



February 27, 2022

BY EMAIL

Steven Croley, General Counsel
Ford Motor Company
scroley@ford.com

Re: LED Flashing Lights

Dear Steven Croley,

The Soft Lights Foundation has notified Ford previously about the toxicity, hazards, and discriminatory nature of LED lighting on vehicles. We are now following up with additional information.

Eye Damage

Warnings

Shown below are the warning labels for several LED products, alerting the operator that LEDs can cause momentary blindness, eye damage, and vision loss, even at a distance. Ford uses similar LED devices in their car and truck headlights that are pointed directly or nearly directly into the eyes of babies, children, adults, the elderly, and wildlife.

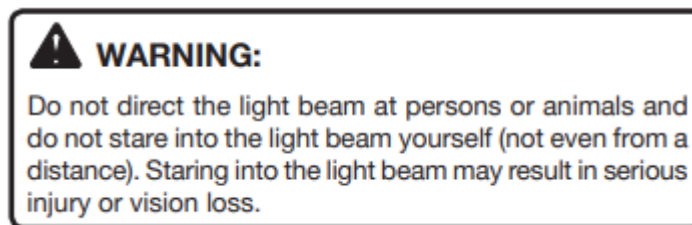


Figure 1 - Ryobi LED Warning

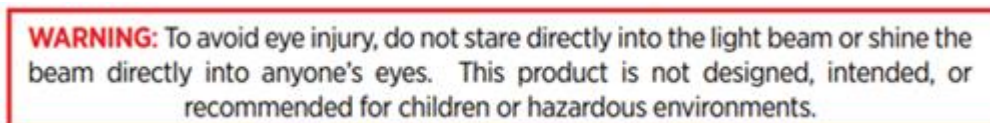


Figure 2 - GearLight LED Warning



Figure 3 - Whelen Engineering LED Warning¹

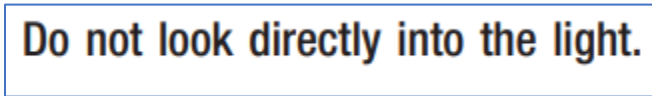


Figure 4 - Feit Electric LED Warning²

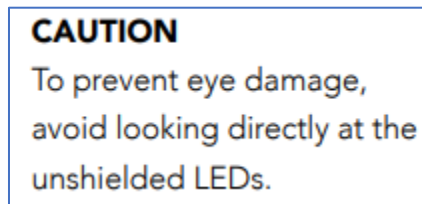


Figure 5 - Hydrobuilder LED Warning³

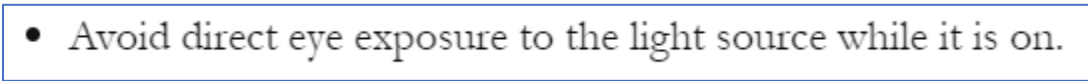


Figure 6 - Acuity Brands LED⁴

We reviewed the Owner's Manual for the 2022 Ford Bronco⁵ Figure 7 is a warning about the Daytime Running Lamp system, noting that the headlamps should be switched on during low visibility conditions. What is missing, though, is the warning that those same headlamps will cause temporary blindness, loss of vision, and eye damage to oncoming drivers and pedestrians.

¹ <https://www.whelen.com/wp-content/uploads/2020/08/14555.pdf>

² https://www.feit.com/wp-content/uploads/2019/09/LED56FP_927_MANUAL.pdf

³ <https://hydrobuilder.com/media/pdf/instructions/ROI-E720-user-manual.pdf>

⁴ https://img.acuitybrands.com/public-assets/catalog/753016/epanl-instruction-sheet.pdf?abl_version=12%2f06%2f2021+12:23:30&DOC_Type=Installation_Instruction_Sheets

⁵ https://www.fordservicecontent.com/Ford_Content/Catalog/owner_information/2022-Ford-Bronco-Owners-Manual-version-1_om_EN_USA_10_2021.pdf

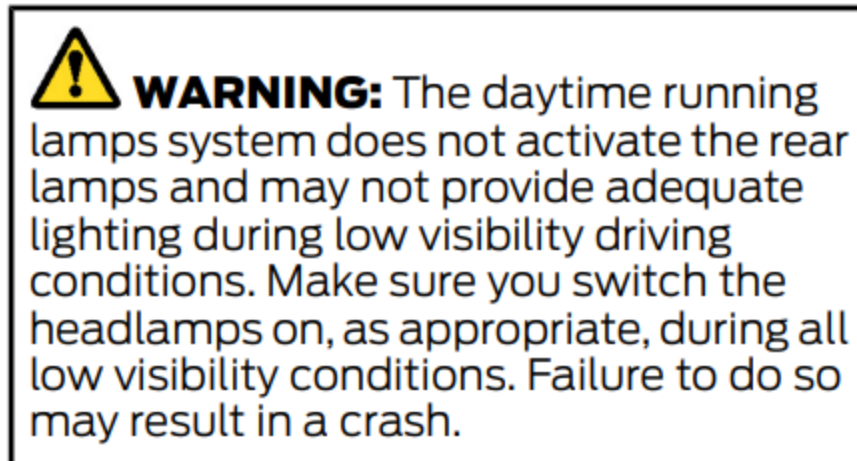


Figure 7 - Ford DRL Warning⁶

Figure 8 warns the operator that they may need to override the system when approaching other road users. The warnings do not explain why an override is necessary. Given that Ford uses LED headlights that cause loss of vision, temporary blindness, and eye damage, it is apparent that users must not use the LED headlamp system at all.

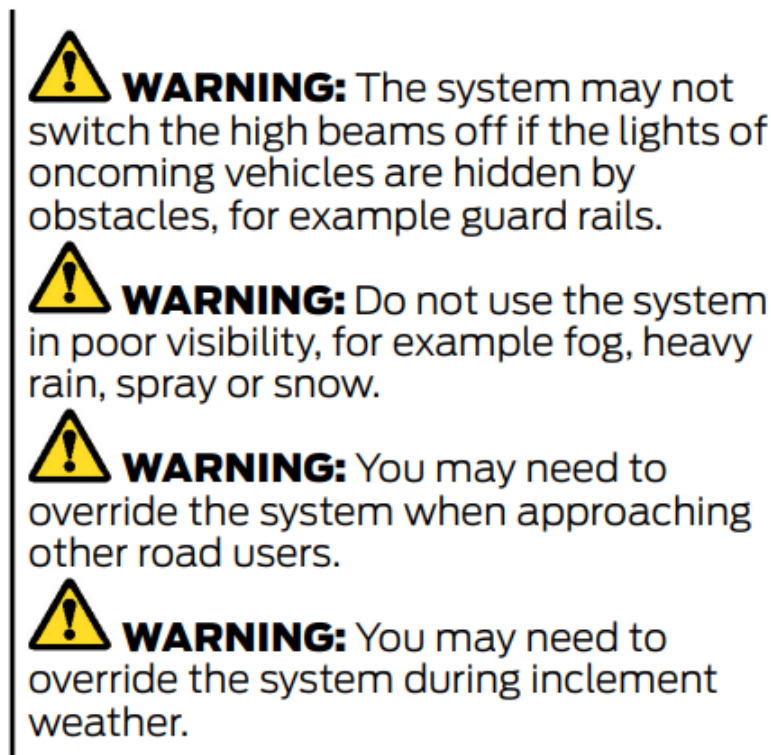


Figure 8 - Ford Headlight Warnings

⁶ https://www.fordservicecontent.com/Ford_Content/Catalog/owner_information/2022-Ford-Bronco-Owners-Manual-version-1_om_EN_USA_10_2021.pdf

We saw no warning in the entire 562-page Ford Bronco user manual that details the momentary blindness, loss of vision, eye damage, or psychological assault caused by Ford’s use of LED headlamps, even though other manufacturers have issued these warnings about their products that use LED lighting systems. Does Ford claim that their LED headlight systems do not cause loss of vision, do not cause eye damage, do not cause momentary blindness, and do not cause psychological trauma? Does Ford disagree with the warnings from other manufacturers that use LEDs?

Medical Research

Ophthalmologists have reported that their patients are reporting glare and double vision from LED headlights.⁷ A quote from the news article states, “Increasingly, ophthalmologists are getting complaints from patients about glare from LED (light emitting diode) bulbs commonly being used as headlights in vehicles.” Note that the article states that these complaints are increasing.

The information in Figure 9 states that “retinal damage can occur when the eye is exposed to high luminance.”

Health effects [\[edit \]](#)

Further information: Laser safety

Retinal damage can occur when the eye is exposed to high luminance. Damage can occur because of local heating of the retina. Photochemical effects can also cause damage, especially at short wavelengths.

Figure 9 - High Luminance Causes Retinal Damage⁸

As of 2013, Hella’s LED headlights had reached peak luminance of 70,000,000 candela / m², as shown in Figure 10. As per the chart in Figure 11, the maximum visual tolerance is 50,000 candela / m².

3 LED HEADLIGHTS ADVANTAGES: COMPARISON

LEDs are superior in several aspects. They might be more expensive to purchase than normal light bulbs or halogen bulbs, but their use pays for itself in a short time. The automotive industry in particular uses the positive features of the LED and employs it increasingly in new vehicles due to the following advantages:

Light Source	Luminous flux [lm]	Efficiency [lm/W]	Colour temperature [K]	Luminance [Mcd/m2]
Conventional bulb W5W	~ 50	~ 8	~ 2700	~ 5
Halogen bulb H7	~ 1100	~ 25	~ 3200	~ 30
Gas discharge D2S	~ 3200	~ 90	~ 4000	~ 90
LED 2.5 Watts	~ 120 (2010) ~ 175 (2013)	~ 50 (2010) ~ 70 (2013)	~ 6500	~ 45 (2010) ~ 70 (2013)

Figure 10 - Headlight Luminance⁹

⁷ <https://outline.com/yxTUzE>

⁸ <https://en.wikipedia.org/wiki/Luminance>

⁹ Hella - <https://www.hella.com/techworld/us/Technical/Automotive-lighting/LED-headlights-833/>

3.2 Typical Values of Luminance

Light Source	Luminance, candela per square metre
Sun	1.6×10^9
Arc lamp	1.5×10^8
Metal halide lamp	5.3×10^6
Clear incandescent lamp, filament	2×10^6 to 2×10^7
Frosted incandescent lamp	50000 to 400000
Low pressure sodium lamp	75000
Maximum visual tolerance	50000
Cloud (sunny day)	35000
Fluorescent lamp	12000 to 14000
White illuminated cloud	10000
60 watt soft-white bulb	10000
Surface of moon	1000
Metal-halide flood lamp	500
Convenience store sign	150
White paper under lamp	30 to 50
Television screen (CRT)	9
Neon lamp	8
Candle	7.5
Clear sky	3 to 5
Moon	2.5
White paper lit by candle at one foot	0.29
Dark sky reserve (proposed)	0.1
Night sky	0.001
Threshold of vision	0.000003

Sources: [32], [7]

Figure 11 - Point Source and Reflected Light Luminances¹⁰

The research article [What is a Photobiological Safety Standard?](https://www.atecorp.com/atecorp/media/pdfs/data-sheets/tektronix-j16_application.pdf)¹¹ Is a discussion of IEC 62471 and concern about eye damage from LEDs and the classification groups Risk Group 0, 1, 2 and 3. We see no indication on Ford's website that Ford has addressed the issue of photobiological safety when exposed to Ford LED headlights. What is the amount of thermal and chemical eye damage caused by exposure to Ford's LED headlights and how does this damage accumulate over time?

¹⁰ https://www.atecorp.com/atecorp/media/pdfs/data-sheets/tektronix-j16_application.pdf

¹¹ <https://firefliier.com/what-is-photobiological-safety-standard/>

Ford's failure to prominently notify the public of the dangers of exposure to Ford LED headlights is a liability for Ford. We have posted links to additional research articles on this topic on our website.¹²

LED Glare

The Ford.com homepage has a video promoting Ford's switch to electric vehicles. The video prominently shows the Ford electric vehicle using the same LED lighting systems that other manufacturers have placed labels on, warning about momentary blindness, eye damage, and vision loss, and warning users not to shine these lights directly into the eyes of a person. Yet, Ford's video clearly and prominently shows the LED headlights and C-shaped lightbar shining directly into the eyes of the viewer.



Figure 12 - 2022 Ford Electric Truck¹³



Figure 13 - Ford Electric Truck Closeup

¹² <http://www.softlights.org/human-health/>

¹³ Ford Homepage 2-26-2022 – www.ford.com

Ford's video of the truck, with the blinding glare and harsh white light, contrasts with the soft orange indirect light of the house being powered by the Ford truck. Ford is conveying the warmth of home with soft orange lighting, and the assaulting power of the truck with harsh blue/white. We know that this imagery is no accident.



Figure 14 - House in Ford Commercial

We did not see any warning on the video from Ford notifying owners that they should not shine these LED headlights directly into anyone's eyes. We did not find any warnings on Ford's website notifying the public that Ford LED headlights cause eye damage.

Consider the photo of tungsten filament headlights as shown in Figure 15. The photo shows the yellowish color and low glare of the tungsten headlights providing sufficient illumination for the driver, without blinding the oncoming bear, deer, driver, or pedestrian with dangerous glare and excessive luminance.



Figure 15 - Tungsten Filament Headlights¹⁴

¹⁴ <https://www.usautosales.info/blog/pros-and-cons-of-halogen-and-led-headlights/>

On the other hand, Figure 16 is an example of the glare from the type of LED headlights that Ford uses in their vehicles. Here is a link to a video showing the oncoming glare from different vehicles. Video: <https://youtu.be/sQHpkG7UhA>



Figure 16 - LED Headlight Glare

As can be seen in the Figure 16 photo and video, the roadway in front of the vehicle taking the video is well lit with the soft, yellow color of a tungsten filament headlight, with the entire lane filled with light, and additional light outside of the lane. While these point source lights may be bright, they do not impact the oncoming driver in nearly the same dangerous fashion as the blue/white flat surface LED headlights from the oncoming vehicle. The three major features of LED headlights that make them so dangerous are the non-uniform energy caused by the flat surface source, the 70,000,000 candela / m² peak luminance that is nearly invariant over distance, and the excessive amount of high energy, glare-causing blue wavelength light. Not visible in the photo may also be sensory or sub-sensory flicker.

Point Source versus Flat Surface Source

With the invention of lasers and LEDs, there are now two types of light sources. There are point sources and flat surface sources. The science and art of lighting that has developed over the past centuries is based solely on point sources of light. The invention of flat surface light sources requires an entirely new understanding of how flat surface light functions; this understanding is missing at Ford.

A point source, which may also be called a spherical emitter or spatially uniform emitter, exists when the energy from the light source radiates uniformly in all 3D spatial directions. The brightness of the light is approximated by luminous intensity, measured in candela.

A flat surface source, also called a Lambertian source or LED source, only emits light in the forward direction from a non-curved surface, resulting in a non-uniform (Lambertian) shape. The

brightness of this type of light is approximated by peak luminance, measured in candela per square meter, also known as nits.

The difference between a point source and a flat surface source is well known within the LED display industry, but entirely lacking within the LED illumination and auto industry. Figure 17 differentiates the two light source types.

Brightness and linearity of human vision

- **Brightness: lack of standardized scientific definition**
 - **Brightness is an attribute of visual perception and is frequently used as synonym for luminance and (incorrectly) for the radiometric term radiance**
- **For point source,**
 - **Brightness (in the photopic vision regime) can be approximated by the luminous intensity (cd)**
- **For surface source,**
 - **Brightness can be approximated by luminance (cd/m²)**
- **Standard CIE**
 - **Assumption: human vision is linear within the photopic regime**
 - **Isotropically emitting blue point source and red point source have the same luminous intensity**

445.664 (Intro. LED) / Euijoon Yoon

Figure 17 – Brightness of Two Source Types¹⁵

Figure 18 is another observation that measuring the brightness of light from a point source is different than measuring light from a flat surface source. LEDs are flat surface sources, not point sources, and must be measured by luminance, not luminous intensity.

¹⁵ Seoul National University - <https://ocw.snu.ac.kr/sites/default/files/NOTE/791.pdf>

To quantify the brightness of a source, it is useful to differentiate between point and surface area sources. For *point sources*, brightness (in the photopic vision regime) can be approximated by the luminous intensity (measured in cd). For *surface sources*, brightness (in the photopic vision regime) can be approximated by the luminance (measured in cd/m^2). However, due to the lack of a formal standardized definition of the term brightness, it is frequently avoided in technical publications.

Figure 18 - Quantifying Brightness of a Source¹⁶

Figure 19 uses the words “Lambertian source” rather than “flat surface source” because the mathematical shape of light from a flat surface follows Lambert’s Cosine Law.

Lambertian Source: A Lambertian source only radiates in one half of the full three-dimensional space, and whose intensity (per unit area of source) varies as the cosine of the angle from maximum output (which is perpendicular to the surface) [76].

Figure 19 - Lambertian Source Definition¹⁷

Figure 20 is further confirmation that LEDs are not point sources, but instead have a non-uniform shape called a Lambertian.

Historically, many LED sources have had nearly Lambertian beam distributions

Figure 20 - LEDs Approximate Lambertians¹⁸

Figure 21 discusses the mathematics of the Lambertian distribution from a flat surface emitter.

¹⁶ Rensselaer Polytechnic Institute, School of Engineering - <https://www.ecse.rpi.edu/~schubert/Light-Emitting-Diodes-dot-org/Sample-Chapter.pdf>

¹⁷ University of Capetown - https://www.crses.sun.ac.za/files/research/completed-research/other/r_solomon.pdf

¹⁸ University of Washington - <https://depts.washington.edu/mictech/optics/me557/Radiometry.pdf>

Eq. (6) is of the form $\rho = b \cos(\phi)$ in (ρ, ϕ) polar coordinates where b is a constant [14]. Eq. (1) and Eq. (6) are known as the *Lambertian* distribution, which represents the 3D light intensity distribution from a flat, differential-area emitter.

Figure 21 - A Flat Surface Emitter is a Lambertian¹⁹

There are thus two types of light sources. There are point sources, where the emitted energy is uniform in all spherical directions, and the brightness is measured via the luminous intensity metric, and there are flat surface sources, where the emitted energy is non-uniform, has a Lambertian shape, and the brightness is measured via the luminance metric. The two types of light sources are very different and cannot use the same standards or mathematical equations.

Ford has failed to recognize the difference between these two types of light sources, resulting in the sale of vehicles with dangerous flat surface LED headlights that do not comply with NHTSA FMVSS-108, and which cause momentary blindness, loss of vision, eye damage, psychological trauma, distraction, and vehicle crashes.

LED Headlight Dangers

Figure 22 is a table from Hella showing supposed advantages of LED headlights. The last column lists the peak luminance of an LED headlight in Mcd/m². The capital M stands for millions, so 70 means that Hella headlights had a peak luminance of 70,000,000 candela per square meter in 2013. We know that by 2018, LED chip makers had reached 100,000,000 candela per square meter.²⁰

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Figure 22 - Headlight Luminance²¹

Figure 22 also shows that conventional headlights were on the order of 5,000,000 candela / m². However, the chart does not specify the distance at which the 5,000,000 candela / m² was measured.

¹⁹ <https://ieeexplore.ieee.org/document/8879542>

²⁰ <https://www.laserfocusworld.com/test-measurement/research/article/16555223/nonlaser-light-sources-highluminance-leds-target-emerging-automotive-lighting-applications>

²¹ Hella - <https://www.hella.com/techworld/us/Technical/Automotive-lighting/LED-headlights-833/>

Since distance is a vital value when measuring luminance²², it would seem to be impossible to make a comparison of the luminance of a conventional bulb with an LED from this table. The key point with flat surface LED light is that the 70,000,000 candela / m² luminance will be same regardless of distance, versus the 5,000,000 candela / m² that would only be valid at a given distance and would then decrease with distance.

As a reminder, the maximum human tolerance is 50,000 candela / m², so both conventional lights and LED lights far exceed maximum human tolerance and we cannot look directly at the light. The purpose of a light source is to illuminate objects which gives rise to vision. When light sources emit light directly into the eye, vision is reduced. The use of a 70,000,000 candela / m² luminance non-uniform light source which is invariant over distance, and which is 14 times brighter than a conventional headlight and which is 1,400 times brighter than human tolerance is negligence.

There are several differences between conventional headlights and LED headlights that make LED headlights toxic, hazardous, discriminatory, and illegal.

Luminous intensity is a measure of the wavelength-weighted power emitted by a light source in a particular direction per unit solid angle, based on the luminosity function, a standardized model of the sensitivity of the human eye.²³ Luminous intensity is measured in candelas, where 1 candela is equal to the light power from 1 candle. A unit solid angle is equal to 1 steradian. There are 4pi, or about 12.6, steradians in a sphere. Therefore, luminous intensity is a measure of the power of the light through a solid angle and if the light source is uniform, then no matter what angle is selected, the luminous intensity will be the same. A luminous intensity of 70,000 candela means the light power from 70,000 candles traveling through a steradian.

As the light travels through space, the light spreads out following the inverse square law. At 1 micrometer, 1 meter, 100 meters, and 1 kilometer, the power of this light is diffused more and more, such that when the light lands on a surface, the total amount of light landing on the surface will be far greater at 1 micrometer than at 1 kilometer. Therefore, to know the total power landing on the eye, we must know the distance from the source.

Luminous intensity is used for point sources such as tungsten. It is not used for flat surface sources such as LED. Because Ford uses luminous intensity while attempting to measure brightness for LEDs, Ford is using the wrong metric.

Luminance is a photometric measure of the density of luminous intensity in a given direction. It describes the amount of light that passes through or is emitted from a particular area and falls within a given solid angle.²⁴ A density of 300 candela per square meter, which is typical of a computer display, means that the light power equates to 300 candles from 1 square meter of surface area. The surface area of the eye is about .00015m².^[25] The area of an LED is .000001m², which is smaller than the human eye. The fact that the human eye is larger than the source of the light is significant because it means

22

https://www.researchgate.net/publication/275534163_The_Impact_of_Distance_on_the_Accuracy_of_Luminance_Measurement

²³ <https://www.convertworld.com/en/luminous-intensity/>

²⁴ <https://www.convertworld.com/en/luminance/>

²⁵ <https://iovs.arvojournals.org/article.aspx?articleid=2772477>

that the entire energy of the LED will land on the eye, as LED light is extremely dense, and this density will vary little over distance.

Luminance is well known in the display industry, and displays such as on cell phones, computer monitors, and electronic billboards properly specify the luminance in candela per square meter or nits to convey the brightness of the display. Ford fails to alert the public to the luminance of its headlights so that the public can know how much eye damage is occurring when exposed to LED headlights.

Color Temperature is an imperfect value that condenses the spectral power distribution into a single number. In the table of Figure 22, the conventional headlamp is rated at 2700 Kelvin, whereas the LED headlight is rated at 6500 Kelvin. The spectral power distribution for a tungsten headlamp is shown in **Error! Reference source not found.** and the spectral power distribution for a 6500K LED headlamp is shown in **Error! Reference source not found.** Glare is caused by blue wavelength light. As is shown in the diagrams, the LED headlamp has vastly more blue wavelength light, which greatly increases glare, loss of vision, risk of eye damage, and risk of psychological disturbances.

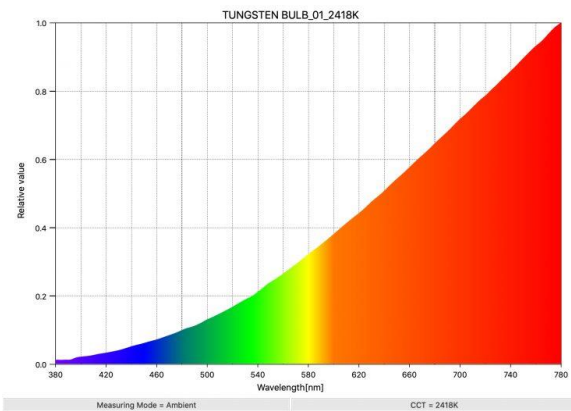


Figure 23 - Tungsten Spectral Power Distribution²⁶

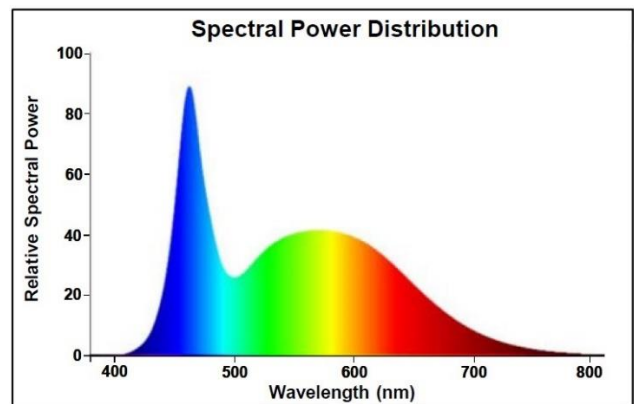


Figure 24 - Sylvania 6500K LED Spectral Power Distribution²⁷

Ford's use of high-glare LED headlights with excessive amounts blue wavelength puts drivers, passengers, pedestrians, and wildlife at risk of eye damage, loss of vision, distraction, agitation, anger, and vehicle crashes.

Flicker

LED headlight systems often produce flicker due to use of Pulse Width Modulation or other engineering techniques. This video shows the flicker on a Toyota Prius. Video: <https://youtu.be/YYhhhG4XQtQ> This flicker was not present when Ford used conventional tungsten point source headlights. Some people have enhanced senses that cause them to be able to consciously see the flicker. Whether consciously visible or not, LED flicker is associated with epileptic seizures, debilitating migraines, and other neurological reactions.

²⁶ <https://www.newsshooter.com/2020/05/11/how-do-you-get-led-lights-to-play-well-together/>

²⁷ <https://www.sylvania-lighting.com/product/en-gb/products/0027102/>

Federal Laws

Motor Vehicle Safety Act of 1966

Prior to 1966 in the USA, there were no vehicle safety regulations, and deaths from vehicle crashes were increasing dramatically. Ralph Nader led the effort to have Congress pass legislation prohibiting automakers from designing vehicles that put the public at risk of injury or death. Congress passed the Motor Vehicle Safety Act of 1966.²⁸

The Motor Vehicle Safety Act defines motor vehicle safety: *“motor vehicle safety” means the performance of a motor vehicle or motor vehicle equipment in a way that protects the public against unreasonable risk of accidents occurring because of the design, construction, or performance of a motor vehicle, and against unreasonable risk of death or injury in an accident, and includes nonoperational safety of a motor vehicle.*²⁹

LED headlights are an obvious design flaw because of the non-uniform energy and Lambertian shape of the light, the spectral power distribution with large spike of blue wavelength light, and the LED flicker. These properties create an unreasonable risk of death or injury, so LED headlights do not meet the definition of motor vehicle safety. LED headlights violate the Motor Vehicle Safety Act.

Ford’s vehicles with LED headlights violate the Federal Motor Vehicle Safety Act because they are an inherently unsafe design that puts the public at unreasonable risk of death or injury.

Americans with Disabilities Act

Because LED headlights trigger life-threatening epileptic seizures, migraines, panic attacks and other negative neurological reactions, LED headlights interfere with major life functions such as seeing, thinking, and concentrating. LED headlights prevent those with light sensitivity disabilities from accessing public services and from navigating to and from employment.

We see no indication on Ford’s website that Ford engaged with the US Access Board to ensure that their LED headlights do not discriminate. We know that the US Access Board has failed to provide guidance to the industry, but the US Access Board’s failure does not negate Ford’s requirement of selling vehicles that do not discriminate.

Ford’s vehicles with LED headlights violate the Americans with Disabilities Act.

National Highway Transportation Safety Administration

²⁸ <https://www.govinfo.gov/content/pkg/STATUTE-80/pdf/STATUTE-80-Pg718.pdf#page=4>

²⁹ https://www.law.cornell.edu/definitions/uscode.php?width=840&height=800&iframe=true&def_id=49-USC-1450788177-1380006377&term_occur=28&term_src=

Federal Motor Vehicle Safety Standards

The National Highway Transportation Safety Administration was created by the Motor Vehicle Safety Act of 1966. One of the first things NHTSA did was to create the Federal Motor Vehicle Safety Standards. Section 108 details the standards for vehicle lighting.³⁰

FMVSS-108 assumes that the light is from the human-visible part of the electromagnetic spectrum and that the light is from a point source. Microwave and x-ray portions of the electromagnetic spectrum are not covered by FMVSS-108, and flat surface sources such as light from an LED or laser beam are also not covered. This means that LED headlights do not comply with FMVSS-108 and are thus not approved for use in motor vehicles. NHTSA's failure to enforce FMVSS-108 does not relieve Ford of its requirement to comply with FMVSS-108.

Figure 25 is a diagram from Hella, a major manufacturer of LED headlights for the auto industry. It is critical to note that these diagrams do not show the non-uniform spatial energy emitted by an LED. These diagrams give the false impression that the LED light is uniform when it is not. No matter how the LED light is reflected or refracted by the optics, the light will still emerge from the headlight with exceedingly intense energy that will far exceed NHTSA regulations for maximum luminous intensity.

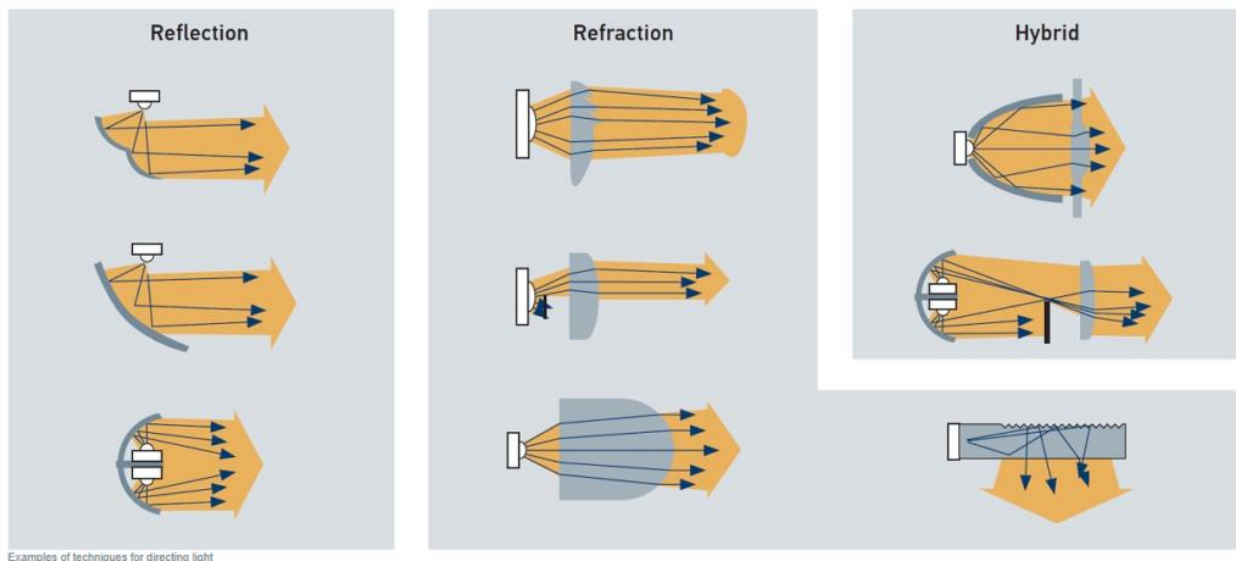


Figure 25 - Optics Diagram of LED Headlight

Ford's use of federally unapproved LED headlights makes Ford liable for the injuries and harm they cause.

FMVSS-108 Certification

We are not privy to Ford's procedures for self-certification of their headlight systems. However, we generally surmise that Ford, or its vendors, place the headlight on a bench and follow the NHTSA test procedure which calls for measuring the luminous intensity at 100 feet from the headlight.³¹ This testing procedure will produce invalid results for LED headlights because LED luminance must be measured in

³⁰ <https://www.law.cornell.edu/cfr/text/49/571.108>

³¹ https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/tp-108-13_tag.pdf

near field (approximately 1 micrometer) in a precision laboratory setting. Additional precision data must then be taken, and the luminous intensity can then be calculated.³² In all probability, this data will show that LED headlights greatly exceed the luminous intensity maximums set in FMVSS-108.

It is exceedingly likely that Ford's self-certification procedures for LED have resulted in the submission of false certification to NHTSA, both because the luminous intensity will exceed the maximums set in FMVSS-108, and because FMVSS-108 is only applicable to point light sources. Ford must notify NHTSA that its test procedures for flat surface LED headlights are invalid.

Adaptive Driving Beam

On February 22, 2022, NHTSA published the final rule for Adaptive Driving Beam headlights.³³ The final rule includes NHTSA's ADB study, which shows that ADB systems don't work. For example, ADB systems don't work on hills or when turning into parking lots. The ADB system does nothing to address the non-uniform, Lambertian shape of the LED light, the issue of the 70,000,000 nit peak luminance from LED chips, the use of 6500 Kelvin Correlated Color Temperature blue wavelength light, or the issue of LED flicker.

The ADB system that NHTSA supposedly approved is based on the use of flat surface LED headlight systems that have never been approved by NHTSA. The Soft Lights Foundation submitted a response to NHTSA's final rule on ADB to the Federal Register.³⁴ Therefore, an automaker that uses an ADB system with LED headlights will still have an unapproved, illegal headlight system. Ford is liable for the injuries these systems cause.

Crashes, Injuries, and Death

Traffic fatalities have been rising in lockstep with the auto industry's use of unapproved LED headlights. NHTSA's fatality crash report of February 2022 shows that fatality crashes increased 12% between 2020 and 2021.³⁵ While we understand that COVID-19 is possibly also a significant factor in fatality crashes for the past 2 years, the fact that fatality crashes started increasing just as LED headlights came into use, and the lack of study of the impacts of glare from LED headlights and LED flashing lights on emergency vehicles, makes it likely that LED headlights are a contributor to the approximately 40,000 American deaths each year from vehicle crashes.

Ford is liable for a portion of these injuries and deaths due to Ford's use of unapproved LED headlight systems.

³² <https://ieeexplore.ieee.org/document/8879542>

³³ NHTSA Federal Register - <https://www.federalregister.gov/documents/2022/02/22/2022-02451/federal-motor-vehicle-safety-standards-lamps-reflective-devices-and-associated-equipment-adaptive>

³⁴ <http://www.softlights.org/wp-content/uploads/2022/02/NHTSA-ADB-Final-Rule-Response.pdf>

³⁵ <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813240>



Figure 26 – LED Headlight Glare

Product Liability

A product liability lawsuit is a legal action that the plaintiff (a consumer) brings against the manufacturers, distributors, and/or retailers of a product that injured them by virtue of a defect of design, manufacture, or marketing.³⁶ The Ban Blinding Headlights petition³⁷ has tens of thousands of signatures from people who are potential plaintiffs in a product liability lawsuit against Ford. Ford's use of unapproved LED headlights that are known to cause eye damage, loss of vision, distraction, and emotional trauma, makes Ford liable. Ford's violation of the Motor Vehicle Safety Act and Americans with Disabilities Act are additional liabilities.

Style versus Safety

Ford has chosen to design and sell vehicle headlights and Daytime Running Lights based on style, rather than functionality. Ford has chosen to design and market headlight systems that appeal to buyer's desires of power and pizzazz, rather than safety. LED headlight housings are not seen by the driver, so what they look like is irrelevant in terms of safety. What is seen is the high intensity, non-uniform, and excessive blue wavelength light emitted by the LED headlights and this is not safe.

Ford's use of 6500K LED headlights with excessive amounts of blue wavelength light is causing short term and long-term permanent eye damage. We have seen nothing on Ford's website that shows

³⁶ <https://www.gacovinolake.com/product-liability/what-is-a-product-liability-lawsuit>

³⁷ <https://www.change.org/p/u-s-dot-ban-blinding-headlights-and-save-lives>

that 6500K LED headlights are safe for the eyes. This makes Ford negligent for failing to ensure that their products are safe.

NHTSA has studied Daytime Running Lights and found no reason for their use.³⁸ The analysis found that DRLs have no statistically significant overall effects on the three target crashes. This study was performed in 2008, prior to the use of flat surface LEDs by Ford. In other words, Ford has chosen to add a feature which uses unapproved LED technology, distracts drivers, and causes negative neurological responses for the purpose of adding “style” and for complying with the laws of Canada. Ford would be smarter to comply with the laws of both the USA and Canada when designing and selling their vehicles. LED Daytime Running Lights are a dangerous product.

We know of no studies that show that LED headlights are better at protecting driver and pedestrian eyes than tungsten. Does Ford have any studies showing that Ford’s switch to LED headlights has improved overall public health and safety? Everything we have read shows the opposite.

Civil Rights and Discrimination

LED headlights violate the fundamental civil right of humans to be able to see, think, and concentrate, and their freedom to be able to use their eyes to look in any direction.

LEDs are known to trigger life-threatening epileptic seizures, migraines, and panic attacks because the non-uniform energy, the unnatural spectral power distribution, and the flicker combine to overload the human nervous system. Some of these stories have been shared publicly.³⁹

Ford is liable for these violations of civil rights and for the discrimination that Ford’s LED headlights cause.

Petition

NHTSA states that they received over 5,000 comments about glare from halogen headlights. NHTSA has not stated how many comments they have received about glare from LED headlights, but over 30,000 people have signed a petition and provided comments.⁴⁰ Below are a few of the comments on the petition, showing that by using flat surface LED headlights in their vehicles, Ford has created dangerous conditions.



Makaila Carpenter

2 days ago

I have an astigmatism and these LED headlights make driving dangerous and nearly impossible.

³⁸ <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811029>

³⁹ <https://www.softlights.org/stories/>

⁴⁰ <https://www.change.org/p/u-s-dot-ban-blinding-headlights-and-save-lives>



Linda Kelly

3 days ago

Lights blind other drivers and cause deaths and accidents



Tina Dougherty

3 days ago

I totally agree with this petition. I don't like driving at night for this reason! It is so dangerous for these lights to be used as headlights.



Ruth MacGabhann

3 days ago

These lights are blinding and make driving in the dark very difficult!



Vanessa Herrera

4 days ago

I have to pull over every time someone with led headlights comes towards me. If I look at their lights, I'm blinded for several minutes



Wilmot Price

6 days ago

I have been blinded by these kinds of lights many times.



Louise Dell

1 week ago

I have been blinded far too many times by these lights and have had many near misses! In the dark they dazzle you, and then you can't see properly for minutes after



Christen Croft

3 weeks ago

I wholeheartedly agree. It's dangerous! When they are coming toward me in a narrow dark road at night, some headlights are so blinding and I have to hope for the best until the other vehicle passes. When they are directly behind me, I have to fold my rearview mirror up (which is dangerous in and of itself, but still less so than not doing it) so that I can see on front of me and that only helps so much, since the glare from them are still blinding me from my sideview mirror. I don't understand why this has been allowed to become such an issue, in the first place. I hope this will save some lives.



ryan hansmann

3 weeks ago

I am a professional driver and the harsh white light makes working dangerous and hard to see while driving at night.



Kenneth Moya

4 weeks ago

We're in Southern California where there's streetlights every 15 feet. You don't need these here, and we NEED to be able to see in front of us instead of using both hands to block the rear and side view mirrors when you're behind us.



Jenny Isadore

4 weeks ago

LED head lights are blinding and very dangerous. Especially at night in the rain when you can't see the lines on the road or anything in front of you because you're blinded by LED head lights.

Summary

Based on the evidence provided above, Ford must take the following actions:

- 1) Train all staff and leadership on the differences between point sources and flat surface sources of light and how these differences impact eyes and nerves.
- 2) Train all Ford staff and leadership to understand that shining non-uniform light at a person violates their civil rights.
- 3) Collaborate with the US Access Board to develop guidelines that ensure that vehicle lighting does not discriminate.
- 4) Update all design software, test procedures, and legal documents to differentiate between point sources and flat surface sources of light.
- 5) Circulate the Ban Blinding Headlights petition to all Ford employees, contractors, and vendors for signatures and comments to demand that NHTSA regulate LED lighting.
- 6) Recall all Ford vehicles with LED headlights, Daytime Running Lights, brake lights and taillights, as they are dangerous products that do not comply with NHTSA FMVSS-108.

Sincerely,

Mark Baker

Mark Baker

President

Soft Lights Foundation

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