



BOSCH

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Dr. Steven Cliff, PhD
Deputy Administrator
National Highway Traffic Safety Administration
U.S. Department of Transportation
1200 New Jersey Avenue, S.E.
Washington, DC 20590

Re: Advanced Notice of Proposed Rulemaking (ANRPM) for Federal Motor Vehicle Safety Standards: Test Procedures

Docket No. NHTSA-2020-0109

Dear Deputy Administrator Cliff,

Robert Bosch LLC (“Bosch”) is grateful for the opportunity to provide its feedback to NHTSA concerning the identification of Federal Motor Vehicle Safety Standards (FMVSS) for replacement, repeal or modification for reasons other than for considerations for automated driving systems (ADS). Bosch appreciates NHTSA’s efforts to secure both public and industry perspectives on the challenges associated with vehicle testing. Bosch believes that efforts related to replacing, repealing and/or modernizing FMVSS could contribute the introduction of innovative technologies that can support the reduction of fatalities, injuries and collisions on U.S. roadways.

As a supplier of the camera(s) and relevant software to enable advanced vehicle lighting technology, Bosch’s intent is to provide NHTSA with input on FMVSS 108¹. Our objective is to focus on areas where we have specific expertise, as well as to identify potential areas of harmonization with related test procedures and/or industry standards.

Related regulations

Considering the modification of FMVSS 108, Bosch would encourage the Agency to harmonize with similar regional regulations and/or related industry standards. Harmonization with related vehicle lighting regulations, such as UNECE No. 48², would reduce the efforts associated with vehicle testing, while

¹ FMVSS 108¹: Lamps, reflective devices, and associated equipment

² UNECE No. 48: Installation of lighting and light-signaling devices



supporting the introduction of new innovative lighting technologies that can improve road safety.

Modifications to existing test procedures

The test procedures presently defined in FMVSS 108 do not enable the deployment of Adaptive Driving Beam (ADB) systems. As reflected in the prior Bosch response to the NPRM for Federal Motor Vehicle Safety Standards; *Lamps, Reflective Devices, and Associated Equipment*³, Bosch believes that ADB systems may increase the driver's field of vision without negatively impacting vision of other road users, which could help to make night driving safer and more comfortable.

Bosch is aware that NHTSA analyzed UNECE No. 48 with respect to Adaptive Driving Beam (ADB) technologies in 2015⁴. In this report, NHTSA identified United-States-relevant use cases that are not sufficiently covered by UNECE No. 48 due to unique regional infrastructure challenges, such as roadway infrastructure design and/or types of vehicles on U.S. roadways. Bosch understands that different use cases may need to be covered by FMVSS 108; however, Bosch would urge NHTSA to consider addressing these use cases without deviating significantly from related tests defined in UNECE No. 48.

Semi-Automatic High Beam switching devices

The procedure defined in S14.9.3.11⁵ of FMVSS 108 is a lab-based static assessment to test the light characteristic at the destination (e.g., the target driver), however it is not very representative of real-world scenarios encountered by traditional automatic high beam (AHB) systems. Bosch recommends that the Agency harmonize S14.9.3.11 with UNECE No. 48, which would assess the performance of the AHB system via vehicle scene-based tests, as opposed to merely lighting intensity.

UNECE No. 48 defines scene-based vehicle test procedures as opposed to solely lab-based static test procedures. For example, the requirement assesses the AHB system performance based on oncoming and proceeding vehicles and bicycles. Bosch recommends that the Agency harmonize with existing scene-

³ Docket No. NHTSA-2018-0090, Federal Motor Vehicle Safety Standards; Lamps, reflective devices, and associated equipment, 2018

⁴ Report No. DOT HS 812 174, Adaptive Driving Beam Headlighting System Glare Assessment, 2015

⁵ FMVSS 108: S12.9.3.11: Semiautomatic headlamp beam switching device tests



based vehicle testing scenarios, which are more representative of real-world conditions that the AHB system will encounter.

For example, a scene-based vehicle test scenario may consider object classification, as modern camera systems and related software are able to detect weak and/or distant light sources and classify the type of light. This may include classification of an oncoming and/or proceeding vehicle, as well as infrastructure light sources such as a streetlamp.

By assessing performance of the AHB system based purely on lighting intensity, as specified in FMVSS 108, the vehicle's real-world performance may not be optimized. More specifically, the AHB system may deactivate the high beams more frequently than needed due to reaction(s) upon infrastructure (e.g., streetlamps) or the AHB system may activate in the presence of an oncoming and/or proceeding vehicle with weak (i.e., unexpectedly low intensity) vehicle lights.

Assessing the performance of an AHB system based on real world scenarios (e.g., including object detection) could help reduce the number of suboptimal deactivations and/or activations of an AHB system. This could maximize the duration a high beam could stay activated to provide additional visibility to the driver, while still reacting appropriately to oncoming and/or proceeding vehicles to prevent glare.

Source(s) for stimulus vehicle

As currently drafted, Bosch believes that FMVSS 108 does not adequately define the type of vehicle lighting systems that will be used in the stimulus vehicle(s) cited in the test scenario(s). Bosch recommends that NHTSA specify the light source technologies that will be utilized during testing.

Bosch also urges NHTSA to consider testing different types of lighting technologies in the test scenario(s). This can include oncoming vehicles with Halogen or LED headlamps and preceding vehicles with incandescent light bulbs, LED and OLED tail lamps. This type of testing variation is more representative of real-world conditions that a vehicle equipped with an AHB system will likely encounter on the road.

In order to stay current with the advancement of headlight technology, Bosch recommends that the Agency continue to engage with the industry, as well as consider data from related publications. For example, the "Ward's Automotive Yearbook" provides information related to advanced vehicle technology and factory-installed equipment. Considering that technology related to vehicle



lighting systems has evolved significantly over the last few decades, it is critical that the test criteria be readily adaptable to accommodate future technologies.

Conclusion

Bosch commends NHTSA for its continued efforts and willingness to engage with the public and industry to replace, repeal or modify existing regulations. With regard to FMVSS 108, Bosch believes that new lighting technologies have the opportunity to increase safety, particularly when an individual is driving in low-light scenarios. Further, improved lighting of the scene in front of a vehicle can enhance the detection performance of advanced driver assistance systems.

In parallel, Bosch also applauds NHTSA for its ongoing work concerning regulatory barriers to Automated Driving System (ADS) technologies. Bosch urges the Agency to continue to efforts associated with the ANPRM for 100-series FMVSS and Notice of Proposed Rulemaking (NPRM) for 200-series in order to enable the testing, certification and deployment of ADS-equipped vehicles.

Bosch is grateful for NHTSA's consideration of our input and welcomes future opportunities to further discuss this response. If you have any questions, please do not hesitate to contact Ana Meuwissen at (202) 815-7645 or at Ana.Meuwissen@us.bosch.com.

Yours sincerely,

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