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July 22, 2023

**BY EMAIL**

Douglas Parker, Assistant Secretary of Labor  
Occupational Safety and Health Administration  
Ford.Leah@dol.gov

**Re: Petition to Publish Performance Standards for LED Lighting**

Dear Douglas Parker,

Pursuant to 5 USC 553(e) Rulemaking, the Soft Lights Foundation hereby submits this petition requesting that the Occupational Safety and Health Administration comply with 29 U.S.C. 651 and 21 U.S.C. 360ii and coordinate with the Food and Drug Administration to develop and publish performance standards for the visible radiation emitted by products using Light Emitting Diodes. The petition is contained in the following pages.

Sincerely,

A handwritten signature in black ink that reads "Mark Baker". The signature is written in a cursive, slightly slanted style.

Mark Baker  
President

Soft Lights Foundation  
[mbaker@softlights.org](mailto:mbaker@softlights.org)

cc:

Office of Disability Employment Policy - Parker.Angela@dol.gov

Office of Inspector General - LaborOIGinfo@oig.dol.gov

Julie Su, Acting Secretary of Labor - talktodol@dol.gov

# Petition To Publish Performance Standards for the Visible Radiation Emitted by Products Using Light Emitting Diodes.

## I. Introduction

In 1968, Congress passed the Radiation Control for Health and Safety Act. This law is codified as 21 U.S.C. 360ii. The law directs the Secretary of Health and Human Services to develop and publish performance standards for electronic products and to collaborate with the Department of Labor and other federal agencies in the development of these standards.<sup>1</sup>

In 1970, Congress passed the Occupational Safety and Health Act, which established the Occupational Safety and Health Administration *“to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resource.”*<sup>2</sup>

Health and Human Services, Food and Drug Administration, and the Occupational Safety and Health Administration have not complied with statutes 29 U.S.C. 651 and 21 U.S.C. 360ii and have not coordinated to develop and publish performance standards for the visible radiation emitted by products using Light Emitting Diodes. Neither the FDA nor OSHA have published performance standards for LED flood lights, LED flashing and strobing lights such as on emergency vehicles, LED overhead lights such as in grocery stores, or other types of LED lighting.

The performance standards that are needed for LED devices include restrictions for peak luminance, spatial non-uniformity, dispersion characteristics, spectral power distribution, square wave flicker, pulse width modulation, and flash characteristics.

This petition requests that OSHA consult and liaison with the FDA to develop techniques to evaluate the visible radiation emitted by LEDs and to publish performance standards to minimize exposure to LED visible radiation to ensure the comfort, health, and safety of the public as required by 29 U.S.C. 651 and 21 U.S.C. 360ii.

## II. 29 U.S.C. Chapter 15 – Occupational Safety and Health

29 U.S.C. Chapter 15 – Occupational Safety and Health details the requirements for the Occupational Safety and Health Administration to establish and carry out policies to protect worker health and safety. The paragraphs below analyze a few of the requirements of section 651.

**§ 651(b) The Congress declares it to be its purpose and policy, through the exercise of its powers to regulate commerce among the several States and with foreign nations and to provide for the general welfare, to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources –**

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<sup>1</sup> <https://www.law.cornell.edu/uscode/text/21/360ii>

<sup>2</sup> [https://www.law.cornell.edu/wex/occupational\\_safety\\_and\\_health\\_act\\_\(osha\)](https://www.law.cornell.edu/wex/occupational_safety_and_health_act_(osha))

**(1) by encouraging employers and employees in their efforts to reduce the number of occupational safety and health hazards at their places of employment, and to stimulate employers and employees to institute new and to perfect existing programs for providing safe and healthful working conditions.**

LED visible radiation is a hazard to human health which harms the general welfare of workers. It is the intent of Congress to protect workers from unhealthful and dangerous working conditions. For example, the intense LED strobe lights used on utility vehicles on an airport tarmac cause eye pain, interfere with vision, and impair cognitive functioning, making for a dangerous work environment.

**(3) by authorizing the Secretary of Labor to set mandatory occupational safety and health standards applicable to businesses affecting interstate commerce, and by creating an Occupational Safety and Health Review Commission for carrying out adjudicatory functions under this chapter.**

OSHA has been given the authority by Congress to set safety and health standards. OSHA has failed to publish these safety and health standards for LED products such as LED floodlights, LED flashing lights, and other types of LED lighting. In addition, OSHA is required by 21 U.S.C. 360ii to liaison with the Food and Drug Administration to publish performance standards for LED products. OSHA has failed to protect workers from LED visible radiation.

**(5) by providing for research in the field of occupational safety and health, including the psychological factors involved, and by developing innovative methods, techniques, and approaches for dealing with occupational safety and health problems.**

LED radiation is especially traumatizing because of the properties of spatial non-uniformity, extreme peak luminance, square wave flicker, digital flashing, and other characteristics. Congress has made protection of mental health in the work place a high priority, and yet OSHA has failed to research and develop approaches for dealing with LED products.

**(7) by providing medical criteria which will assure insofar as practicable that no employee will suffer diminished health, functional capacity, or life expectancy as a result of his work experience.**

Workers are already suffering from diminished health, functional capacity and reduced life expectancy as a result of being subjected to LED radiation in the workplace.

**(9) by providing for the development and promulgation of occupational safety and health standards.**

OSHA has failed to set any standards for the use of LED products.

### III. 21 USC Section 360ii – Program of Control

21 U.S.C. Chapter 9, Subchapter V, Part C, Section 360ii – Program of Control, details the requirements for Health and Human Services to establish and carry out an electronic product radiation control program. HHS implements this section via the HHS Food and Drug Administration Center for Devices and Radiological Health.

In the following sections, we assess the requirements of Section 360ii.

**(a) ESTABLISHMENT** *The Secretary shall establish and carry out an electronic product radiation control program designed to protect the public health and safety from electronic product radiation. As a part of such program, he shall—*

It is clear in (a) that Congress' mandate is to protect the public from the harms of electronic product radiation. The word "shall" means that this section is a mandate, and not optional. The FDA currently has no electronic product radiation control program for the visible radiation emitted by non-point source LED emitters, in violation of this statute.

**(1)** *pursuant to section 360kk of this title, develop and administer performance standards for electronic products;*

Performance standards for LED products must include restrictions for peak luminance, spatial non-uniformity, dispersion characteristics, spectral power distribution, square wave flicker, pulse width modulation, and flash characteristics. The FDA currently has published no performance standards for any of these characteristics of LED visible radiation, in violation of this statute.

**(2)** *plan, conduct, coordinate, and support research, development, training, and operational activities to minimize the emissions of and the exposure of people to, unnecessary electronic product radiation;*

LED visible radiation is a human health hazard and has been documented to cause seizures, migraines, nausea, agitation, panic attack, fear, anger, eye pain, eye injury, distraction, reduced cognitive functioning, and impaired vision. The FDA has taken few or no steps to minimize the emissions and exposure of visible radiation emitted by LEDs, in violation of this statute.

**(3)** *maintain liaison with and receive information from other Federal and State departments and agencies with related interests, professional organizations, industry, industry and labor associations, and other organizations on present and future potential electronic product radiation;*

The FDA has made little or no effort to maintain a liaison with OSHA regarding the visible radiation emitted by LEDs. LEDs were invented in the 1960s and this statute mandates that the FDA be aware of "future potential electronic product radiation." OSHA and the FDA failed to liaison and ensure that performance standards for LED products were published before billions of LED emitters were installed in the work place.

**(4)** *study and evaluate emissions of, and conditions of exposure to, electronic product radiation and intense magnetic fields;*

The FDA has made little or no effort to study and evaluate visible radiation emissions from LED electronic products, in violation of this statute.

**(5)** *develop, test, and evaluate the effectiveness of procedures and techniques for minimizing exposure to electronic product radiation; and*

The FDA has not developed, tested, or evaluated the effectiveness and techniques for minimizing exposure to LED visible radiation, in violation of this statute. The FDA has not yet publicly acknowledged that LEDs are not a point source, and that LEDs must be regulated by the metric luminance. Nor has the FDA publicly acknowledged that LEDs emit spatially non-uniform luminance in a mathematical Lambertian shape that does not disperse following an inverse square law. The FDA has not developed techniques that are valid and accurate for measuring peak luminance. High-power LED chips already exceed 70,000,000 candela per square meter of peak luminance, and yet the FDA has not developed any procedures to minimize exposure to this intense visible radiation.

Similarly, the FDA has made little or no effort to evaluate the effectiveness and techniques for minimizing exposure to hazardous blue wavelength light, exposure to square wave flicker, or exposure to pulsed visible radiation such as emitted by LED flashing and strobing lights.

*(6) consult and maintain liaison with the Secretary of Commerce, the Secretary of Defense, the Secretary of Labor, the Atomic Energy Commission, and other appropriate Federal departments and agencies on (A) techniques, equipment, and programs for testing and evaluating electronic product radiation, and (B) the development of performance standards pursuant to section 360kk of this title to control such radiation emissions.*

OSHA and the FDA have not adequately consulted and maintained a liaison on techniques, equipment, or programs of testing and evaluating LED visible radiation, nor have OSHA and the FDA developed the required performance standards to control the visible radiation emissions from LEDs, despite the Secretary of Labor being explicitly listed in this statute.

## IV. LED Products

LEDs are used in many locations and for many functions. Each of these different uses requires explicit performance standards to ensure the comfort, health, and safety of workers, and to ensure accessibility for all individuals, especially those who are highly sensitive to LED visible radiation.

### A. LED Overhead Lighting in Grocery Stores

LED overhead lighting can cause migraines, headaches, and nausea and has already caused documented cases of workers having to quit their jobs due to the LED lighting. OSHA currently has no protections for workers from LED radiation.



## B. LED Flood Lights

LED flood lights often contain high levels of hazardous blue wavelength light which causes irreversible photochemical retinal damage.<sup>3</sup> OSHA currently has no health or safety restrictions on LED floodlights, such as those shown in the photo below.



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<sup>3</sup> <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6288536/>

## C. LED Strobe Lights

Currently, OSHA has no standards for LED flashing lights such as on police vehicles, fire engines, ambulances, tow trucks, or garbage trucks. For example, a police officer may use LED strobe lights while driving to an incident, and then leave the strobe lights on at the incident. Notice in this video how the intense LED flashing lights interfere with officer vision.

(<https://youtu.be/k3FvFwsW-vs>)



These are just a few examples of the many types of LED products that require regulation to protect workers' health and safety.

## V. Characteristics of LED Visible Radiation

The characteristics of LED visible radiation that require performance standards includes:

- **Peak luminance** – A maximum luminance value in candela per square meter must be set for each LED product to ensure that the light is safe and comfortable for all individuals, especially those who are most sensitive.
- **Inverse Square Law Dispersion** – Since LEDs emit light from a flat surface and do not meet the criteria for point source emitter, then, by definition, the light does not disperse following an inverse square law. Restrictions must be created to ensure that the light gently and safely disperses.
- **Spatial Uniformity** – The beam of light emitted by an LED is mathematically described as a Lambertian, meaning that the light energy within the beam is not homogeneous. LEDs create a non-uniform illumination pattern that can lead to unsafe conditions and neurological harm. Regulations must ensure uniform illumination from devices that are designed to illuminate a volume of space.

- **Spectral Power Distribution** – LEDs frequently contain a large spike of hazardous blue wavelength light and piecewise spectral power distribution that can cause serious ocular damage which can be permanent. LED products with a high Correlated Color Temperature can cause blinding glare and eye pain. Cumulative exposure to blue wavelength light will likely result in eye cell death, leading to diseases such as macular degeneration. Restrictions must be set to ensure that the spectral power distribution is harmless.
- **Square Wave Flicker** – An LED is a digital device, and the LED requires electronics to cause the LED to emit visible radiation. The square wave flicker can be a health hazard for all individuals, with reactions ranging from mild annoyance to nausea, to migraine, and to seizure. Flicker rates as high as 10,000 Hertz can be neurologically detected. Thus, as per 21 U.S.C. Section 360ii, the temporal characteristics of LED visible radiation must be restricted to minimize harm for all individuals, especially those who are most sensitive.
- **Flash Characteristics** – For flashing and strobing LEDs, the square wave on/off is neurologically hazardous because it can change too quickly, and the nerves and brain do not have the necessary capacity to process this type of energy. At a minimum, LED strobe lights are a dangerous distraction, but they also can violate civil rights and trigger agitation, anger, debilitating seizures, and life-threatening seizures. Restrictions must be set on LED strobe lights to ensure that the LED strobe light does not trigger a seizure, migraine, or panic attack, or decrease vision or impair cognitive abilities.

## VI. Requested Action

Petitioner requests that OSHA consult and liaison with the FDA to minimize the risk of harm to all workers, especially those who are most sensitive, from LED visible radiation devices and to publish performance standards for all categories of LED products, in accordance with 29 U.S.C. 651 and 21 U.S.C. Section 360ii, that will ensure the comfort, health, safety, and equal access rights of the workers, including those with disabilities and the generally healthy population.