



MEGAMAN[®]
Energy Saving Lamps

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Comments on Energy Star Program Requirements for Integral LED Lamps

All Lamps

Lamp Requirements:									
Correlated Color Temperature (CCT)	Lamp must have one of the following designated CCTs (per ANSI C78.377-2008) and fall within the 7-step chromaticity quadrangles as defined in the Appendix.								
	<table border="1"> <thead> <tr> <th><u>Nominal CCT</u></th> <th><u>CCT (K)</u></th> </tr> </thead> <tbody> <tr> <td>2700 K</td> <td>2725 ± 145</td> </tr> <tr> <td>3000 K</td> <td>3045 ± 175</td> </tr> <tr> <td>3500 K</td> <td>3465 ± 245</td> </tr> </tbody> </table>	<u>Nominal CCT</u>	<u>CCT (K)</u>	2700 K	2725 ± 145	3000 K	3045 ± 175	3500 K	3465 ± 245
<u>Nominal CCT</u>	<u>CCT (K)</u>								
2700 K	2725 ± 145								
3000 K	3045 ± 175								
3500 K	3465 ± 245								

Megaman suggests to expand the color temperature categories, such as 4100K, 5000K, 6500K

All Lamps

Dimming	Must be dimmable. Specific requirements: TBD
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Megaman suggests Non-dimmable LED Lamp should be within the scope of the requirements.

All Lamps

Lumen Maintenance	Lamps shall deliver at least 70% of initial lumens for at least 25,000 hours.
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Megaman suggests to reduce the lumen maintenance at least 70% of initial lumens for at least 15,000 hours which reference from the UK EST requirement.

Questions - Dimming

Is it possible to define a common protocol for LED products that would ensure acceptable dimming performance on most currently installed residential dimming controls?

Megaman agrees that a common protocol should be created for testing dimmable LED lamps.

For information sharing, the common dimmers in the market are:

- TRIAC Dimmer (R,L,C)/ Universal dimmer, normally for incandescent lamp***
- 12V Halogen (L,C)***
- Leading edge & Trailing edge dimmer.***

These dimmers are already installed and difficult for the user to replace.

Questions - Dimming

Is it necessary to transition to new “LED-compatible” dimmers as more LED products come to market?

Megaman agrees that a transition period should be provided due to most of the dimmers used in the current market are not capable for LED Lamps

Questions - Dimming

How can DOE and the ENERGY STAR program best facilitate progress and improvement in the area of LED-dimmer compatibility?

Megaman suggests that partner shall submit a list of a minimum of 10 dimmer types used in the manufacturer's own internal testing to determine the lamps satisfactory performance on the consumer market. One of the dimmer shall test with the LED lamp bulbs during the entire life. This suggestion is made the reference from the UK EST requirement.

Directional Lamps

Minimum luminous efficacy	45 lumens per watt (lm/W)
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Megaman suggests that the Minimum Luminous Efficacy should be classified into different group by different diameter and wattage of the reflector lamp. This is not a fair requirement for those small diameter and low wattage LED lamps to have 45 lm/W.

For example, GU10, R50 reflector lamp (50mm in diameter)

	Halogen	CFL	LED
Efficacy	5-12 lm/W	24-28 lm/W	15-28 lm/W

Directional Lamps

- Proposed Minimum Efficacy classification (Reference from UK EST):

Lamp reflector Diameter (mm)	Minimum Lumen per Watt (l/w)
$39 \leq \phi \leq 50$	20
$51 \leq \phi \leq 80$	30
$81 \leq \phi$	35

Reference



IK test outcome fo
Reflector

Small wattage LED perform lower efficacy.

Directional Lamps

<p>Minimum light output – <i>BR, ER, K, and R lamps</i></p>	<p>Lamp shall have minimum light output (total luminous flux) equal to the target wattage of the lamp to be replaced multiplied by 10.</p>
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Megaman suggests that the LED directional lamps shall have a rated wattage not greater than 25% of the lamp it is claimed to replace. Due to the current technology is difficult to maintain the replacement of 10 times difference. This requirement is made from the reference of UK EST.

Since the efficacy of the LED module can be around 100-120 lm/W at the instantaneous stage, however the efficacy is dropped to around 40-55 lm/W when the lamp turn on after 30 mins. Also, the lumen must be dropped when the LED module assembled as a completed lamp. Therefore, the minimum efficacy are difficult to keep 40-55 lm/W.

Directional Lamps

NOTE:

MR16 lamps are used in low voltage and line voltage applications. Direct replacement of halogen MR16s in existing low voltage systems using electronic transformers can result in failure to meet minimum load requirements. DOE seeks stakeholder input on how to address this issue. Please see the cover letter for additional information.

The electronic driver for traditional MR16 lamps may not retrofit for LED lamps due to the driver for MR16 is a constant voltage type but the driver for LED lamp is a constant current type. The LED lamp may easily be damaged when incorporate with the electronic driver for traditional MR16 lamps due to the fluctuation of the current when dimming from the electronic dimmer.

Directional Lamps

<p>Minimum center beam intensity² – PAR and MR16 lamps</p>	<p>Models based on statistical analysis of 432 PAR and 284 MR16 lamps produced by NEMA manufacturers are used to set minimum center beam intensity requirements. For a given target lamp wattage and target beam angle, mathematical functions for each lamp type yield the minimum required center beam intensity in candelas (cd). The minimum requirement for PAR lamps is within two standard deviations of the center beam intensity predicted by the PAR model. For MR16s the required minimum is within one standard deviation.</p>	
	Lamp family	Functions
	PAR	<p>http://www.drintl.com/temp/ESIntLampCenterBeamTool.xls Please enter the following information into the online tool:</p> <ol style="list-style-type: none"> 1. PAR diameter in eighths of an inch (i.e., 16, 20, 30, 38) 2. Target lamp nominal wattage 3. Target lamp beam angle in degrees
	MR16	<p>http://www.drintl.com/temp/ESIntLampCenterBeamTool.xls Please enter the following information into the online tool:</p> <ol style="list-style-type: none"> 1. Target lamp nominal wattage 2. Target lamp beam angle in degrees

According to the table provided from the web, the minimum centre beam intensity can be calculated automatically by entering the lamp wattage, beam angle and lamp dimension (for PAR lamp). However, we found that the calculated value was difference from the ordinary value from the market.

Directional Lamps

For example:

PAR30, 75W, 10 degrees:

PAR30, 75W, 10 degrees	Calculated value	Ordinary value
Minimum centre beam intensity	9561	7500

For example:

MR16, 35W, 10 degrees:

MR16, 35W, 10 degrees	Calculated value	Ordinary value
Minimum centre beam intensity	5079	5000

Due to the discrepancy between the table and the ordinary value, we would like to learn more information about this table and is it a must to follow the value which calculated? Since it may becomes a large affection if the declared value is lower than the calculated.

Questions – Reliability Testing

What kinds of requirements should be considered to minimize the likelihood of premature failure of ENERGY STAR qualified integral LED lamps?

Megaman suggests that the rapid cycling test should be added into the requirements so that a prediction can be done within the initial qualification.

Questions – Reliability Testing

What duration of testing is adequate to verify long-term performance?

Megaman suggest that the initial qualification can be done at 4,000 hours due to 6,000 hours is too late for the product to launch into the market with reference to the product life cycle. Apart from the initial qualification, progress lumen maintenance & life test report should be provided at 8,000 & 15,0000 hours.

THE END