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Docket Management Facility
U.S. Department of Transportation
1200 New Jersey Avenue S.E.
West Building Ground Floor, Room W12-140
Washington, D.C. 20590

Submitted via www.regulations.gov

**Comments of Consumer Reports to the
National Highway Traffic Safety Administration on the
Notice of Proposed Rulemaking – Federal Motor Vehicle Safety Standards: Lamps,
Reflective Devices, and Associated Equipment
Docket No. NHTSA-2018-0090**

Consumer Reports (CR), an independent, nonprofit member organization that works side by side with consumers for truth, transparency, and fairness in the marketplace,¹ welcomes the opportunity to submit written comments to the National Highway Traffic Safety Administration (NHTSA) regarding the notice of proposed rulemaking to amend federal motor vehicle safety standard (FMVSS) No. 108: Lamps, reflective devices, and associated equipment. This proposal would alter FMVSS No. 108 to permit manufacturers the option of equipping vehicles with adaptive driving beam (ADB) technology, which actively modifies the headlamp beams to provide more illumination while not subjecting other drivers to excessive glare.² The proposal also would establish performance requirements intended to ensure the safe introduction and operation of ADB headlighting systems if they are equipped on newly manufactured vehicles.

On the basis of research and testing of current headlamps on U.S. vehicles by Consumer Reports and other organizations; the recommendation by the National Transportation Safety Board for NHTSA to allow adaptive headlight systems;³ our understanding of ADB technology already on roads in Europe; and the evidence presented by NHTSA as a part of its notice of proposed rulemaking; Consumer Reports supports allowing ADB headlighting systems to be introduced on new vehicles in the United States. We agree with NHTSA that ADB technology likely enhances safety both by providing variable illumination sculpted to account for traffic on

¹ Founded in 1936, Consumer Reports uses its dozens of labs, auto test center, and survey research center to rate thousands of products and services annually. CR works together with its more than 6 million members for a fairer, safer, and healthier world, and reaches nearly 20 million people each month across our print and digital media properties.

² In this notice, NHTSA grants a 2013 petition for rulemaking by Toyota seeking this action. See Docket No. NHTSA-2013-0004. Other entities, including BMW and Volkswagen, also made similar requests since that time.

³ National Transportation Safety Board, *Special Investigation Report: Pedestrian Safety*, NTSB/SIR-18/03 at 21.

the road and by increasing usage of the greater illumination traditionally provided by upper beams, which are underutilized by drivers.

In general, NHTSA's proposed amendments to equipment requirements in FMVSS No. 108 are sensible changes that would provide performance requirements that would allow ADB systems onto new U.S. vehicles while ensuring that they meet appropriate glare limits and visibility requirements currently applicable to lower beam and upper beam headlamps. As NHTSA completes rulemaking to amend FMVSS No. 108 and as ADB-equipped vehicles enter the U.S. marketplace, we urge NHTSA to collect information from manufacturers that would allow the agency to continue improving its understanding of the effects of ADB technology on motor vehicle safety and to strengthen and fine-tune requirements under FMVSS No. 108 as may be necessary. This would include evaluating the opportunities and risks of systems with particular abilities to detect, identify, and respond to pedestrians, cyclists, and other more vulnerable road users.

Background

Current headlamp performance and utilization of upper beams is inadequate, leaving consumers at greater risk of a crash at night and in other low-light conditions. Since 2004, Consumer Reports has been evaluating headlight performance on its tested vehicles.⁴ Data for current vehicles in CR's tests—representing 359 vehicles tested from model years 2013 through 2018—demonstrate several key findings:

- CR's headlight testing has found that the average lower beam headlights provide a seeing distance of approximately 300 feet. This average includes tested vehicles with each of the three main types of current headlights: halogen, high-intensity discharge (HID) and light emitting diode (LED).
- Dry braking distances from CR's brake distance tests for those same vehicles (from 60 mph on dry asphalt) resulted in an average stopping distance of 132 feet. CR estimates that it takes, on average, approximately 308 feet to see, react to, and stop for another vehicle, pedestrian, animal, or object ahead on the roadway when traveling at 60 mph.⁵
- In inclement weather, the average lower beam seeing distances would be expected to decrease, while average braking distances would be expected to increase—further exacerbating the disparity. Average wet braking distances for the same 359 vehicles we tested averaged 143 feet, from 60 mph on wetted asphalt surfaces.
- Meanwhile, average upper beam (high beam) performance in CR's headlight testing resulted in seeing distances of approximately 550 feet.

⁴ Consumer Reports' headlight test course is based on visibility of target signs placed at 50-foot intervals on a flat test course. Tests are conducted at night in moonless conditions with no precipitation. Visibility is based on a jury rating from two observers seated in the subject test vehicle on how many signs are clearly visible. All vehicles have headlights vertically aligned prior to visibility tests.

⁵ Consumer Reports calculated this estimate based on a 60 mph initial speed, an estimated 2.0 second reaction time, and an average 132-foot braking distance.

Based on our test results, current lower beam technology does not provide sufficient visibility given current average vehicle dry and wet braking capabilities. In addition, according to IIHS's most recent test results, only 32 of 165 evaluated vehicle models (or 19%) have headlamps available that IIHS rates "good," and even then, "most good-rated headlights are optional or bundled with features that can raise the price of the vehicle," rather than coming standard.⁶ With regard to upper beams, the added 250 feet of visibility that can be provided by the average upper beam technology has the potential to significantly improve a driver's ability to avoid obstacles ahead of them on the road. However, results from research regarding the use of upper beams in the U.S. market suggests that drivers do not use their upper beams as often as would be prudent, with measured and observed upper beam use rates of 42% and 50%, respectively.⁷

Technologies like ADB systems—which provide the advantages of upper beam seeing distances and, effectively, improve the rate of upper beam utilization—would likely improve drivers' ability to see and avoid objects in their forward path. It is time for adaptive driving beams to come equipped on new vehicles for sale in the United States.

Comments and Recommendations

On the basis of the foregoing discussion and the evidence presented in NHTSA's proposal, Consumer Reports generally supports NHTSA's proposal for amending equipment requirements in FMVSS No. 108, which would help address the need for systems that provide drivers with greater seeing distances and reduce the frequency of crashes. We provide the following additional comments:

- **ADB technology likely enhances safety.** We agree with NHTSA on the safety benefits that consumers on the road are likely to see from the introduction of ADB headlighting systems: (1) greater illumination of the road compared to existing lower beams, with a variable, sculpted pattern that avoids glare affecting other drivers; and (2) increased upper beam usage when there are no other vehicles present, which would help drivers avoid crashes in low-light conditions, particularly those involving pedestrians, cyclists, animals, and roadside objects.
- **Amending FMVSS No. 108 is necessary to allow ADB systems on a permanent basis.** We agree with NHTSA that at least some current lower beam photometry requirements do not appear to allow the enhanced beam that ADB technology provides. Accordingly, we generally support the proposed changes to equipment requirements that would permit ADB systems to operate on a permanent basis. (We note that the general exemption

⁶ Insurance Institute for Highway Safety, "NIGHT VISION: Headlights improve, but base models leave drivers in the dark," *Status Report*, Vol. 53, No. 8 (Nov. 29, 2018) (online at www.iihs.org/iihs/sr/statusreport/article/53/8/1).

⁷ JM Sullivan, et al., *High beam headlight use on unlighted rural roads*, University of Michigan Transportation Research Institute (Mar. 2004) (online at: journals.sagepub.com/doi/abs/10.1191/1477153504li104oa).

process under 49 U.S.C. § 30113 could permit ADB systems on a temporary basis, as several pending petitions urge.⁸)

- **ADB systems should be subject to appropriate performance requirements.** In its current proposal, NHTSA seeks to enhance safety by allowing ADB systems on new cars and by setting appropriate performance requirements for them. Consistent with this goal, we generally support NHTSA’s proposal to apply several FMVSS No. 108 provisions and several analogous provisions to ADB technologies, including glare limits, visibility requirements, and several existing semiautomatic beam switching device requirements (in addition to the bulk of existing requirements under FMVSS No. 108). The exact requirements NHTSA selects should be determined on the basis of what would provide the greatest visibility while minimizing excessive glare. To address a few subjects in particular:

- *Glare limits:* We generally support NHTSA’s proposal to require that the part of the adaptive beam that is cast near other vehicles not exceed the current low beam illuminance maxima, and the part of the adaptive beam that is cast onto unoccupied roadway not exceed the current upper beam illuminance maxima, unless and until the agency receives data indicating that alternative requirements would better serve safety. Although this approach differs from recommended practice in SAE J3069,⁹ which does not cap the illuminance of the adaptive beam directed toward unoccupied roadway at the current upper beam maxima, it is sensible to maintain this limit for glare prevention purposes unless safety data dictates otherwise.

We support NHTSA’s proposal to consider exceedance of glare limits to be a noncompliance, except in the case of momentary spikes. Ongoing and forthcoming research regarding glare, including research into glare dosage, exposure, or perceptibility, may yield findings that prompt further amendments or a more granular approach to glare limits in the future.

- *Visibility for the driver of the vehicle with ADB:* To ensure a vehicle’s ADB system provides sufficient visibility for the driver, we support applying the existing photometry tests to the ADB system, unless and until the agency receives data indicating that alternative test requirements would better serve safety. This would help ensure that the ADB beam always provides at least a minimum level of light, even as it dynamically changes, including because of the presence of other vehicles.

⁸ See NHTSA, “BMW of North America, LLC-Receipt of Petition for Temporary Exemption From FMVSS No. 108 for Adaptive Driving Beam; BMW of North America, LLC and Volkswagen Group of America-Request for Certain Information To Support Petitions for Adaptive Driving Beams,” 83 Fed. Reg. 12650 (Mar. 22, 2018) (online at www.federalregister.gov/d/2018-05772).

⁹ SAE International, *SAE J3069_201606, Surface Vehicle Recommended Practice; Adaptive Driving Beam* (June 2016) (online at www.sae.org/standards/content/j3069_201606).

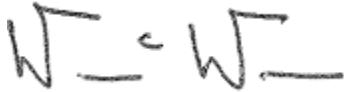
- *Several current semiautomatic beam switching device requirements:* Currently, S9.4.1 of FMVSS No. 108 includes several requirements specific to vehicles equipped with a semi-automatic means of switching between lower and upper beams. These include a manual override (“a means convenient to the driver for switching to the opposite beam from the one provided”), fail safe operation (ensuring that “failure of the automatic control portion of the device must not result in the loss of manual operation of both upper and lower beams”) and an automatic dimming indicator (“a convenient means of informing the driver when the device is controlling the headlamps automatically”). We support applying each of these requirements to ADB systems. Given the potential for unnecessary dashboard glances, we also support NHTSA’s tentative decisions not to require visual indication of the type of beam (upper or lower) an ADB system is providing at a given time, or the activation of the upper beam indicator when the ADB system (and its respective telltale indicator) is activated.
- **NHTSA’s additional operation requirements would strengthen the amended standard.** We support NHTSA’s proposal to include several additional new operation requirements for ADB systems in FMVSS No. 108 that mostly come from the SAE J3069 recommended practice.¹⁰ These include requiring ADB systems to detect system malfunctions (including sensor obstruction), notify the driver of a fault or malfunction, automatically disable the system until any detected fault is corrected, and produce a lower beam as a default any time the vehicle is traveling at a speed below 25 mph, in order to limit glare in circumstances where upper beams are not intended for use (which could be manually overridden if need be).
- **Test procedures should ensure that ADB systems properly function in a broad range of circumstances.** Given NHTSA’s proposal to have a dynamic road test for ADB systems with a select number of driving scenarios and road configurations, instead of using stationary test fixtures, we support the agency’s intention for there to be a broad range of test vehicles that would measure illuminance. This approach is reasonable to adequately ensure that ADB systems detect other vehicles, identify them, and shade them appropriately, and to do so for vehicles of different size, shape, and lighting configurations; at the same time, we urge required testing to be practical and efficient. We also support NHTSA’s intention for vehicles to be tested at tracks under a broad range of real-world conditions, including various curvatures and speeds. While we understand that the ADB systems tested by NHTSA thus far did not demonstrate that they could prevent excessive glare in hilly or undulating road conditions to any measurable degree better than a typical lower beam headlamp, we urge the agency to remain open to strengthening the standard to account for submitted data relevant to this specific issue.

¹⁰ We understand that NHTSA has drawn inspiration for several parts of its proposal from regulations overseen by the Economic Commission for Europe (ECE) and scenarios that are part of the ECE road test for ADB systems. We also understand that NHTSA cannot, by law, adopt the ECE road test as an FMVSS because it does not provide sufficiently objective performance criteria. As NHTSA indicates in its notice of proposed rulemaking, the agency has tested several ECE-approved ADB systems and believes they would be able to meet the proposed requirements and test procedures.

- **NHTSA should collect additional information about ADB systems.** In addition to the regulatory changes NHTSA is proposing, the agency should require manufacturers to submit detailed and timely information regarding the performance of ADB systems and the consumer experience with them as they are introduced. This information should be made publicly available in aggregate form, at a minimum, and include crash reduction estimates, near-miss statistics that are reasonably related to lighting, and consumer satisfaction data, including documentation of the technology's impact on glare experienced by other drivers.

Thank you for considering our comments. We thank NHTSA for the opportunity to comment on its welcome proposal to allow adaptive driving beam systems on U.S. vehicles and establish appropriate performance requirements for them. Consumer Reports looks forward to continuing to work with you to reduce traffic deaths and injuries on our roads, including in low-light conditions.

Respectfully submitted,



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