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17-BSTD-01: Draft 2019 Building Energy Efficiency Standards

Additional submitted attachment is included below.

From: Wilkins, Arnold J
To: Energy - Docket Optical System; Bozorgchami, Payam@Energy; Shirakh, Maziar@Energy; Lee, Simon@Energy; Chau, Thao@Energy
Subject: 17-BSTD-01: Draft 2019 Building Energy Efficiency Standards
Date: Monday, November 13, 2017 1:52:03 AM
Attachments: JA8database10-4-17v3.xlsx

Dear Madam/Sir,

I have researched the effects of lighting flicker on headache and ocular motor control for the last 30 years. The current 2016 standards are nowhere near stringent enough to reduce the symptoms induced by flicker. It was a major innovation to insist on the measurement of flicker and I had hoped that with the all the data collected to date that the CEC would be proposing more stringent flicker standards that are achievable by the majority of the products that are in the current JA8 database.

Instead, the edits to the JA8 appendix in the draft Express Terms appears to be going backwards from the progress made in the 2016 standards. The JA10 reporting requirement in JA8 have required the reporting of amplitude modulation for 40 Hz, 90 Hz, 200 Hz, 400 Hz, 1000 Hz cut-off frequencies. These values can be directly compared to the recommended values of no likely physiological impact in the IEEE PAR 1789 Standard, “Recommended Practices for Modulating Current in High-Brightness LEDs for Mitigating Health Risks to Viewers.” The proposal in the Draft Express Terms to allow either reporting the JA10 collected data or Pst and SVM from NEMA 77 will effectively remove the data from the JA8 database for poorer performing products where the manufacturers may not wish to be easily compared against other products or the IEEE standard in a transparent fashion and thus will choose to submit data in the NEMA 77 format.

With what is known about the lamps and luminaires in the

JA8 database at full light output, perhaps a more stringent requirement should be considered for frequencies less than 200 Hz, such as percent amplitude modulation no greater than 5 percent. Similarly given the findings for phantom array, at full light output for cut off frequencies of 1,000 Hz a maximum percent amplitude modulation of no greater than 25 percent would be warranted. From evaluating the JA8 database, significantly more stringent flicker requirement could be considered at full light output and have minimal effect on the products that are already complying.

If the CEC considers it too late to consider increasing the stringency and improving the quality of lamps that are allowed in homes, I recommend that the CEC commission a study by health experts (not equipment manufacturers) to determine what level of flicker is not only beneficial for the health and happiness of Californians but also evaluate existing market share and cost of these better performance lamps. This will be significantly more difficult if the Ja10 data is no longer collected. Work I had conducted with Brad Lehman (chairman of the IEEE committee) found that simple changes to the design of LED drivers can provide excellent performance with minimal incremental cost.

Thus my recommendation are:

- Keep collecting the JA10 formatted data and reject the proposal to replace this data with the NEMA 77 Pst and SVM metrics.
- Reduce the allowable levels of flicker. If not in the 2019 standard, then conduct research to reduce this for the next standard.

It is now known that the perception of the phantom array is non-monotonic with frequency and that the IEEE1789 standard far from being too conservative, may actually be insufficiently stringent.

Sincerely,

Arnold Wilkins
Professor Emeritus

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UK