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April 8, 2022

Dr. Steven Cliff
Deputy Administrator
National Highway Traffic Safety Administration
1200 New Jersey Avenue, S.E.
Washington, D.C. 20590

RE: NHTSA Final Rule: FMVSS 108, Lamps, Reflective Devices, and Associated Equipment, Docket No. NHTSA–2022–0013, Federal Register / Vol. 87, No. 35 (February 22, 2022)

Dear Deputy Administrator Cliff:

Ford Motor Company (Ford), a domestic manufacturer and importer of motor vehicles with offices at One American Road, Dearborn, Michigan 48126-2798, submits the following petition for reconsideration on the amended FMVSS 108 standard which allows the use of Adaptive Driving Beam (ADB) headlighting systems.

Ford is supportive of actions that promote the advancement of safety and technology and appreciates NHTSA's publication of the final rule. We agree with NHTSA that ADB has the potential to reduce the risk of crashes by increasing visibility without increasing glare.[1] [2]

Ford has sold vehicles equipped with ADB headlighting systems in China and Europe for many years, and in Canada since 2020. These systems have been well-received by our customers.

Additionally, Ford supports and has participated in the development of the comments submitted by the Alliance for Automotive Innovation (Auto Innovators) and the Society of Automotive Engineers (SAE) Lighting Systems Group and incorporates those comments by reference in our response. In addition to supporting these comments, Ford is providing additional alternatives for consideration, below, related to glare limits which we believe ensure acceptable glare performance and help enable near-term utilization of ADB technology so the public can benefit from its improved lighting performance.

[1] "Such illumination, referred to as glare, can reduce the ability of other drivers to see and cause discomfort." 87 Fed. Reg. 9916 (Feb. 22, 2022).

[2] "ADB therefore has the potential to reduce the risk of crashes by increasing visibility without increasing glare. The adaptive beam is particularly useful for distance illumination of pedestrians, animals, and objects in or near the road when other vehicles are present and thus preclude use of the upper beam." *Id*. at 9919.

ADB Glare Limits

We appreciate the changes NHTSA made in the final rule, which eliminated the short right curve scenario and reduced the glare evaluation distances for the medium and large right curves and the short and medium left curves. However, we still believe there is value in reconsidering the glare limit requirements for the remaining right curve tests.

In the final rule, NHTSA explained that the final scenarios for the radii of curvature were selected based on three criteria, including, "scenarios such that a compliant lower beam would be able to pass the scenario."[3] However, with the scenarios specified in the final rule, specifically those for right curves, currently compliant lower beams may not comply with the glare limits (maximum illumination values). Appendix A provides an example of a compliant lower beam (2021 F-150) that exceeds the ADB glare requirements when evaluated for the right curve scenarios.

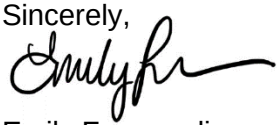
While the final rule acknowledged that "[c]urrent lower beams will produce glare on hills and undulating roads," it also explained that NHTSA believes dynamic vertical aim "could provide better glare protection than current lower beam systems" by aiming the ADB pattern "down more than a lower beam."[4] We are concerned that aiming headlamps down in right curve scenarios will negatively impact safety by reducing visibility and affect customer satisfaction. Appendix A highlights the reduction in visibility when the 2021 F-150 headlamps are aimed down three inches to meet the glare limits in the final rule. Additionally, Ford agrees with NHTSA that to comply with these glare limits on right curves, ADB headlamp systems will require additional hardware and new technology. This additional hardware and technology will add cost and complexity while also reducing driver visibility and customer satisfaction.

For these reasons, Ford recommends the agency reconsider the glare limits for right curves. After careful consideration, Ford proposes separate glare limits for right curves, based on the Insurance Institute for Highway Safety (IIHS), *Headlight Test & Rating Protocol,* to reduce glare from current standards while maintaining a high level of road visibility for drivers.[5] Appendix B provides a proposed update to Table XXI: Adaptive Driving Beam Photometry Requirements and a graphical comparison of these proposed ADB limits and current IIHS glare limits

Additionally, OEMs, like Ford, have ADB systems currently available in other markets that increase visibility without increasing glare. Given the unique right curve requirements in the final rule, none of Ford's existing systems can meet the required ADB glare limits today. If NHTSA is unable to modify the ADB final rule to align with either the SAE proposal, or the Ford alternative proposed in Appendix B, Ford requests NHTSA include a phase-in period for the right curve tests that allows ADB headlighting systems to meet the proposed right curve glare limits in Appendix B immediately, and then phase into the more stringent limits currently in the final rule over a five-year phase in period. This phase-in will allow customers to benefit from this technology sooner, while giving OEMs time to design and validate to the more stringent requirements contained in the final rule.

Ford appreciates the opportunity to provide these comments. If you have any questions regarding these comments, please contact Kathryn Howie (email: khowie8@ford.com).

Sincerely,



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[3] *Id.* at 9940.

[4] *Id.* at 9942.

[5] Insurance Institute for Highway Safety, *Headlight Test & Rating Protocol*, *Ver. III* (July 2018).

Appendix A

The table below compares the performance of the 2021 F-150 headlamps at nominal aim and the 2021 F-150 headlamps aimed three inches down.

With the aim lowered three inches, the glare on the right curves does decrease enough to nearly meet the requirements, however, it results in a significant decrease in visibility.

Curve	Attribute	Maximum Illuminance Requirement (lux)	2021 F-150 Headlamp Aim		% Difference
			Nominal	3 inches Down	
Right Medium Curve 230 m	15.0 m to 29.9 m	3.1	3.2*	2.9	-9.9
	30.0 m to 59.9 m	1.8	5.6*	1.3	-77.8
Right Large Curve 370 m	15.0 m to 29.9 m	3.1	3.1	2.8	-10.0
	30.0 m to 59.9 m	1.8	4.4*	1.1	-75.8
	60.0 m to 119.9 m	0.6	4.6*	0.7*	-85.1
Straight Road Lower Beam Seeing Distance (m)			149	89	-40.3

* indicates value exceeds maximum illuminance requirement

Appendix B

Table XXI: Adaptive Driving Beam Photometry Requirements with Proposed Changes in Blue

Table XXI: Adaptive Driving Beam Photometry Requirements [1]			
MEASUREMENT DISTANCE INTERVAL (m)	MAXIMUM ILLUMINANCE OPPOSITE DIRECTION LEFT CURVES (lux)	MAXIMUM ILLUMINANCE OPPOSITE DIRECTION RIGHT CURVES (lux)	MAXIMUM ILLUMINANCE SAME DIRECTION (lux)
Greater than or equal to 15.0 and less than 30.0	3.1	7.1	18.9
Greater than or equal to 30.0 and less than 60.0	1.8	4.8	18.9
Greater than or equal to 60.0 and less than 120.0	0.6	2.1	4.0
Greater than or equal to 120.0 and less than or equal to 220	0.3	—	N/A

Comparison of IIHS and Proposed ADB Glare Limits