



The Vehicle Suppliers Association

Comments of
MEMA, The Vehicle Suppliers Association
to the
United States Department of Transportation
National Highway Traffic Safety Administration (NHTSA)
In Response To
Request for Comment on Vestigial Vehicle Safety Regulations
Docket No. NHTSA-2026-0133
March 24, 2026

I. Introduction

MEMA, The Vehicle Suppliers Association (MEMA), respectfully submits these comments in response to the National Highway Traffic Safety Administration (NHTSA or Agency) *Request for Comment on Vestigial Vehicle Safety Regulations* within the Federal Motor Vehicle Safety Standards (FMVSS).¹ MEMA represents nearly 1,000 vehicle suppliers that manufacture lighting systems, braking systems, tires, advanced restraint systems, electric vehicle components, and other safety technologies regulated under FMVSS.

MEMA is the leading trade association in the United States for vehicle suppliers, parts manufacturers, and remanufacturers. The mobility sector depends on the resiliency and strength of suppliers, and MEMA has been the voice of the supplier industry since 1904. MEMA's members conceive, design and manufacture the technology, components, and services that enable the production of new vehicles, as well as the essential maintenance and repair of the more than 295 million highway vehicles² that are currently on the road in the U.S.

MEMA strongly supports NHTSA's effort to identify and modernize regulatory and technical requirements that no longer serve a meaningful safety purpose or that impede the deployment of modern technologies. Many FMVSS requirements were developed decades ago for vehicle architectures and component technologies that differ significantly from those in use today. While the underlying safety objectives of these standards remain essential, some individual requirements have become outdated, duplicative, or misaligned with modern engineering practices.

MEMA welcomes the opportunity to work with NHTSA on this important initiative. Modernization of these requirements can preserve safety performance while allowing innovation and improving the efficiency of regulatory compliance.

¹ Nat'l Highway Traffic Safety Admin., *Request for Comment on Vestigial Vehicle Safety Regulations*, Docket No. NHTSA-2026-0133 (2026).

² S&P Global Mobility Vehicles in Operation as of January 1, 2024. This figure includes passenger cars, light trucks as well as medium and heavy-duty trucks.

MEMA members have reviewed the NHTSA request and have identified the following standards and provisions as candidates for elimination or substantial modernization:

FMVSS	Subject	Recommended Action
105	Hydraulic and Electric Brake Systems (Regenerative Braking Interaction)	Clarify regenerative braking test procedures to ensure consistency between conditioning and performance evaluation phases.
106	Brake Hoses, Assemblies, and End Fittings	Revise and replace current brake hose whip test and water whip test with improved and more accurate/actual durability testing.
108	Lamps & Reflective Devices	Transition to performance-based glare and visibility metrics.
111	Rear Visibility	Certain prescriptive mirror dimensions and placement assumptions may be outdated. Camera systems more effective.
139/119/109	Tire Performance	Adopt UN GTR16; refine chunking definition; eliminate bead/plunger tests.
121	Air Brake Systems	Changes to make standard more technologically neutral regarding electronic controlled braking systems
135	Brake Systems	Maintain FMVSS 135 as a baseline braking standard while aligning test procedures with modern SAE methodologies and regenerative braking systems.
214	Side Impact Protection	Modernize rigid barrier/test devices assumptions.
302	Flammability of Interior Materials	Clarify applicability and adopt risk-based exemptions for low-mass and low-surface-area interior components; align with UNECE R118.
305	Electric-Powered Vehicles	Update to reflect modern lithium-ion architecture.

II. Statutory and Legal Framework - Governing Requirements Under the Safety Act

The National Traffic and Motor Vehicle Safety Act (Safety Act)³ directs NHTSA to establish motor vehicle safety standards that are practicable; meet the need for motor vehicle safety;

³ National Traffic and Motor Vehicle Safety Act of 1966, Pub. L. No. 89-563, 80 Stat. 718 (codified as amended at 49 U.S.C. §§ 30101-30183).

and are stated in objective terms.⁴ Congress also granted the Agency authority to amend or rescind standards as technology evolves.⁵ As vehicle technologies advance, including electrification, advanced lighting systems, improved tire construction, and camera-based visibility systems, it is appropriate for the Agency to evaluate whether certain legacy test procedures or design specific requirements remain appropriate.

Many existing FMVSS provisions were originally developed to address vehicle technologies prevalent several decades ago. In some cases, the testing methods embedded in these standards reflect assumptions about vehicle architecture or component design that no longer correspond to current engineering practices. Where such provisions no longer contribute meaningfully to safety outcomes, their continued application can impose unnecessary compliance costs, slow the introduction of new safety technologies,⁶ and create divergency from international regulatory frameworks.

The Safety Act expressly authorizes the Agency to amend or rescind motor vehicle safety standards when technological developments render existing provisions unnecessary or outdated. Courts have consistently recognized that the Agency possesses broad discretion to update standards to reflect evolving engineering practices and vehicle technologies.⁷

III. Criteria for Identifying Vestigial FMVSS Provisions

In evaluating potential vestigial provisions within FMVSS, MEMA recommends that NHTSA consider several factors.

First, the Agency should assess whether the requirement continues to address a measurable safety risk based on current vehicle designs and operating environments. If the requirement no longer addresses a realistic failure mode or safety concern, it may warrant revision or removal.⁸

Second, NHTSA should evaluate whether the requirement is duplicative of other regulatory provisions or modern engineering validation processes. In some cases, legacy test procedures overlap with newer requirements or with established industry validation practices that ensure safety performance.⁹

Third, the Agency should consider whether the requirement unnecessarily constrains innovation by prescribing specific design solutions rather than performance outcomes.

⁴ 49 U.S.C. § 30111(a).

⁵ 49 U.S.C. § 30111(b); 30162(a)(1).

⁶ Nat'l Highway Traffic Safety Admin., *Adaptive Driving Beam Headlamps*, Final Rule, 87 Fed. Reg. 9,918, 9,922-23 (Feb. 22, 2022) (discussing regulatory barriers to deployment of adaptive lighting technologies).

⁷ See *Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 42-43 (1983) (recognizing agency discretion in modifying safety standards).

⁸ Nat'l Highway Traffic Safety Admin., *Vehicle Safety Rulemaking and Research Priority Plan 2021-2023*, at 6-8 (2021).

⁹ Nat'l Highway Traffic Safety Admin., *Laboratory Test Procedure Framework and Validation Methodology for FMVSS*, DOT HS 812 937 (2020).

Performance-based standards generally allow manufacturers to achieve safety objectives through multiple engineering approaches while maintaining safety equivalence.¹⁰

Finally, the Agency should evaluate opportunities to harmonize U.S. standards with widely adopted international technical regulations where appropriate. Harmonization can reduce compliance burdens without reducing safety and can accelerate the availability of advanced safety technologies in the U.S. market.¹¹

Consistent with this statutory framework, MEMA recommends that NHTSA evaluate the following FMVSS provisions requiring modernization:

A. FMVSS No. 105 – Hydraulic and Electric Brake Systems (Regenerative Braking Interaction)

FMVSS 105 establishes performance requirements and test procedures for hydraulic and electric service brake systems on motor vehicles, including stopping distance, burnish (conditioning), and fade performance requirements.¹²

Member input highlights a specific inconsistency in the application of FMVSS 105 to electrified commercial vehicles equipped with regenerative braking systems. Under the current standard, the burnish (or bedding) procedure requires the regenerative braking system to be active (i.e., “ON”) during the conditioning phase of the test. However, during the subsequent stopping distance measurement portion of the test, the regenerative braking system must be deactivated. This creates a fundamental inconsistency in the test methodology. When the regenerative braking remains active during the burnish procedure, the friction brakes are not sufficiently engaged to achieve proper conditioning. As a result, the friction braking system may not be fully representative of real-world performance when evaluated in the subsequent stopping distance test with regenerative braking deactivated.

Members note that this mismatch between conditioning and performance measurement introduces variability and may not accurately reflect the operational characteristics of modern electrified braking systems. In practice, regenerative and friction braking systems are designed to operate in an integrated manner, and separating their operation across different phases of the compliance test can distort performance outcomes.

Accordingly, members recommend that NHTSA clarify or revise the test procedure to ensure consistency in the treatment of regenerative braking across both the burnish and stopping distance phases. This could include maintaining a consistent regenerative braking state throughout testing or otherwise updating the procedure to better reflect real-world system integration in electrified vehicles.

¹⁰ Office of the Federal Register, *Regulatory Impact Analysis Guidance*, Exec. Order No. 13,563, 76 Fed. Reg. 3,821 (Jan. 21, 2011).

¹¹ World Forum for Harmonization of Vehicle Regulations (WP.29), Global Technical Regulation No. 16: Tires, U.N. Doc. ECE/TRANS/180/Add.16 (2018).

¹² Federal Motor Vehicle Safety Standards; Hydraulic and Electric Brake Systems, 49 C.F.R. § 571.105.

More broadly, this issue illustrates how legacy test procedures developed for conventional hydraulic braking systems may not translate effectively to modern electrified vehicle architectures, reinforcing the need for performance-based, technology-neutral updates to FMVSS requirements.

B. FMVSS No. 106 – Brake Hoses, Assemblies, and End Fittings

Members have conveyed to MEMA that the whip resistance test and water absorption and whip resistance test required under FMVSS 106 are no longer the most accurate or current testing available for brake hose performance, particularly for motorcycle use.¹³ MEMA urges NHTSA to consider more accurate testing available which is designed to mimic more closely how brake hose assemblies on motorcycles are impacted by forces in the real world.

FMVSS 106 establishes performance and labeling requirements for brake hoses, brake hose assemblies (BHAs), and brake hose end fittings.¹⁴ Among other requirements, hydraulic BHAs must meet the whip resistance test (“whip test”) and water absorption and whip resistance test (“water whip test”). Originally only applicable to four-wheeled vehicles, NHTSA amended FMVSS 106 in 1973 to also apply to motorcycles, but in doing so, NHTSA did not explain why the FMVSS 106 requirements, including the whip and water whip tests, were appropriate for the different motions, loads, and duty cycles of motorcycle BHAs.¹⁵

The whip and water whip tests do not accurately reflect the type of movement to which BHAs are actually subjected during motorcycle usage. On motorcycles, BHAs experience one-dimensional vertical motion as the suspension travels up (bringing the BHA ends closer together) and as the suspension travels down (bringing the BHA ends farther apart). BHAs may also experience some relative motion during steering. In contrast, whip and water whip tests subject BHAs to aggressive rotational movements unlike anything experienced in real world motorcycle use. Additionally, the stresses and number of cycles in the whip and water whip tests far exceed what BHAs in motorcycles are subjected to during real-world use.

Members have indicated that other modern fatigue durability testing procedures can more accurately replicate the dynamic stresses experienced by BHAs during real-world vehicle operation. For example, a durability testing machine has been developed that can subject BHAs to the type of movement they experience on motorcycles. Updating regulatory test procedures to reflect these more representative durability assessments could improve alignment between laboratory testing and real-world performance. This would maintain the significant safety performance of BHAs while reducing unnecessary compliance burdens that come with manufacturing BHAs to withstand the whip test’s rotational motions that suppliers do not view as being reflective of real-world experience. Additionally, the new test assessing durability could use a machine that is much easier to maintain than the whip test machine, thus reducing maintenance and operating costs.

¹³ 49 C.F.R. § 571.106.

¹⁴ 49 C.F.R. § 571.106; see also SAE J1401 – *Road Vehicle Hydraulic Brake Hose Assemblies*, SAE Int’l (latest revision).

¹⁵ 38 Fed. Reg. 31,302, 31,302 pt. 571 (Nov. 13, 1973).

C. FMVSS No. 108 – Lamps, Reflective Devices, and Associated Equipment

FMVSS 108 establishes performance and design requirements for vehicle lighting equipment, including headlamps, signaling devices, and reflective elements.¹⁶ The standard plays an essential role in ensuring vehicle visibility and roadway safety.

Recent technological developments and advances in adaptive lighting systems, including Adaptive Driving Beam (ADB) headlamps, allow vehicles to dynamically adjust headlamp illumination patterns in response to surrounding traffic conditions. These systems can significantly improve nighttime visibility for drivers while reducing glare experienced by other road users.¹⁷

MEMA members have noted that certain aspects of the U.S. ADB implementation framework differ from international standards, particularly those developed by the United Nations Economic Commission for Europe (UNECE) regulations governing adaptive lighting systems.¹⁸

For example, U.S.- specific testing procedures differ from European requirements and may impose duplicative and conflicting validation burdens.¹⁹ FMVSS 108 contains highly prescriptive photometric grid and beam pattern requirements developed during the halogen headlamp era.²⁰ Modern matrix LED and ADB systems dynamically adjust light distribution in real time. Static grid-based compliance metrics may constrain systems that reduce glare and improve forward visibility. In addition, global UNECE regulations (e.g., Reg. 48 and Reg. 149) incorporate performance-based adaptive criteria not fully aligned with FMVSS 108.²¹

Industry participants have previously raised concerns through petitions for reconsideration that certain aspects of the U.S. testing approach may introduce technical complexity without corresponding safety benefits.²² These benefits include the interaction between static photometric requirements and dynamically controlled beam patterns, as well as potential inconsistencies in certain testing scenarios.²³

Members have also identified several additional technical aspects of the current U.S. testing framework that may warrant further review, including haze measurement

¹⁶ 49 C.F.R. § 571.108 (Federal Motor Vehicle Safety Standard No. 108 – *Lamps, Reflective Devices, and Associated Equipment*).

¹⁷ Nat'l Highway Traffic Safety Admin., *Adaptive Driving Beam Headlamps, Final Rule*, 87 Fed. Reg. 9,918, 9,918–9,920 (Feb. 22, 2022).

¹⁸ United Nations Economic Commission for Europe (UNECE), *Regulation No. 48: Installation of Lighting and Light-Signalling Devices*, U.N. Doc. ECE/TRANS/WP.29/2023/48.

¹⁹ Nat'l Highway Traffic Safety Admin., *ADB Headlamp Rulemaking Analysis*, 87 Fed. Reg. at 9,930–9,932.

²⁰ 49 C.F.R. § 571.108, Table XIX and associated photometric grid requirements.

²¹ United Nations Economic Commission for Europe (UNECE), *Regulation No. 149 – Road Illumination Devices (ADB Systems)*, U.N. Doc. ECE/TRANS/WP.29/2021/149.

²² Alliance for Automotive Innovation, *Petition for Reconsideration of Adaptive Driving Beam Final Rule*, NHTSA Docket No. NHTSA-2021-0008 (2022).

²³ Society of Automotive Engineers (SAE), *SAE J3069 – Adaptive Driving Beam Performance Requirements*, SAE International (2021).

considerations and the positioning requirements used during low-beam and high-beam testing procedures.²⁴ Industry engineers have noted that certain horizontal alignment and positioning assumptions embedded in legacy test setups were developed for earlier headlamp technologies and may not fully reflect the operational characteristics of modern adaptive lighting systems. Clarifying these technical parameters could improve testing consistency while ensuring that adaptive lighting technologies are evaluated based on their real-world safety performance.

MEMA encourages NHTSA to continue evaluating opportunities to clarify testing procedures and consider harmonization where appropriate. Aligning technical requirements where possible can facilitate the introduction of advanced lighting technologies while maintaining safety performance. The following examples illustrate these broader concerns in specific regulatory provisions.

Specific FMVSS 108 Technical Examples Identified by Members

MEMA members have identified several specific provisions with FMVSS 108 that illustrate how legacy design assumptions and prescriptive requirements may create unnecessary compliance burdens, constrain innovation, or diverge from international approaches. These examples are representative of broader themes discussed above and are intended to assist NHTSA in identifying areas where targeted modernization may be appropriate.

1. Prescriptive Requirements Based on Legacy Lighting Technologies

Supplier companies have indicated that certain FMVSS 108 provisions continue to reflect design assumptions developed for earlier lighting technologies and may no longer be necessary to achieve current safety objectives.

For example, minimum effective projected luminous lens area (EPLLA) requirements for rear lighting functions, including turn signals, stop lamps, and high-mounted stop lamps, were originally developed in the context of incandescent lighting systems, where larger illuminated areas were necessary to achieve sufficient visibility.²⁵ Members indicate that modern LED lighting technologies are capable of meeting all required photometric performance and visibility angles without reliance on minimum surface area requirements. As a result, EPLLA requirements may function as a design constraint rather than a safety requirement.

Similarly, reflector requirements, and particularly side reflectors, were historically intended to improve vehicle detectability in low-light conditions and mitigate angle collisions.²⁶ Members note that advances in LED lighting performance and reduced stopping distances have significantly improved vehicle conspicuity, potentially reducing the incremental safety benefit of these prescriptive reflector requirements.

In addition, current daytime running lamp (DRL) photometric minimums, such as the 500 candela requirement at the H-V test point, are based on outdated SAE technical standards

²⁴ Society of Automotive Engineers (SAE), SAE J1383 – *Performance Requirements for Motor Vehicle Headlamps*, SAE International (2022).

²⁵ 49 C.F.R § 571.108, Tables 1-III (photometric and lens area requirements).

²⁶ See *id.* at §§ 571.108 S5.1.1.1, Table IV (reflective devices requirements).

and differ from current international approaches, e.g., SAE J2087 and UNECE R148, which use 400 cd.²⁷ MEMA members believe that aligning with modern standards would reduce unnecessary design constraints and support global harmonization.²⁸

2. Test Procedures That Do Not Reflect Modern System Performance

Members identified several FMVSS 108 testing procedures that may not accurately reflect the real-world performance of modern adaptive lighting systems.

For example, current ADB provisions impose detailed constraints on photometric intensity distribution and transition zones, e.g., fixed angular transition limits.²⁹ Members indicate that these requirements may force systems to default to lower-performance lighting modes, such as switching to low beam rather than allowing optimized reduced-intensity high beam patterns. Allowing controlled high-beam regions with reduced intensity can improve forward visibility while maintaining glare protection for other road users.

In addition, requirements governing transition zone sharpness, e.g., fixed angular gradients, may introduce artificial design constraints that are not aligned with driver perception of real-world system performance. Members note that smoother gradients may improve driver comfort and reduce distraction.

Members also identified dynamic on-road testing requirements for ADB systems as potentially duplicative of laboratory-based validation methods already widely used in international regulatory frameworks. Allowing equivalent laboratory testing approaches could reduce compliance burdens while maintaining safety performance.

3. Requirements That Impose Burdens Without Measurable Safety Benefits

Members highlighted several FMVSS 108 provisions that they perceive as adding additional burden without a corresponding increase in real-world safety.

For example, under FMVSS 108 S14.4.2.2 and S14.4.2.2.4.1, the outdoor exposure test currently evaluates compliance based on an absolute haze threshold following environmental exposure.³⁰ Members have indicated that this approach may not accurately reflect material performance of real-world safety outcomes.

Instead, members recommend modifying the requirement to evaluate degradation in haze or surface luster over time, rather than relying on a fixed post-exposure value. If a material has been validated through established certification processes (e.g., AMECA), the absolute haze value alone may not provide a meaningful indication of safety performance.

Members note that modern lighting systems increasingly rely on optical materials with higher initial haze to achieve uniform light distribution and improved performance.³¹ These materials are intentionally designed with specific optical characteristics and are widely used

²⁷ SAE Int'l, SAE J2087 – *Daytime Running Lamps* (latest revision).

²⁸ UNECE Regulation No. 87 – *Daytime Running Lamps*, U.N. Doc. ECE/TRANS/WP.29/343.

²⁹ 49 C.F.R. § 571.108 S10.18 (ADB photometric requirements).

³⁰ 49 C.F.R. § 571.108 S14.4.2.2.4.1 (outdoor exposure and haze measurement requirements).

³¹ SAE Int'l, *Optical Materials in Automotive Lighting Systems*, SAE Technical Paper 2021-01-0850.

in compliant international applications.³² Therefore, members suggest that revising the requirement to focus on relative material degradation rather than absolute haze values would better align testing with real-world performance, reduce unnecessary design constraints, and support continued innovation in advanced lighting systems.

In addition, the three-year outdoor exposure test requirement itself may impose unnecessary development timelines.³³ Members suggest that validated accelerated weathering tests or surrogate material testing approaches could provide equivalent durability assurance while enabling faster adoption of new materials.

4. Barriers to Technology-Neutral Design and Innovation

Several provisions within FMVSS 108 may limit the deployment of advanced lighting technologies by prescribing specific design approaches rather than performance outcomes.

Member companies have highlighted the example of restrictions on horizontal aiming adjustments and requirements for physical aim-locking devices reflect legacy mechanical aiming systems.³⁴ Modern headlamp systems are digitally aligned during manufacturing and service, reducing the relevance of these legacy provisions. Members indicate that prohibiting horizontal adjustments may limit the ability to properly re-aim headlamps following repair or real-world vehicle changes, without clear safety benefit.

Similarly, requirements that evaluate headlamp performance on a per-lamp basis may not reflect the architecture of modern lighting systems, where the combined performance of left and right headlamps defines the effective beam pattern.³⁵ Members recommend consideration of system-level photometric evaluation approaches, consistent with international frameworks.

In addition, mounting height assumptions and beam configuration requirements developed for earlier lighting systems may contribute to glare concerns in modern vehicles, particularly where higher-mounted headlamps are used. Members note that updated performance-based approaches could better address glare outcomes than prescriptive configuration limits.

5. Opportunities for Targeted Harmonization

Across these examples, members consistently identified opportunities to improve alignment between FMVSS 108 and international regulatory frameworks, including UNECE World Forum for Harmonization of Vehicle Regulations (WP.29) Regulations 48, R148 and 149.³⁶

³² UNECE Regulation No. 149, Annex 11 (material durability and performance validation requirements).

³³ ASTM G154 – Standard Practice for Accelerated Weathering of Nonmetallic Materials.

³⁴ 49 C.F.R. § 571.108 S10.18.9 (headlamp aim requirements).

³⁵ UNECE Regulation No. 149, § 5.3 (system-level photometric evaluation).

³⁶ World Forum for Harmonization of Vehicle Regulations (WP.29), *Overview of Global Vehicle Lighting Standards* (2023).

Key areas for harmonization include:

- ADB performance requirements and failure mode definitions.
- Photometric evaluation methodologies, including system-level assessment approaches.
- Material durability and weathering test procedures.
- Daytime running lamps performance thresholds.
- Removal or modernization of prescriptive design-based requirements, e.g., EPLLA, reflector requirements.

Recent exemption proceedings further illustrate how legacy lighting requirements may constrain deployment of advanced safety technologies. In prior proceedings, the Federal Motor Carrier Safety Administration (FMCSA) granted and extended exemptions for enhanced rear lighting systems that provide additional visual warnings to trailing drivers beyond those required under existing regulations.³⁷

In those proceedings, FMCSA determined that such systems were likely to achieve a level of safety equivalent to or greater than compliance with existing requirements, noting benefits including improved conspicuity, enhanced warning capability, and earlier driver response in rear-end collision scenarios.³⁸ These systems operate in conjunction with, but extend beyond, traditional brake-activated lighting functions contemplated by FMVSS 108.

These findings underscore that certain prescriptive lighting requirements, particularly those tied to fixed activation conditions and legacy signaling assumptions, may not fully accommodate modern safety-enhancing technologies.

Targeted harmonization in these areas would reduce duplicative validation burdens, improve regulatory consistency across global markets, and accelerate deployment of advanced lighting technologies in the U.S.

D. FMVSS No. 111 – Rear Visibility

FMVSS 111 establishes rear visibility requirements for motor vehicles, including mirror-based visibility requirements intended to provide drivers with a view to the rear and along the sides of the vehicle.³⁹ MEMA encourages NHTSA to modernize FMVSS 111 to reflect that

³⁷ See *Parts and Accessories Necessary for Safe Operation; Application for an Exemption*, 84 Fed. Reg. 5,557 (Feb. 21, 2019) (granting exemption for enhanced rear lighting system and finding that supplemental lighting providing earlier warning to trailing drivers can achieve a level of safety equivalent to or greater than existing requirements); see also *Application of Grote Indus., LLC for Exemption*, Docket No. FMCSA-2026-0100 (pending as of March 2026) (seeking approval for radar-integrated rear collision warning system utilizing enhanced lighting activation independent of braking).

³⁸ See *id.* at 5,558-59.

³⁹ See 49 C.F.R. § 571.111.

camera-monitor systems (CMS) may, in appropriate applications, provide superior field of view, reduced blind zones, and improved driver visibility compared with traditional mirrors.⁴⁰

Advances in CMS have significantly expanded the potential for improved rearward visibility, particularly for larger vehicles. These systems can provide wider fields of view and reduce blind zones compared with traditional mirror-based visibility systems, reduce blind spots associated with mirror housings, improve visibility in low-light conditions, and incorporate enhanced features such as glare mitigation and dynamic field-of-view adjustment (e.g., trailer tracking functionality).⁴¹

NHTSA has previously recognized the relevance of camera-based rear visibility systems, including through its 2019 Advance Notice of Proposed Rulemaking seeking comment on whether FMVSS 111 should permit CMS as an alternative to certain mirror requirements, as well as ongoing agency research related to driver use of such systems.⁴²

Member input, including feedback from heavy-duty suppliers developing advanced visibility systems, indicates that certain prescriptive mirror-dimension and placement assumptions embedded in FMVSS 111 may no longer reflect the most effective means of achieving the standard's underlying safety purpose. In the heavy-duty context in particular, CMS may improve driver situational awareness by expanding the observable field of view, reducing visual obstruction created by exterior mirrors, and enhancing visibility in conditions where conventional mirrors are less effective.⁴³

Public regulatory proceedings further support this conclusion. In granted exemption proceedings involving CMS in lieu of conventional rear-vision mirrors on commercial motor vehicles, the Federal Motor Carrier Safety Administration (FMCSA) determined that such systems were likely to achieve a level of safety equivalent to or greater than that provided by traditional mirror requirements.⁴⁴ FMCSA identified several relevant safety benefits, including expanded field of view, elimination of mirror-related blind spots, improved performance in low-light conditions, glare reduction, and enhanced functionality for articulated vehicles.⁴⁵

⁴⁰ *Federal Motor Vehicle Safety Standard No. 111, Rear Visibility*, 84 Fed. Reg. 54,533, 5433-34 (Oct. 10, 2019) (seeking comment on permitting camera-monitor systems as an alternative to inside and outside rearview mirrors under FMVSS 111).

⁴¹ See Nat'l Highway Traffic Safety Admin., *Agency Information Collection Activities; Submission to the Office of Management and Budget for Review and Approval; Drivers' Use of Camera-Based Rear Visibility Systems Versus Traditional Mirrors*, 90 Fed. Reg. 35,752, 35,753 (July 29, 2025) (explaining that the information collection supports NHTSA's evaluation of camera-based rear visibility systems).

⁴² See *id.*; Insurance Institute for Highway Safety, *Evaluation of Camera-Based Rear Visibility Systems*, IIHS Technical Report (2022).

⁴³ See *id.* (describing safety benefits including expanded field of view, blind spot reduction, improved low-light visibility, glare reduction, and dynamic viewing capabilities).

⁴⁴ See *Parts and Accessories Necessary for Safe Operation; Application for an Exemption from Stoneridge, Inc.*, 84 Fed. Reg. 5,557, 5,559 (Feb. 21, 2019) ("FMCSA believes that granting the exemption . . . is likely to achieve a level of safety equivalent to or greater than the level of safety provided by the regulation.").

⁴⁵ See *id.* at 5,558-59 (describing safety benefits including expanded field of view, blind spot reduction, improved low-light visibility, glare reduction, and dynamic viewing capabilities).

FMCSA also recognized the close relationship between the applicable commercial vehicle mirror requirement and mirror provisions of FMVSS 111.⁴⁶

Members have also identified opportunities to modernize testing procedures associated with indirect vision systems. Certain breakaway and impact test procedures applicable to mirror systems reflect legacy design assumptions that may not align current technologies or global practices. International standards, including UNECE Regulation 46, utilize dynamic pendulum test procedures to evaluate mirror performance under impact conditions.⁴⁷ Members indicate that permitting the use of such test methods, or adopting them as an alternative compliance pathway, could reduce development costs while maintaining robust safety performance and promoting greater harmonization across global markets.

Accordingly, MEMA recommends that NHTSA evaluate whether FMVSS 111 should be updated to provide a technology-neutral compliance pathway for camera-monitor systems that can demonstrate equivalent or superior rear-visibility performance. This could include revisiting prescriptive mirror requirements, establishing objective performance criteria for alternative indirect-vision systems, and considering harmonized approaches that would permit use of validated camera-monitor systems while maintaining safety performance.⁴⁸

Modernizing FMVSS 111 in this manner would also be consistent with MEMA's previously articulated policy priorities supporting the replacement of legacy design-based requirements with performance-based approaches that enable deployment of advanced safety technologies.⁴⁹

E. FMVSS Nos. 139, 109, AND 119 – Tire Performance Standards

FMVSS 139, 109, and 119 establish performance requirements for passenger car and light vehicle tires.⁵⁰ These standards include endurance tests, strength tests, and bead unseating resistance tests designed to evaluate tire structural integrity and performance under specified operating conditions.⁵¹

⁴⁶ See *id.* at 5,557–58 (describing the applicable commercial motor vehicle mirror requirement and its relationship to FMVSS No. 111 mirror requirements).

⁴⁷ See UNECE, Regulation No. 46, *Uniform Provisions Concerning the Approval of Devices for Indirect Vision and of Motor Vehicles with Regard to the Installation of These Devices* (including dynamic pendulum test procedures for mirror impact performance).

⁴⁸ See 49 U.S.C. § 30111(a)–(b) (requiring that motor vehicle safety standards be practicable, meet the need for motor vehicle safety, and be stated in objective terms, while authorizing NHTSA to amend standards as technology evolves).

⁴⁹ MEMA, *Surface Transportation Safety Policy Priorities (2025)* (supporting modernization of legacy design-based requirements to permit camera-based systems); MEMA, *Response to DOT Request for Information* (Aug. 2025).

⁵⁰ 49 C.F.R. §§ 571.109, 571.119, 571.139.

⁵¹ Nat'l Highway Traffic Safety Admin., *Federal Motor Vehicle Safety Standards; New Pneumatic Radial Tires for Light Vehicles*, 67 Fed. Reg. 69,600 (Nov. 18, 2002).

Several of the test procedures embedded in these standards were originally developed during an era when bias-ply tire construction was prevalent.⁵² Members have explained that modern radial tire construction differs substantially from historical bias-ply designs in both structural configuration and load distribution characteristics.⁵³ Radial tires incorporate steel belts and reinforced sidewall structures that significantly alter the way forces are distributed during operation.⁵⁴ As a result, certain legacy evaluation methods developed for earlier tire designs may not provide the same safety-relevant information when applied to contemporary tire technologies.⁵⁵

MEMA members have identified several specific provisions that may warrant review:

- The bead unseating resistance test
- The plunger energy (tire strength) test
- The treatment of parasitic tread block chunking (PTBC) as a failure mode in endurance testing.

The bead unseating and plunger tests were developed decades ago and may not accurately reflect the structural characteristics of modern radial tires.⁵⁶ Industry experience suggests that these tests may introduce evaluation conditions that differ significantly from real-world operating scenarios.⁵⁷

Members have also noted that PTBC observed during laboratory endurance testing represents a test environment phenomenon that does not typically occur in real-world vehicle operation.⁵⁸ As a result, treating PTBC as a failure condition may create barriers for otherwise safe and high-performing tire designs.

Industry engineers have indicated that parasitic tread block chunking may arise during laboratory endurance testing due to the controlled conditions and specific load cycles used in regulatory evaluation protocols. These conditions may not correspond directly to real world vehicle operation environments. As a result, the occurrence of PTBC in controlled test conditions may not necessarily indicate a safety relevant performance issue during normal vehicle operation.

NHTSA previously recognized potential concerns regarding certain tire testing provisions in a 2019 advanced notice of proposed rulemaking examining possible updates to tire

⁵² U.S. Dep't of Transp., *Tire Safety: Everything Rides on It*, DOT HS 810 561 (2006).

⁵³ Michelin Technical Report, *Radial Tire Construction and Performance Characteristics*, Tire Technology International (2020).

⁵⁴ National Academy of Sciences, *Tires and Passenger Vehicle Safety*, Transportation Research Board Special Report 286 (2006).

⁵⁵ European Tyre & Rubber Manufacturers' Association, *Global Tire Industry Report*, at 17-19 (2022).

⁵⁶ Nat'l Highway Traffic Safety Admin., *Tire Strength and Endurance Testing Evaluation*, DOT HS 811 579 (2011).

⁵⁷ Transportation Research Board, *Evaluation of Tire Structural Integrity Tests*, TRB Annual Meeting Proceedings (2017).

⁵⁸ SAE International, SAE J2452 – *Stepwise Coastdown Methodology for Measuring Tire Rolling Resistance*, SAE Int'l (2019).

performance requirements.⁵⁹ MEMA encourages the Agency to revisit these issues as part of the current modernization effort.

F. FMVSS No. 121 – Air Brake Systems

FMVSS 121 establishes performance and equipment requirements for braking systems on vehicles equipped with air brake systems.⁶⁰ MEMA urges NHTSA to update FMVSS 121 so it better reflects modern commercial vehicle braking technologies and better aligns with global, UNECE regulations. Member companies have shared their perspective that the current standard was designed for older pneumatic braking systems and contains brake actuation and release timing requirements that are now outdated, overly prescriptive, and not well suited to electronically controlled braking systems (ECBS), commonly referred to as brake-by-wire systems.

MEMA members have indicated that maintaining FMVSS 121's legacy timing tests creates unnecessary design and testing burdens for OEMs and component manufacturers without delivering measurable safety benefits, as demonstrated by NHTSA's 2012 determination of inconsequentiality in response to a petition from Volvo, Mack, and Meritor WABCO,⁶¹ which shows that deviations from timing limits had no adverse safety impact.⁶² MEMA also recognizes that FMVSS 121 does not take into consideration vehicles without brake pedals, which restricts development of fully autonomous commercial vehicles.⁶³

MEMA therefore recommends that NHTSA increase or eliminate FMVSS 121's prescriptive brake release timing requirements and remove references that assume pneumatic actuation, to make the standard technology neutral and more accommodating of innovative technologies, such as ECBS. MEMA encourages a comprehensive regulatory review of FMVSS 121 and stands ready to assist, if more technical feedback is needed.

G. FMVSS No. 135 – Light Vehicle Brake Systems

FMVSS 135 establishes performance requirements for hydraulic and electric braking systems used in light vehicles.⁶⁴ The standard includes requirements for braking performance, system integrity, and brake system durability.

⁵⁹ Nat'l Highway Traffic Safety Admin., *Federal Motor Vehicle Safety Standards; Tire Testing Modernization ANPRM*, 84 Fed. Reg. 6,706 (Feb. 28, 2019).

⁶⁰ 49 C.F.R. § 571.121.

⁶¹ U.S. Department of Transportation. "Volvo Trucks North America and Mack Trucks, Inc., Grant of Petition for Decision of Inconsequential Noncompliance." Docket No. NHTSA-2010-0160; Notice 2. (2012). Available at: <https://www.govinfo.gov/content/pkg/FR-2012-04-04/html/2012-8000.htm>.

⁶² Volvo Trucks N. Am., Mack Trucks, Inc., & Meritor WABCO, *Grant of Petition for Decision of Inconsequential Noncompliance*, 77 Fed. Reg. 20,295 (Apr. 4, 2012).

⁶³ Nat'l Highway Traffic Safety Admin., *Side Impact Protection Final Rule*, 88 Fed. Reg. 33,844 (May 25, 2023).

⁶⁴ 49 C.F.R. § 571.135.

MEMA members have noted that while FMVSS 135 reflects legacy assumptions about braking system architectures, it continues to serve as an important reference point for vehicle braking performance. Brake-by-wire systems and regenerative braking systems introduce architectures that are not contemplated when hydraulic-centric test assumptions were developed. A large portion of vehicles currently operating in the U.S. fleet were designed using this framework, and the standard remains widely understood across the industry.

Member companies have recommended that testing protocols focus on stopping performance and redundancy rather than mechanical configuration. Recent updates to industry testing procedures, including revisions to SAE J2784,⁶⁵ have introduced updated simulated dynamometer testing approaches for evaluating braking performance.

The updated SAE testing framework includes revised definitions for average stopping distance and expanded testing considerations for vehicles operating in towing and trailering configurations.⁶⁶ Members have indicated that these updated testing methodologies may better reflect contemporary braking system performance while maintaining continuity with established regulatory performance benchmarks. These updates include revised definitions of average stopping distance and expanded scope considerations for vehicles used in towing or trailering applications.⁶⁷

Members provided additional technical feedback indicating that certain test procedures and performance assumptions embedded in FMVSS 135 may not fully align with modern braking system designs, particularly for electrified vehicles incorporating regenerative braking systems. For example, test procedures such as burnishing and stopping distance evaluations may require deactivation or alteration of regenerative braking functions during testing, creating conditions that do not reflect real-world vehicle operation.

Members indicated that this misalignment can result in test outcomes that are not representative of actual vehicle performance and may introduce unnecessary complexity into compliance validation. In particular, the interaction between friction braking systems and regenerative braking controls is not consistently addressed within existing test procedures, leading to variability in how manufacturers interpret and implement compliance strategies.

Members also noted that industry test methodologies, including those developed through SAE standards such as SAE J2784, have evolved to better reflect real-world braking performance, including considerations for average stopping distance and integrated system behavior.⁶⁸ Aligning FMVSS 135 test procedures with these modern methodologies, or allowing alternative compliance pathways that account for regenerative braking functionality, could improve consistency, reduce unnecessary testing burdens, and better reflect current vehicle technologies while maintaining safety performance.

Industry participants are currently evaluating how these updated procedures may be incorporated into product development and validation processes. At the same time, members

⁶⁵ SAE International, SAE J2784 – *Dynamometer Global Brake Effectiveness Test*, SAE Int'l (2024).

⁶⁶ SAE International, SAE J2784 §5.4 (Average Stopping Distance Definition) (2024).

⁶⁷ SAE International, SAE J2784 §6.3 (Tow/Trailer Brake Performance Evaluation) (2024).

⁶⁸ See SAE Int'l, SAE J2784 – *Dynamometer Global Brake Effectiveness Test* (2024).

have emphasized that the existing FMVSS 135 framework should continue to serve as a reference baseline as testing methodologies evolve.

Maintaining continuity with existing standards is particularly important for aftermarket components and replacement parts, which rely on established regulatory benchmarks. As NHTSA considers potential updates to braking standards, preserving compatibility with the current FMVSS 135 framework will help ensure continuity across vehicle platforms and component supply chains.

H. FMVSS No. 214 – Side Impact Protection

FMVSS 214 establishes performance requirements intended to protect vehicle occupants in side impact crashes, including dynamic barrier testing and structural performance criteria.⁶⁹ Advances in vehicle structural design, side curtain airbags, and energy-absorbing materials have significantly improved occupant protection in side impact scenarios over the past several decades.

Members have indicated that certain testing assumptions embedded in earlier versions of FMVSS 214 were developed based on vehicle architectures and restraint system designs that differ from many modern vehicle platforms. As vehicle structures and restraint systems continue to evolve, NHTSA may have opportunities to evaluate whether existing test device assumptions or structural evaluation parameters remain aligned with current engineering practices.

Members identified potential redundancy between FMVSS 214 dynamic side impact testing requirements and side impact evaluations conducted under the New Car Assessment Program (NCAP).⁷⁰ Both frameworks utilize similar moving deformable barrier test configurations to evaluate occupant protection performance. However, NCAP protocols generally apply more stringent performance thresholds and higher test severity conditions than those required under FMVSS 214. Members noted that where vehicles are engineered to meet more stringent NCAP performance levels, duplicative compliance testing under FMVSS 214 may not provide additional measurable safety benefits.

Accordingly, NHTSA may wish to evaluate whether aspects of FMVSS 214 could be updated to better reflect the relationship between regulatory compliance testing and NCAP performance evaluations. Potential approaches could include aligning testing procedures, recognizing equivalent or more stringent performance validation frameworks, or otherwise reducing duplicative testing requirements where safety outcomes are achieved through existing validation practice.

⁶⁹ 49 C.F.R. § 571.214.

⁷⁰ Nat'l Highway Traffic Safety Admin., New Car Assessment Program (NCAP) Side Impact Test and Evaluation Protocols, DOT HS 812 795 (2020).

Such an approach would be consistent with the Agency's authority under the Safety Act to ensure that motor vehicle safety standards remain practicable, performance-based, and reflective of current technology, while avoiding unnecessary regulatory burden.⁷¹

I. FMVSS No. 302 – Flammability of Interior Materials

FMVSS 302 establishes burn resistance requirements for materials used in the occupant compartments of motor vehicles.⁷² The standards specify flammability performance criteria for a range of interior components, including seating systems, trim materials, and other interior elements, and broadly applies to “any other interior material.”⁷³

While the underlying safety objective of reducing fire propagation risk in the occupant compartment remains critical, members have identified that the scope and application of FMVSS 302 may warrant reevaluation considering modern vehicle design and modern usage. Members have noted that the inclusion of “any other interior material” has led to increasingly expansive interpretations of the standards, such that small, low-mass components, including plastic clips, wiring conduits, rubber bumpers, and similar minor parts, are often treated as subject to flammability testing requirements. Member companies have conveyed to MEMA that these components may have negligible contribution to fire propagation risk due to their limited mass, surface area, or location within the vehicle.

As a result, suppliers report that FMVSS 302 can create disproportionate compliance burdens, particularly with supplier validation and production part approval process (PPAP). Significant time and resources are expended identifying, testing, documenting, and tracking flammability compliance for components that may not meaningfully affect occupant safety outcomes. MEMA members have informed that, in some cases, manufacturers also apply additional internal safety factors or statistical thresholds, further increasing compliance complexity without corresponding safety benefits.

By contrast, international regulatory frameworks, including UNECE Regulation 118, incorporate more targeted applicability provisions that exclude materials below certain mass or surface area thresholds from flammability testing requirements.⁷⁴ These provisions reflect a risk-based approach that focuses regulatory requirements on materials most likely to contribute to fire propagation in the occupant compartment.⁷⁵

Members indicate that adopting a similar risk-based framework within FMVSS 302, through clarification of applicability or the introduction of appropriate exemptions for low-mass or low-risk components, could reduce unnecessary compliance burdens while

⁷¹ See 49 U.S.C. § 30111(a)-(b) (requiring that motor vehicle safety standards be practicable, meet the need for motor vehicle safety, and be stated in objective terms).

⁷² See 49 C.F.R. § 571.302 (Flammability of Interior Materials); see also *id.* § S4.1 (applying requirements to specified components and “any other interior material”).

⁷³ See *id.*

⁷⁴ See UNECE, Regulation No. 118, *Uniform Provisions Concerning the Burning Behavior of Materials Used in the Interior Construction of Certain Categories of Motor Vehicles*, Annexes 6-8 (providing applicability thresholds and exemptions for materials below specified mass or surface area limits).

⁷⁵ See *id.*

maintaining the underlying safety objectives of the standard. Such an approach would be consistent with the Safety Act's requirement that motor vehicle safety standards be practicable and based on objective safety needs and would support modernization of the standard in a manner that reflects current vehicle technologies and material applications.⁷⁶

J. FMVSS No. 305 – Electric-Powered Vehicles

FMVSS 305 establishes requirements related to electrical safety in electric-powered vehicles, including protection against electrical shock following a crash.⁷⁷

As electrified vehicles have become more prevalent, the engineering architecture of high-voltage battery systems has continued to evolve. Modern electric vehicles incorporate multiple layers of protection designed to isolate battery systems in the event of faults or crashes. These protections typically include battery management systems, high-voltage contactors, fusing systems, and other fault-detection mechanisms.⁷⁸

MEMA emphasizes the importance of ensuring that battery systems can be safely isolated following crash events or overcurrent conditions to protect vehicle occupants and first responders. Several members have highlighted the importance of ensuring that both the positive and negative poles of high-voltage battery systems can be effectively isolated following a fault condition.

Updating or clarifying these provisions could allow manufacturers to demonstrate safety performance using modern battery-system architectures while preserving the core safety goals of the regulation.

MEMA recommends that NHTSA provide clarification of battery isolation following crash or overcurrent events, including protection against single-point failure and isolation of both positive and negative poles. Modernization should emphasize overcurrent mitigation while allowing performance-based compliance pathways.

Members have emphasized that overcurrent protection remains the primary safety consideration in modern high-voltage battery architectures. Contemporary electric vehicle battery systems are typically designed with multiple layers of electrical protection intended to detect abnormal current flow and isolate the battery in the event of a fault or crash event. These protection strategies are often implemented through redundant contactor systems and battery management controls designed to prevent electrical hazards. Clarifying regulatory expectations regarding overcurrent protection and isolation mechanisms may help ensure that modern battery system architectures can demonstrate compliance with the safety objectives of FMVSS 305.

⁷⁶ See 49 U.S.C. § 30111(a) (requiring motor vehicle safety standards to be practicable, meet the need for motor vehicle safety, and be stated in objective terms).

⁷⁷ 49 C.F.R. § 571.305.

⁷⁸ Nat'l Highway Traffic Safety Admin., *Electric Vehicle Safety Standards ANPRM*, 85 Fed. Reg. 72,987 (Nov. 16, 2020).

IV. Broader Modernization and Harmonization Principles

Modernization of FMVSS requirements should preserve measurable safety performance while enabling the introduction of innovative vehicle technologies. Standards should emphasize performance of outcomes rather than prescribing specific design configurations whenever feasible. A technology-neutral approach can encourage innovation while maintaining the safety objectives of the Safety Act. In addition, harmonization with international regulatory frameworks where appropriate can reduce unnecessary compliance burdens and facilitate the introduction of advanced safety technologies in the U.S. market.

MEMA recommends that NHTSA consider several regulatory approaches to facilitate modernization of vestigial provisions. The Agency may wish to initiate targeted advanced notices of proposed rulemaking addressing specific standards identified in this proceeding. Establishing technical working groups with participation from industry stakeholders, safety experts, consumer groups, and other interested parties, could assist NHTSA in evaluating potential updates to testing methodologies and performance criteria. Incorporating real-world crash data and field performance information may further support these evaluations. In addition, reviewing opportunities for international regulatory harmonization and reassessing cost-benefit analyses using updated fleet data may help ensure that modernization efforts maintain strong safety outcomes while reducing unnecessary compliance burdens.

V. Conclusion

MEMA appreciates NHTSA's efforts to identify vestigial regulatory requirements and to modernize federal vehicle safety standards where appropriate. Ensuring that FMVSS requirements reflect current vehicle technologies and engineering practices can support both safety and innovation. By updating outdated testing provisions, clarifying performance-based compliance pathways, and considering opportunities for regulatory harmonization, the Agency can maintain strong safety performance while facilitating the introduction of new technologies.

MEMA and its member companies look forward to continued engagement with NHTSA as the Agency evaluates potential modernization of the FMVSS framework. Please do not hesitate to contact Jennifer Lewis, MEMA Vice President of Regulatory Affairs, at jlewis@mema.org or Emily Sobel, MEMA Senior Manager of Regulatory Policy at esobel@mema.org with any questions or if the Agency would like additional information on any of the points articulated above.