



Mark Baker <mbaker@softlights.org>

LED Headlights Are Unregulated and Dangerous

Knieser, Brian <Brian.Knieser@mail.house.gov>

Tue, Feb 20, 2024 at 9:57 AM

To: Mark Baker <mbaker@softlights.org>, "Durand, Adam" <Adam.Durand@mail.house.gov>

Cc: "Diaz, Moises" <Moises.Diaz@mail.house.gov>

Hello Mark,

I wanted to let you know that since the last time I contacted you, I've been working on a letter to NHTSA's Deputy Administrator Shulman urging her to implement prescriptive standards that address the wide-spread problem of excessively bright headlights (see below).

We are currently circulating the letter among House members requesting they sign on. You may also want to forward it to Soft Lights Foundation members and ask them to contact their representative to request they sign on.

Thank you for your engagement on this issue and we'll be in touch.

Respectfully,

Brian Knieser

Office of Congressman Mike Thompson

Brian.Knieser@mail.house.gov

C: 202.819.4514 W: 202.225.3311

[Text of the Letter]

Dear Deputy Administrator Shulman:

We are writing to bring to your attention the concerns expressed by our constituents regarding the issue of excessively bright automotive headlights and their potential impact on driver safety. We, too, find the headlights on many vehicles to be excessively bright, likely endangering other drivers navigating the roads at night.

A 2001 report by the National Highway Traffic Safety Administration (NHTSA) found that approximately 30 percent of respondents reported experiencing "disturbing" nighttime headlight glare. Furthermore, a 2008 NHTSA report confirmed that headlight glare is an important safety issue, not to mention the thousands of complaints submitted to NHTSA to the same effect.

We are aware that on February 15, 2022, NHTSA issued a final rule allowing automakers to install adaptive driving beam headlights in new vehicles. While this rule may provide some relief in time, it does not implement any requirements, nor does it address the problematic headlights on the tens of thousands of existing vehicles.

Therefore, we respectfully ask you to duly consider implementing prescriptive standards that will reduce glare from excessively bright headlights on all passenger vehicles in operation. Such standards would serve to address the pressing safety concerns related to excessively bright headlights, ensuring a safer driving environment for all. Thank you for your attention to this important issue.

[###]

[Quoted text hidden]



March 1, 2024

Mark Baker, President
Soft Lights Foundation
9450 SW Gemini Drive PMB 44671
Beaverton, OR 97008

Sent via email to: mbaker@softlights.org

Re: Citizen Petition – Docket Number FDA-2023-P-3828

Dear Mr. Baker:

This is an interim response to the petition dated September 6, 2023, filed by the Food and Drug Administration (FDA) on September 7, 2023. In the petition, you requested that FDA “issue 21 CFR Part 1040.50 - LED Vehicle Lights to regulate electromagnetic radiation in the visible portion of the spectrum emitted by products that use Light Emitting Diodes that are used on vehicles, and that these regulations set restrictions on spatial non-uniformity, chip-level peak luminance and peak radiance, dispersion characteristics, spectral power distribution, digital flicker, pulse width modulation, synchronous and asynchronous flash rates, and rise and decay characteristics, and that the regulations be designed to protect the physical health, neurological health, psychological health, safety, comfort, cognitive functioning, vision, and civil rights of all individuals, especially those who are negatively impacted by LED radiation.”

FDA has been unable to reach a decision on your petition because it raises issues requiring further review and analysis by agency officials. This interim response is provided in accordance with FDA regulations on citizen’s petitions (21 CFR 10.30(e)(2)). We will respond to your petition as soon as we have reached a decision on your request.

If you have any questions about this interim response, please contact Patricia Kaufman of our Office of Policy at 301-796-1174.

Sincerely,

Ellen J. Flannery, J.D.
Deputy Center Director for Policy
Director, Office of Policy
Center for Devices and Radiological Health



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Office of the Chief Counsel

1200 New Jersey Avenue SE.
Washington, DC 20590

February 13, 2024

Mr. Mark Baker, B.S.E.E.
Soft Lights
9450 SW Gemini Drive PMB 44671
Beaverton, OR 97008
mbaker@softlights.org

Dear Mr. Baker:

This responds to your letter and email dated June 27, 2021 and October 31, 2021, respectively, regarding the legal status and safety of motor vehicle headlamps that use light-emitting diode (LED) technology as the light source. Please note that our answer below is based on our understanding of the specific information provided in your letter and email.

You ask about the “legality of LED headlights.” You state your belief that Federal Motor Vehicle Safety Standard (FMVSS) No. 108 does not regulate “peak luminance, absolute spectral power distribution or flicker” and that the standard “only applies to spherical emitters such as tungsten-filament and gas-discharge and is not applicable to non-uniform luminance flat-source emitters such as LED chips.” You ask whether it is “NHTSA’s position that FMVSS No. 108 is only applicable to uniform luminance emitters which can be regulated by setting maximums for luminous intensity without the need of setting peak luminance maximums” and whether “NHTSA [has] approved the use of spatially heterogeneous visible radiation for use as the light source used in vehicle headlights.” You state your concerns about adverse health impacts due to the performance characteristics of LEDs, such as high peak luminance, high-color temperature, high-energy blue wavelength light, and flicker. You request NHTSA’s opinion about the “sufficiency” of FMVSS No. 108 regarding these health concerns.

We understand you to use “uniform luminance emitters” to refer to filament (halogen/tungsten) and high-intensity discharge (HID) light sources, and “non-uniform” or “heterogenous emitter” to refer to LED light sources. We therefore understand you to be asking whether LEDs are legal as a light source in motor vehicle headlamps under FMVSS No. 108, and, if they are legal, what is NHTSA’s position on the safety of LED light sources in headlamps with respect to “eye safety, mental safety, and visual performance.”

Background

NHTSA is authorized by the National Traffic and Motor Vehicle Safety Act (Safety Act, 49 U.S.C. Chapter 301) to issue FMVSS that set performance requirements for new motor vehicles and new items of motor vehicle equipment. The Safety Act requires manufacturers to self-certify that their

vehicles and equipment conform to all applicable FMVSS in effect on the date of manufacture. NHTSA also investigates safety-related defects.

FMVSS No. 108, "Lamps, reflective devices, and associated equipment," applies to "[p]assenger cars, multipurpose passenger vehicles, trucks, buses, trailers (except pole trailers and trailer converter dollies), and motorcycles" and covers, among other things, "original and replacement lamps, reflective devices, and associated equipment" for motor vehicles. The standard specifies performance requirements for headlamps. The most common types of headlamps are integral beam (S10.14) and replaceable bulb (S10.15, S11) headlamps.

NHTSA has stated that LED light sources are permitted as part of an integral beam headlamp if they are wired in series such that a failure of one LED would cause all the LEDs to cease functioning, and they otherwise comply with all relevant FMVSS.¹ Paragraph S4 of FMVSS No. 108 defines an integral beam headlamp as "a headlamp ... comprising an integral and indivisible optical assembly including lens, reflector, and light source, except that a headlamp conforming to paragraph S10.18.8 or paragraph S10.18.9 may have a lens designed to be replaceable." The standard does not contain performance requirements for a light source that is part of an integral beam headlamp, but instead specifies performance requirements for the complete headlamp. These include (among other things) photometry, through minimum and maximum candela at specified test points,² color, which must remain within specified boundaries,³ and that the headlamp be steady burning.⁴

While LED light sources that are part of an integral beam headlamp are permitted as noted above, no LED light source is currently permitted to be used in a replaceable bulb headlamp. FMVSS No. 108 contains specific requirements for the replaceable light sources (i.e., bulbs) used in replaceable bulb headlamps. These requirements are intended to support light source interchangeability. Paragraph S11 of the standard requires that "[e]ach replaceable light source must be designed to conform to the dimensions and electrical specifications furnished with respect to it pursuant to part 564 of this chapter[.]"⁵ Part 564 requires that replaceable bulb manufacturers submit to NHTSA for review and acceptance various design specifications for the bulb. If accepted, this design information is then placed in a publicly available docket to facilitate the manufacture and use of those light sources. As of the date of this letter, no submission that includes LEDs as the light source for a replaceable bulb headlamp has been listed in the docket. Therefore, no LED replaceable light source may be used in a replaceable bulb headlamp.

¹ Letter from Stephen Wood, Acting Chief Counsel, NHTSA, to Takayuki Amma, Manager, Koito Manufacturing Co. (Dec. 21, 2005). Letter from O. Kevin Vincent, Chief Counsel, NHTSA, to Junichi Hasegawa, Stanley Electric Co. (Apr. 8, 2013). Interpretation letters are available on NHTSA's online interpretations database at <https://www.nhtsa.gov/nhtsa-interpretation-file-search>.

² Photometry requirements for headlamp systems can be found in FMVSS No. 108, Tables XVIII and XIX.

³ See FMVSS No. 108, Table I-a (headlamp color). Chromaticity requirements are pursuant to FMVSS No. 108 S14.4.

⁴ See FMVSS No. 108 Tables I-(a and c). NHTSA has stated that "steady burning" means "light that is essentially unvarying in intensity." See Letter from Frank Berndt, Chief Counsel, NHTSA, to United Sidecar Association, Inc. (Feb. 9, 1982). A device may fail to meet this requirement where the driver "would not see a signal that was consistent or reliable in its meaning." See Letter from Paul Jackson Rice, Chief Counsel, NHTSA, to Bob Abernathy, Idea's Inc. (Sept. 7, 1990) (applying steady burning in a taillamps context). In the context of a modulating motorcycle headlamp, we have stated that "there is no failure to conform if the modulating light from the lamp is perceived to be a steady beam." Letter from John Womack, Acting Chief Counsel, NHTSA, to Joe De Sousa (March 10, 1994).

⁵ See Letter from John Womack, Acting Chief Counsel, NHTSA, to Nancy Tavarez, Beatrix Industries (Aug. 30, 1995) (clarifying application of Part 564 to replaceable headlamp bulbs).

Discussion

Pursuant to FMVSS No. 108, paragraphs S4 and S10.14, LEDs are allowed to be used as a light source in integral beam headlamps as long as the headlamp conforms to all applicable headlamp requirements in FMVSS No. 108. However, LEDs are not currently permitted in a replaceable bulb headlamp. Nevertheless, illegal LED headlamp replaceable light sources may be available for purchase on the internet, and although these lights do not conform to the requirements of FMVSS No. 108, some consumers purchase and install these LED light sources in their replaceable bulb headlamps. While NHTSA regulates the manufacture and sale of light sources, it generally does not regulate the modifications individuals make to their own vehicles. It is therefore left to State law to address installation of an LED replaceable light source in a headlamp.

FMVSS No. 108 does not directly regulate what you describe as peak luminance as measured in nits or the spectral power distribution of the headlamp light source. However, this is indirectly regulated through the headlamp performance requirements, such as the photometry and chromaticity requirements. Additionally, flicker is regulated through the requirement that lower beam headlamps be steady burning. We also note that, although FMVSS No. 108 requires that the light emitted by headlamps be white, the permissible boundary of white includes colors that may be perceived by the human eye as white with a yellow tint and white with a blue tint.⁶

In your communications, you raise concerns about the health impacts of LED headlamps. We are aware of concerns raised about possible adverse effects of certain LED devices, particularly as used in street lighting that emits excess blue light.⁷ NHTSA's focus is on automotive safety, but the agency recognizes that separate expertise resides in sister agencies that are health-focused, such as the Food and Drug Administration.

I hope this information is helpful. If you have any further questions, please feel free to contact Eli Wachtel of my staff at this address or at (202) 366-2992.

Sincerely,



John Donaldson
Acting Chief Counsel

⁶ Letter from Frank Seales, Jr., Chief Counsel, NHTSA, to Richard Hodson, (July 4, 2000) (stating that "SAE J578c defines white by blue, yellow, green, red, and purple boundaries within a chromaticity diagram. Thus, it is possible to design a headlamp that emits a light that approaches the blue boundary and is perceived as having a blue tint but which nevertheless remains within the boundaries that define "white." These headlamps would comply with the color requirements of Standard No. 108.").

⁷ See "AMA adopts guidance to reduce harm from high intensity street lights," American Medical Association, June 14, 2016, available at <https://www.ama-assn.org/press-center/press-releases/ama-adopts-guidance-reduce-harm-high-intensity-street-lights>.



9450 SW Gemini Drive
PMB 44671
Beaverton, OR 97008
www.softlights.org

February 24, 2024

BY MAIL

Sophie Shulman, Acting Director
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Re: Petition to Set Overall Limit on Headlight Intensity

Dear Sophie Shulman,

Pursuant to CFR Title 49, Subtitle B, Chapter V, Part 552, Subpart A Petitions for Rulemaking, Defect, and Non-Compliance Orders, the Soft Lights Foundation hereby submits this petition requesting that NHTSA update FMVSS-108 to set an overall limit on low beam headlight intensity. 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

cc:
Representative Mike Thompson
Representative Mark Pocan
Representative John Garamendi

Petition to Limit Overall Low Beam Headlight Intensity

I. FMVSS-108 Table XIX-a.

NHTSA sets the standards for vehicle lighting in the Federal Motor Vehicle Safety Standard Section 108. The limits for lower beam headlight intensity are specified in Table XIX-a as shown in Figure 1.

TABLE XIX-a: HEADLAMP LOWER BEAM PHOTOMETRY REQUIREMENTS									
TEST POINT (degrees)		LOWER BEAM # 1M (LB1M)		LOWER BEAM # 1V (LB1V)		LOWER BEAM # 2M (LB2M)		LOWER BEAM # 2V (LB2V)	
		MAXIMUM PHOTOMETRIC INTENSITY (cd)	MINIMUM PHOTOMETRIC INTENSITY (cd)	MAXIMUM PHOTOMETRIC INTENSITY (cd)	MINIMUM PHOTOMETRIC INTENSITY (cd)	MAXIMUM PHOTOMETRIC INTENSITY (cd)	MINIMUM PHOTOMETRIC INTENSITY (cd)	MAXIMUM PHOTOMETRIC INTENSITY (cd)	MINIMUM PHOTOMETRIC INTENSITY (cd)
⁽¹⁾ 10U to 90U	⁽¹⁾ 90L to 90R	125	-	125	-	125	-	125	-
4U	8L & 8R	-	64	-	64	-	64	--	64
2U	4L	-	135	-	135	-	135	-	135
1.5U	1R to 3R	-	200	-	200	-	200	-	200
1.5U	1R to R	1,400	-	1,400	-	1,400	-	1,400	-
1U	1.5L to L	700	-	700	-	700	-	700	-
0.5U	1.5L to L	1,000	-	1,000	-	1,000	-	1,000	-
0.5U	1R to 3R	2,700	500	2,700	500	2,700	500	2,700	500
H	V	5,000	-	5,000	-	-	-	-	-
H	4L	-	135	-	135	-	135	-	135
H	8L	-	64	-	64	-	64	-	64
0.5D	1.5L to L	3,000	-	-	-	3,000	-	-	-
0.5D	1.5R	20,000	10,000	-	-	20,000	10,000	-	-
0.6D	1.3R	-	-	-	10,000	-	-	-	10,000
0.86D	V	-	-	-	4,500	-	-	-	4,500
0.86D	3.5L	-	-	12,000	1,800	-	-	12,000	1,800
1D	6L	-	1,000	-	-	-	1,000	-	-
1.5D	2R	-	15,000	-	15,000	-	15,000	-	15,000
1.5D	9L & 9R	-	1,000	-	-	-	1,000	-	-
2D	9L & 9R	-	-	-	1,250	-	-	-	1,250
2D	15L & 15R	-	850	-	1,000	-	850	-	1,000
2.5D	V	-	-	-	-	-	-	-	-
2.5D	12L & 12R	-	-	-	-	-	-	-	-
4D	V	7,000	-	10,000	-	-	-	-	-
4D	4R	12,500	-	12,500	-	12,500	-	12,500	-
4D	20L & 20R	-	-	-	300	-	-	-	300

⁽¹⁾ These test points are boundaries, intensity values within this boundary must meet the listed photometry requirement.

Figure 1 - Table XIX-a Headlight Intensity for LB2V

The second to last column labeled Lower Beam #2B (LB2V) is for modern headlights. The sub column header reads, "MAXIMUM PHOTOMETRIC INTENSITY (cd)". This column thus sets the maximum intensity limits for headlights using luminous intensity measured in candela. As can be seen in the table, there are numerous test points that have no limit. NHTSA has confirmed in writing that the dashes mean the intensity limit is infinity.

The first two columns in Table XIX-a set the measurement test points for compliance testing. The letters H and V represent the Horizontal and Vertical

midpoint of the headlight. The remaining test points are degrees to the left, right, up, or down from the H,V test point.


As can be seen in the table, there is no intensity limit for many locations. For example, there is no limit for the middle of the headlight, there is no intensity for 4 degrees left of the H,V point, and there is no limit on intensity from 4 degrees down and from 20 degrees left to 20 degrees right. There is no overall limit on intensity.

Due to the lack of an overall intensity limit, the extreme intensity plus the blue wavelength light used in most LED headlights is causing drivers and pedestrians to be blinded by excessive glare, putting public safety at risk. The petitioner therefore requests that NHTSA establish an overall LB2V limit on intensity.

II. Public Comments


The public has serious concerns about the safety of LED headlights. Nearly 60,000 people have signed a petition demanding the LED headlights be banned.¹ The petition contains thousands of comments describing the blinding glare, eye pain, and fear for their safety due to the use of LED headlights. The thousands of comments from this petition have been submitted to NHTSA on multiple occasions. Below are a few of the most recent safety comments about LED headlights.


¹ <https://www.change.org/p/u-s-dot-ban-blinding-headlights-and-save-lives>


 **John Arndt**
14 hours ago

It is atrocious that some people think they need excessively bright Headlights, also the lights were never approved or tested.

♡ 2


 · [Report](#)


 Write a reply... Reply


 **Robert Heimowitz**
18 hours ago

LED headlights are causing problems.

♡ 2


 · [Report](#)

 Write a reply... Reply

 **Jeremy Nyberg**
19 hours ago

Yes please. I have been in a few near-misses while being blinded by oncoming traffic.

♡ 2

 · [Report](#)

III. Glare

In the rejection letter for petition NHTSA-2022-0109, Ann Collins wrote, "NHTSA believes the current research supports that FMVSS No. 108 contains the appropriate requirements to address these areas. NHTSA agrees that glare can have a negative safety impact and believes FMVSS No. 108 addresses that issue." As shown in Figure 1, FMVSS-108 contains no overall limit on intensity, and thus Ann Collins' claim that FMVSS-108 contains appropriate requirements to address glare caused by the use of LED technology is not justified.

Ann Collins also wrote, "While LED integral beam headlamps can be made to have a smaller footprint compared to lamps that use halogen or high-

*intensity discharge (HID) light sources, which can be perceived to be more uncomfortable at closer distances, an agency report to Congress, "Nighttime Glare and Driving Performance," stated that when viewed from more than approximately 100 feet, the size of a headlamp has little impact on discomfort and that no research has identified any impact of oncoming headlamp size on the visibility of the person experiencing glare."*²

The above statement is based on a report that was delivered to Congress in 2007, prior to the widespread introduction of LED headlights. In that glare report to Congress, NHTSA writes, "New headlamp technologies (e.g., light emitting diodes), even newer than HID and projector headlamps, are beginning to be introduced on vehicles in the United States." and "Indeed, new headlamp systems may aid in reducing the tradeoff between visibility and glare by allowing systems to respond dynamically to the driving situation. At the same time, these dynamic headlamp systems will present new challenges for regulation of vehicle lighting."

Thus, at least as far back as 2007, NHTSA was aware that the impacts of LED headlights needed study and that regulation of LED technology was a requirement. Yet rather than notify the automakers that they were required to comply with 5 U.S.C. 551-559 and petition NHTSA for authorization to sell vehicles with LED headlights and provide proof to NHTSA that LED headlights were safe, NHTSA took no action. Previous petitions by the automakers for modifications to FMVSS-108 required approximately a decade for NHTSA to study the new technology and eventually grant approval of the petition. In the case of LED headlights, the entire regulatory process was skipped, with LED headlights simply appearing on roadways with no regulation at all, putting public safety at risk.

LEDs emit extremely intense light from a tiny flat surface area. Ann Collins wrote that the size of the headlamp has little impact on discomfort and that no research has identified any impact of oncoming headlamp size on the visibility of the person experiencing glare. This statement is based on the 2007 report that NHTSA acknowledges does not include LED headlights. Given that LEDs have drastically different spatial, spectral, and temporal characteristics as compared to a tungsten filament, it is inappropriate for NHTSA to claim that the size of the emitter has little impact on discomfort or disability glare, and it is inappropriate to claim that no research has identified issues with glare from LED headlamps because the studies have not yet been performed. NHTSA has not studied the impacts of glare from LED headlights and has not published the required performance standards for LED headlights which would place a limit on intensity and blue wavelength light.

² https://www.nhtsa.gov/sites/nhtsa.gov/files/glare_congressional_report.pdf

IV. Requested Action

1. Update FMVSS-108 Table XIX-a LB2V to set an overall maximum limit for intensity for any point in space at 100 feet from the source. The overall maximum should be 20,000 candelas, or another value that NHTSA determines ensures the comfort, health, safety, and civil rights of any oncoming driver, pedestrian, bicyclist, wheelchair user, child, and all others, and which meets US Food and Drug Administration requirements for protection of photobiological, neurological, psychological, and hormonal safety for Visible Light radiation emitted by an electronic product.