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NHTSA Begins Regulations of ADS Technology: An Overview of Amendments to Federal Motor Vehicle Safety Standards

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On March 30, 2022, the National Highway Traffic Safety Agency (NHTSA) published a Final Rule amending certain Federal Motor Vehicle Safety Standards (FMVSS) for vehicles with automated driving systems ("Final Rule"). 87 Fed Reg 18560 (Mar. 30, 2022). These amendments will introduce new definitions and subtle textual changes to address concerns that existing language posed barriers to the development of autonomous driving technology, and to maintain a consistent level of safety for occupants of autonomous vehicles without manual controls. While the amendments in NHTSA's Final Rule are narrow in scope, they are NHTSA's first steps towards comprehensive regulation of fully-autonomous vehicles, and – as discussed herein – will likely be followed by additional regulation in the near future. This article will discuss the Final Rule's most significant impacts on existing FMVSS.

Background and Recent ADS-Related NHTSA Activity

Created in 1970 by the National Highway Safety Act, NHTSA is an agency within the Department of Transportation that is tasked with reducing crashes and their resulting deaths and injuries. NHTSA achieves this through carrying out research and establishing minimum performance standards for motor vehicles aimed at protecting the public against (1) an unreasonable risk of crashes; or (2) injury or death in the event a crash occurs. These Federal Motor Vehicle Safety Standards (FMVSS) are developed based on concerns and suggestions expressed by industry leaders and in-house research. The amendments announced in NHTSA's Final Rule will be limited to the 200-series FMVSS (201-226).

The only exception to this are the introduction of new terms and changes to definitions, which can be found in 571.3. However, the impact of these new terms and definitions will more or less be limited to the occupant protection standards of the 200-series FMVSS. These standards focus on occupant protection and vehicle crashworthiness in the event a crash occurs. For example, FMVSS 208 – the keystone of NHTSA's 200-series standards – governs requirements for occupant restraint systems (airbags, seatbelts, etc.). See 49 CFR 571.208. FMVSS 201, 203, and 205 establish standards to protect occupants from impacts with the interior of a vehicle. See 49 CFR 571.201, 203, 205. FMVSS 214, 216(a), 223, 224 establish standards related to vehicle structure integrity and energy absorption from external impacts. See 49 CFR 571.214, 216(a), 223, 224. In its entirety, the 200-series FMVSS represent a 50-year collaboration between NHTSA and industry leaders to reduce injuries on the road.

As of the Final Rule's publication, there are no fully autonomous driving vehicle operating on the roads in the United States, (NHTSA has provided exemptions to certain developers to test vehicles with high levels of autonomy in limited geographic areas), and NHTSA has not published any standard that dictates the content or performance of advanced driver assist features. In September 2016, NHTSA adopted definitions published by the Society of Engineers' (SAE) Levels of Automation, which provides a detailed description of each level of automated driving technology- from 1 (low level driver assist) -5 (fully autonomous). See Lindsay Brooke, U.S. DoT Chooses SAE J3016 for Vehicle-Autonomy Policy Guidance, Society of Automotive Engineers International, Sept 20, 2016. A visual chart may be found here: https://www.sae.org/binaries/content/assets/cm/content/blog/sae-j3016-visual-chart_5.3.21.pdf. Instead, NHTSA has assumed an observational and advisory role by promoting the development of competing technologies, issuing voluntary guidelines for best practices, and removing existing barriers to technological development. See United States Department of Transportation, Preparing for the Future of Transportation- Automated Vehicles 3.0 (Oct. 4, 2018). NHTSA has also begun collecting information on the performance of low-level automated technology already on the road. On June 29, 2021, NHTSA issued a Standing General Order, requiring manufacturers to report crashes involving vehicles in which Level 2 technology was active. National Highway Traffic Safety Administration, First Amended Standing General Order 2021-01. However, NHTSA has been hesitant to place unnecessary restrictions on this burgeoning industry, preferring instead to promote the development of competing technology in controlled environments to yield the highest quality product.

On March 30, 2020, NHTSA announced a Notice of Proposed Rule Making (NPRM) to promulgate the first ADS-focused amendments to its FMVSS. In its NPRM, NHTSA proposed limited textual changes to certain 200-series FMVSS to account for unconventional vehicle designs that are expected to be present in future ADS-equipped vehicles. Autonomous driving systems, or ADS is defined by NHTSA as "hardware or software that are collectively capable of performing the entire [dynamic driving task] on a sustained basis." 87 Fed. Re. 18650 (Mar. 30, 2022). This definition is adopted from Society of Automotive Engineers (SAE) Standard J3016_201806- Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles. Id. The narrow scope of the NPRM was to respond to concerns expressed by ADS developers that outdated and ambiguous language of existing standards potentially precluded the introduction of innovative designs on the road. Namely, NHTSA was interested in the development of passenger vehicles that lack manually-operated controls. After two years of receiving and considering comments, NHTSA published its Final Rule on March 30, 2022. Consistent with its NPRM, the guiding principles of the Final Rule are to:

1. Maintain the level of crashworthiness and occupant safety currently provided to occupants by applying existing test performance requirements to vehicles without manual controls
2. Amend standards to account for new designs; and
3. Amend requirements in a manner that minimized textual changes. Id at 18652.

Summary of Significant Textual Changes

The Final Rule begins with the introduction of new terms and modification existing definitions in Section 571.3 to clarify whether and how existing standards will apply to new vehicle designs. To account for vehicles that may be operated completely autonomously, NHTSA added the term "Manually-operated driving controls," which is defined as:

> A system of controls (1) that are used by an occupant for real-time, sustained, manual manipulation of the motor vehicle's heading (steering) and/or speed (accelerator and break); and (2) that are positioned such that they can be used by an occupant, regardless of whether the occupant is actively using the system to manipulate the vehicle's motion. 87 Fed Reg 18560, 18567 (Mar. 30, 2022).

The addition of this term is accompanied by the modification of the terms "Driver's Designated Seating Position" (driver's seat), which is now defined as the seating position "providing immediate access to manually operated driving controls," and "Passenger Seating Position" (passenger seat) which is defined as "any designated seating position other than the driver's designated seating position[.]" 87 Fed Reg 18560, 18566-67 (Mar. 30, 2022).

The interplay of these terms sets up the most significant change brought by the Final Rule: the modification of spatial references in test procedures and safety standards that rely on the presence of a driver's seat or manually-operated controls. Many commenters discussed the implication of the rule for stowable or removable manually-operated controls ("Dual Capability"). In response, NHTSA clarified that vehicles with Dual Capability will be required to certify compliance with all applicable FMVSS in both modes. Vehicles with remotely accessible controls only will be considered to have no manually-operated controls. An example of this change is its impact on FMVSS 203- Impact Protection for the Driver from Steering Control System and 204- Steering Wheel control Rearward Displacement. Under the Final Rule, these standards will not apply to vehicles without manually operated controls. In vehicles with stowable controls ("Dual Mode"), the vehicle would only need to comply when the controls are deployed. Specifically, standards currently applicable to the right front outboard seating position (front right passenger seat) will now also be applied to the left-front outboard seating position (traditional driver's seating position) in ADS vehicles without manually-operated controls. "Inboard" and "Outboard" seating positions are the preferred terms used by NHTSA to discuss reference points in the Final Rule. While their definitions are relatively technical, it is sufficient for this article to understand that outboard seating positions are located within 12 inches of the side window, whereas inboard positions are positioned greater than 12 inches away. The use of these terms assist in an accurate discussion of Final Rule, which targets vehicle designs with novel seating arrangements. Some exceptions to this general rule exist – the most significant of which is that NHTSA's amendment to restraint requirements under FMVSS 208 will vary depending on the seating configuration in the front row. This will be discussed in greater detail below.

NHTSA's reasoning behind this change is to provide an adequate level of safety to occupants of the left front outboard seating position when this position does not offer manually-operated driving controls. For example, as noted above, it is illogical to maintain the requirements of FMVSS 203 and 204 (related to protections provided to seating positions with immediate access to the steering wheel) in a vehicle does not have a steering wheel. NHTSA added that copious amounts of data indicate there are no technical reasons why the protections provided by a seat in the right front outboard seating position could not be mirrored by a passenger seat on the left side. Therefore, this simply provides a common-sense change to ensure that the appropriate standards are applied to new technology where application of pre-amendment standards did not make sense and potentially prevented development of certain

designs. Below is a discussion of the most significant impacts of this change.

Changes Specific to FMVSS 208

FMVSS 208 – which governs vehicle restraint systems – received the greatest attention in NHTSA's Final Rule. As mentioned above, the Final Rule will amend 208 so that the standards applicable outboard seat will generally apply to the left front outboard seat in vehicles without manually-operated controls. The most significant impact on FMVSS 208 will be the Standard's restraint requirements for seats in the front row. Because the amended requirements vary depending on the seating configuration, NHTSA published the diagram depicted below to assist the reader's understanding. For the reader's context, prior to this amendment, FMVSS 208 required outboard seats to be equipped with Type 2 belts (shoulder and lap) and advanced airbags and required that inboard seats only be equipped Type 1 belts (lap belt only). See 49 CFR 571.208., "Advanced Airbag" requirements refer to occupant protections that account for real life crash scenarios in which deployment presents a risk of injury. Most importantly, advanced airbags protect occupants that may be out of position (i.e., occupants who move around during a crash because they are unbelted). Advanced airbag requirements also focus on protection small children. For example, pre-amendment FMVSS 208 required (and still requires) that the right front outboard airbag be suppressed when young children occupy the seat, or the seat is unoccupied, and required that inboard seats only be equipped Type 1 belts (lap belt only).

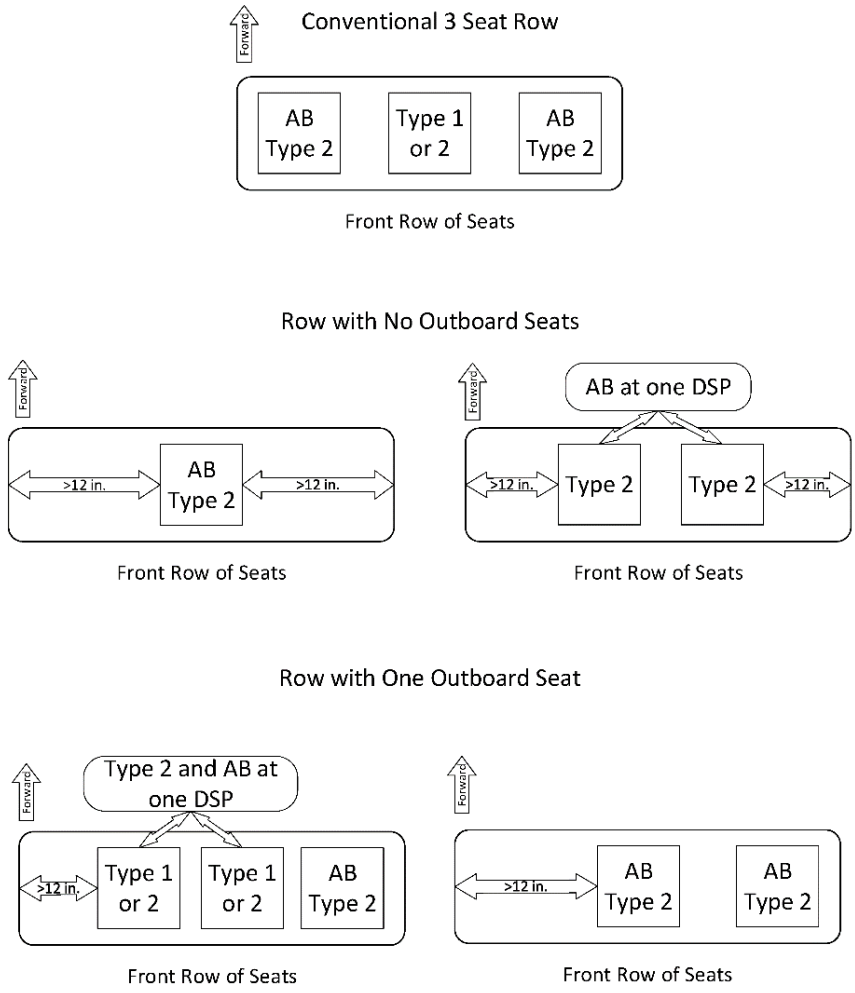

Figure 1 - Schematic of air bag (AB) and seat belt protection for vehicles without driving controls and fewer than 2 outboard DSPs (provided for illustration purposes only)

The Final Rule also amends the airbag suppression telltale requirements for seats in the front row. These relate to the suppression of airbags when they are either unnecessary, or pose an unreasonable risk to the occupant's safety. In the latter case, NHTSA is most concerned with small children and out of position occupants. The telltale or warning informs the occupant of the seat whether the airbag specific to that occupant is active. The Final Rule clarifies that each designated seating position with a deployable airbag must have an individual telltale that is visible to that seat's occupant. 87 Fed Reg 18560, 18576 (Mar. 30, 2022).19

The NPRM also considered requiring the suppression of vehicle motion when the driver's designated seating position is occupied by a small child and ADS is engaged. In support of this, NHTSA reiterated its concern that small children should never occupy this position, regardless of the level of automation engaged. However, NHTSA removed this requirement from the Final Rule in response to comments expressing concern for unintended consequences, including suppression when the seat is occupied by adults similar in size to a small child. However, as will be discussed below, NHTSA indicated that it will be exploring alternatives to its proposed amendment.

NHTSA Action in Near Future

NHTSA has acknowledged that the changes made by this Final Rule are narrow in scope, despite receiving comments which raised additional issues related to new ADS-technology. In response to these comments, NHTSA shed light about actions it intends to take related to ADS-vehicles in the near future. For example, NHTSA's Final Rule clarified that the 200-series FMVSS will not apply to occupant-less vehicles. However, many commenters expressed concerns over crash compatibility of occupant-less vehicles with other vehicle designs. One issue addressed throughout FMVSS' 200-Series is Crash Compatibility, which concerns the interaction between vehicles of different sizes and density in multi-vehicle crashes. A significant portion of NHTSA's research on this issue relates overriding and under-riding (the tendency of the front end of a vehicle to move over or under another vehicle during impact). See National Highway Traffic Safety Administration, Research Program for Vehicle Compatibility (May, 2003). NHTSA responded that it would continue to monitor on-road deployment of new vehicle designs, adding that it was especially interested in the crash compatibility of occupant-less trucks. Other commenters expressed concerns that exempting occupant-less vehicles from FMVSS 205 standards requiring window glazing would pose an unintended risk to pedestrians and cyclists. Windshield glazing is a method of layering multiple sheets of glass to improve impact energy absorption and prevent injuries caused by shattering during an impact. However, NHTSA responded that after researching the issue, it found no evidence of an unintended safety benefit provided by glazing to non-occupants. Therefore, this exemption is not likely to change in the near future.

In its analysis of the changes to FMVSS 208's restraint requirements for vehicles without driver's seats, NHTSA also discussed a series of issues that are subject to ongoing research. For example, NHTSA announced its intent to conduct additional research on the minimum distance required between two seats with operational airbags to account for front row seating arrangements with multiple inboard positions. NHTSA is also conducting research on occupant protection standards for non-conventional seating arrangements. This includes side-facing and campfire arrangements – both of which are likely to be incorporated in future designs of ADS vehicles without manual controls. Additionally, NHTSA will revisit its proposal to suppress vehicle motion when a small child is detected in the driver's seat during ADS operation. One alternative discussed is to require low risk airbag deployment when the driver's designated seating position is occupied by anyone the size of a small a child. Low Risk Deployment simply refers to a reduced deployment strength for smaller occupants or occupants in close proximity to the air bag. Finally, NHTSA announced its intent to issue an NPRM on telltales and warnings for ADS-

equipped vehicles. Therefore, it is possible that additional amendments may be made within the next couple of years.

Conclusion

While the changes made by NHTSA's Final Rule are subtle and narrow in scope, they remove barriers to the continuing development of ADS technology and pave the way for broader regulation. As NHTSA discussed in response to comments to the NPRM, it already plans to conduct research and issue new NPRM's for additional ADS-related issues. Consequently, this Final Rule signals that NHTSA intends to become more involved in the regulation ADS-technology, and more guidance is soon to follow.

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