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BY EMAIL

Sachin Pavithran, Executive Director
Access Board
pavithran@access-board.gov

Re: Petition to Publish Accessibility Requirements for LED Products

Dear Sachin Pavithran,

Pursuant to 5 USC 553(e) Rulemaking, the Soft Lights Foundation hereby submits this petition requesting that the Access Board coordinate with the Food and Drug Administration, as required by 21 USC 360ii, to develop and publish requirements for the visible radiation emitted by products using Light Emitting Diodes to ensure equal access for individuals with disabilities to programs, services, and activities covered under Title I, Title II, and Title III of the Americans with Disabilities Act. 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

Petition To Publish Accessibility Standards for Products Using Light Emitting Diodes.

I. Introduction

In 1968, Congress passed the Radiation Control for Health and Safety Act. This law is codified in 21 USC Chapter 9, Subchapter V, Part C – Electronic Product Radiation Control. The law directs the Secretary of Health and Human Services to develop and publish performance standards for electronic products and to collaborate with other federal agencies in the development of these standards.¹

Health and Human Services, Food and Drug Administration, and the Access Board have not complied with this statute and have not coordinated to develop and publish performance and accessibility standards for the visible radiation emitted by products using Light Emitting Diodes. There are no published performance standards for LED General Service Lamps, LED streetlights, LED strobe lights, LED lights on signs, LED vehicle headlights, and other types of LED lighting to ensure equal access for those who are neurologically intolerant of LED visible radiation.

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

This petition requests that the Access Board 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, safety, and equal access of those with disabilities as required by 21 USC Chapter 9, Subchapter V, Part C, Section 360ii – Program of Control, and the Americans with Disabilities Act.

II. 21 USC Section 360ii – Program of Control

21 USC 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

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

visible radiation emitted by non-point source visible radiation emitted by LEDs, 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 include restrictions for peak luminance, spatial uniformity, inverse square law dispersion, spectral power distribution, square wave flicker, pulse width modulation, flash characteristics, total exposure, and cumulative exposure. 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 the Access Board 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.*” Access Board and the FDA failed to liaison and ensure that performance standards for LED products were published before LEDs became ubiquitous in the built environment, which has resulted in the creation of unlawful discriminatory barriers throughout nearly every street, sidewalk, building, and vehicle in society.

- (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 strobe 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.

Access Board and the FDA have not adequately consulted and maintained a liaison on techniques, equipment, or programs of testing and evaluating LED visible radiation, nor has the Access Board and the FDA developed the required performance standards to control the visible radiation emissions from LEDs, in violation of this statute.

III. 42 USC Chapter 126 – Equal Opportunity for Individuals with Disabilities

In the following sections, we assess some of the requirements of the Americans with Disabilities Act. These sections are not an exhaustive list of the ADA requirements but serve to illustrate how the use of LEDs creates discriminatory barriers, in violation of statutes.

Section 12101 – Findings and Purpose.

(a)(1) – “The Congress finds that physical or mental disabilities in no way diminish a person’s right to fully participate in all aspects of society, yet many people with physical or mental disabilities have been precluded from doing so because of discrimination; others who have a record of a disability or are regarded as having a disability also have been subjected to discrimination;”

LED visible radiation creates discriminatory barriers, preventing individuals with disabilities from fully participating in all aspects of society, despite their right to do so, as noted in this statute.

(a)(2) - *“historically, society has tended to isolate and segregate individuals with disabilities, and, despite some improvements, such forms of discrimination against individuals with disabilities continue to be a serious and pervasive social problem;”*

LED visible radiation isolates and segregates individuals who are neurologically intolerant of LED visible radiation, forcing these individuals to be trapped in their homes and segregating them from the rest of society, which discriminates against those individuals.

(a)(3) - *“discrimination against individuals with disabilities persists in such critical areas as employment, housing, public accommodations, education, transportation, communication, recreation, institutionalization, health services, voting, and access to public services;”*

LED visible radiation prevents individuals with disabilities from accessing their place of employment, their apartments, schools, buses and trains, city streets, and their doctors and dentists.

(a)(4) - *“unlike individuals who have experienced discrimination on the basis of race, color, sex, national origin, religion, or age, individuals who have experienced discrimination on the basis of disability have often had no legal recourse to redress such discrimination;”*

(a)(5) - *“individuals with disabilities continually encounter various forms of discrimination, including outright intentional exclusion, the discriminatory effects of architectural, transportation, and communication barriers, overprotective rules and policies, failure to make modifications to existing facilities and practices, exclusionary qualification standards and criteria, segregation, and relegation to lesser services, programs, activities, benefits, jobs, or other opportunities;”*

(a)(6) - *“census data, national polls, and other studies have documented that people with disabilities, as a group, occupy an inferior status in our society, and are severely disadvantaged socially, vocationally, economically, and educationally;”*

(a)(7) - *“the Nation’s proper goals regarding individuals with disabilities are to assure equality of opportunity, full participation, independent living, and economic self-sufficiency for such individuals; and”*

(a)(8) - *“the continuing existence of unfair and unnecessary discrimination and prejudice denies people with disabilities the opportunity to compete on an equal basis and to pursue those opportunities for which our free society is justifiably famous, and costs the United States billions of dollars in unnecessary expenses resulting from dependency and nonproductivity.”*

Individuals who have lost their jobs due to LED visible radiation discrimination are no longer able to be economically productive. They are unable to provide for their families and may become dependent on the government for economic support. The use of LED visible radiation devices is thus an economic burden for the taxpayer.

Subchapter I – Employment

Section 12112 – Discrimination

- (a) – General Rule** – *“No covered entity shall discriminate against a qualified individual on the basis of disability in regard to job application procedures, the hiring, advancement, or discharge of employees, employee compensation, job training, and other terms, conditions, and privileges of employment.”*

LED visible radiation has wide ranging impacts on employment, resulting in discrimination during the hiring process, training, and employment of individuals with disabilities, in violation of this statute.

- (b) – Construction** – *“As used in subsection (a), the term “discriminate against a qualified individual on the basis of disability” includes—*

(1) - limiting, segregating, or classifying a job applicant or employee in a way that adversely affects the opportunities or status of such applicant or employee because of the disability of such applicant or employee;”

LED visible radiation limits and segregates individuals who cannot neurologically tolerate this type of radiation, in violation of this statute.

(5) - (A) not making reasonable accommodations to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, unless such covered entity can demonstrate that the accommodation would impose an undue hardship on the operation of the business of such covered entity;”

The “undue hardship” claim is often made by employers to deny accommodation. However, in the case of discrimination from LED devices, no such undue hardship claim can be made because the FDA has not vetted or approved such devices and thus there is no legal justification for the use of LED products. Once the FDA, in conjunction with the Access Board, publish the required performance standards and accessibility standards, an if an employer complies with those standards, then an undue hardship claim could be considered.

Subchapter II – Public Services

Section 12132 – Discrimination

“Subject to the provisions of this subchapter, no qualified individual with a disability shall, by reason of such disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of a public entity, or be subjected to discrimination by any such entity.”

LED visible radiation causes individuals with neurological intolerance to such radiation to be excluded from participation in the services, programs and activities of public entities and discriminates against those individuals, in violation of this statute.

Subchapter III – Public Accommodations and Services Operated by Private Entities

Section 12182 – Discrimination

- (a) **GENERAL RULE** – *“No individual shall be discriminated against on the basis of disability in the full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of any place of public accommodation by any person who owns, leases (or leases to), or operates a place of public accommodation.”*

LED visible radiation prevents the full and equal enjoyment of goods, services, facilities, privileges, advantages, and accommodations of public accommodations for those who are impaired by LED visible radiation, in violation of this statute.

(b) **Construction**

(1) **GENERAL PROHIBITION**

(A) **Activities**

- (i) **Denial of Participation** - *“It shall be discriminatory to subject an individual or class of individuals on the basis of a disability or disabilities of such individual or class, directly, or through contractual, licensing, or other arrangements, to a denial of the opportunity of the individual or class to participate in or benefit from the goods, services, facilities, privileges, advantages, or accommodations of an entity.”*

LED visible radiation denies individuals who are impaired by LED visible radiation the opportunity to benefit from the goods, services, facilities, privileges, advantages, and accommodations of an entity.

- (B) **Integrated Settings** – *“Goods, services, facilities, privileges, advantages, and accommodations shall be afforded to an individual with a disability in the most integrated setting appropriate to the needs of the individual.”*

LED radiation devices do not provide the most integrating setting for certain individuals because the characteristics of LED visible radiation cause such an individual to suffer seizures, migraines, panic attacks, or brain fog.

(2) **SPECIFIC PROHIBITIONS**

(A) **Discrimination**

For purposes of subsection (a), discrimination includes—

- (i) - *“the imposition or application of eligibility criteria that screen out or tend to screen out an individual with a disability or any class of individuals with disabilities from fully and equally enjoying any goods, services, facilities, privileges, advantages, or accommodations, unless such criteria can be shown to be necessary for the provision of the goods, services, facilities, privileges, advantages, or accommodations being offered;”*

The use of LED visible radiation devices screens out or tends to screen out those individuals who are highly sensitive to LED light and prevents those individuals from fully and equally enjoying the good, services, privileges, advantages, and accommodations offered, in violation of this statute.

IV. Cases of Discrimination

Because LED products have been released into the environment without proper vetting and regulation, there have already been numerous documented cases of discrimination caused by using LED products. Here are a few documented cases.

A. Individual One – Epilepsy

1. The Village of Cambridge, New York and the utility company National Grid replaced the HPS streetlights in the village with LED streetlights. When exposed to the visible radiation from LED streetlights, Individual One suffers a life-threatening grand mal seizure. Individual 1 requested accommodation from the Village and National Grid, and the 5 streetlights nearest to Individual One’s house were restored to HPS streetlights. The result is that Individual One cannot walk beyond the tiny geographical space nearest her house. Individual One has been isolated and excluded from society and the services and benefits provided by the Village of Cambridge and National Grid. This is discrimination in violation of 42 USC Chapter 126. This incident is documented in New York State Public Service Commission Case 21-02623.²
2. Individual One worked at a Hannaford’s grocery store. The company installed LED lighting inside the store. Since Individual One cannot be exposed to LED visible radiation without suffering a seizure, Individual One requested accommodation. The company denied the accommodation request, forcing Individual One to lose her employment and income. This is discrimination in violation of 42 USC Chapter 126.
3. Individual One was a passenger in a vehicle in Williamstown, Massachusetts when Individual One was exposed to LED strobe lights from a Rectangular Rapid Flashing Beacon traffic control device. Individual One suffered a grand mal seizure and subsequent concussion from hitting Individual One’s head against the window. The concussion resulted in slurred speech and impaired cognitive functioning which lasted for several months. RRFBs create a discriminatory barrier which prevents equal access. Williamstown was notified of the incident, but declined to remove the RRFB, in violation of 42 USC Chapter 126.
4. Individual One was exposed to the visible radiation from an LED headlight on a vehicle, causing Individual One to suffer a grand mal seizure.

B. Individual Two – Autism Spectrum Disorder

² <https://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=21-02623&CaseSearch=Search>

1. Individual Two was exposed to LED visible radiation from vehicle headlights and floodlights on the way to, and at, Individual Two's place of employment, which caused significant psychological stress. Due to cumulative exposure to multiple LED sources over a period of months, Individual Two suffered a panic episode which resulted in involuntary police hold and four days in the hospital.
2. Individual Two was a passenger in a vehicle when a Yachats, Oregon emergency service vehicle that was immediately in front of Individual Two turned on LED strobe lights. The intensity of the LED strobe lights overwhelmed Individual Two, resulting in a panic episode.
3. Individual Two was the driver of a vehicle in Medford, Oregon when Individual Two encountered emergency vehicles on the roadway using LED strobe lights. The LED strobe lights caused impaired vision and reduced cognitive functioning, causing Individual Two to have to turn the vehicle around and take an alternate route. Individual Two requested accommodation from the city of Medford but was denied. This is discrimination, in violation of 42 USC Chapter 126.
4. The city of Ashland, Oregon has installed RRFB LED strobe light traffic control devices. When subjected to the LED strobe lights from the RRFBs, Individual Two becomes debilitated. Individual Two requested accommodation from the city but was denied.

C. Individual Three – Migraines

The city of Davis, California replaced HPS streetlights with LED streetlights. When exposed to the visible radiation from LED streetlights, Individual Three suffers debilitating migraines requiring days or weeks lying in bed in a completely dark room. Individual Three requested accommodation from the city, which then reduced the color temperature of the LED streetlight. However, this action did not solve the issue, and Individual Two still suffers migraines when exposed to the LED streetlights in Davis. This is discrimination, in violation of 42 USC Chapter 126.

D. Individual Four – Toxic Encephalopathy

The city of Ketchikan, Alaska replaced HPS streetlights with LED streetlights directly outside of Individual Four's house. The visible radiation from the LED streetlights causes brain fog, impairing Individual Four's cognitive functioning. Individual Four requested accommodation from the city but was denied. Individual Four filed a discrimination case ASCHR J-22-097 with the Alaska Human Rights Commission.

E. Individual Five – Electromagnetic Hypersensitivity Syndrome

Individual Five suffers discomfort, vertigo, and visual impairment when exposed to LED visible radiation. Individual Five has had great difficulty finding a dentist and other medical services that do not use LED devices. This is discrimination, in violation of 42 USC Chapter 126.

F. Individual Six –Epilepsy

Individual Six was exposed to LED strobe lights from an RRFB in Little Canada, Minnesota which caused Individual Six to suffer nausea, loss of balance, and vomiting. Individual Six requested accommodation from Little Canada but was denied. Individual Six filed case Q# 107420 with the Minnesota Department of Human Rights.

V. LED Uses

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 the public, and to ensure equal access for all individuals with disabilities.

- **General Service Lamps** – The Department of Energy banned the incandescent light bulb, discriminating against individuals who cannot tolerate LED visible radiation. Those individuals will now be forced to use candles or some other inferior electric light source.
- **Streetlights** – LED streetlights have been documented to cause seizures and migraines. The excessive blue wavelength light that is typical of most LED streetlights is responsible for significant increases in diseases such as prostate, thyroid, and breast cancer, diabetes, heart disease, obesity, mood disorders, and early mortality. For a person who suffers a seizure or migraine when exposed to LED visible radiation, an LED streetlight prevents access to public services such as streets and sidewalks.
- **Vehicle Headlights and Daytime Running Lights** – LED headlights and DRLs are exceedingly intense, and the blue wavelength light is a known photobiological hazard. For those who cannot tolerate the intensity, spectral power distribution, or square wave flicker from an LED headlight, it may now be impossible to navigate any street.
- **Vehicle Brake Lights, Taillights, Turn Signals, and Backup Lights** – The intensity of these LED lights can prevent those with disabilities from navigating towards the light source.
- **LED Indicator Lights** – These tiny LEDs now appear in washing machines, refrigerators, tools, vehicles, wall sockets, and many other products. The intensity is unregulated, putting those with disabilities at risk of seizure, migraine, or other adverse neurological reactions.
- **LED Displays** – LED displays such as used with computers, kiosks, electronic billboards, and vehicle dashboards are intolerable to certain individuals with disabilities. Such an individual would not be able to use a rideshare service that uses LED displays, would not be able to walk along a city street with LED advertising displays, and would not be able to use an LED kiosk to pay for services, thus excluding these individuals from services and benefits.
- **Strobe Lights** – LED strobe lights are installed on nearly every emergency vehicle such as police, fire, and ambulance, and on utility vehicles such as tow trucks and garbage trucks. LED strobe lights trigger seizures, migraines, and panic attacks. Since these vehicles are mobile, an LED assault can occur anywhere, violating the civil rights of individuals who have disabilities.

- **Strip Lights** – The strip lights that are used in beverage coolers and other products are exceedingly intense and can cause seizure, migraine, anxiety, eye pain, and eye injury. The use of strip lights at the front of a grocery store can prevent a person with a disability from checking out.

VI. 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, 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 USC 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.
- **Total Visible Radiation** – As the quantity of products in each location emitting LED visible radiation increases, the environment becomes less safe. Limits must be set on total

exposure to LED visible radiation in a location such as a grocery store or at the post office or on a street.

- **Cumulative Radiation Exposure** – The impacts of repeated exposure to LED visible radiation over time can accumulate. Limits must be set for daily and lifetime exposure to LED radiation.

VII. Requested Action

Petitioner requests that Access Board consult and liaison with the FDA to minimize the risk of harm to, and eliminate discrimination of, individuals with disabilities, from LED visible radiation devices and to publish performance standards for all categories of LED products, in accordance with 21 USC Section 360ii and 42 USC Chapter 126, that will ensure the comfort, health, safety, and equal access rights of those with disabilities.