



**Desi Ujkashevich, Global Director**  
Automotive Safety Office  
Sustainability, Environment & Safety Engineering

**Fairlane Plaza South,  
Suite 400**  
330 Town Center Drive  
Dearborn, MI 48126-2738

May 29, 2020

Mr. James Owens  
Acting Administrator  
National Highway Traffic Safety Administration  
1200 New Jersey Avenue S.E., West Building  
Washington D.C. 20590-0001

RE: Notice of Proposed Rulemaking (NPRM): *Occupant Protection for Automated Driving Systems*  
Docket No. NHTSA-2020-0014

Dear Mr. Owens:

Ford Motor Company (Ford), a domestic manufacturer and importer of motor vehicles with offices at One American Road, Dearborn, Michigan 48126-2798, submits the following response supporting NHTSA's efforts to address regulatory barriers for vehicles operated by an Automated Driving System (ADS) and lack manual controls through the subject NPRM.

Ford appreciates NHTSA's leadership and efforts in identifying and addressing the regulatory barriers for the deployment of ADS-equipped vehicles by soliciting inputs from stakeholders<sup>1</sup>, initiating research for proposing modifications to the current FMVSS regulatory text and test procedures<sup>2</sup>, and issuing notices for proposed rulemaking<sup>3</sup>, including this NPRM. We also support the agency's plans to continuously update guidance<sup>4</sup> on other emerging safety areas for ADS-equipped vehicles.

---

<sup>1</sup>Removing Unnecessary Regulatory Barriers to Automatic Safety Technologies  
(<https://www.regulations.gov/document?D=NHTSA-2018-0009-0001>)

<sup>2</sup> VTTI Research contract DTNH2214D00328L/DTNH2217F00177, "Assessment, Evaluation, and Approaches to Modification of FMVSS that may Impact Compliance of Innovative New Vehicle Designs Associated with Automated Driving Systems."

<sup>3</sup>Removing Regulatory Barriers for Vehicles With Automated Driving Systems  
(<https://www.regulations.gov/document?D=NHTSA-2019-0036-0001>)

<sup>4</sup> <https://www.transportation.gov/sites/dot.gov/files/docs/policy-initiatives/automated-vehicles/360956/ensuringamericanleadershipav4.pdf>

Ford was built on the belief that freedom of movement drives human progress. It is a belief that has always fueled our passion to create great cars and trucks and drives our commitment today as well, to become the world's most trusted mobility company, designing smart vehicles for a smart world that help people move more safely, confidently, and freely.

The benefits of ADS operated vehicles are substantial, including the potential to save lives, expand mobility, and make transportation more efficient. Hence, Ford is investing in an autonomous future and working to provide mobility solutions for transportation challenges affecting communities across the country and around the world.

We have announced our intent to deploy an SAE Level 4<sup>5</sup>-capable ADS-equipped vehicle for commercial application in mobility services in the next few years.

Ford is a member of the Alliance for Automotive Innovation (Innovators) and participated in the development of their response to this NPRM intending to update the Federal motor vehicle safety standards (FMVSS) to reduce compliance challenges for vehicles equipped with Automated Driving Systems (ADS) that lack the traditional manual controls necessary for human drivers. The responses herein supplement those provided by the Innovators. Our key takeaways are summarized below:

- **Identify requirements that are not applicable:** We are aligned with the agency's efforts to clarify the application of occupant protection standards to goods delivery vehicles, that never carry occupants, as well as the applicability of standards designed to protect drivers from injury in vehicles that do not contain a steering wheel or steering column. In a similar vein we recommend that the agency consider revisiting the transmittance requirements for glazing as the ADS does not rely on a clear windshield like a human driver would.
- **Clarify terms and definitions for ADS-equipped vehicles without manual controls:** Ford supports NHTSA's pragmatic approach of updating the regulatory text for crashworthiness standards that use the driver's seat or the steering control as a spatial reference point for other locations. In addition to the proposed updates Ford also recommends updating the definition of Forward control in Part 571.3, since it requires the presence of an engine and a steering wheel hub, both of which could be absent for ADS-equipped vehicles with an electric powertrain.
- **Continue to meet the safety intent of the regulations:** Although ADS equipped vehicles are expected to cause fewer crashes, we expect that for the foreseeable future the occupant protection standards will continue to be applicable.
  - a) We believe that NHTSA should adopt a technology neutral approach to apply the current performance requirements for the passenger seat called out in FMVSS208, to both outboard positions when there are no controls, or to the center seat when the outboard seating positions are absent.
  - b) Ford appreciates NHTSA's safety concerns for child seats mounted in the driver seat of a "Dual mode" AV when the ADS is active but believes that AV developers need to have additional options beyond motion suppression. Appendix 1 contains further details about an alternative approach to address the safety concern.

---

<sup>5</sup> Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles J3016\_201609 ([https://www.sae.org/standards/content/j3016\\_201609/](https://www.sae.org/standards/content/j3016_201609/))

At Ford, the safety of our customers and the integrity of our products are a primary focus. NHTSA's NPRM is an important step to establish a pathway to aid in the efficient deployment of ADS equipped vehicles, provide certainty for manufacturers, and more importantly enhance safety for all Americans. We thank NHTSA for the opportunity to provide input and look forward to collaborating with the agency as it plans to address the regulatory barriers for ADS-equipped vehicles. If you have questions regarding these comments, please contact Gurnath Vemulakonda (email: [gvemulak@ford.com](mailto:gvemulak@ford.com) or phone: 313-323-9582).

Sincerely,

A handwritten signature in dark ink, appearing to read 'Desi Ujkashevic', with a long horizontal flourish extending to the right.

Desi Ujkashevic

Attachments:

1. Appendix 1 – Comments and Response to Questions Regarding Possible Approaches to Revising Occupant Protection Standards.

## **Appendix 1 – Comments and Response to Questions Regarding Possible Approaches to Revising Occupant Protection Standards.**

### **FMVSS No 205 – Glazing Materials**

#### ***NHTSA Proposal:***

*NHTSA tentatively concludes that FMVSS No. 205 remains relevant for crashworthiness of ADS-equipped vehicles without driving controls vehicles and would apply to trucks only if they have at least one DSP.*

#### ***Discussion:***

Ford believes NHTSA should consider adopting the SAE J3097 procedure in FMVSS 205 to allow both trucks and passenger cars to employ privacy glass rearward of the B-Pillar and accommodate the option of using glass plastics including polycarbonate, which offers potential weight, cost savings and additional protections<sup>6</sup>. Adopting the procedure will harmonize the regulation with EU standards that allow polycarbonate and transmittance, rearward of the B-Pillar.

Darkening the windows rearward of the B-Pillar can reduce the sun load, which in turn can lower air-conditioning needs especially during summer, resulting in fuel savings or longer operation times for electric vehicles.

Additional savings can be accrued without compromising safety in the case of AVs, by darkening all the openings. Unlike human drivers that need to see outside through the windshield, AVs use multi-modal sensors for 360-degree awareness. The sensor suite includes sensors like radars, lidars and cameras that are typically located outside the occupant compartment and do not depend on the transmittance characteristics of the windshield and windows for accurate perception of the surroundings. One or more exterior facing cameras in the sensor suite could be located within the passenger compartment but only need a small section of clear glass to perceive the surroundings.

While an ADS-DV could meet the safety needs for the standard as described above, AV developers should consider working with local governments and law enforcement agencies to address any concerns, such as the desire for an officer to scan the interior of the vehicle during a traffic stop.

#### ***Recommended update to Regulatory text:***

##### ***Before:***

*S5.1 Incorporates ANSI/SAE Z26.1-1996 standard by reference.*

##### ***After***

*S5.1 Replace use of ANSI/SAE Z26.1-1996 with SAE J3097. In case of an ADS equipped vehicle, the transmittance requirements apply only for the glazing material that the manufacturer determines is needed by the sensor suite to perceive the surroundings.*

---

<sup>6</sup> Docket No. NHTSA-2019-0024

## **FMVSS No 208 – Occupant Crash Protection**

**NHTSA Proposal:** Textual Modifications Addressing That There May Be No Driver's Seat and Multiple Outboard Passenger Seats

*Safety protections for an occupant in the front row center seating position when both the outboard seating positions are eliminated. Should any center seating positions in ADS-equipped light vehicles without driving controls vehicles be allowed to be equipped only with lap belts, when they may not have a front left outboard DSP or for that matter, any outboard DSP?*

### **Discussion:**

As NHTSA alluded in the NPRM, the inboard seat has fewer safety requirements since it is currently used less frequently. Ford is of the opinion that if the inboard seat is the only seat in the front row, the seat usage is expected to be comparable to current outboard seats. Hence it follows that the current outboard seat performance requirements should apply to the center seat to ensure the same level of frontal impact protection as today's frequently used seats.

However, if this seat is an occasional use seat (e.g., a jumper seat that is stowed), and is clearly marked as such, the current front center requirements, and not the outboard seat requirements, should apply.

### **NHTSA Proposal: Treatment of Advanced Air Bags**

*Under the proposed rule... in an ADS-DV without manual controls, the front left outboard seating position (i.e., the seating position that would typically be the driver's seat in a traditional vehicle), would need to meet passenger seat requirements... [including] both adult and child occupant protection requirements.*

### **Discussion:**

Ford believes an AV with no manual steering control should have the safety requirements required for the front right outboard position should be mirrored for the front left outboard position.

### **Recommended update to Regulatory text:**

#### **Before:**

S19.2.1 The vehicle shall be equipped with an automatic suppression feature for the passenger air bag which results in deactivation of the air bag during each of the static tests specified in S20.2

#### **After:**

S19.2.1 The vehicle shall be equipped with an automatic suppression feature for any front outboard passenger air bag which results in deactivation of the air bag during each of the static tests specified in S20.2

***NHTSA Proposal: Treatment of ADS Vehicles with Driving Controls When Children are in the Driver's Seat and the ADS is active.***

*When a vehicle could be capable of operation without a driver, it is possible that a child not old enough to drive could be placed in the driver's designated seating position. NHTSA believes this would be an inherently unsafe condition, particularly for smaller children, because the driver's seating position is not required to have crash protection for children or protection from the dangers of OOP air bag deployment.*

*This NPRM tentatively proposes that the following conditions would disallow vehicle motion:*

- 1) The occupant of the seat is classified as a child, for which air bag suppression would be an option in a passenger seat, i.e., up to a 6-year-old as determined by the same test procedures used by air bag suppression (S20, S22 and S24).*
- 2) The vehicle is in an operational state that does not require a driver, i.e., any situation where the ADS is under full control.*

***Discussion:***

Ford has identified two main issues as foreseeable and predictable risks that need to be considered when a child is seated in a driver seating position for an ADS equipped "dual mode" SAE Level 4 vehicle with traditional manual steering controls containing a steering column and steering wheel. These issues are crash protection for the child and a potential unintended take-over of the driving task by the child. NHTSA proposed that the risks could be addressed by suppressing motion of the vehicle when a child seat is detected in the driver seat if the ADS is active. While this could be an option for some AV developers, there is historical precedent with seatbelt interlocks that suggests that there is a potential for customer confusion and pushback. Hence, there needs to be a secondary option for other AV developers.

Both the risks identified can be resolved as follows:

- ***Crash Protection:*** Ensure the same level of crash protection for children of various ages in the driver seat position as provided today in the passenger outboard seating position, by requiring the same performance requirements for both outboard seats. Additionally, AV developers may need to assess due care considerations for in position child performance for their individual vehicle designs as well.
- ***Unintentional Take-Over of the Driving Task From the ADS.*** This risk can be addressed by suppressing manual requests to the steering control in ADS mode when a child is detected in the driver seat. Updating the regulatory text as follows can also ensure that the "make inoperative" provision<sup>7</sup> is not violated.

---

<sup>7</sup> 49 U.S.C 30122

**Recommended update to Regulatory text:**

**Before:**

No Text

**After:**

*Each ADS Vehicles with Driving Controls shall at the option of the manufacturer, meet one of the options below:*

**Option 1:** *Motion suppression for vehicles with manually-operated driving controls that do not require a driver maybe considered an option*

*Under the motion suppression option - Each vehicle that is certified as complying with S14 shall not be capable of motion when a 12-month-old CRABI dummy is placed at the driver's seating position and the vehicle is in an operational state that does not require a driver. S19.5.1 Motion suppression shall be assessed under the test procedures specified in S20.1 through S20.2, except that the 12-month-old CRABI dummy is placed in the driver's seating position and the result shall be an inability of engage vehicle motion.*

**Option 2:** *Manual input suppression for vehicles with manually-operated driving controls that do not require a driver maybe considered an option*

*Under the manual input suppression option - Each vehicle that is certified as complying with S14 shall not be capable of receiving manual input when a 12-month-old CRABI dummy is placed at the driver's seating position and the vehicle is in an operational state that does not require a driver. S19.5.1 Manual input suppression shall be assessed under the test procedures specified in S20.1 through S20.2, except that the 12-month-old CRABI dummy is placed in the driver's seating position and the result shall be an inability of inputting requests for manual controls if the vehicle is in motion.*

*In addition, the system's performance would be certified to the same test procedures for air bag suppression as detailed in S20, S21, and S24. This allows NHTSA to remain technology neutral.*

## Part 571.3

***Ford Proposal:*** Update the Forward Control definition under part 571.3

***Discussion:***

ADS equipped vehicles may use electrified powertrains that can afford developers innovative vehicle architectures for optimizing new mobility needs, that may not have been possible with a traditional internal combustion engine. Some of the new architectures may have a Forward Control design<sup>8,9,10</sup>, but the absence of an engine and manual controls will not allow them to meet the definition of a Forward control vehicle described in Part 571.3. The proposed change to the definition recommends the alternative use of the electric motor in place of the engine and a reference point relative to a first-row seating reference point in place of the steering wheel hub when either do not exist.

***Recommended update to Regulatory text:***

***Before:***

*Forward control means a configuration in which more than half of the engine length is rearward of the foremost point of the windshield base and the steering wheel hub is in the forward quarter of the vehicle length.*

***After:***

*Forward control means a configuration in which more than half of the engine or the electric motor in case of an electric powertrain length is rearward of the foremost point of the windshield base and the steering wheel hub is in the forward quarter of the vehicle length. For a vehicle without a steering control system, Forward control means a configuration in which more than half of the engine length or the electric motor in case of an electric powertrain, is rearward of the foremost point of the windshield base, and a point 400 mm forward of the seating reference point of the rearmost designated seating position in the front row of seats, is in the forward quarter of the vehicle length."*

---

<sup>8</sup> Navya shuttle – [www.navya.tech](http://www.navya.tech)

<sup>9</sup> VW Sedric concept - <https://www.volkswagenag.com/en/news/stories/2018/02/sedric-the-future.html>

<sup>10</sup> Cruise Origin concept - <https://www.getcruise.com/origin/>