEMA cautions against restricting the proposed allowances for performance any farther, either in this proceeding or in future proceedings. Not evidenced in the IOU testing or arguments due to the IOUs' limited product selection and evaluation and minimal life testing is the fact that different designs/brands of fluorescent lamp have differing needs for filament heating. Some

lamps do not need as much filament heat, while some do. There is a wide availability of T5 and T8 lamps in the marketplace and price often dictate product selection rather than pairing lamps to ballasts on a same-manufacturer basis. As long as ballasts are afforded flexibility in the amount of filament heat they provide, compatibility is less of a problem. An overly-strict limitation of filament heating power will result in increased lamp to ballast incompatibility, which can contribute to early lamp failure. To ensure maximum consumer satisfaction during the maintenance phase, NEMA recommends a broad range of ballast energy allowances and thus greater potential lamp to ballast compatibility and interoperability in the field, as is reflected in the recommendations of NEMA Standard LL-9[3]. For additional information regarding lamp to ballast compatibility we invite interested parties to review a presentation given by NEMA members to the IEC about the findings of our 5-year lamp survivability test study which examined lamp life based on lamp-to-ballast combination variation at multiple dimming levels. This presentation was submitted to the docket with our previous comments of June of 2014 under filename "14-AAER-1 NEMA LS-11 Paper_20070221_final".

8. Reporting format: We note to CEC that the U.S. DOE requires reporting BLE to three decimal places, unlike the CASE study data set. Industry intends to continue the DOE practice since our labs and forms are set to this already.

9. Correction to Table X item J for reporting requirements: corrections to the reporting requirements with respect to the NEMA proposed changes are provided below in our recommended changes to regulatory language.

10. Minimum Dimming Ballast Efficiency Requirements: NEMA believes that two test points, selected to be outside the dimming ranges where proprietary protocols are most at play, can satisfy the desire in California to assess and regulate ballast efficiency with reduced risk of IP conflict. NEMA proposes CEC require testing of 1 and 2 lamp T8 and T5 fluorescent dimming ballasts at 100% and 50% arc power, and set minimum Ballast Luminous Efficiency (BLE) requirements for each based on an adapted version of the U.S. DOE's minimum BLE requirement for fixed output ballasts.
    See below for description and equations:

    We refer to the DOE's Fluorescent Ballast Final Rule[4] of March 11, 2011 and its Table I.1 (copied below), where the equation for minimum BLE as a function of arc power is provided. For purposes of the California regulation, NEMA proposes that the factors B and C be copied from the DOE table's row for Program Start Ballasts. Factor A must be adjusted to account for the power consumption of dimming circuitry, which is not present in fixed output ballasts. Furthermore, since 0-10V ballasts tend to consume less power than ballasts with active communications (ex. WiFi), we propose that they have separate requirements, with slightly more allowance granted to ballasts with active communications due to their added functionality.

[3] http://www.nema.org/Standards/Pages/Dimming-of-T8-Fluorescent-Lighting-Systems.aspx
[4] http://www.regulations.gov/#!docketDetail;D=EERE-2007-BT-STD-0016

The adjustments to factor A for the two technologies is based on a 4% and 6% increased allowance over Federal minimums for fixed output ballasts to accommodate additional power needs for 0-10V and Active communications products, respectively.

Measured BLE at 100%
For minimum BLE calculations for 0-10V products, NEMA proposes factor A be <u>0.953</u>
For minimum BLE calculations for active communications products, NEMA proposes factor A be <u>0.933</u>
B and C are fixed constants, for each equation B=0.51 and C=0.37.

Equation: Minimum BLE = A / (1+B*arc power^{-C})
Or specifically,
0-10V Minimum BLE = 0.953 / (1+0.51*arc power$^{-0.37}$)
Active Minimum BLE = 0.933 / (1+0.51*arc power$^{-0.37}$)

Measured BLE at 50%:
For minimum BLE calculations for 0-10V products, NEMA proposes factor A be 0.758 (0.993 x 0.763 = .7576)
For minimum BLE calculations for active communications products, NEMA proposes factor A be 0.742 (.993 x .747 = .7418)
B and C are fixed constants, for each equation B=0.51 and C=0.37.

<u>Proposal</u>: measured BLE for products to be sold in California must equal or exceed the minimum BLE derived from the equation above with the same confidence level in reporting as is required by the DOE for fixed-output ballasts[5].

[5] http://federalregister.regstoday.com/data/2011/070/FR2011-070548.pdf

TABLE I.1—NEW AND AMENDED ENERGY CONSERVATION STANDARDS FOR FLUORESCENT LAMP BALLASTS

Fluorescent lamp ballasts * shall have a ballast luminous efficiency no less than A/(1 + B * total lamp arc power∧-C) where A, B, and C are as follow:				Percent improvement over current standard or baseline **
Product Class	A	B	C	
Instant start and rapid start ballasts (not classified as residential) that are designed to operate .... 4-foot medium bipin lamps 2-foot U-shaped lamps 8-foot slimline lamps	0.993	0.27	0.25	5.7
Programmed start ballasts (not classified as residential) that are designed to operate .... 4-foot medium bipin lamps 2-foot U-shaped lamps 4-foot miniature bipin standard output lamps 4-foot miniature bipin high output lamps	0.993	0.51	0.37	10.8
Instant start and rapid start ballasts (not classified as sign ballasts) that are designed to operate 8-foot high output lamps	0.993	0.38	0.25	26.5
Programmed start ballasts (not classified as sign ballasts) that are designed to operate 8-foot high output lamps	0.973	0.70	0.37	26.2
Sign ballasts that operate 8-foot high output lamps	0.993	0.47	0.25	15.1
Instant start and rapid start residential ballasts that operate .... 4-foot medium bipin lamps 2-foot U-shaped lamps 8-foot slimline lamps	0.993	0.41	0.25	7.2
Programmed start residential ballasts that are designed to operate ...... 4-foot medium bipin lamps 2-foot U-shaped lamps	0.973	0.71	0.37	5.8

* Fluorescent ballasts that are exempt from these standards are listed in section III.A.3.
** Percent improvement is applicable to the average of ballasts directly analyzed.

DOE Fluorescent Ballasts Final Rule November 14, 2011 Table I.1, for reference

Proposed changes to NOPA regulatory language of February 13, 2015, beginning on page 14/48

Clauses in the 45-day language that are not mentioned are left unmodified by NEMA proposals. All CEC's proposed 45-day underline and strikeout have been incorporated as given in the document of February 13th, and NEMA proposed changes made to that language are identified in underlined text or ~~strikethrough~~. Likewise, existing language in the current Title 20 is provided without underline as needed to locate and identify new proposed language from NEMA. Administrative notes are [bracketed] and are not intended to be part of the regulatory language.

Section 1602. Definitions.

(j)

~~"Weighted Ballast Luminous Efficacy" means the weighted average ballast luminous efficacy as calculated in section 1604(j)(3)(D).~~

[add new definition]

"Ballast Luminous Efficiency (BLE)" means the ratio of lamp arc power to ballast input power

Section 1604. Test Method for Specific Appliances.

(j)

(3)

(B) Two ~~Three~~ sets of input power and arc power shall be measured using the federal test procedure with the total arc power tuned to 100~~, 80,~~ and 50 percent of the measured maximum arc power.

~~If a step dimming ballast or a ballast that can only turn connected lamps on or off has dimming steps other than 80 and 50 percent, then the closest step that is between 90 and including 65 percent shall be used for 80 percent testing, and the closest step that is between 65 and including 35 percent shall be used for 50 percent testing. If no step exists in the above prescribed ranges, then no result shall be recorded for that percentage dimming test.~~ The resulting input powers shall be recorded and referred to as P100~~, P80,~~ and P50. The measurement of power factor shall be taken during the measurement of maximum arc power and reported.

~~(C) Standby mode test: the ballast shall also be tested with a control input set to the lowest dimming state possible up to and including no light output. The input power to the ballast shall be measured and recorded as P0. The measurement must be taken 90 minutes after entering this state. P0 shall be recorded as the mean value of measurements taken at 5 second intervals over a 5-minute period.~~

[New Proposed Item C]

(C) Standby power. If the ballast has a standby power requirement, standby power will be tested in accordance with U.S. 10 CFR 430 Appendix Q and may not exceed 1.5W.

~~(D) The weighted ballast luminous efficacy shall be calculated using the following formula and table:~~ [Strike all under item D in 45-day language]

[New Proposed Item D]

(D)Ballast Luminous Efficacy shall be calculated using the following formula:

Ballast luminous efficacy = lamp arc power / ballast input power

[add reference]
The following documents are incorporated by reference in Section 1605.3.
Number Title
FEDERAL REQUIREMENTS
Uniform Test Method for Measuring the Energy Consumption of Fluorescent Lamp Ballasts
C.F.R., Title 10, part 430, Appendix Q
Copies available from: Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402
http://ecfr.gpoaccess.gov/

Section 1605.3 State Standards for Non-Federally Regulated Appliances.
(j) Fluorescent Lamp Ballasts and Deep-Dimming Fluorescent Ballasts.
(1) Deep-Dimming Fluorescent Ballasts. Deep-dimming fluorescent ballasts manufactured on or after May 1, 2016 shall meet the following energy conservation standards:
(i) Shall not consume more than 1.5 watt in standby mode;
(ii) Shall have a power factor of 0.9 or greater; and
(iii) ~~Shall have a weighted ballast luminous efficacy greater than or equal to the threshold described in the following equation:~~
[Strike Formula]

~~*P100 is shorthand for maximum arc power as defined in section 1602 and discussed in section 1604~~
[Add new descriptions and formulas]
Measured BLE at 100% and 50% arc power must meet or exceed the calculated minimum BLE based on the following equations:

For 100% arc power
For products with Active communications $\text{Minimum BLE} = 0.933 / (1+0.51*\text{arc power}^{-0.37})$
For 0-10V, 3-wire, phase and all other products $\text{Minimum BLE} = 0.953 / (1+0.51*\text{arc power}^{-0.37})$

For 50% arc power
For products with Active communications $\text{Minimum BLE} = 0.742 / (1+0.51*\text{arc power}^{-0.37})$
For 0-10V, 3-wire, phase and all other products $\text{Minimum BLE} = 0.758/ (1+0.51*\text{arc power}^{-0.37})$

Accuracy: the reported BLE will be per U.S. DOE regulations for fixed output ballasts as given in the November 14, 2011 Energy Conservation Standards for Fluorescent Lamp Ballasts, Final Rule.

[Add reference]
The following documents are incorporated by reference in Section 1605.3
United States Department of Energy
Energy Conservation Program: Energy Conservation Standards for Fluorescent Lamp Ballasts, Final Rule, November 14, 2011

Section 1606 Filing by Manufacturers; Listing of Appliances in Database
Table X Continued – Data Submission Requirements

	Appliance	Required Information	Permissible

J	Deep-Dimming Fluorescent Ballasts	*Ballast Input Voltage	120, 277, other (specify)
		*Number of Lamps	
		*Lamp type	T5, T8~~, other (specify)~~
		*Dimming Type	Continuous, stepped, individual lamp control, other (specify)
		*Control Type	3-wire, 0-10 volts, digital communication, phase, other (specify)
		*Start Type	Instant start, rapid start, program start, other (specify)
		P100	
		Arc Power 100	
		~~P80~~	~~(answer NA if not applicable)~~
		~~Arc Power 80~~	~~(answer NA if not applicable)~~
		P50	~~(answer NA if not applicable)~~
		Arc Power 50	~~(answer NA if not applicable)~~
		~~P0 (standby mode power)~~ Standby Power	
		~~Integrated~~ Ballast Luminous Efficacy P100	
		Ballast Luminous Efficacy P50	
		Power Factor	

* “Identifier” information as described in Section 1602(a).