

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460



OFFICE OF  
AIR AND RADIATION

January 22, 2010

Dear ENERGY STAR Integral LED Lamp Stakeholder, Manufacturer or Other Interested Party:

The purpose of this letter is to present a proposal for amending the ENERGY STAR Program Requirements for Integral LED Lamps published on December 3, 2009 with an effective date of August 31, 2010. The proposal is to change the minimum LED Operating Frequency requirement from 150 Hz to 120 Hz, resulting in a new version of the specification, Version 1.1. The effective date of the specification would remain unchanged, August 31, 2010.

The performance requirements laid out in the ENERGY STAR specification for Integral LED Lamps (V1.0) are intended to ensure that qualified products are energy efficient and meet user performance expectations. One of the requirements contained in the criteria document is for minimum LED operating frequency. This requirement was intended to mitigate potential health and safety problems caused by visible flicker. Feedback from industry stakeholders on earlier drafts of the integral LED lamp criteria was minimal and inconsistent, suggesting alternative frequency requirements ranging from 100 Hz to 500 Hz.

In the final criteria published December 3, the minimum LED Operating Frequency requirement was increased from the previously proposed 120 Hz to 150 Hz in an effort to address stated industry concerns. However, subsequent industry feedback has indicated significant concerns exist about this higher requirement, citing cost and design implications, and the exclusion of products using AC-driven LEDs. Further, several stakeholders state the requirement as written is inadequate to prevent visible flicker and potentially should address modulation depth, waveforms, duty cycle, and other characteristics, in addition to frequency.

The Environmental Protection Agency (EPA) seeks to address this issue in close cooperation with the Department of Energy, industry and standard-setting organizations to achieve the following objective: ENERGY STAR qualified lamps do not exhibit visible flicker during full output or dimmed operation. An IEEE working group including leading human factors experts is working to develop *Recommended Practices of Modulating Current in High Brightness LEDs for Mitigating Health Risks to Viewers*, but the results of this work likely will not be available until next year. To avoid delays in the implementation of the ENERGY STAR specification for Integral LED Lamps, we propose reverting back to a  $\geq 120$  Hz requirement, pending the completion of further research on this topic

Stakeholders are advised that EPA intends to again address visible flicker concerns once industry consensus measurement methods and recommended performance thresholds are available. If

additional changes are warranted, they will be proposed and finalized through a stakeholder process, allowing adequate time for transition.

EPA is accepting comments on the proposed amendment, changing the LED Operating Frequency requirement from  $\geq 150$  Hz to  $\geq 120$  Hz, by Friday, February 12, 2010. Please send written comments to Kate Buck at [kbuck@icfi.com](mailto:kbuck@icfi.com), or feel free to contact me with questions or concerns at (202) 343-9272.

As always, thank you for your support of ENERGY STAR.

Sincerely,

A handwritten signature in black ink, appearing to read 'Alex Baker', with a long horizontal flourish extending to the right.

Alex Baker  
Lighting Program Manager, ENERGY STAR  
EPA