

ASSIST recommends...

Dimming: A Technology-Neutral Definition

The ability to dim the lights is an important feature in home lighting and one reason why incandescent lamps remain popular. An increasing number of LED and CFL replacement lamps are now being marketed as dimmable, despite the lack of widely accepted industry standards that define or characterize dimming for all lamps. However, the increasing number of dimmable products have resulted in reports of lamp/dimmer incompatibility.

Since 2011, ASSIST has sponsored research to investigate the current standards for lamp dimming performance, how and whether products are meeting those standards, and whether other definitions, such as those based on user expectations of dimming, should be included.



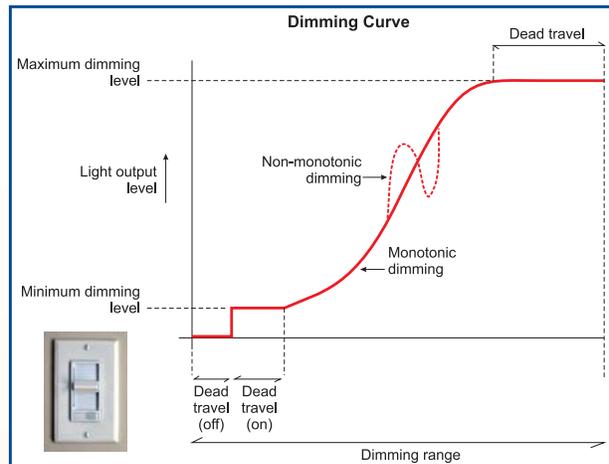
The LRC laboratory “dining room” used for human factors dimming experiments.

Experiments

LRC researchers conducted literature reviews of existing standards, performed technology evaluations, and ran human factors experiments to derive a set of recommendations for dimming.

The LRC conducted numerous experiments in a laboratory “dining room” to evaluate users’ expectations for dimmed light levels and how they expect dimming devices and lamps to behave. Since many of the aspects of a dimming system are contextual, researchers focused on residential and hospitality scenarios where the main reason for dimming is to set the ambiance.

To evaluate the minimum light level, subjects were asked to perform tasks while the lighting condition was altered. Subjects indicated when the light level reached the minimum acceptable level where performing each task was still comfortable. Subjects controlled the dimmer when evaluating dead travel, then responded to a series of questions designed to gauge the subject’s satisfaction with the dimmer’s dead travel.



Idealized dimming profile showing the minimum and maximum dimming levels, dead travel, and rate of change of light output as a function of dimmer range. Not all of these elements may be present in a given product’s dimming profile.

Recommendations

ASSIST has published *ASSIST recommends... Dimming: A Technology-neutral Definition* to provide recommendations for dimming based on user expectations in residential-like applications. These include:

- Minimum light level – No more than 5% of the maximum light output
- Maximum light level – No less than 90% of full light output at rated voltage (not on a dimmer)
- Dead travel – No more than 10% of dimmer travel at the top and bottom of dimmer travel
- Flicker – For frequencies below 120 Hz, less than 10% flicker; for frequencies above 120 Hz, follow recommendations in *ASSIST recommends... Flicker Parameters for Reducing Stroboscopic Effects from Solid-state Lighting Systems*

For more information: www.lrc.rpi.edu/programs/solidstate/assist/dimming.asp



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