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Sent: Friday, February 27, 2009 1:55 PM

To: SSL

Cc: Bill Blackley; Mike Bauer; Justin Larson; Terry Flint; Jeff Aymond; Roy Archer

Subject: Program requirements for integral LED lamps

Importance: High

Dear Richard

I am pleased to present Nexus Lighting's comments with regards to the Energy Star Program requirements for Integral LED Lamps (Draft 1-16-09). I am available at the contact information given at the foot of this e-mail at any time to answer questions you may have.

ALL Lamps

Lamp Requirements

CCT

Please explain why the standard is ending with the 3500K CCT bin. Based on some customer's input, the 4000K bin may be a desirable CCT.

Color Spatial Uniformity

This seems to have been derived from CREE fixtures, therefore we cannot agree to these comments

Color Maintenance

What is the method in which the accelerated testing would take place (temperature, sample size, etc...)? Also, please provide the formula in which to calculate the u' v' based on x,y coordinates.

CRI

We are suggesting a minimum of 75.

Dimming

As this standard's focus is on true replacement lamps, we feel that the LED lamp manufacturers should try to achieve dimming capabilities with phase control dimming. There are inherent problems with standard dimmers, but compatibility between LED lamps and standard Phase Control dimmers is entirely possible.

The standard should probably not differentiate between the Leading or Trailing edge types.

Next, we need to define criteria in which constitutes quality dimming. Dimming range is one (between 0 and 100%). Dimming resolution/sensitivity is another unit of measure (example: will a 10% change in the phase cut result in more than an X amount of intensity, i.e. responsiveness of a lamp to a change in phase cut). These are not

industry standards, but they're worth discussing. The load should not create overheating/buzzing/overall damage to the dimmer in both the short term and long term. How to define and measure damage is debatable.

Warranty

Agreed on 3 years.

Thermal Management

Agreed about LED Manufacturer statement. Please clarify on test procedures and certification programs. The statement is too vague.

Lumen Maintenance

25,000 hours should be achievable, but most lamp manufactures are stating L70 values of 35,000+ hours. Is a 25,000 hour L70 too low?

Allowable Lamp Bases

It may make more sense to specify the socket that a lamp must be compatible with. Restrictions on the base "form" should be replaced with "functional" requirements as they pertain to the target socket.

Power Factor

This should be $PF \geq 0.85$.

Minimum Operating Temperature

Agreed

Output Operating Frequency

$f \geq 120\text{Hz}$: OK

The dimming statement should define a dimming protocol/dimmer as some phase control dimmers behave differently depending on which quadrant of AC voltage the dimmer is operating in. It all depends on the quality of the dimmer.

Electromagnetic and Radio Frequency Interference

Agreed

Noise

Agreed

Transient Protection

Is this safety or performance based? i.e. Does the lamp need to function after this is applied, or simply not create a hazard?

Operating Voltage

Agreed. 110-130.

Packaging

We do not agree with the lamp packaging stating any known incompatibility with photo controls, dimmers or timing devices, this is the responsibility of those manufactures to test our lamps as they would any other lamp for compliance with their products. We require appropriate art work for compliance with "Lighting Facts"
Do not agree with the "Must" statement that both English and French languages are used for products being sold into Canada

NON Standard Lamps

Agree with all statements.

Replacement Lamps

Omni directional

Agree with all statements.

Decorative Lamps

Agreed

Directional Lamp requirements

Min Lum. Efficacy

This should state different efficacies per different beam angles. i.e. Floods should be more efficient than spot with respect to lm/W. That being said, Floods should be raised to at least 55lm/W. Also, there needs to be a standard in which lamp power is defined.

Minimum center beam intensity

We would like to see further discussion around this point as we must consider potential glare issues.

Minimum light output

This is a peculiar way of specifying this parameter. A table of values seems more appropriate. There is a necessity to distinguish between CCTs.

Luminous intensity distribution

Please clarify. FWHM (100-50%) or 100-10%?

NOTE about Elec. Transformers

This is not a lamp issue so much as it is a transformer issue. New electronic transformers are being developed with decreased minimum load requirements.

TESTING Requirements

Light Output

Agreed

LED Lumen Maintenance

6000hrs is 8.3months. Conundrum: once test has expired, LED is somewhat obsolete due to advancements in LED technology. 6000hrs is probably meaningful as far as tests are concerned, but really doesn't give the manufacturers design freedom.

Therefore, there's incentive not to change/improve design? Furthermore, there are several models predicting LED degradation over time. Which one is to be used?

Integral LED Lamp Lumen Maintenance and Reliability

Comments as above.

Minimum center beam intensity

Although trying to match center beam candle power is important, it is also important to note that not all MR16's are used for very narrow spot applications. Based on photometric and optical performance of the best in class LED emitters, based on our analysis it will be near impossible to meet the minimum center beam candela as classified according to the spreadsheet.

As a result – more bench marking and analysis is required be for Energy Star set a requirement that cannot be achieved and would limit applications with center beam intensity is not the only design factor

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