Brief Review of California Title 20 Deep-Dimming Ballast Regulations

December 6, 2016

Timeline / History

- May 2015: CEC adopted the proposed T20 Regulation on Deep-dimming ballasts
- May 2016: CEC staff introduce ambiguity over interpretation of Arc Power
- 01 July 2016: T20 rule takes effect; no ballasts are certified due to ambiguity
- 26 August 2016: After a product availability gap of 57 days for new dimming ballasts, the first ballasts appear in the CEC database

Reminders Regarding Cathode Heating

- Cathode Heating is necessary to prevent premature lamp failure, especially under dimmed conditions
- It is a useful output of the product, and as such, should not be considered a ballast loss
- Cathode design varies by lamp manufacturer; it is important to provide sufficient heating to be compatible with all major lamps
- In written comments to the CEC, NEMA asked for an allowance to support the full range of Cathode Heating allowed by Standards LL 9-2011, *Dimming of T8 Fluorescent Lighting Systems*

CA T20 Definition of Arc Power

- To address the need for cathode heating, CEC defined Arc Power to include cathode heating as part of the useful output of the ballast

> (j) Fluorescent Lamp Ballasts and Deep-Dimming Fluorescent Lamp Ballasts.
>
> "Arc power" means the entire output power of the ballast and delivered to all attached lamps.

CA T20 Measurement of Arc Power

- California did not clearly describe how to measure cathode heating

- This was the source of the interpretative issue introduced weeks before the Regulation took effect

What test method is the state requiring?
The test method for deep-dimming fluorescent lamp ballasts is the federal test method 10 C.F.R. Section 430.23(q)(Appendix Q to Subpart B of part 430) with four major modifications (Sections 1604(j)(3)(A) through 1604(j)(3)(D)). In addition, the test method is modified by the definition of "arc power" in Section 1602(j).

- A suitable test method is now being developed in ANSI

CA T20: Arc Power – Lessons Learned

- Cathode Heating is a useful output of the ballast, and as such should not be considered an internal loss

- A clear, accurate and repeatable test method is needed

CA T20 Standby Power

- 1 W limit

- Vague test method resulted in uncertainty over product compliance and problems during product certification

At what dimming state should the standby mode test be conducted?
Under the standby mode test, the ballast is tested "with a control input set to the lowest dimming state possible up to and including no light output." (Section 1604(j)(3)(C)) The test procedure for this test is a combination of the test in Appendix Q of Subpart B of Part 430 of Title 10 of the Code of Federal Regulations, and the modification in Title 20, Section 1604 of the California Code of Regulations. In addition, the test is slightly different for continuous dimming and step-dimming ballasts. For continuous dimming ballasts, the test laboratory should turn down the manufacturer-recommended dimmer control signal to no light output. For step-dimming ballasts, the test laboratory should switch the manufacturer-recommended dimmer control signal to no light output (typically "off"). After 90 minutes of entering this state, the test laboratory should take the measurement of standby power of the ballast.

CA T20 Standby Power – Lessons Learned

- Only apply the Standby Power test to products with a true Standby Mode