



May 29, 2020

James C. Owens, Deputy Administrator  
National Highway Traffic Safety Administration  
West Building, Ground Floor, Room W12-140  
1200 New Jersey Avenue, S.E.  
Washington, D.C. 20590

**Re:** Tesla's Comments in Response to "Occupant Protection for Automated Driving Systems," 85 Fed. Reg. 17624 (March 30, 2020); Docket No. NHTSA-2020-0014

Dear Deputy Administrator Owens:

Tesla, Inc. ("Tesla" or the "Company"), is pleased to submit written comments to the National Highway Traffic Safety Administration ("NHTSA" or the "Agency") in response to the Agency's March 30, 2020, Notice of Proposed Rulemaking ("NPRM") regarding Occupant Protection for Automated Driving Systems. Tesla applauds the Agency's efforts to modernize the crashworthiness portions of the Federal Motor Vehicle Safety Standards ("FMVSS") and appreciates the Agency's attempts to pursue a technology-neutral approach and to provide certainty to industry when it comes to certification and compliance verification for Automated Driving System (ADS)-equipped vehicles.

Overall, Tesla believes that NHTSA's proposals are sound. Tesla understands and appreciates that removing barriers is an important first step. Tesla also agrees that this stepped approach is appropriate given the expected, and impending, mixed-fleet transition period where manual and ADS-equipped vehicles may co-exist. We encourage NHTSA to continue its efforts to undertake research where necessary and to finalize rules that will provide a pathway towards making fully automated driving a reality in both conventional and nonconventional vehicles.

As discussed in more detail below, Tesla believes portions of the Agency's proposal can be revised in a manner that would make a major impact on the clarity, effectiveness, and practicality of the rules. Additionally, in a few cases, Tesla believes that more research, analysis, and/or considerations need to be given to regulatory updates before they are implemented.

## I. Background

Tesla is the world's leading manufacturer of fully electric vehicles ("EVs"). The Company maintains primary research, development, and manufacturing facilities in Palo Alto and Fremont, California, and Sparks, Nevada. Tesla has been instrumental in reviving consumer interest in EVs with the introduction of the Roadster in 2008, the Model S in 2012, the Model X in 2015, the Model 3 in 2017, and the Model Y earlier this year. With each model, we proved that modern EVs can deliver performance, range, technology, safety, and style, all in a completely emissions-free package.

Safety is our highest priority. We design our vehicles to ensure that an all-electric architecture and powertrain design will enhance passenger safety in the event of a crash. Among the more than 1,000 vehicles that NHTSA has tested under the New Car Assessment Program, Tesla vehicles – Models 3, S, and X as a group – have achieved the lowest overall probabilities of injury. Additionally, we design our vehicles to allow for continual improvements to the fleet via remote, over-the-air ("OTA") software updates. We use OTA updates to provide customers with safety and convenience features as quickly as we develop and validate them. In addition, Tesla now sells all its vehicles with the sensors and computational hardware necessary for full self-driving capability. The Company will enable self-driving functionalities via OTA updates as we validate the features, confirm regulatory compliance, and receive any necessary government approvals.

## II. Comments

### A. Definition of "Driver"

In the NPRM, NHTSA has not proposed any update to the definition of "driver" contained in 49 C.F.R. § 571.3, although it notes that it may do so in future notices.<sup>1</sup> Instead, the Agency proposes to add other "supporting or clarifying definitions" to indicate when the Federal Motor Vehicle Safety Standards ("FMVSS") are referring to a human driver or the ADS.

As defined in the FMVSS, the "driver" is "the occupant of a motor vehicle seated immediately behind the steering control system."<sup>2</sup> In the NPRM, the Agency concludes that an "occupant" must be a human because only humans can "occupy the space of the vehicle" and, thus, the term "driver," as used in the FMVSS, must be a human.<sup>3</sup> The Agency recognizes that interpreting the definition of "driver" as a human

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<sup>1</sup> 85 Fed. Reg. at p. 17633.

<sup>2</sup> 49 C.F.R. § 571.3.

<sup>3</sup> 85 Fed. Reg. at p. 17633.

precludes use of an unmodified version of the term to describe the driving functionality of the ADS (where no human may be involved in the driving task), but it does not propose any such modification.

Acknowledging the potential regulatory challenges presented by its long-standing definition of “driver,” the Agency quotes from its 2016 interpretation letter to Google<sup>4</sup>, where it identified situations in which an ADS could be deemed the driver for purposes of certain FMVSS. Coupled with its statements that a driver must be human, there appears to be a conflict in the Agency’s position – or at least uncertainty as to whether this part of the Google interpretation still stands. Because this perceived conflict may stifle or delay innovation and cause further compliance uncertainty, Tesla urges the Agency to clarify its discussion of the Google interpretation and its position with respect to the treatment of an ADS as a driver.

Tesla believes such clarification can be accomplished most effectively by updating the definition of “driver” or creating an entirely new defined term, such as “operator.” The term “operator” is broad and flexible enough to include human drivers, while at the same time keeping pace with innovation up to and including an ADS. Indeed, it could be defined to include an occupant – *i.e.*, the human – seated behind the manually-operated driving controls, a remote operator (whether human or machine and whether outside the vehicle or in another designated seating position within the vehicle), and/or the ADS, including where individual(s) vehicles may ultimately be operated in a fleet mode (e.g., Robo-Taxi, Platooning). Tesla recognizes the logistical complications with redefining “driver” through this rulemaking and acknowledges that there could still be an evolution in the future. For example, NHTSA could keep the definition of driver unchanged for now, add the definition of operator (which may or may not include “driver” as one of the definitions), insert “driver or operator” where appropriate within the crashworthiness standards, and then, for future notices such as the crash avoidance rulemaking, determine whether to keep “driver” as a separately defined term or eliminate it altogether.

Tesla is also concerned that, if the Agency does not update the meaning of “driver” now, it may result in confusion and inconsistency not only by manufacturers, but also state lawmakers. While states are responsible for regulating the human driver and vehicle operations, they have begun to regulate deployment of ADS-equipped vehicles in ways that may impact design and performance. Many states have enacted – or begun crafting – laws that include definitions for “driver” or “operator.” For example, California has already taken the term “operator” and defined it as a person seated in the driver’s seat. See Cal. Veh. Code, Div. 16.6, sec. 38750(a). Similarly, Florida defines “operator” to include “a person exercising control over or steering a vehicle,” although it recently enacted legislation, adding a defined term for “teleoperation system” and allowing a remote human operator to perform certain aspects of the

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<sup>4</sup> Available at: <https://www.nhtsa.gov/interpretations/google-compiled-response-12-nov-15-interp-request-4-feb-16-final>

driving task. See FL Stat. 316.003(50) and (89). If states continue to lead in defining these terms, the industry will be forced to work within those definitions, and that could cause confusion or conflict should NHTSA later redefine “driver.”

If the Agency, nevertheless, decides to retain the existing definition of “driver” for now, Tesla urges it to reconsider the definitions of “steering control system” and “manually-operated driving controls.” As currently proposed, the definition of “steering control system” includes only “manually-operated driving controls used to control the vehicle heading,” making both terms appear to be at least somewhat superfluous. The terms could have independent meaning if the Agency more broadly defines “steering control system” to focus on the system responsible for vehicle heading or movement control in general, including both “manually-operated driving controls” and those that are not manually operated (i.e., for vehicles that are not equipped with manually-operated driving controls). If the Agency declines to adopt such an expanded definition at this time, Tesla seeks clarity as to whether remote operation, within or outside the vehicle, should fall within the definition of “manually-operated driving controls,” and at which point is control no longer considered “manually operated” (e.g., where portable controls could be passed between occupants within the vehicle and/or within a trip, or where there is a handoff from the ADS to the human operator). These clarifications are especially important given that the Agency has proposed to include these definitions in 49 C.F.R. § 571.3, so that they will have applicability to all FMVSS.

#### B. Driver’s Designated Seating Position

As one of the terms “supporting or clarifying” the definition of “driver,” the Agency has proposed a revised definition for “driver’s designated seating position” as “a designated seating position providing immediate access to manually-operated driving controls.”<sup>5</sup> Immediate access is not, however, further defined or clarified in the NPRM. Throughout the notice, the Agency appears to focus primarily on two scenarios: (1) manually-operated driving controls that are stowed when the ADS is in control of the driving task; and (2) vehicles that are not equipped with manually-operated driving controls. Because these are not the only potential, future possibilities, the Agency should consider adding further detail, taking into account situations where, for example, the manual controls may be removable, or where they may still be present, but are “locked” or rendered inoperative when the ADS is in control of the driving task, or where the vehicle may be operated remotely by portable steering controls within the vehicle (e.g. by cell phones or tablets). Tesla assumes that the Agency would treat removable or remote operation as if the controls were stowed, but more discussion of what is meant by “immediate access” would provide further clarity.

Similarly, the proposed definition of “manually-operated driving controls” may not fully consider the range of possibilities. How to properly protect occupants in a crash changes as we move away from conventional controls like steering wheels, to new concepts that rely on buttons, joysticks, screens, etc.,

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<sup>5</sup> 85 Fed. Reg. at p. 17644.

which may not present the same risk or level of injury in a crash. As a result, the presence of such equipment should not necessarily be determinative of whether the designated seating position should be considered a driver's rather than a passenger's seat for purposes of occupant protection. Instead, the manufacturer should be able to designate which seating position(s), if any, should be considered the "driver's (or more broadly, "operator's") designated seating position(s)."

In addition, NHTSA should consider adding further clarity to the phrase "positioned such that they can be used by an occupant." First, Tesla suggests NHTSA amend "occupant" to "occupant(s)" to include and allow for the possibility that vehicle control(s) may be passed to, and used by, more than one occupant in more than one designated seating position. Second, the Agency should consider whether additional clarity on the positioning of such controls is needed. For example, controls that are portable may not be attached to the instrument panel and, therefore, may not technically be "positioned" anywhere or in any one location. Because the NPRM purports to create a new requirement in FMVSS 207, S4.1 that each vehicle with manually-operated driving controls have a driver's designated seating position,<sup>6</sup> adding clarity to the meaning of "positioned" would further aid manufacturers in designating a "driver's designated seating position" for compliance purposes.

Finally, NHTSA should consider whether it is, in fact, now requiring a driver's designated seating position for vehicles with manually-operating driving controls<sup>7</sup> and, if so, whether it should include some recognition in FMVSS 207, S4.1 that, in certain circumstances involving dual-mode vehicles, the driver's designated seating position may become a passenger's designated seating position (e.g., when the manually-operated driving controls are stowed). Otherwise, in such cases, technically there may be no driver's designated seating position, which could create uncertainty about compliance with FMVSS 207, S4.1 for dual-mode vehicles.

### C. Vehicle Motion Suppression

Citing the broad concern that it is inherently unsafe for children to be in the "driver's seat," the Agency seeks comments on whether dual-mode vehicles should not be capable of motion if a child is detected in the driver's seat.<sup>8</sup> However, the Agency has not explained why this additional requirement would have any meaningful impact on safety. As for any rollaway risk, FMVSS 114, S5.2 already requires prevention measures, which are currently applicable to dual-mode vehicles. With respect to occupant protection, in at least some circumstances, NHTSA has proposed regulatory changes that would protect child

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<sup>6</sup> 85 Fed. Reg. at p. 17646.

<sup>7</sup> Compare 85 Fed. Reg. at p. 17646 ("Each vehicle with manually-operated driving controls shall have a driver's designated seating position.") with FMVSS Considerations for Vehicles with Automated Driving Systems: Volume 1, DOT HS 812 796 at p. 68 (April 2020) ("The FMVSS do not require that a vehicle has a driver's DSP.").

<sup>8</sup> 85 Fed. Reg. at p. 17637.

occupants seated in this seating position in a crash. As stated in the NPRM, “[i]f controls are not present in front of a seating position, either because they are stowed or because the vehicle is not equipped with manually-operated driving controls, the occupant in that seating position is not a ‘driver.’”<sup>9</sup> And, in that case, the seating position would be considered a “passenger seating position” under the FMVSS and would be required to meet both adult and child occupant protection requirements, including advanced air bags.

If NHTSA nevertheless decides to retain this requirement in the final rule, Tesla requests that it clarify and further define the scope and size of such child occupants, as well as the basis for its determination. NHTSA has proposed a new FMVSS 208, S19.5, which specifies: “Each vehicle that is certified as complying with S14 shall not be capable of motion when a 12-month-old CRABI dummy is placed in the driver’s seating position and the vehicle is in an operational state that does not require a driver.”<sup>10</sup> NHTSA should consider further explaining the basis for relying solely on the 12-month-old CRABI dummy. Tesla understands that NHTSA is attempting to mirror the air bag suppression requirements currently application to the passenger’s seat. However, the concern here appears different, and the test may therefore be insufficient, because it seeks not only to address whether the air bag will deploy, but also whether the vehicle will be capable of motion. If the system is not required to detect a 13-month-old, for example, then it appears the purported safety risk remains the same, and the proposed rule does not seem tailored to the safety concern.

Tesla is also concerned that the Agency’s proposal does not consider the risk of “false positives.” The proposed rule does not contain any reference or test parameters for the outer bounds at which the vehicle shall not be capable of motion. Tesla recognizes that this is not an easy task. It may be difficult for a system to determine with certainty whether the occupant is a child or smaller statured adult. Older children in a booster may weigh the same as a small adult and Tesla seeks clarity on how much overlap would be permissible – if any. In other words, NHTSA should consider further clarifying the bounds of what must be detected. One suggestion for addressing this issue could be for the Agency to provide a range, for example, by revising the proposal to require that the vehicle shall not be capable of motion when at least a 12-month-old CRABI dummy and up to a 10 year ATD are placed in the driver’s designated seating position.

#### D. Additional Comments

NHTSA should consider whether it would add clarity to FMVSS 203, S1 and FMVSS 204, S1 to add language similar to that proposed for FMVSS 201, S5.1.1(d) – i.e., “if a steering control is present.”

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<sup>9</sup> *Id.* at p. 17634

<sup>10</sup> *Id.* at p. 17637.

NHTSA should also consider whether additional updates or clarifications are necessary to standards that use steering control “rim” as a reference point, e.g., FMVSS 208, S10.3.1 and FMVSS 214, S12.3.2. Use of the term “rim” implies a round steering mechanism, and NHTSA has acknowledged in the NPRM that steering controls may not be circular.<sup>11</sup> Tesla suggests using an alternative reference point or more broadly defining “rim” as “the projected sweep of the handgrip surface in the steering envelope.”

NHTSA has requested comment on whether the final rule should “require air bag (including out-of-position protection) and lap/shoulder seat belt protection to [] inboard seating positions, if outboard seating positions are removed.”<sup>12</sup> As the Agency recognizes, this equipment is not currently required for inboard – i.e., center – seating positions. Before issuing such a rule, Tesla urges the Agency to first conduct research on the appropriateness and type of equipment (especially for out-of-position) that is needed to protect an occupant in this seating position, including e.g., where the center seat could serve as both an armrest for outboard occupants and a foldable seat.

NHTSA also requested comment on whether changes should be made to any other crashworthiness standards. In response, Tesla urges NHTSA to consider updates to the parking brake status in compliance testing where it may not reflect real-world scenarios. While there may not be an immediate impact, if the parking brake would not typically be applied in a real-world situation that may present a barrier to new concepts in the future or may risk designs that protect in a testing scenario, but not in the real world.

Finally, Tesla appreciates the Agency’s ongoing efforts to address dual-mode vehicles, and urges the Agency to consider adding even more clarity regarding the applicability of the FMVSS to such vehicles. Dual-mode vehicles are likely to be some of the first ADS-equipped vehicles on the road due to the current regulatory landscape, lengthy exemption process, and limited fleet for which an exemption can be granted. NHTSA should take care when addressing requirements that may impact dual-mode vehicles to avoid conflicts and inconsistencies. For example, in the NPRM, NHTSA said, “[i]f controls are not present in front of a seating position, either because they are stowed or because the vehicle is not equipped with manually-operated driving controls, the occupant in that seating position is not a ‘driver.’”<sup>13</sup> But it also stated, “[i]n such [dual-mode] vehicles, the seat where the manual controls are located would still be a driver’s seat even when the ADS is engaged . . .”<sup>14</sup> Tesla assumes the last statement does not apply if the manually-operated driving controls are stowed or removed, but requests that NHTSA clarify this point.

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<sup>11</sup> *Id.* at p. 17639.

<sup>12</sup> *Id.* at p. 17636.

<sup>13</sup> *Id.* at p. 17634.

<sup>14</sup> *Id.* at p. 17637.

Tesla appreciates this opportunity to share our comments in response to the NPRM. If NHTSA has any questions or comments regarding this submission, please feel free to contact me at [anbell@tesla.com](mailto:anbell@tesla.com) or my colleague, Beth Mykytiuk, at [emykytiuk@tesla.com](mailto:emykytiuk@tesla.com).

Sincerely,

A handwritten signature in black ink that reads "Anders Bell". The signature is written in a cursive, flowing style.

Anders Bell  
Senior Director  
Safety Systems Engineering