Comments of

MEMA, The Vehicle Suppliers Association

to the

National Highway Traffic Safety Administration

on the

Automatic Emergency Braking Systems for Light Vehicles

Notice of proposed rulemaking

August 14, 2023

Docket No. NHTSA-2023-0021

Introduction

MEMA, The Vehicle Suppliers Association, is the leading trade association in North America for vehicle suppliers, parts manufacturers, and remanufacturers. It has been the voice of the vehicle supplier industry since 1904.

Automotive and commercial vehicle suppliers are the largest employer of manufacturing jobs in the United States employing over 900,000 people throughout the country. Direct, indirect, and induced vehicle supplier employment accounts for over 4.8 million U.S. jobs and contributes 2.5 percent to U.S. GDP.

Suppliers lead the way in new vehicle innovations. Member companies conceive, design, and manufacture the OE systems and technologies that make up two-thirds of the value of every new vehicle and supply the automotive aftermarket with the parts that keep millions of vehicles on the road, fueling international commerce and meeting society's transportation needs. MEMA members are committed to safety and sustainability.

Opening Remarks

MEMA supports the intent and goals of these proposed regulations. The vehicle supplier industry has led the way in designing and improving the performance of automatic emergency braking (AEB) and pedestrian AEB (PAEB) systems. The industry welcomes NHTSA's efforts and urges the Agency to finalize this rule without delay. MEMA also requests that NHTSA consider aligning the new requirements, to the maximum extent practicable, with UN ECE Regulations No. 151 and 152. These regulations are understood by the industry and have been formed based on data from testing and real-work experience. Suppliers have already developed sensors, software and systems using technology relevant to the UN ECE regulations successfully. To align with these regulations will facilitate faster, less burdensome rollout and expansion of AEB into the U.S. vehicle fleet. If NHTSA pursues U.S.-only requirements, development and deployment of these life-saving technologies will be delayed unnecessarily.

MEMA supports NHTSA's intent to ensure that the proposed standard provides the highest level of performance for consumers. However, the supplier industry must acknowledge that the requirements encapsulated in the NPRM are more in alignment with the most advanced AEB and PAEB systems that are available on the market. Further, it is important to note, in our experience, it will not be possible to achieve the proposed standards with only software changes. Hardware changes must also be considered and included in the rulemaking analysis.

We note with concern that some of the proposed requirements for AEB would set the bar for performance in excess of the current levels in the new car assessment program (NCAP). NCAP has historically been used as a voluntary forcing function and encouragement for new technology, thus NCAP leads regulatory requirements. Additionally, we note with some confusion that changes proposed in this NPRM would in some cases exceed those proposed in the request for comments[1] on the most recent new car assessment program (NCAP) updates proposed by NHTSA in early 2022. This could result in regulations exceeding the voluntary program designed to lead and guide those same regulations. This mismatch could and should have been avoided.

MEMA reminds the agency that our members supply significant technological input to vehicle safety systems, and we are always willing to brief NHTSA personnel on the latest technology so that it may be understood and considered. When NHTSA procures vehicles for testing on the open market without supplier input, there is a risk that the vehicles chosen may have older technology implemented and the latest technology may not be evaluated for rulemaking research.

We hold that successful management of the emergence and maintenance of both voluntary (NCAP) and mandatory Federal Motor Vehicle Safety Standards should rely on clear, publicly available and publicly assisted roadmaps. We note their absence from this proceeding and call on NHTSA to meet with industry to share information on the latest technologies and to lay out a clear goal for update of standards. Industry relies on NHTSA to supply regulatory certainty to our planning and operations and industry can provide NHTSA with the latest information about relevant systems and other programs of potential use to regulatory proceedings.

Specific Comments

Avoidance versus Mitigation

Collision avoidance and collision mitigation are very distinct requirements. In the proposed rule NHTSA makes mention of both conditions (collision avoidance versus collision and contact mitigation). Even with a fully operational AEB system, the driver of the vehicle still shares responsibility. Likewise, passive safety systems such as airbags, restraints and other technology are also part of the overall safety plan. NHTSA must also consider these other

[1] https://www.regulations.gov/document/NHTSA-2021-0002-0001

factors in this rulemaking and not focus solely on one technology (i.e., AEB). AEB is a tool to help reduce severity of collisions and enhance crash mitigation. Complete crash *avoidance* for all speeds and scenarios is not a realistic requirement for AEB. Rather, AEB functions as a supplement and aid to the driver to help mitigate the severity of a potential collision. NHTSA should expand consideration of both active and passive safety systems, clarify these terms and conditions in the final rule and align test scenarios and requirements with established AEB and PAEB requirements in Europe.

In its proposed rule NHTSA insists on total avoidance of all contact between test vehicles and/or simulated pedestrians for all test runs. Without any margin for possible error or several trials there is a high likelihood of false positive activations. We propose NHTSA align with UN ECE Regulation No. 152 which allows for some contact at high speeds. Furthermore, total avoidance of contact is not a realistic requirement, and again NHTSA should align with UN ECE Regulation no. 152 and EuroNCAP, which respects this.

Brake Technology Considerations

The increased deployment of AEB technology resulting from this rulemaking will include vehicle designs currently using vacuum booster braking. ESC systems on vehicles with vacuum booster braking, while they may meet FMVSS 126, may not have sufficient fluid flow and pressure to active AEB effectively, these designs will have to be changed to implement braking technology more compatible with AEB (such as electrohydraulic conversion or electrohydraulic booster). This is an example of a hardware *and* software change, per our opening comments and NHTSA must adequately and accurately capture the related time and cost impacts associated with this hardware change in the regulatory impact analysis.

Timing of AEB and PAEB Regulations

We agree with NHTSA's proposal to allow additional time to incorporate and test AEB at higher speeds, and with the proposal to set the upper bound at 60 km/h three years after publication of a final rule and then 65 km/h four years after publication.

Front Crash Warning Requirement

With respect to auditory, visual and haptic warning modes, we understand that human machine interface functions in the vehicle, including sound quality and volume, fall under the discretion of the OEM. However, in an effort to ensure that the driver hears an FCW auditory alert, we recommend prioritizing the FCW alert over other in-vehicle or non-vehicle (outside of the vehicle) generated sounds. For example, ensuring the FCW alert can override in-vehicle sounds, by temporarily muting or delaying an in-vehicle sound at the time the FCW auditory alert is given, could help the driver more clearly detect the alert. To help the driver hear the alert while noise outside the vehicle is present, we recommend that the FCW alert be able to dynamically adjust to a volume loud enough to be easily detected by the driver. MEMA also urges the Agency to permit haptic feedback to serve as one of the warning modes.

Event Recording

We recognize that recording AEB activations could help with classifying the cause of an activation and thus provide helpful information for reconstructing events. Event data recorders could also capture and retain information such as lateral and longitudinal distance at activation, object class, yaw rate, and steering wheel angle, which could be helpful for better understanding specific scenarios and reducing the number and severity of future crashes.

We also understand that data storage is a limitation. To reduce the volume of data, we recommend storing images that are taken at set intervals, for example, 5 seconds before and after the AEB activation, with one image per second.

It is possible that third parties in these incidents may also be captured in these recordings, which may cause privacy concerns. This is an area that could benefit from further evaluation.

Informing Consumers, Drivers, and Owners about AEB

NHTSA is considering a requirement that manufacturers provide information describing the conditions under which the AEB system can avoid collisions, warning drivers that the AEB system is an emergency system and not designed for typical braking situations, and specifying the conditions under which the AEB system is not likely to prevent a collision.

This type of information is helpful to the vehicle owner/operator and is typically already provided by the OEM in the owner's manual. The vehicle operator can better understand AEB system capabilities if this information is provided and is shared in an easy-to-access way. NHTSA could consider supporting this process by placing webpage links to AEB information sources on non-intrusive areas of the vehicle, as a way to share the functionality/benefits of the AEB system with vehicle occupants.

Technical and Testing Recommendations

NHTSA's proposal does not specify that the VTD's radar cross section during in-the-field verifications be measured to objectively assess whether the radar cross section still falls within the acceptability corridor. MEMA recommends NHTSA use the same RCS corridor values for the rear and side of the vehicle test device that are included in ISO Standard 19206-3:2021.

In terms of the vehicle orientations tested, we recommend that NHTSA consider including rear view, side view, and angled rear view (30 degrees, for example). The angled rear view is especially useful for representing a vehicle making a right-hand turn, a maneuver that can be especially dangerous, considering that right-turn collisions at intersections with traffic signals account for 24 percent of roadway fatalities each year[2]. An angled rear-view test could provide information to better mitigate such crashes.

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[2] Source: Hisham et al 2023: Contributing factors to right-turn crash severity at signalized intersections: An application of econometric modeling - ScienceDirect

Minimum Speeds and AEB

NHTSA is not proposing FCW and AEB systems to be active below 10 km/h (6 mph), because it has tentatively concluded that AEB systems do not offer consistent performance at such low speeds. MEMA agrees with this approach.

NHTSA proposes that the same FCW specifications outlined for the lead vehicle AEB condition be applied to the PAEB condition. The FCW system must operate at any forward speed greater than 10 km/h (6.2 mph). The proposed FCW modalities and related characteristics of auditory and visual components are the same for lead vehicle AEB and PAEB conditions. MEMA agrees with this approach.

AEB System Disablement

NHTSA seeks comment on the permissibility of automatic deactivation of the AEB system and under which situations the regulation should explicitly permit automatic deactivation of the AEB system. There are undoubtedly situations when this system should be able to be deactivated. UN ECE Regulation No. 152 has established deactivation criteria requiring at least two deliberate actions are required by the driver – to avoid unintended system deactivation. Harmonization with this approach is recommended. Additionally, if the system is manually deactivated, it is recommended that the system be automatically re-enabled with the next ignition cycle.

Drivers of many existing vehicles can readily disable their AEB system in such cases when the AEB system is predictably, but incorrectly triggered by objects or structures. If the driver is permitted to turn off the AEB system in additional scenarios, we recommend that the vehicle's AEB system be reset/reactivated each time the car is started (i.e., new ignition cycle), so that *engaged* AEB is the *default* mode.

Making the AEB deactivation process more complex could also ensure drivers are not able to disengage the system when it is not appropriate to do so. We recommend aligning with the deactivation criteria established in UN ECE Regulation No. 152, under which at least two deliberate actions are required to deactivate the AEB system, among other criteria.

Test Duration and Number of Runs

NHTSA seeks comment on the number of repeated tests for a given test condition and on potential procedures for repeated tests. The agency also seeks comment on the merits of permitting a vehicle that fails to activate its AEB system in a test to be permitted additional repeat tests, including a repeat test process similar to that in the recent revisions to UN ECE Regulation No. 151. Additionally, the agency seeks comment on whether there should be additional tests performed in the event no failure occurs on an initial test for each series.

For all test scenarios and tests conducted, MEMA proposes to include allowable contact, especially of the test dummy, and incorporation of multiple test runs (e.g., passing 5 of 7) for meeting requirements. These system tests should be aligned to the maximum extent practicable with UN ECE Regulation No. 151 (and others). Additional tests should be allowed.

Malfunction Indications

NHTSA seeks comment on whether standardization of indicators would be of benefit. The AEB malfunction indicator light should be standardized. Standardizing would help consumers and the aftermarket alike understand if the AEB system is not functioning properly. We recommend that the malfunction indicator light be triggered upon starting the vehicle, if the AEB system's self-test detects a failure at that time. We also encourage that the AEB malfunction indicator light if the AEB system becomes degraded, even if only temporarily, while the vehicle is in operation. Recognizing the utility of the Electronic Stability Control (ESC) lamp on the vehicle's dashboard, which lights up in cases of an ESC malfunction, we suggest similarly including an AEB lamp, or similar indicator on the vehicle's dashboard, that illuminates when the AEB system is not functioning properly. For testing the malfunction indicator light itself, MEMA suggests covering/blocking the AEB camera sensor and evaluating if the malfunction indicator light is triggered.

AEB and PAEB Test Conditions

NHTSA proposes to use only 50 percent overlap in the obstructed child running from the right and the running adult from the left scenarios due to the same reduced reaction time.

MEMA questions whether it is technically feasible to require speeds greater than 40 km/h for successful conduct of the obstructed child running from the right test, not due to detection, but due to limitations of the vehicle braking systems for no-contact. We again propose NHTSA align with UN ECE Regulation No. 152 for these requirements.

NHTSA is considering two alternatives to a no-contact requirement for both the lead vehicle and pedestrian performance test requirements. The first alternative would be to permit low speed contact in NHTSA's on-track testing. Under this alternative, the subject vehicle would meet the requirements of the standard if it applied the brakes automatically in a way that reduced the impact speed either by a defined amount or to a maximum collision speed. The speed at which the collision would be allowed to occur would be low enough that the crash would be highly unlikely to be fatal or to result in serious injury.

MEMA agrees with the NHTSA alternate proposal for contact. Consistent with European regulations, low speed contact should be permissible during testing. MEMA recommends a no contact test requirement at speeds up to 25 mph (roughly 40 kph), and a realistic speed reduction requirement above this speed (i.e., collision mitigation). We suggest that NHTSA follow the speed reduction test criteria for daytime scenarios included in UN ECE Regulation No. 152.

Regarding potential contact between test vehicles, MEMA again urges NHTSA to align to the maximum extent practicable with UN ECE Regulation No. 151 and 152.

NHTSA proposes in all PAEB test scenarios, a test is immediately complete if the subject vehicle makes contact with the pedestrian test mannequin. MEMA agrees with these criteria, with due regard to our previous statements regarding collision mitigation versus collision/contact avoidance and some allowance for contact. Accordingly, while contact might end the test, it does not signal an immediate failure of that test. NHTSA must align with UN ECE Regulation No. 152 to the maximum extent practicable.

Test Scenarios

In the proposed rule, NHTSA indicates it is considering removing the false activation tests completely, instead requiring a robust documentation process or specifying a data storage requirement. MEMA agrees with this proposal. A false activation test as a single test is not representative of the number of false activations in the field, and a vast number of single tests would need to be conducted to ensure that an AEB system does not activate at the wrong times. Additionally, there is the potential for manipulation of the test. For example, EuroNCAP does not include false activation tests, as they consider that AEB sensors could be programmed to pass specific test conditions, while in reality the sensor may not be capable of correctly responding to scenarios that are very similar to the test case.

Although we do not recommend a false activation test, efforts should be taken to reduce instances of false activation. Further, an expectation to share documentation demonstrating efforts taken to prevent false AEB activations is reasonable.

During testing, NHTSA proposes the lead vehicle does not diverge laterally more than 0.3 m (1.0 ft) from the intended travel path. This tolerance would apply to both the slower-moving and decelerating lead vehicle test scenarios (for the stopped lead vehicle scenario, the lead vehicle is stationary and is centered on the projected subject vehicle travel path). MEMA recommends lane positioning requirements be harmonized with UN ECE Regulation No. 152 – e.g., 0.2m *not* 0.3m permitted lateral variance.

Proposed change to Test Method Section 7

Testing when approaching a lead vehicle.

MEMA proposes the following mandatory requirements for technical feasibility in car-to-car scenarios:

i. increase headway for decelerating lead vehicle to a time gap > 0.7 second.
ii. allow repetitions for failed tests.

Industry members have voiced concerns that the proposed relative velocity reduction of the AEB and Crash Imminent Braking (CIB) from 60 kph to 80 kph could result in a higher false positive rate. This is because the AEB must activate earlier, with higher situational uncertainty. Generally (especially for vision systems) sufficient performance at higher velocities to reach full velocity reduction will be very challenging. MEMA proposes testers be allowed multiple repetitions (i.e., 5 out of 7) of a scenario and that collision mitigation instead of avoidance be allowed at higher velocities. It is further recommended that the test speed be reduced from 80 kph to 42 km/h to be harmonized with EuroNCAP, where rewards are provided for full collision avoidance up to 50 km/h.

As previously stated, we support a no-contact test below 25 mph, and a speed reduction test above 25 mph. For the speed reduction test, we recommend following a similar approach taken by the CIB and dynamic brake support (DBS) NCAP tests, with a vehicle (traveling over 25 mph) needing to meet the criteria for test passage in 5 out of 7 test runs. The speed reduction test should be based on data and take into account the speeds at which injury risk for pedestrians and vehicle occupants is quite low. Alignment with UN ECE Regulation No. 152 daytime speed reduction test requirements is also recommended.

For the Decelerating Lead Vehicle test condition, if NHTSA maintains the proposed upper bound of 80 km/h, the headway for 80 kph at 12 meters spacing equals a time gap of around 0.54s for a constant following scenario. In this scenario an advisory or preliminary alert could help the driver to increase headway to a safe value.

For the scenario "Decelerating Lead Vehicle," MEMA proposes a headway greater than 16 meters and a time gap greater than 0.7 seconds at 80 kph, if NHTSA maintains the proposed upper bound of 80 km/h.

For the car-to-car scenario, the proposed requirement to avoid collision with a stationary vehicle without driver intervention at up to 80 km/h may be overly aggressive and lead to false positive braking events. Additionally, a forward collision warning (FCW) allowing the driver to evasively steer may be more appropriate. It is recommended that NHTSA research steering functions like electronic steering systems and automated emergency steering to also assist in collision avoidance at higher velocities.

Proposed changes to Section 8, “Testing when approaching a pedestrian”

MEMA urges NHTSA to amend the requirements articulated in section 8 and to allow repetitions for failed tests, as we have proposed for other test scenarios. A number of factors may emerge which would challenge a manufacturer’s ability to ensure that every test is executed under identical conditions.

In addition, MEMA requests that NHTSA allow for additional lighting in the test. Allowing only for low beam lighting will not be viable. Instead, MEMA asks that the Agency permit additional lighting, as is the case in the current Euro NCAP test procedure or permit the use of high beams.

Full avoidance is not reproduceable at higher velocities in low light conditions and in obstructed scenes. Due to external influences, it is impossible to ensure that every test run is performed under the exact same conditions in this test, which is why it cannot be guaranteed that AEB will always achieve its maximum performance.

To mitigate the effects of external influences, NHTSA should allow multiple repetitions of a scenario (i.e., 5 out of 7) and collision mitigation instead of full avoidance at higher velocities. Optionally, NHTSA might allow steering functions like electronic steering systems and automated emergency steering (ESS/AES) to avoid collisions at higher velocities.

Low beam scenarios: In dark environments without streetlights, the high beam is usually manually or automatically activated for a better view. In such cars in this scenario, the lower beams would not be active and this scenario is not depicting a real driving situation.

MEMA recommends for "low beam tests" NHTSA allow the usage of automatic high beam if available or the usage of streetlights (similar to EuroNCAP) to depict city traffic/urban driving conditions.

It is unclear if there is crash data to support the need for the stationary pedestrian test. In real-world conditions, it is unlikely that a pedestrian would be completely stationary, and without any movement or motion; the probability increases for false activations from other stationary objects along a road (like road signs). MEMA questions the need for this test scenario, as the 'moving along path' test scenario would seem to address real world scenarios.

Vehicle AEB and PAEB System Conditions During and Prior to Test

NHTSA proposes AEB systems be initialized before each series of performance tests to ensure the AEB system is in a ready state for each test trial. MEMA agrees with this approach.

NHTSA proposes there be no specific limitations on how a subject vehicle may be driven prior to the start of a test trial. MEMA disagrees. To promote harmonization, MEMA proposes that the Agency adopt the pre-test conditioning process outlined in UN ECE Regulation 152 for subject vehicle conditions:

If requested by the vehicle manufacturer:

- The vehicle can be driven a maximum of 100 km on a mixture of urban and rural roads with other traffic and roadside furniture to initialize the sensor system.
- The vehicle can undergo a sequence of brake activations in order to ensure the service brake system is bedded in prior to the test.
- The average temperature of the service brakes on the hottest axle of the vehicle, measured inside the brake linings or on the braking path of the disc or drum is between 65 and 100°C prior to each test run.

Daylight and Darkness Considerations

As part of this proposal, NHTSA proposes testing under both daylight and darkness lighting conditions. In the darkness testing condition, NHTSA proposes testing with both lower beam and upper beam headlamps activated. MEMA agrees with testing under conditions of both daylight and darkness and refers the Agency to our prior comments regarding automatic high beam operation.

Environmental Test Conditions

NHTSA proposes that AEB compliance tests not be conducted during periods of precipitation, including rain, snow, sleet, or hail. While testing only in clear, clement weather arguably does not represent the range of potential real-world conditions, we are unable to suggest how repeatable, representative adverse weather conditions might be successfully simulated. Individual manufacturers and suppliers will not be precluded from performing additional tests above and beyond the requirements of NHTSA. Testing in clear weather as proposed can then be viewed as an effective minimum requirement, that vehicle and systems suppliers could voluntarily exceed as part of normal market competition.

NHTSA proposes minimum visibility ranges to ensure test repeatability, with a limitation on the presence of conditions that would obstruct visibility, including fog or smoke during AEB testing. MEMA agrees with the proposed visibility conditions for AEB performance tests. Aligning the AEB performance test visibility conditions with those contained in relevant U.S. NCAP test procedures for recommended technologies is encouraged.

Adopting a discrete minimum visibility range in testing could hinder the ability to accurately replicate tests. While AEB sensors should be able to operate in a variety of weather conditions, trying to consistently replicate weather conditions like fog and snow is very difficult to achieve and may result in inaccurate test results.

NHTSA proposes that the test track surface have a peak friction coefficient of 1.02 when measured using an ASTM F2493 standard reference test tire, in accordance with ASTM E1337-19 at a speed of 64.4 km/h (40 mph), without water delivery. MEMA agrees with the agency's proposal to use a PFC of 1.02 for test track surfaces.

We note the potential for confusion stemming from the mention of both 0.90 and 1.02 as possible friction coefficient values in this rulemaking's documents. A review of several references provides the following clarifying comparison:

Description	Regulation	Test Procedure
FMVSS 105	1.02	0.9 pg. 19
FMVSS 121	1.02	0.9 pg. 6
FMVSS 126	1.02	0.9 pg. 19
FMVSS 135	1.02	0.9 pg. 19
FMVSS 136	1.02	0.9 pg. 16

It is apparent from this table that the test procedures all need to be updated to reflect new reference tire friction coefficients. We trust NHTSA is aware of this and will take appropriate action.

We further urge NHTSA to monitor research and development in tire formulations and consider review of the above listed FMVSS to align these references with any new innovations in tires and to consider changes to reference tire specifications through the public process as appropriate.

When considering the limitations for stability of the test equipment during windy conditions, MEMA proposes that the Agency consider assigning wind-still conditions as the test requirement. The presence of wind will likely affect the pose of the test equipment creating deviations in the test scenario. These deviations present the possibility of reducing the reliability and accuracy of testing. MEMA suggests the Agency to adopt wording similar to that employed in UN ECE Regulation 152, "(j) The tests shall be performed when there is no wind liable to affect the results."

FMVSS 135 addresses the slope of the test plane area and provides the following parameters, "the test surface has no more than a 1% gradient in the direction of testing and no more than a 2% gradient perpendicular to the direction of testing." MEMA proposes that the Agency adopt this language in the final rule or clearly refer to FMVSS 135.

Vehicle Test Devices

NHTSA proposes that the subject vehicle be loaded with not more than 277 kg (611 lb.), which includes the sum of any vehicle occupants and any test equipment and instrumentation. MEMA recommends NHTSA harmonize with UN ECE Regulation No. 151 and 152 and EuroNCAP, which specify the maximum load to be 200kg vs. the proposal of vehicle weight *not to exceed* 277kg.

NHTSA seeks comment on specifying a set of real vehicles to be used as vehicle test devices in AEB testing. Instead of conducting high-speed AEB tests with real vehicles, which could result in injury (if people are involved) and are also costly from a financial perspective, MEMA encourages the use of tests that involve a soft target. If combined with documentation provided by the OEM, this soft-target test could serve the same purpose as a real-vehicle test.

NHTSA seeks comment on the utility and feasibility of test laboratories safely conducting AEB tests with real vehicles, such as through removing humans from test vehicles and automating scenario execution, and how laboratories would adjust testing costs to factor in the risk of damaged vehicles. MEMA recommends AEB tests conducted by test laboratories be oriented to the target supplier's standards, and that Technical Bulletin (TB-25) be used as a reference, as it describes properties of the GVT which must be kept consistent during the test.

Test Mannequin Specifications

To be consistent with live pedestrians, NHTSA proposes the pedestrian test mannequins have the dimensions specified in ISO Standards 19206-2:2018, which would be incorporated by reference into proposed 49 CFR part 561. MEMA agrees with this proposal, because use of this mannequin aligns well with EuroNCAP's AEB systems testing approach and would aid the process of harmonizing U.S. and European AEB standards, which we highly encourage. We also encourage the use of the ISO 19206-2:2018 mannequin for pedestrian AEB testing. This would help prevent delays in testing, as these mannequins are already validated and are readily available.

Incorporating more advanced pedestrian tests into the range of required test scenarios could also help improve safety outcomes for pedestrians and vehicle occupants. However, the integration of new, advanced tests should not delay integration of the already available and proven pedestrian mannequin tests that this proposal recommends. If NHTSA wishes to develop advanced pedestrian mannequin tests, we recommend those be the subject of a *future* AEB/PAEB rule.

NHTSA seeks comment on whether use of the 50th percentile adult male test mannequin ensures PAEB systems would react to small adult females and other pedestrians other than mid-size adult males. NHTSA also considered whether a small adult female mannequin is necessary and whether the child test mannequin also should be specified for use in all PAEB scenarios. MEMA agrees that incorporating female and child mannequins into test criteria should be prioritized, especially if NHTSA finds that existing AEB image recognition systems could be improved through such testing. However, the integration of child and female adult mannequins should not delay the integration of existing and proven mannequin tests. If integrating such child and adult female mannequins would cause a delay in implementing this proposed rule, we encourage NHTSA to include the child and female mannequin pedestrian tests in a *future* proposal.

To encourage further harmonization with international standards and utilize already available, proven resources, we further recommend using PAEB mannequins that are included in existing, applicable ISO and UN ECE standards. We also encourage greater focus on PAEB testing in night-time conditions, as data from 2021 shows that 50 percent of pedestrian deaths occurred between 6:00 p.m. and midnight[3].

Further, because artificial light sources like ambient and vehicle light may impact AEB performance, PAEB tests with this lighting could also be beneficial. However again, if integrating night-time and artificial light PAEB testing would cause a delay in finalizing this rule, we encourage that this testing be considered in a *future* rule.

Regarding child-specific PAEB test scenarios, tests conducted in daylight would be appropriate, as data shows a significantly reduced risk of child pedestrian deaths at night.

Conclusion

MEMA and its members are committed to vehicle safety and to delivering the AEB and PAEB systems and components needed to enable and improve this important safety aspect. Besides clarity of the regulations themselves, alignment of regional AEB and PAEB regulations will further improve the implementation and effectiveness of these regulations throughout the U.S. vehicle market. NHTSA can improve the implementation of automatic emergency braking systems in the U.S. by aligning with well-understood European standards already in place. MEMA strongly encourages the NHTSA to pursue this alignment and is always available to work with representatives of the agency to assist in any way possible.

[3] Source: Pedestrians (iihs.org)