



## DEPARTMENT OF TRANSPORTATION

### National Highway Traffic Safety Administration

#### 49 CFR Part 571

[Docket No. NHTSA-2024-0071]

RIN 2127-AL37

### Federal Motor Vehicle Safety Standards; Occupant Crash Protection, Seat Belt Reminder Systems, Controls and Displays

**AGENCY:** National Highway Traffic Safety Administration (NHTSA), Department of Transportation (DOT).

**ACTION:** Final rule.

**SUMMARY:** This document amends Federal Motor Vehicle Safety Standard (FMVSS) No. 208, “Occupant crash protection,” to require a seat belt use warning system for rear seats. The rule also updates and enhances the current seat belt warning requirements for the driver’s seat belt and extends these requirements to the front outboard passenger seat. The final rule applies (with some exceptions) to passenger cars, trucks, most buses, and multipurpose passenger vehicles with a gross vehicle weight rating of 4,536 kilograms (10,000 pounds) or less. This document also makes related amendments to FMVSS No. 101, “Controls and displays.”

**DATES:** *Effective date:* The effective date of this final rule is [INSERT DATE 60 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

*Compliance date:* The compliance date of this final rule is September 1, 2026, for the front seat belt warning system requirements and September 1, 2027, for the rear seat belt warning system requirements, with optional early compliance permitted. Multi-stage manufacturers and alterers would have an additional year to comply.

*Petitions for reconsideration:* Petitions for reconsideration of this final rule must be received not later than [INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE *FEDERAL REGISTER*].

**ADDRESSES:** Petitions for reconsideration of this final rule must refer to the docket and notice number set forth above and be submitted to the Administrator, National Highway Traffic Safety Administration, 1200 New Jersey Avenue SE, Washington, DC 20590. Note that all petitions received will be posted without change to [www.regulations.gov](http://www.regulations.gov), including any personal information provided.

*Privacy Act:* Petitions will be placed in the docket. Anyone is able to search the electronic form of all documents received into any of our dockets by the name of the individual submitting the comment (or signing the comment, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the *Federal Register* published on April 11, 2000 (Volume 65, Number 70; Pages 19477–78) or you may visit <https://www.transportation.gov/individuals/privacy/privacy-act-system-records-notice>.

**FOR FURTHER INFORMATION CONTACT:** For non-legal issues, you may contact Ms. Carla Rush, Office of Crashworthiness Standards, Telephone: (202) 366-4583; Email: [carla.rush@dot.gov](mailto:carla.rush@dot.gov); Facsimile: (202) 493-2739. For legal issues, you may contact Mr. John Piazza ([John.Piazza@dot.gov](mailto:John.Piazza@dot.gov)) or Eli Wachtel ([Eli.Wachtel@dot.gov](mailto:Eli.Wachtel@dot.gov)), Office of Chief Counsel, Telephone: (202) 366-2992; Facsimile: (202) 366-3820. The address of these officials is: the National Highway Traffic Safety Administration, 1200 New Jersey Avenue S.E., Washington, DC, 20590.

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## **I. Executive Summary**

This final rule amends Federal Motor Vehicle Safety Standard (FMVSS or Standard) No. 208, "Occupant crash protection," to require a seat belt use warning system for rear seats. This

rule completes NHTSA's response to a mandate in the Moving Ahead for Progress in the 21st Century Act (MAP-21) that directed NHTSA to initiate a rulemaking to require a seat belt warning for the rear seats in motor vehicles; it also completes NHTSA's action on a rulemaking petition from Public Citizen and Advocates for Highway and Auto Safety for the same rule. The final rule also updates and enhances the current seat belt warning requirements for the driver's seat belt and extends these requirements to the front outboard passenger seat. The final rule applies (with some exceptions) to passenger cars, trucks, most buses, and multipurpose passenger vehicles (MPVs) with a gross vehicle weight rating (GVWR) of 4,536 kilograms (10,000 pounds) or less. NHTSA is issuing this final rule under the National Traffic and Motor Vehicle Safety Act (Safety Act), 49 U.S.C. chapter 301, Motor Vehicle Safety (49 U.S.C. 30101 *et seq.*).

#### Safety Need for the Final Rule

Using a seat belt is one of the most effective ways a motor vehicle occupant can prevent death and injury in a crash. Seat belts prevent occupants from being ejected from the vehicle, provide "ride-down" by gradually decelerating the occupant as the vehicle deforms and absorbs energy, and reduce occupant contact with harmful interior surfaces and other occupants. Seat belts are effective in most types of crashes and greatly reduce the risk of fatal and non-fatal injuries compared to the risk faced by unrestrained occupants.

While seat belt use is meaningfully higher than it was a decade ago, there is room for improvement. Usage rates for seat belts in rear seats have consistently been below those for the front seats; and while front seat belt use rates increased in the early 2010s, for the last several years they have plateaued. According to data from NHTSA's annual study of observed seat belt use, in every year from 2013 through 2022, seat belt use was lower in the rear seats than in the front seats, ranging from a difference of about 9 percentage points in 2013 (78 percent vs. 87 percent) to about 14 percentage points in 2017 (75 percent vs. 89 percent). In 2022, front seat belt use was about 91.6 percent and rear seat belt use was about 81.7 percent.

Every year, thousands of unrestrained motor vehicle occupants are killed in crashes and tens of thousands of unrestrained occupants are injured (additional details on the target population are provided in the summary of benefits and costs later in this executive summary). Seat belt warning systems (also referred to as seat belt reminder systems) encourage seat belt use by reminding unbuckled occupants to fasten their belts and/or by informing the driver that a passenger is unbelted so that the driver can request the unbelted occupant to buckle up. The warnings provided by seat belt warning systems typically consist of visual and/or audible signals. Research by NHTSA and others shows that seat belt warning systems are effective at getting unbuckled occupants to fasten their seat belts.

FMVSS No. 208 currently requires a short-duration audio-visual seat belt warning for the driver's seat belt in passenger cars, most trucks and MPVs with a GVWR of 4,536 kg (10,000 lb) or less, and buses with a GVWR of 3,855 kg (8,500 lb) or less. Under these current requirements, the visual component of the warning generally must be at least 60 seconds long, and the audible component must be at least four seconds long.

Voluntary adoption by vehicle manufacturers of warnings that go beyond this regulatory minimum, while considerable, has been mixed. Although the regulations do not require seat belt warnings for any seating position other than the driver's seat, almost all model year (MY) 2022 vehicles have a voluntarily provided seat belt warning for the front outboard passenger seat. However, voluntary adoption for rear seats has been much slower, as only about 47 percent of MY 2022 vehicles come equipped with a voluntarily provided rear seat belt warning system. Most vehicles already provide a seat belt warning for both front outboard seats that is much longer than the minimal required warning for the driver's seat belt, with the vast majority of vehicles including an alert that is at least 90 seconds. This widespread adoption suggests that the front seat belt warning minimum requirements in the FMVSS are outdated, as consumers accept audio-visual reminders that are far longer than the required minimums.

As discussed above, rear seat belt use rates have persistently been below those for the front seats, and progress on front seat belt use rates has slowed. Moreover, unbuckled occupants, in the front and rear seats, continue to be overrepresented in fatal crashes (51 percent), given the lower exposure of unbelted occupants relative to belted occupants (because front seat belt use is about 90 percent and rear seat belt use is 80 percent). Despite the effectiveness of seat belts and seat belt warnings, most new vehicles continue to lack a rear seat belt warning. Additionally, while most vehicles provide some level of enhanced reminders for the front seats, this level of enhanced protection has not occurred for all vehicles and is not standardized. This gap in protection suggests a need for a beneficial safety technology that is not being met in the vehicle market. This final rule is intended to meet this safety need.

#### Legal authority and prior regulatory history

NHTSA is issuing this final rule pursuant to the National Traffic and Motor Vehicle Safety Act (49 U.S.C. 30101 *et seq.*) (Safety Act), which authorizes NHTSA to establish FMVSSs. That statute requires safety standards to be objective, practicable, and meet the need for safety, among other things. NHTSA has concluded that the finalized requirements satisfy these statutory criteria.

This final rule completes NHTSA's response to a rulemaking mandate in MAP-21. MAP-21 required DOT (NHTSA, by delegation) to initiate a rulemaking proceeding to require rear seat belt warnings and directed the agency to issue a final rule unless the rule would not meet the Safety Act requirements for an FMVSS.

This final rule also completes NHTSA's action on a rulemaking petition from Public Citizen and Advocates for Highway and Auto Safety. The petition requested that NHTSA issue a rule requiring a seat belt warning system for rear seats on passenger cars and MPVs with a GVWR of 4,536 kg (10,000 lb) or less.

#### Summary of the final rule

This final rule amends the existing seat belt warning provisions in FMVSS No. 208. The final rule has two main components. The first requires a seat belt warning for the rear seats. The second amends and enhances the seat belt warning requirements for the front outboard seats. The requirements apply (with some exceptions) to passenger cars and trucks, most buses, and multipurpose passenger vehicles with a GVWR of 4,536 kg (10,000 lb) or less.

#### 1. Rear seat belt reminder requirements

The first component of this final rule is a set of requirements for a seat belt warning for rear seats. The new requirements have four main elements.

- *Visual warning on vehicle start-up to inform the driver of the status of the rear seat belts.*

The final rule requires a visual warning that informs the driver how many or which rear seat belts are in use and/or not in use. The warning must activate when the ignition (or, for electric vehicles (EVs), propulsion system) is activated, and last for at least 60 seconds. No visual warning is required if the system can determine that there are no occupied rear seats or if there are no occupied rear seats with a seat belt that is not in use.

- *Audio-visual change-of-status warning.* The final rule requires an audio-visual warning whenever a fastened rear seat belt is unfastened while the vehicle is in forward or reverse drive mode. (The warning is not required if the system can determine that a rear passenger has unfastened the seat belt in order to exit the vehicle or switch seats.) The warning must last for at least 30 seconds or until the seat belt that triggered the warning is re-fastened. The audible portion of the warning may be temporarily paused to allow another audible safety warning alerting the driver to take immediate action.

- *Requirements related to electrical connections.* Readily removable rear seats must either automatically establish the electrical connections when the seat is put in place or, if a manual connection is required, the connectors must be readily accessible. Vehicles equipped with certain types of seat belt warning systems are additionally required to

provide a visual warning to the driver if a proper electrical connection has not been established.

- *Owner's manual requirements.* The vehicle owner's manual (which includes information provided by the vehicle manufacturer to the consumer, whether in digital or printed form) must describe the warning system's features, including the location and format of the visual warnings. It must also include instructions on how to make any manual electrical connections for readily removable seats.

## 2. Front outboard seat belt warning requirements

The final rule includes several changes and enhancements to the seat belt warning requirements for the front outboard seats. The new requirements have two main elements.

- *Seat belt warning now required for front outboard passenger seat.* This final rule requires a seat belt warning for the front outboard passenger seat. It does not require one for front center seats because, among other things, doing so would not be cost-effective. Currently, only the driver's seat is required to have a seat belt warning, although almost all vehicles now provide a seat belt warning for the front outboard passenger seat as well.
- *Enhanced audio-visual seat belt warning.* The final rule requires a longer-duration audio-visual warning than is currently required for the driver's seat belt. The final requirements for this warning differ from the proposal, which would have required (with some exceptions) an audio-visual warning lasting until the belt at any occupied front outboard seat was fastened. This included a warning at the start of a trip and if a belt was unfastened during a trip. The proposal did not include any other warning triggers, such as vehicle speed. The final rule requires a visual warning and a two-phase audible warning that is based, in part, on vehicle speed.

*Visual warning.* Under the final rule, a visual warning is required whenever the ignition switch is in the "on" or "start" position (or the propulsion system is activated),

the seat is occupied, and the seat belt is not in use. The warning must be visible to the driver.

*Audible warning.* The final rule requires a two-phase audible warning. The first phase warning must activate when the ignition/propulsion system is activated, the seat is occupied, and the belt is not in use. The first phase warning must last for at least 30 seconds, unless the seat belt that triggered the warning is fastened or the second phase audible warning is activated within that time. The second phase audible warning must activate, and remain active, whenever the seat is occupied, the seat belt is not in use, and the vehicle speed is at least 10 km/h (6.2 mph). The audible warning may be temporarily paused to allow another audible safety warning alerting the driver to take immediate action.

The final rule also contains requirements for the visual and audible warnings as well as for other system features.

#### Compliance date

This final rule establishes a compliance date for the amendments to FMVSS No. 208, “Occupant crash protection,” as follows. Manufacturers must comply with the amendments as of September 1, 2026 for the front seat belt warning system requirements and September 1, 2027 for the rear seat belt warning system requirements, with optional early compliance (see Section IX for details). Consistent with 49 CFR 571.8(b), multi-stage manufacturers and alterers have an additional year to comply.

#### Regulatory alternatives

NHTSA considered a wide range of alternatives to the proposed requirements. The main alternatives NHTSA considered were the seat belt warning requirements in Economic Commission for Europe (ECE) Regulation No. 16 (R16) and Euro New Car Assessment Programme (Euro NCAP). The finalized requirements are identical or similar to ECE R16 and Euro NCAP in many respects but differ from them in several ways. For instance, while under

ECE R16 the smallest occupant a rear seat belt system with occupant detection must be capable of detecting is a small-statured adult female, under the final rule such systems must be capable of detecting occupants as small as a 6-year-old child and activating the warning accordingly.

Another way the proposal differs from ECE R16 is the duration of the front seat belt warning on vehicle start-up: R16 generally requires only a 30-60 second audio-visual warning; the final rule requires, under certain conditions, an audio-visual warning that lasts until the seat belt is buckled. The final regulatory analysis quantifies the costs and benefits of three specific regulatory alternatives: requiring occupant detection for the rear seat belt warning system; requiring (for the front outboard seats) an audio-visual warning on vehicle start-up with a duration of 90 seconds; and requiring a seat belt warning for front center seats.

#### Benefits and costs of the proposed requirements

This final rule is significant and was reviewed by the Office of Management and Budget under Executive Order 12866, as amended by Executive Order 14094.

NHTSA estimates the target population and the benefits and costs of the final rule requirements in the stand-alone final regulatory impact analysis (FRIA) that is being placed in the docket with this final rule and is summarized in this document.

Based on NHTSA's data on fatalities and injuries from motor vehicle crashes, adjusted to account for the benefits of other mandatory safety technologies, there are, on average, 822 fatalities and 11,409 injuries to unrestrained rear seat occupants and 8,383 fatalities and 154,739 injuries to unrestrained front outboard seat occupants each year. The final rule requirements are aimed at reducing these deaths and injuries.

NHTSA estimates the benefits it expects from the final rule seat belt warning requirements. The benefits are the fatalities and injuries that would be prevented by these requirements. The benefits depend, principally, on the expected increase in seat belt use and the effectiveness of seat belts in preventing deaths and injuries.

For the rear seat belt warning system analysis, NHTSA used a “low” and a “high” estimate for the increase in rear belt use with the warning system. For occupants 11 years and older, these were 3 and 5 percentage points, respectively, and for occupants from 6 to 10 years old, 0.3 and 0.4 percentage points respectively.<sup>1</sup> For simplicity, NHTSA refers to these scenarios as “Low” and “High.” The estimated annual benefits for rear seat belt warning systems are presented in table 1.<sup>2</sup>

**Table 1—Estimated Annual Benefits—  
Potential Lives Saved and Injuries Prevented for Rear Seat Belt Warning Systems (SBWS) without Occupant Detection, with Estimated “Low” and “High” Percentage Point Increase in Belt Use**

<b>Injury Level</b>	<b>Low</b>	<b>High</b>
<b>MAIS 1</b>	36	54
<b>MAIS 2</b>	80	120
<b>MAIS 3</b>	26	38
<b>MAIS 4</b>	4	6
<b>MAIS 5</b>	1	2
<b>Total Injuries</b>	148	221
<b>Fatal</b>	26	39

Another way to measure benefits is by calculating equivalent lives saved (ELS). Equivalent lives saved are the number of prevented fatalities added to the number of prevented injuries, with the prevented injuries expressed in terms of fatalities (that is, with an injury expressed as a fraction of a fatality, so that the more serious the injury, the higher the fraction). The estimated equivalent lives saved assuming either a 3 percent or 7 percent discount rate are presented in table 2.

**Table 2—Estimated Annual Benefits—  
Equivalent Lives Saved (ELS) – Rear SBWS without Occupant Detection**

<b>Belt Use Increase</b>	<b>3 percent Discount Rate</b>	<b>7 percent Discount Rate</b>
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<sup>1</sup> Children in booster seats are part of the target population for this final rule because they should be restrained with the seat belt and so would benefit from a seat belt reminder. The transition to a booster seat typically occurs from ages 4 – 7 years, and recommendations to remain in a booster seat exist until age 12 years. <https://www.nhtsa.gov/vehicle-safety/car-seats-and-booster-seats#find-the-right-car-seat-car-seat-recommendations>.

<sup>2</sup> The Abbreviated Injury Scale (AIS) is a classification system for assessing impact injury severity developed and published by the Association for the Advancement of Automotive Medicine and is used for coding single injuries, assessing multiple injuries, or for assessing cumulative effects of more than one injury. MAIS represents the maximum injury severity of an occupant at an AIS level, i.e., the highest single AIS for a person with one or more injuries. MAIS 1 & 2 injuries are considered minor injuries and MAIS 3 – 5 are considered serious injuries.

<b>Low</b>	29.98	24.31
<b>High</b>	45.09	36.55

NHTSA also estimates the costs of the final rule requirements for rear seat belt warnings. NHTSA estimates that the minimum cost to comply with the rear seat belt warning requirements is \$166.44 million (M). This is based on a per-vehicle cost of \$19.59 for 53.1 percent of 16M affected new vehicles.

Based on the foregoing, NHTSA performed benefit-cost and cost-effectiveness analyses. A benefit-cost analysis calculates the net benefits, which is the difference between the benefits flowing from injury and fatality reductions and the cost of the rule. The net benefit estimates are presented in table 3. The cost-effectiveness analysis derives the cost per equivalent life saved, which is equal to the total cost of the rule divided by the total fatal equivalents that it prevents. These estimates are presented in table 4.

**Table 3 – Net Benefits – Rear SBWS without Occupant Detection  
(2020 Dollars, in Millions)**

<b>Belt Use Increase</b>	<b>Benefits 3 percent Discount</b>	<b>Benefits 7 percent Discount</b>	<b>Cost</b>	<b>Net Benefits 3 percent Discount Rate</b>	<b>Net Benefits 7 percent Discount Rate</b>
<b>Low</b>	\$357.78	\$290.05	\$166.4	\$191.34	\$123.62
<b>High</b>	\$538.00	\$436.16	\$166.4	\$371.56	\$269.72

**Table 4 – Cost-Effectiveness Analysis (Cost per Equivalent Life Saved) – Rear SBWS without Occupant Detection  
(2020 Dollars, in Millions)**

<b>Belt Use Increase</b>	<b>ELS 3 percent Discount</b>	<b>ELS 7 percent Discount</b>	<b>Cost</b>	<b>Cost/ELS 3 percent Discount</b>	<b>Cost/ELS 7 percent Discount</b>
<b>Low</b>	29.98	24.31	\$166.4	\$5.55	\$6.85
<b>High</b>	45.09	36.55	\$166.4	\$3.69	\$4.55

This final rule also enhances the driver seat belt warning requirements by requiring an indefinite visual warning and a two-phase audible warning that is based, in part, on vehicle speed that remains active until the driver's seat belt is buckled and extending these enhanced driver's seat belt warning requirements to the front outboard passenger seat. NHTSA estimates the

annual benefits of a seat belt warning for the driver and outboard front passenger that remains active until the occupant’s seat belt is buckled as shown in table 5 and table 6.

**Table 5 – Estimated Annual Benefits-  
Lives Saved and Injuries Prevented – Indefinite Duration SBWS (Front Outboard Seats)**

<b>Injury Level</b>	<b>Driver</b>	<b>Front Passenger</b>	<b>Total</b>
<b>MAIS 1</b>	129	14	143
<b>MAIS 2</b>	151	19	170
<b>MAIS 3</b>	62	8	69
<b>MAIS 4</b>	9	1	10
<b>MAIS 5</b>	3	0	3
<b>Total Injuries</b>	<b>354</b>	<b>42</b>	<b>395</b>
<b>Fatal</b>	<b>20</b>	<b>2</b>	<b>22</b>

**Table 6 – Estimated Annual Benefits-  
Equivalent Lives Saved – Indefinite Duration SBWS (Front Outboard Seats)**

	<b>Undiscounted</b>	<b>3 percent Discount Rate</b>	<b>7 percent Discount Rate</b>
<b>Driver</b>	42.26	34.98	28.36
<b>Front Passenger</b>	4.44	3.68	2.99
<b>Total</b>	46.70	38.66	31.35

NHTSA estimates that the incremental cost of the enhanced seat belt warning for the driver’s seat and the front outboard passenger seat would be no greater than the currently available seat belt warning. Although a seat belt warning is currently not required for the front outboard passenger seats, we estimate that 96 percent of new vehicles are equipped with them.<sup>3</sup> NHTSA estimates that the cost for equipping a front outboard passenger seat with a seat belt warning system is about \$2.13 per vehicle. To equip a seat belt warning system in the front outboard passenger seat positions on the remaining four percent of the new vehicle fleet (16 million) without such a warning is \$1.36 million (= \$2.13 x 0.04 x 16 million).

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<sup>3</sup> Based on data on total projected vehicle sales in the United States for MY 2022 from the agency’s New Car Assessment Program *Purchasing with Safety in Mind: What to Look For When Buying a Vehicle* program.

The total monetized benefits, costs, and net benefits (total monetized benefits – total cost) of the enhanced seat belt warning system for the driver and front passenger are shown in table 7. Table 8 presents the results of the cost effectiveness analysis—cost per equivalent lives saved from enhanced SBWS for the driver and front outboard passenger.

**Table 7 – Annual Monetized Benefits, Costs, and Net Benefits - Indefinite SBWS (Front Outboard Seats)  
(2020 Dollars, in Millions)**

	Driver		Front Passenger		Driver and Front Passenger	
	3 percent	7 percent	3 percent	7 percent	3 percent	7 percent
<b>Passenger Car Benefits</b>	\$188.89	\$154.12	\$22.86	\$18.65	\$211.75	\$172.77
<b>Light Truck &amp; Van Benefits</b>	\$228.51	\$184.29	\$21.05	\$16.97	\$249.56	\$201.26
<b>Total Benefits</b>	\$417.41	\$338.41	\$43.90	\$35.62	\$461.31	\$374.03
<b>Total Costs</b>	\$0	\$0	\$1.36	\$1.36	\$1.36	\$1.36
<b>Net Benefits</b>	\$417.41	\$338.41	\$42.54	\$34.26	\$459.95	\$372.67

**Table 8—Cost-Effectiveness Analysis (Cost per Equivalent Life Saved) – Indefinite SBWS (Front Outboard Seats)  
(2020 Dollars, in Millions)**

Discount Rate	ELS	Cost	Cost/ELS
3 percent	38.66	\$1.36	\$0.04
7 percent	31.35	\$1.36	\$0.04

The net benefits of the final rule requiring seat belt warning for rear seating positions and the enhanced seat belt warning for the front outboard seats are shown in table 9. The net benefits are positive for both 3 percent and 7 percent discount rates and for both the low and high effectiveness estimates for rear seat SBWS.

**Table 9 – Net benefits from the Final Rule (SBWS without Occupant Detection for Rear Seating Positions and Indefinite SBWS for Front Outboard Seating Positions)  
(2020 Dollars, in Millions)**

	3 percent Discount Rate	7 percent Discount Rate
<b>Front Outboard Seats</b>	\$459.95	\$372.67
<b>Rear Seats (low increase in rear seat belt use)</b>	\$191.34	\$123.62

<b>Rear Seats (high increase in rear seat belt use)</b>	\$371.56	\$269.72
<b>Total Net Benefits (low increase in rear belt use)</b>	<b>\$651.29</b>	<b>\$496.28</b>
<b>Total Net Benefits (high increase in rear belt use)</b>	<b>\$831.51</b>	<b>\$642.39</b>

## II. Background

On September 7, 2023, NHTSA published a notice of proposed rulemaking (NPRM) to amend FMVSS No. 208, “Occupant crash protection,” to require a seat belt use warning system for rear seats and to enhance the existing front seat belt warning requirements, including requiring a seat belt warning for the front outboard passenger seat and increasing the duration of the warning.<sup>4</sup> This section provides an abbreviated background on the subject matter and regulatory history of the proposed requirements. For a fuller discussion, the reader is referred to the NPRM.<sup>5</sup>

### Seat belts and seat belt warning systems

Using a seat belt is one of the most effective actions a motor vehicle occupant can take to prevent death and injury in a crash.<sup>6</sup> Seat belts protect occupants in various ways. They prevent occupants from being ejected from the vehicle, gradually decelerate the occupant as the vehicle deforms and absorbs energy, and reduce the occurrence of occupant contact with harmful interior surfaces and other occupants.<sup>7</sup> Research has found that seat belts greatly reduce the risk of fatal and non-fatal injuries compared to the risk faced by unrestrained occupants. For rear seat occupants, seat belts reduce the risk of fatality by 55 percent (for passenger cars) and 74 percent (for light trucks and vans). For drivers, seat belts reduce the risk of fatality by 48 percent (for

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<sup>4</sup> 88 FR 61674.

<sup>5</sup> *Id.* at pgs. 61680-61686.

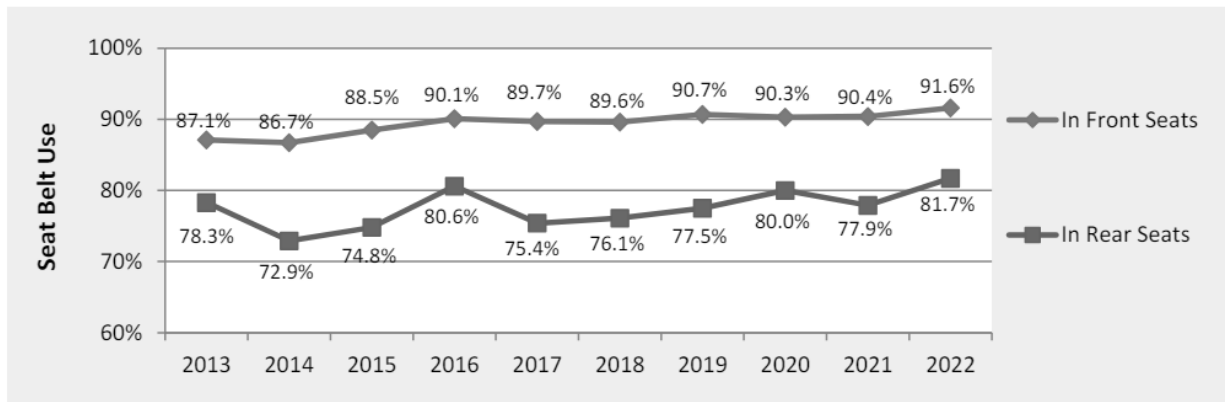
<sup>6</sup> *See, e.g.*, 68 FR 46262 (Aug. 5, 2003). *See also* Buckling Up: Technologies to Increase Seat Belt Use. Special Report 278 at 18, Committee for the Safety Belt Technology Study, Transportation Research Board of The National Academies (2003).

<sup>7</sup> Charles J. Kahane, Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012 – Passenger Cars and LTVs – With Reviews of 26 FMVSS and the Effectiveness of Their Associated Safety Technologies in Reducing Fatalities, Injuries, and Crashes. 89 DOT HS 812 069 at 89, Department of Transportation, National Highway Traffic Safety Administration (2015).

passenger cars) and 61 percent (for light trucks and vans) and reduce the risk of moderate to greater severity injuries by 65 percent. For front outboard passengers, seat belts reduce the risk of fatality by 37 percent (for passenger cars) and by 58 percent (for light trucks and vans) and reduce the risk of moderate to greater severity injuries by 65 percent.<sup>8</sup>

While seat belt use is meaningfully higher than it was a decade ago, there is room for improvement. Usage rates for rear seat belts have consistently been below those for the front seats, and while front seat belt use rates increased early in the previous decade, for the last several years they have plateaued. According to data from NHTSA’s National Occupant Protection Use Survey (NOPUS), from 2013 to 2022, seat belt use was lower in the rear seat than in the front seat, ranging from a difference of 8.8 percentage points in 2013 (78.3 percent vs. 87.1 percent) to 14.3 percentage points in 2017 (75.4 percent vs. 89.7 percent).<sup>9</sup> In 2022, front seat belt use was 91.6 percent and rear seat belt use was 81.7 percent.<sup>10</sup> See Figure 1.

**Figure 1 - Seat Belt Use by Seating Position for Occupants 8 and Older, 2013-2022**



<sup>8</sup> See the Final Regulatory Impact Analysis (FRIA) (in the docket for this rulemaking) for these effectiveness estimates.

<sup>9</sup> Boyle, L. L. (2022, August). Occupant restraint use in 2021: Results from the NOPUS Controlled Intersection Study (Report No. DOT HS 813 344). National Highway Traffic Safety Administration. NOPUS is the only nationwide probability-based observational survey of seat belt use in the United States. The survey observes seat belt use as it actually occurs at randomly-selected roadway sites, and involves a large number of occupants (68,804 in 2021). NOPUS observations are made during daylight hours and are not necessarily representative of high-risk driving times when belt use may be lower.

<sup>10</sup> Boyle, L. L. (2023, November). Occupant restraint use in 2022: Results from the NOPUS Controlled Intersection Study (Report No. DOT HS 813 523). National Highway Traffic Safety Administration.

NHTSA has, over time, implemented a variety of strategies to increase seat belt use. These have included sponsoring national media campaigns, supporting the enactment of state seat belt use laws and high-visibility enforcement, and facilitating or requiring vehicle-based strategies.<sup>11</sup> While such measures have helped make enormous progress, the persistent gaps in seat belt use suggest that additional approaches may be necessary.

Seat belt warning systems (also referred to as seat belt reminder systems) are a vehicle-based strategy to increase belt use. Seat belt warning systems encourage seat belt use by reminding unbuckled occupants to fasten their belts and/or by informing the driver that a passenger is unbelted, so that the driver can request the unbelted occupant buckle up. The warnings provided by seat belt warning systems typically consist of visual and audible signals. An optimized warning system balances effectiveness and annoyance, so that the warning is noticeable enough that the occupants will be motivated to fasten their belts, but not so intrusive that an occupant may attempt to circumvent or disable it or the public will not accept it. Research by NHTSA and others shows that seat belt warning systems are effective at getting unbuckled occupants to fasten their seat belts. (We take a closer look at this research in Section VIII, Overview of Benefits and Costs, and the FRIA.)<sup>12</sup>

FMVSS No. 208 currently requires a short audio-visual seat belt warning for the driver's seat belt on passenger cars<sup>13</sup>; trucks and MPVs with a GVWR of 4,536 kg (10,000 lb) or less (except for some compliance options which do not require the warning)<sup>14</sup>; and buses with a GVWR of 3,855 kg (8,500 lb) or less and an unloaded weight less than or equal to 2,495 kg

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<sup>11</sup> For example, NHTSA runs a Congressionally mandated High Visibility Enforcement annual campaign focused on increasing seat belt use. The Click It or Ticket nationwide campaign has been in effect for about 20 years. It runs every year from mid-May through the Memorial Day weekend, into the first week in June.

<sup>12</sup> See also Section V of the NPRM (pgs. 61684-61685).

<sup>13</sup> S4.1.5.1(a)(3); S7.3.

<sup>14</sup> S4.2.6; S7.3.

(5,500 lb).<sup>15</sup> The standard does not require seat belt warnings for any seating position other than the driver's seat.<sup>16</sup>

Manufacturers have two compliance options for the driver's warning.<sup>17</sup> The first option requires that if the key is in the "on" or "start" position and the seat belt is not in use, the vehicle must provide a visual warning for at least 60 seconds, and an audible warning that lasts 4 to 8 seconds. Under the second option, when the key is turned to the "on" or "start" position, the vehicle must provide a visual warning for 4 to 8 seconds (regardless of whether the driver seat belt is fastened) and an audible warning lasting 4 to 8 seconds if the driver seat belt is not in use.<sup>18</sup> The current seat belt warning requirements (i.e., for the driver's seat only) have been in the standard since 1974.<sup>19</sup>

Although not required by NHTSA's regulations, most currently produced vehicles have a seat belt warning for the front outboard passenger seat. Based on data on total projected vehicle sales in the United States for MY 2022 from the agency's New Car Assessment Program (NCAP) *Purchasing with Safety in Mind: What to Look For When Buying a Vehicle* program, almost all (about 97 percent) MY 2022 vehicles offered for sale in the United States were equipped with a seat belt warning for the front outboard passenger seat.<sup>20</sup> Further, almost all vehicles already provide an audio-visual seat belt warning for both front outboard seats that is longer than the minimum warning for the driver's seat belt currently required in FMVSS No. 208. However, the persistence of the front seat belt warning, while often greater than the

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<sup>15</sup> S4.2.6 (with the exception of some compliance options).

<sup>16</sup> See, e.g., Interpretation Letter from NHTSA to R. Lucki, July 24, 1985 ("Thus, the intent was to require a warning system for only the driver's position."). All NHTSA interpretation letters cited in this preamble are available at <https://www.nhtsa.gov/nhtsa-interpretation-file-search>.

<sup>17</sup> 49 CFR 571.208, S7.3.

<sup>18</sup> The warning requirements for automatic belts in S4.5.3 mirror, with some differences, the first compliance option. Automatic belts are rarely, if ever, installed in current production vehicles, and NHTSA's regulations limit the seating positions for which automatic belts may be used to rear seats.

<sup>19</sup> 39 FR 42692 (Dec. 6, 1974).

<sup>20</sup> Through the NCAP program, NHTSA sends annual requests for safety information about new vehicles to vehicle manufacturers. This includes specific questions on seat belt reminder systems. The focus of this request for information is for vehicle models that will be sold in the upcoming model year that have a GVWR of 4,536 kg (10,000 lb) or less, and this data generally covers all such vehicles offered for sale in the U.S. for MY 2022. Throughout this document we will refer to this data as our "NCAP data" or "Purchasing with Safety in Mind: What to Look For When Buying a Vehicle" data or information.

minimal durations required by FMVSS No. 208, is not consistent across new vehicles. Specifically, a little over half of MY 2022 vehicles provide a visual warning that lasts until the belts at any occupied front outboard seat are fastened, and almost all (about 93 percent) have an audible warning lasting at least a minute and a half; however, less than half have an audible warning lasting at least two minutes.<sup>21</sup> This means that while many new vehicles have significantly enhanced reminders, many do not. This disparity, along with the plateauing front seat belt use numbers, suggests that the current regulatory minima are too short, and that in the absence of a requirement, persistent audible reminders that could improve front seat belt use are not widely available in the market.<sup>22,23,24</sup>

While almost all MY 2022 vehicles have a seat belt warning for the front outboard passenger seat, under half come equipped with a rear seat belt warning system. Rear seat belt warnings were first introduced in the United States by Volvo around 2009. About 47 percent of MY 2022 vehicles, from 15 vehicle manufacturers, are equipped with a rear seat belt warning system. Thus, while rear seat belt warnings have become more widely deployed in recent years, the majority of the current fleet still is not equipped with them.

In short, front seat belt use rates appear to have plateaued, and rear seat belt use rates have persistently been below those for the front seats. Moreover, unbuckled occupants continue to be overrepresented in fatal crashes (51 percent), given the lower exposure of unbelted occupants relative to belted occupants (because front seat belt use was about 90 percent and rear seat belt use was 80 percent for the period in question). In spite of the effectiveness of seat belts and seat belt warnings, most new vehicles continue to lack a rear seat belt warning, and, while

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<sup>21</sup> See NPRM, pgs. 61709-61711, and appendix A.

<sup>22</sup> Mark Freedman *et al.* The Effectiveness of Enhanced Seat Belt Reminder Systems Draft Report: Observational Field Data Collection Methodology and Findings. 2007. DOT HS-810-844. Washington, DC: National Highway Traffic Safety Administration.

<sup>23</sup> N. Lerner *et al.* 2007. Acceptability and Potential Effectiveness of Enhanced Seat Belt Reminder System Features. DOT HS 810 848. Washington, DC: National Highway Traffic Safety Administration [hereinafter DOT 2007].

<sup>24</sup> Transportation Research Board Study at 8, 25; Mark Freedman *et al.*, Effectiveness and Acceptance of Enhanced Seat Belt Reminder Systems: Characteristics of Optimal Reminder Systems Final Report. DOT HS 811 097.

many vehicles provide significantly enhanced reminders for the front seats, many do not. This suggests a need for a beneficial safety technology that is not being met in the vehicle market. This final rule is intended to meet that need.

Rulemaking petition, MAP-21 mandate, and prior rulemaking notices for this action

On November 21, 2007, Public Citizen and Advocates for Highway and Auto Safety (Advocates, and, collectively, petitioners) petitioned NHTSA to amend FMVSS No. 208 to require a seat belt warning system for rear seats on passenger cars and MPVs with a GVWR of 4,536 kg (10,000 lb) or less.<sup>25</sup> On June 29, 2010, the agency published a Request for Comments document (RFC) on the petition.<sup>26</sup> The RFC discussed the agency's research and findings regarding rear seat belt warnings and solicited comments. NHTSA subsequently granted the petition.

In 2012, Congress passed the Moving Ahead for Progress in the 21st Century Act (MAP-21).<sup>27</sup> That legislation contained two provisions regarding seat belt warning systems. First, it repealed the 8-second durational limit for the driver's seat belt audible warning.<sup>28</sup> Second, it required the Secretary of Transportation to initiate a rulemaking proceeding to amend FMVSS No. 208 to provide a safety belt use warning system for designated seating positions in the rear seat.<sup>29</sup> It directed the Secretary to either issue a final rule, or, if the Secretary determines that such an amendment does not meet the requirements and considerations of 49 U.S.C. 30111,<sup>30</sup> to submit a report to Congress describing the reasons for not prescribing such a standard.

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<sup>25</sup> Docket No. NHTSA-2010-0061-0002.

<sup>26</sup> 75 FR 37343 (June 29, 2010) (Docket No. NHTSA-2010-0061).

<sup>27</sup> Pub. L. 112-141 (2012).

<sup>28</sup> *Id.* at section 31202(a)(2) (repealing portion of 49 U.S.C. 30124).

<sup>29</sup> *Id.* at section 31503. Authority has been delegated to NHTSA. 49 CFR 1.95.

<sup>30</sup> Section 30111 requires that a Motor Vehicle Safety Standard meet the need for safety, be stated in objective terms, and be practicable, among other requirements. *See infra* Section IV.

In 2019, NHTSA published an Advance Notice of Proposed Rulemaking (ANPRM) seeking comment on a variety of issues related to potential rear seat belt warning requirements.<sup>31</sup> NHTSA published the NPRM on September 7, 2023.<sup>32</sup>

### **III. Other Seat Belt Reminder Requirements and Protocols**

The Economic Commission for Europe (ECE) has instituted seat belt warning requirements, and the European New Car Assessment Programme (Euro NCAP) and the Insurance Institute for Highway Safety (IIHS) have also included seat belt reminder systems in their respective ratings protocols. Below we briefly summarize the seat belt reminder provisions in each of these.

#### ECE Requirements

The ECE has issued an updated version of Regulation No. 16<sup>33</sup> (R16) that requires seat belt reminder systems in all front and rear seats on new cars.<sup>34</sup> The seat belt reminder system is required to have both a start-of-trip warning and a change-of-status warning for both the rear and front seats, though the exact requirements differ somewhat for rear and front seats.

*Rear seat requirements.* R16 specifies a two-level warning. The first-level warning is a visual warning and the second-level warning is an audio-visual warning. The first-level warning applies at the start of a trip and the second-level warning applies when a fastened belt becomes unfastened during a trip. The first-level warning must activate when the seat belt of any of the rear seats is not fastened and the ignition switch or master control switch is activated. The first-level warning must last at least 60 seconds or until the belt is fastened (or the seat is no longer occupied, if equipped with occupant detection). The second-level warning must activate when a belt becomes unfastened and certain specified speed or distance thresholds are met and must last for 30 seconds unless other specified criteria are met (e.g., the belt is re-fastened).

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<sup>31</sup> 84 FR 51076 (Sept. 27, 2019) (Docket No. NHTSA-2019-0093).

<sup>32</sup> 88 FR 61674.

<sup>33</sup> ECE Regulation No. 16, Revision 10.

<sup>34</sup> The regulation was introduced in two phases: September 1, 2019 for new vehicle types (*i.e.*, all vehicle models with a new type approval) and September 1, 2021 for all newly-produced and registered vehicles.

*Front seat requirements.* The front seat belt warning requirements are similar to the rear seat warnings, with some differences. First, the first-level visual warning is only required to last 30 seconds, not 60 seconds. Second, the second-level audio-visual warning applies to unfastened belts at the start of the trip as well as to changes in belt status (i.e., a fastened belt that becomes unfastened).

The regulation also contains a variety of other requirements relating to the seat belt warning systems (e.g., telltales, exemptions for certain vehicles and seating positions). R16 also allows for short- and long-term deactivation of both front and rear warnings.

The ECE requirements are discussed in more detail where relevant in later sections of this preamble.

#### Euro NCAP

Euro NCAP introduced seat belt warnings in their assessment protocol in 2002. The Euro NCAP protocol for Safety Assist systems describes which features a seat belt reminder must have to qualify for points in this area of assessment,<sup>35</sup> which is then used to calculate the overall vehicle rating.<sup>36</sup>

*Rear seat warnings.* For rear seats, a visual signal must start once the ignition switch is engaged. The visual signal must be at least 60 seconds long. Occupant detection is required for rear seats to be eligible for a score; this is a new requirement that was instituted after NHTSA published the NPRM. For systems without occupant detection,<sup>37</sup> the visual signal must clearly indicate to the driver which seat belts are in use and not in use. For systems with occupant detection on all rear seating positions, the visual signal does not need to indicate the number of seat belts in use or not in use, but the signal must remain active if a seat belt remains unfastened

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<sup>35</sup> Euro NCAP's overall safety rating is based on four areas of assessment (Adult Occupant Protection, Child Occupant Protection, Vulnerable Road Users, and Safety Assist).

<sup>36</sup> European New Car Assessment Programme Assessment Protocol – Safety Assist, Safe Driving, Version 10.3, December 2023.

<sup>37</sup> This language remains in the protocol as a precondition for receiving a score for seats with occupant detection. In a vehicle where not all the rear seats are equipped with occupant detection, if seats without occupant detection do not meet these requirements the seats with occupant detection would not receive a score.

on any of the occupied seats in the rear. No visual signal is required if all the rear occupants are belted. For systems with rear seat occupant detection, a 30-second audible signal needs to activate before the vehicle reaches a speed of 25 km/h (15.5 mph) or before it travels 500 meters when any occupied seat has an unbuckled belt. When any seat belt experiences a change of status at vehicle speeds above 25 km/h (15.5 mph), an audio-visual signal is required, with the visual signal lasting 60 seconds and the audible warning lasting 30 seconds, unless certain conditions are met.

*Front seat warnings.* The Euro NCAP protocol requires that, to receive points, at the start of a trip the system must provide a visual seat belt warning that lasts until the belt is fastened<sup>38</sup> and an audible warning that activates when certain conditions are met and generally must last at least about 90 seconds (the exact duration depends on a variety of specified criteria, such as vehicle speed or distance travelled). It also specifies an audio-visual change-of-status warning that meets the requirements of the initial start-of-trip warning.

#### Insurance Institute for Highway Safety (IIHS) Protocol

On December 2021, IIHS released its Seat Belt Reminder System Test and Rating protocol.<sup>39</sup> It sets out general requirements for the seat belt reminder visual and audible signals for front outboard and rear seating positions. It specifies that a visual signal must be displayed in the instrument panel, overhead panel, or center console, indicating an unfastened belt. The audible warning must begin if the seat belt is unfastened at ignition and for change-of-status, and can cease when the seat belt is unfastened, the vehicle is no longer in motion, or the seat is no longer occupied. The protocol also has sound pressure level and frequency requirements for the audible warning.

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<sup>38</sup> Section 3.4.2.1.

<sup>39</sup> Insurance Institute for Highway Safety. (April 2024.) Seat Belt Reminder System Test and Rating Protocol, Version III, *available at* <https://www.iihs.org/media/f15e5be9-ac62-4ea6-a88d-7511105bff5/H3hGKQ/Ratings/Protocols/current/Seat%20Belt%20Reminder%20Test%20Protocol.pdf> (*last accessed* May 16, 2024).

For the rear seats, the IIHS protocol specifies that the visual signal must activate within 10 seconds of the ignition being turned on, that the signal must indicate whether the seat belt at each rear seating position is fastened or unfastened, and that it must last at least 60 seconds. It does not require a visual signal if the seat belts at all occupied rear seats are fastened or if no rear occupants are present. It allows the visual signal to be cancelled by the driver. For a seat belt change-of-status in the rear seats when the vehicle is in motion, it requires an audible and visual signal that lasts at least 30 seconds. It further specifies that the audible and visual signal can stop when seat belts at the occupied rear seats are fastened, the vehicle is no longer in motion, or the seats are no longer occupied.

For the front seats, under the IIHS ratings protocol, the primary audible reminder signal for the front outboard seats must be at least 90 seconds in total duration to obtain an “acceptable” or “good” rating.

Unlike Euro NCAP, the IIHS rating system provides ratings (Poor, Marginal, Acceptable, and Good) instead of points. For instance, if the front-passenger seat has an audible signal that lasts less than 8 seconds it would be given a “Poor” rating. For a “Good” rating both the driver and front-passenger belt reminder must have an audible signal that lasts at least 90 seconds and meet the rest of the belt reminder system requirements for an “Acceptable” rating, including the requirements for a rear seat belt reminder system. Accordingly, a vehicle cannot receive a “Good” rating without having a rear seat belt reminder system, and a rear seat belt reminder system is not required for all the other ratings. The protocol does not specify occupancy criteria (that is, the smallest occupant (or the size and weight corresponding to the smallest occupant)) that the system must be able to detect.

#### **IV. Statutory Authority**

NHTSA is issuing this final rule pursuant to its authority under the National Traffic and Motor Vehicle Safety Act (Safety Act). Under 49 U.S.C. chapter 301, Motor Vehicle Safety (49 U.S.C. 30101 et seq.), the Secretary of Transportation is responsible for prescribing motor

vehicle safety standards. The responsibility for promulgation of FMVSS is delegated to NHTSA.<sup>40</sup>

Section 30111 of the Safety Act requires that an FMVSS be practicable, meet the need for motor vehicle safety, and be stated in objective terms.<sup>41</sup> The Safety Act defines “motor vehicle safety” as “the performance of a motor vehicle or motor vehicle equipment in a way that protects the public against unreasonable risk of accidents occurring because of the design, construction, or performance of a motor vehicle, and against unreasonable risk of death or injury in an accident, and includes nonoperational safety of a motor vehicle.”<sup>42</sup> “Motor vehicle safety standard” means a minimum performance standard for motor vehicles or motor vehicle equipment.<sup>43</sup> When prescribing safety standards, the Secretary must consider all relevant, available motor vehicle safety information.<sup>44</sup> The Secretary must also consider whether a proposed standard is reasonable, practicable, and appropriate for the types of motor vehicles or motor vehicle equipment for which it is prescribed, and the extent to which the standard will further the statutory purpose of reducing traffic accidents and associated deaths.<sup>45</sup>

The statutory criterion of practicability is multidimensional. Most relevant to this rule, it means that in issuing this final rule, NHTSA must balance benefits and costs, with safety as the preeminent consideration.<sup>46</sup> This requirement means that NHTSA ought not simply choose the least costly regulatory option.<sup>47</sup> It also means that the final rule must be reasonably feasible,

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<sup>40</sup> See 49 CFR 1.95.

<sup>41</sup> 49 U.S.C. 30111(a).

<sup>42</sup> 49 U.S.C. 30102(a)(9).

<sup>43</sup> Section 30102(a)(10).

<sup>44</sup> Section 30111(b)(1).

<sup>45</sup> Section 30111(b)(3)-(4).

<sup>46</sup> See, e.g., *Motor Vehicle Mfrs. Ass’n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 55 (1983) (“The agency is correct to look at the costs as well as the benefits of Standard 208 . . . When the agency reexamines its findings as to the likely increase in seatbelt usage, it must also reconsider its judgment of the reasonableness of the monetary and other costs associated with the Standard. In reaching its judgment, NHTSA should bear in mind that Congress intended safety to be the preeminent factor under the Motor Vehicle Safety Act.”)

<sup>47</sup> See, e.g., *Public Citizen, Inc. v. Mineta*, 340 F.3d 39, 58 (2nd Cir. 2003) (“The notion that ‘cheapest is best’ is contrary to *State Farm*. There the Court instructed NHTSA ‘to look at the costs as well as the benefits’ of motor vehicle safety standards, and to ‘bear in mind that Congress intended safety to be the pre-eminent factor under the [Safety Act.] Thus, when NHTSA issues standards under the Safety Act, *State Farm* requires that the agency weigh safety benefits against economic costs; moreover, *State Farm* instructs the agency to place a thumb on the safety side of the scale.”) (quoting *Motor Vehicle Mfrs. Ass’n of U.S., Inc.*, 463 U.S. at 54) (citations omitted).

both economically<sup>48</sup> and technologically.<sup>49</sup> Importantly, however, the Safety Act does allow NHTSA to issue technology-forcing safety standards.<sup>50</sup> NHTSA must also consider the public acceptability of safety standards<sup>51</sup> and provide adequate lead time.<sup>52</sup>

In developing this final rule, the agency carefully considered these statutory requirements and has concluded that it meets them. They are discussed in more detail throughout the preamble and in the regulatory analyses where relevant.

## V. Summary of the NPRM

The NPRM had two main components. The first proposed requiring a seat belt reminder for the rear seats. The second proposed changes and enhancements to the seat belt warning requirements for the front outboard seats, most notably an audio-visual warning that persists until the seat belt at any occupied front outboard seat is fastened. These proposed requirements would apply to passenger cars and trucks, buses (except school buses), and MPVs with a GVWR of 4,536 kg (10,000 lb) or less.

### Rear seat belt reminder requirements

The first component of the NPRM was a set of proposed requirements for a seat belt warning for rear seats. The proposed requirements had four main elements.

- *Visual warning on vehicle start-up to inform the driver of the status of the rear seat belts.*

We proposed three different compliance options from which manufacturers could choose

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<sup>48</sup> See, e.g., *Public Citizen, Inc. v. Mineta*, 340 F.3d at 58 (2nd Cir. 2003) (“The committee recognizes . . . that the Secretary will necessarily consider reasonableness of cost, feasibility and adequate lead time.”) (quoting H. Rep. No. 1776, at 16 (1966)).

<sup>49</sup> See, e.g., *Paccar, Inc. v. Nat’l Highway Traffic Safety Admin.*, 573 F.2d 632, 635 n.5 (9th Cir. 1978) (“Practicable is defined to require consideration of all relevant factors, including technological ability to achieve the goal of a particular standard[.]”) (citations and quotations omitted) (quoting H.R. Rep. No. 1776, 89th Cong., 2d Sess. 16 (1966)).

<sup>50</sup> *Chrysler Corp. v. Dep’t of Transp.*, 472 F.2d 659, 673 (6th Cir. 1972) (“[T]he Agency is empowered to issue safety standards which require improvements in existing technology or which require the development of new technology, and it is not limited to issuing standards based solely on devices already fully developed.”).

<sup>51</sup> *Pac. Legal Found. v. Dep’t of Transp.*, 593 F.2d 1338, 1345–46 (D.C. Cir. 1979) (“We believe that the agency cannot fulfill its statutory responsibility unless it considers popular reaction. Without public cooperation there can be no assurance that a safety system can meet the need for motor vehicle safety.”) (quotations and citations omitted).

<sup>52</sup> 2 U.S. Code Cong. & Adm. News, 89th Cong., 2d Sess., 1966, p. 2714, *quoted in H & H Tire Co. v. U. S. Dep’t of Transp.*, 471 F.2d 350, 353 (7th Cir. 1972). (“The committee recognizes . . . that the Secretary will necessarily consider [in the issuance of standards] reasonableness of cost, feasibility and adequate lead time.”).

for the rear seat belt warning system. The first would require the system to indicate how many or which rear seat belts are in use (the “positive-only” option). The second would require the system to indicate, for the occupied rear seats, how many or which rear seat belts are not in use (the “negative-only” option). The third would require the system to indicate, for the occupied rear seats, how many or which rear seat belts are in use and how many or which rear seat belts are not in use (the “full-status” option). Certain features would be required of all the options. Each system would have to provide a continuous or flashing visual warning, consisting of either icons or text, visible to the driver. The visual warning would have to last for at least 60 seconds, beginning when the vehicle’s ignition switch is moved to the “on” or “start” position. All the systems would require that the vehicle be equipped with technology to determine that the belt latch is fastened.<sup>53</sup> The negative-only and full-status compliance options would additionally have required that the vehicle be equipped with an occupant detection system (which facilitates these more informative warnings).

- *Audio-visual change-of-status warning.* We proposed an audio-visual warning whenever a fastened rear seat belt is unfastened while the ignition switch is in the “on” or “start” position and the vehicle’s transmission selector is in a forward or reverse gear. The warning would have to last for at least 30 seconds. We did not propose any requirements for the volume or tone of the warning. The intent of this warning was to alert the driver or other occupants to a change in belt status during a trip. The warning would not be required if a door is open, which would be the case if a rear passenger unfastened their belt in order to exit the vehicle.
- *Requirements related to electrical connections.* We proposed to require that readily removable rear seats either automatically re-establish the necessary electrical

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<sup>53</sup> We note the preamble language imprecisely indicated the necessity for a belt latch sensor. As discussed later in this document, it was not our intention to require a specific technology.

connections, or, if a manual connection is required, have readily accessible connectors.

Further, vehicles with the negative-only compliance option would be required to provide a visual warning to the driver if a proper electrical connection has not been established for a readily removable rear seat.

- *Owner's manual requirements.* We proposed that the vehicle owner's manual (which includes information provided by the vehicle manufacturer to the consumer, whether in digital or printed form) describe the warning system's features (including the location and format of the visual warnings) and include instructions on how to make any manual electrical connections for readily removable seats.

#### Front outboard seat belt warning requirements

The NPRM included several enhancements to the seat belt warning requirements for the front outboard seats. We proposed three main changes.

- *Audio-visual warning on vehicle start-up for front outboard passenger seat.* We proposed to require a seat belt warning for the front outboard passenger seat.
- *Increasing the duration of the audio-visual warning on vehicle start-up.* We proposed enhancing the front seat warning requirements by requiring an audio-visual warning that remains active until the seat belt at any occupied front outboard seat is fastened. Vehicle manufacturers could adjust the characteristics of the auditory warning signal (such as frequency and volume) to make the warning both effective and acceptable to consumers. The proposal included specific duty cycle characteristics.
- *Audio-visual change-of-status warning.* We also proposed to require an audio-visual change-of-status warning whenever a front outboard seat belt is unbuckled during a trip (unless a front door is open, to account for an occupant unfastening the belt to exit the vehicle). The warning would be required to remain active until the seat belt is refastened.

#### Proposed Compliance Date

We proposed a compliance date for the amendments to FMVSS No. 208, “Occupant crash protection,” as follows. Manufacturers would be required to comply with the amendments as of the first September 1 that is one year after the publication of the final rule for the front seat belt warning system requirements and the first September 1 that is two years after the publication of the final rule for the rear seat belt warning system requirements, with optional early compliance. Multi-stage manufacturers and alterers would have an additional year to comply.

### Regulatory Alternatives

NHTSA considered alternatives to the proposed requirements. The main alternatives NHTSA considered were the seat belt warning requirements in ECE R16 and Euro NCAP. The proposed requirements were identical or similar to ECE R16 and Euro NCAP in many respects but differed from them in several ways. For instance, while the ECE rear seat belt warning regulations allow a warning for an unfastened seat belt at an unoccupied seat, the proposal would not allow this, because we tentatively believed that the resulting “false” warning would potentially annoy drivers and lead to behaviors that would decrease system effectiveness. Another way the proposal differed from ECE R16 is the duration of the front seat belt warning on vehicle start-up: R16 generally requires only a 30-60 second audio-visual warning; NHTSA proposed a warning that lasts until the seat belt is buckled.

## **VI. Final Rule and Response to Comments**

### **A. Rear Seat Belt Warning Requirements**

#### **1. Applicability**

The proposal applied to all rear designated seating positions in passenger cars and all rear designated seating positions certified to a compliance option requiring a seat belt in trucks, buses, and MPVs with a GVWR of 4,536 kg (10,000 lb) or less, except for school buses and law enforcement vehicles. NHTSA’s regulations define a bus as a vehicle designed for carrying

more than ten persons.<sup>54</sup> The proposal included small buses, which refers to buses with a GVWR not more than 10,000 lb; this therefore includes high-capacity vans. However, the proposal did not include medium-sized buses (with a GVWR 10,000 lb – 26,000 lb) or large buses (with a GVWR greater than 26,000 lb). We proposed to apply the proposed requirements to the specified categories of vehicles because these vehicles are required to have seat belts at all rear designated seating positions and (except for some buses) a seat belt warning for the driver’s seat. We noted that some types of trucks and MPVs (motor homes, walk-in van-type trucks, vehicles designed to be sold exclusively to the U.S. Postal Service, or vehicles with a GVWR between 8,500-10,000 lb carrying a chassis-mount camper)<sup>55</sup> and over-the-road buses that are also prison buses<sup>56</sup> are not required to have rear seat belts. In the NPRM we explained that we did not propose to exempt special-purpose vehicle types such as ambulances because NHTSA believed that they are typically customized after first sale.

The proposed applicability was largely consistent with ECE R16, with a few differences. The rear seat belt reminder requirements in R16 do not include vehicles that carry more than nine persons (including the driver).<sup>57</sup> There is also no weight specification for the passenger vehicles to which R16 applies. R16 also exempts “ambulances, hearses, and motor-caravans as well as for all seats for vehicles used for transport of disabled persons, vehicles intended for use by the armed services, civil defense, fire services and forces responsible for maintaining public order.”<sup>58</sup>

### Comments

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<sup>54</sup> 49 CFR 571.3 (“*Bus* means a motor vehicle with motive power, except a trailer, designed for carrying more than 10 persons.”) (italics in original).

<sup>55</sup> S4.2.7.1.

<sup>56</sup> S4.4.3.3; S4.4.5.1.

<sup>57</sup> Section 8.4.1.2 (rear seat belt warning requirements apply to M<sub>1</sub> and N<sub>1</sub> category vehicles); Consolidated Resolution on the Construction of Vehicles (R.E.3) Revision 6, Section 2.2.1 (category M<sub>1</sub> vehicles) (“Vehicles used for the carriage of passengers and comprising not more than eight seats in addition to the driver's seat.”) and Section 2.3.1 (category N<sub>1</sub> vehicles) (“Vehicles used for the carriage of goods and having a maximum mass not exceeding 3.5 tonnes [7,716 lb].”).

<sup>58</sup> Section 8.4.1.3.

NHTSA received comments that supported the proposal; comments that recommended expanding the applicability; and comments that recommended excluding additional vehicle types.

Some commenters specifically supported various aspects of the proposal. Freedman Seating Company (FSC) and Mr. Koo supported the vehicles covered by the proposal and Ms. Tombrello supported including van-like buses because she believed some have been prone to misloading of passengers and baggage. Mr. Stange agreed that the final rule should exclude medium and large buses, due to the distraction the system would create for the driver; problems with maintenance and sensor reliability; and the fact that bus passengers are not required to wear seat belts in some states.

Some commenters argued for including additional higher-capacity vehicles that the proposal excluded. The National Safety Council (NSC) and Ms. Tombrello supported including school buses (regardless of weight) and Mr. Koo supported including school buses with a GVWR 10,000 lb and under. FSC supported extending the requirements to over-the-road buses with a GVWR between 10,000 and 26,000 lb (except school, perimeter seating and transit buses). NSC commented that the final rule should include limousines. Relatedly, InterMotive Vehicle Controls (InterMotive) commented that it manufactures an aftermarket seat belt reminder system for buses and vans with a GVWR both below and above 10,000 lb.

On the other hand, some comments argued for excluding additional vehicles from the requirements. The Alliance for Automotive Innovation (Auto Innovators) and Mercedes-Benz and Mercedes-Benz Research and Development North America (Mercedes) recommended exempting vehicles with more than six rear seats or more than two rear rows, pointing to challenges with providing the driver with the status information on all seating positions via the instrument panel (or other in-vehicle display) due to the number of seats that may need to be displayed. Auto Innovators further commented that for high-occupancy vehicles with removeable seats, an electronic control unit and other hardware are needed, which leads to

practicability concerns, including increased costs for customers. Mercedes reiterated these practicability concerns.

The Recreational Vehicle Industry Association (RVIA) similarly commented that this final rule should harmonize with R16 and not apply to motor homes. RVIA raised several different issues specific to motor homes. First, it explained that motor homes are used in unique ways because they are used both for transportation and for temporary, recreational, and seasonal use. As an example, RVIA discussed a scenario where occupants are seated in a rear seating position with the motor home turned on, but where the vehicle remains stationary, leading to a false warning. Second, it commented that motor homes' rear seats are often used for storage, which could again lead to false warnings. Third, RVIA commented that, because motor homes are often equipped with non-conventional seats that convert into a bed, developing wiring and sensors that would not be damaged in the conversion process would be challenging if not impossible. Fourth, RVIA commented that the rear portion of a motor home also has its own electrical system with very little interface with the chassis electronics. This lack of interface between electrical systems is unique in comparison to other types of vehicles that typically have seats installed in standard configurations in the same factory as the vehicle is assembled, completed, and shipped. RVIA stated that there is currently not a way to provide electronic signals from the seating positions in the rear portion of the motor home to the sophisticated electronics controls that are proprietary to the chassis manufacturers.

Finally, Braun Northwest (BNW) commented that the final rule should exempt ambulances, giving essentially two different reasons. First, BNW commented that the reason NHTSA gave for not exempting ambulances – that they are typically customized after first sale – was factually inaccurate. BNW commented that while some special-purpose vehicles may be customized after first sale, that is not the case with ambulances. BNW explained that data from the Ambulance Manufacturer's Division of the National Truck Equipment Association indicates that van ambulances with a GVWR under 10,000 lb, which would be affected by this NPRM,

comprise more than 20 percent of the annual production of United States ambulance manufacturers. Second, BNW pointed out that, while circuited buckles needed for seat belt buckle status indication are commonly available and simple to install on the two- and three-point seat belts commonly used on most vehicles, they are inherently problematic on the four, five, and six-point belts needed on ambulances. BNW explained that recent work facilitated by NHTSA resulted in a new SAE International (SAE) recommended practice, SAE J3026 Ambulance Patient Compartment Seating Integrity and Occupant Restraint, developed specifically for testing occupant restraint systems in ambulances. All three national ambulance standards (KKK-A-1822F, Federal Specification: Star-Of-Life Ambulance; NFPA 1917 Standard for Automotive Ambulances; and CAAS Ground Vehicle Standard) now require compliance with SAE J3026. BNW indicated that the critical ramification of SAE J3026 for the NPRM was that side-facing ambulance bench seats must be fitted with four-point, five-point, or six-point seat belts. BNW commented that there are practicability concerns with enabling buckle status indication for these seat belts, including the problem of getting wires from an emergency locking seat belt retractor to a circuited buckle located at the center front of the occupant's torso. Additionally, BNW argued that seat belt reminders may prevent medical personnel from administering medical care, as changes in occupant position required to render patient care would cause alarm indications that add distraction and confusion in an environment where such distractions can have dire consequences.

#### Agency Response

NHTSA is adopting the proposal except that the final rule contains an additional exemption for ambulances.

The major difference between the vehicles to which R16 and the final rule apply is that the final rule applies to small buses, which typically include buses with up to about four rear rows—mainly high-capacity passenger vans (10 to 15-passengers), such as Chevrolet Express, Ford Transit, GMC Savana, and Mercedes Sprinter passenger vans. However, because the rule

applies only to vehicles with a GVWR less than 10,000 lb, it would generally not include vehicles with more than four rows.

We believe that including small buses such as these high-capacity vans addresses an important safety need. As we explained in the NPRM, we believe it is particularly important to include vehicles with a GVWR greater than 3,855 kg (8,500 lb), but less than or equal to 4,536 kg (10,000 lb), because this range includes high-occupancy vehicles. Including these vehicles is important because an increasing number of high-occupancy vehicles are used as personal vehicles and are not solely used for work-related purposes.<sup>59</sup> In addition, multiple rear seats or rows make it more difficult for the driver to ascertain rear seat belt use, so a warning could prove especially useful in these vehicles. We think this requirement would be especially beneficial for 15-passenger vans, for which there is both an increased risk of rollover (related to the occupancy level of these vehicles) and lower seat belt use rates compared to other passenger vehicles.<sup>60</sup>

Providing a reminder in vehicles with multiple rear rows is technically feasible. As we noted above, because the final rule applies to vehicles with a GVWR 10,000 lb or less, it generally would not include vehicles with more than four rear rows of seats, which should make it easier to implement a reminder. We are unaware of any currently produced full-size passenger vans having a rear seat belt reminder system. We did find aftermarket solutions from abroad for medium to large buses,<sup>61</sup> and InterMotive commented that a seat belt warning system already exists for multipurpose passenger vehicles with a GVWR both below and above 10,000 lb. They currently manufacture an after-market solution, SeatLink, for the bus and van market, including seats supplied by Freedman Seating Company (Freedman). However, we do not have any information on the performance and reliability of these systems.

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<sup>59</sup> See, e.g., <https://media.ford.com/content/fordmedia/fna/us/en/news/2016/07/29/nothing-mini-about-this-van--ford-transit-attracts-large-familie.html> (*last accessed* May 16, 2024).

<sup>60</sup> Belt use rates among occupants in 15-passenger vans involved in fatal crashes are significantly lower compared to other passenger vehicles. See Subramanian, R. (2008). *Fatalities to Occupants of 15-Passenger Vans, 1997-2006*. (Report No. DOT-HS 810 947). National Highway Traffic Safety Administration.

<sup>61</sup> See <https://www.phoenixseating.com/our-products/all-buckled-up> and <https://www.fsrtek.com/applications/bus-seat-belt-alarm-system> (*last accessed* May 16, 2024).

We do acknowledge that vehicles such as high-capacity vans may encounter visual signal complexities. Accordingly, our intent was to propose performance requirements that provide manufacturers with the flexibility to design a warning system that is appropriate for each vehicle type (for example, the final rule does not require a full schematic of the rear seats). For example, a visual warning option for vehicles with multiple rows could be the seat belt icon with an adjacent number corresponding to how many rear seat belts are fastened. In addition, as we explain in more detail below (see Section VI.A.2.a.i), in response to the comments, we have expanded the compliance options to allow additional types of visual warning systems. This too should help address any concerns related to feasibility.

The final rule, however, also follows the proposal in excluding school buses and medium and large buses. As we explained in the NPRM, extending the requirements to school buses would place additional cost burden on school systems and may result in reductions in service; would place additional burdens on the driver; and raises liability issues and the potential for buses being out of service due to malfunctioning systems. Many of these concerns were raised by commenters to the ANPRM and we believe these concerns are still valid. Moreover, as we also pointed out in the NPRM, school buses use compartmentalization, which provides protection even to unbelted occupants. Similarly, the final rule also excludes medium and large buses because of issues such as those noted by Mr. Stange, including cost, reliability, and driver burden.

The final rule also follows the proposal by including motor homes. As an initial matter, we note that some motor homes are not required to have rear seat belts so the requirements will not necessarily apply to all motor homes. In addition, the seat belt requirements do not apply to seats in motor homes with a GVWR over 10,000 lb and classified as MPVs which the manufacturer designates and conspicuously labels as not intended for occupancy while the vehicle is in motion.<sup>62</sup> Accordingly, such vehicles are not subject to the requirements in this

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<sup>62</sup> 49 CFR 571.3 (definition of “designated seating position”); FMVSS No. 207 S4.4.

rule. Although we recognize that R16 exempts motor homes (motor caravans), we see no reason to exclude from this rule designated seating positions (DSPs) in motor homes that are required to have seat belts. Those DSPs are designed to have passengers while the vehicle is in motion. Such occupants would benefit from a seat belt and therefore, from a seat belt reminder. We note that if the motor home is turned on for other purposes than driving, the start-up warning is a 30-second visual warning that should not be unduly annoying.

Limousines, depending on their characteristics, may also be covered by the rule. Limousines are not currently a vehicle class defined in the FMVSS. Depending on its characteristics, a limousine might be classified as a passenger car, MPV, or bus.<sup>63</sup> Generally, a passenger car is designed for carrying 10 or fewer persons, an MPV is a vehicle carrying 10 or fewer persons which is constructed either on a truck chassis or with certain special features, and a bus is designed to carry more than 10 persons. The final rule encompasses all these vehicle types, so a limousine would be covered by the requirements as long as it weighed 10,000 lb or less. At the same time, the FMVSS generally apply to new vehicles, including new vehicles that are altered, or vehicles manufactured in more than one stage. Limousines (such as “stretch” limousines) that are the result of modifications made to a vehicle after first purchase other than for resale would not be required to be certified to the seat belt reminder requirements for seating positions that are added in the modification process.<sup>64</sup>

The one way the final rule does depart from the proposal with respect to the applicability is by including an exemption for ambulances from the rear seat belt warning system

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<sup>63</sup> 49 CFR 571.3.

<sup>64</sup> The Infrastructure, Investment and Jobs Act, H.R. 3684, Sections 23015, 23023 (117th Congress) (2021), contains two provisions that direct NHTSA to conduct research and issue rules (if such rules would meet the criteria in section 30111 of the Safety Act) related to various aspects of limousine crashworthiness and occupant protection. NHTSA’s research in these areas is ongoing. *See, e.g.*, DOT Regulatory Agenda, Fall 2023, RIN 2127-AM48, “Seat Belts in Limousines,” available at <https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202310&RIN=2127-AM48> (last accessed December 16, 2024). The law also directs that the rules issued pursuant to it apply to modified vehicles. However, that law also defines the term “limousine” to, among other things, refer to vehicles weighing between 10,000 and 26,000 lb. This would therefore not include any limousines that are covered by this final rule, which is limited to vehicles up to 10,000 lb. GVWR.

requirements.<sup>65</sup> Given the information provided by BNW, the original intent of the rule not applying to ambulances, and the fact that excluding ambulances harmonizes with ECE R16, the final rule exempts ambulances. Although neither FMVSS No. 208 nor 49 CFR 571.3 defines “ambulance,” FMVSS No. 201, “Occupant protection in interior impact,” defines it to mean “a motor vehicle designed exclusively for the purpose of emergency medical care, as evidenced by the presence of a passenger compartment to accommodate emergency medical personnel, one or more patients on litters or cots, and equipment and supplies for emergency care at a location or during transport.”<sup>66</sup> We are including a cross-reference to this definition in the regulatory text. However, we have not included a broader carve-out for emergency vehicles. We did not receive any comments indicating that such a carve-out was necessary. Moreover, there are a number of ways that owners and purchasers of emergency vehicles for official purposes could disable the warnings. These owners and purchasers already sometimes alter vehicles significantly.<sup>67</sup>

## **2. Requirements**

The NPRM proposed a 60-second visual warning on vehicle start-up; a 30-second audio-visual warning if a buckled belt is unfastened during a trip; and requirements or criteria related to readily removable seats, the owner’s manual instructions, the location of the telltale, and how NHTSA would determine that a belt was or was not in use. We discuss these requirements in turn below.

### **a. Visual warning on vehicle start-up**

The NPRM proposed a 60-second visual warning on vehicle start-up that would inform the driver of how many or which seat belts are and/or are not in use. We proposed three different compliance options for the type of information conveyed to the driver. Occupant detection would not be required for one of the three compliance options. The warning would be triggered

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<sup>65</sup> This does not exempt ambulances from the front seat belt warning requirements.

<sup>66</sup> FMVSS No. 201, S3 (definitions).

<sup>67</sup> Although section 30122 of the Safety Act prohibits making inoperative required safety devices, this prohibition does not apply to vehicle owners. *See infra* n. 91 and accompanying text.

when the ignition is placed in the “on” or “start” position. When testing a system certified to one of the compliance options necessitating occupant detection, NHTSA would seat a dummy or human occupant corresponding to a 6-year-old. We discuss these proposed requirements below in more detail.

**i. Type of information conveyed by the visual warning and whether occupant detection should be required**

The proposed requirements for the rear seat belt warning system (RSBWS) included a visual warning that would activate on vehicle start-up to inform the driver of the status of the rear seat belts. We proposed three different compliance options. The first would require the system to indicate how many or which rear seat belts are in use (the “positive-only” option). The second would require the system to indicate, for the occupied rear seats, how many or which rear seat belts are not in use (the “negative-only” option). The third would require the system to indicate, for the occupied rear seats, how many or which rear seat belts are in use and how many or which rear seat belts are not in use (the “full-status” option). The negative-only and full-status compliance options would require that the rear seats be equipped with a mechanism to determine when a belt latch is fastened and an occupant detection system (which facilitates these more-informative warnings), while the positive-only option would only require that the rear seats be equipped with a mechanism to determine when a belt latch is fastened.

In the NPRM we stated that we had tentatively decided not to require occupant detection in the rear seats because occupant detection continued to present technical challenges which could reduce the effectiveness and/or acceptance of these systems. This tentative decision was also based on factors such as the needed increase in seat belt use for this regulatory alternative to have positive net benefits. Because we did not propose to require occupant detection, we also did not propose requiring enhanced warnings (such as an audible warning on vehicle start-up).

The proposal harmonized with ECE R16 and Euro NCAP in a variety of ways, but also deviated from them in some respects.

ECE R16 requires a visual warning at the start of a trip. That warning “indicate[s] at least all rear seating positions to allow the driver to identify, while facing forward as seated on the driver seat, any seating position in which the safety-belt is unfastened.”<sup>68</sup> Occupant detection is not required, but in vehicles that do have occupant detection the warning does not need to indicate unfastened belts for unoccupied seating positions.<sup>69</sup>

The Euro NCAP rating protocol also requires a visual warning at the start of a trip. The requirements are similar to ECE R16. However, Euro NCAP’s rating protocol was recently revised to require occupant detection in the rear seat to receive points for this feature. For systems without occupant detection, the visual signal must clearly indicate to the driver the seating positions showing the rear seat belts in use and not in use. (These seats would not be eligible for points, but in order for seats with occupant detection to receive points the seats without occupant detection would have to meet these requirements.) For systems with occupant detection, the visual signal does not need to indicate the number of seat belts in use or not in use, but the signal must remain as long as the seat belt remains unfastened on any of the occupied seats in the rear.<sup>70</sup> No signal is required if all of the rear occupants are belted<sup>71</sup> or no rear occupants are detected.<sup>72</sup>

The IIHS rating protocol requires a visual signal indicating “whether the seat belt at each rear seating position is fastened or unfastened.”<sup>73</sup>

The NPRM acknowledged that the proposed compliance options were not consistent with all seat belt warning systems currently deployed in the U.S. and Europe or with Euro NCAP’s requirements. Specifically, we noted that manufacturers appeared to be deploying systems that would be categorized as either positive-only or negative-only except without occupant detection, the latter of which would not be permitted under the proposed compliance options. We also

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<sup>68</sup> Section 8.4.4.2.

<sup>69</sup> Section 8.4.4.2.

<sup>70</sup> Section 3.4.3.1.3.

<sup>71</sup> Section 3.4.3.1.4.

<sup>72</sup> Section 3.4.3.1.1.

<sup>73</sup> Seat Belt Reminder System Test and Rating Protocol, Version III at pg. 7.

noted that the positive-only compliance option did not appear to be consistent with Euro NCAP because Euro NCAP requires that systems without occupant detection show the rear seat belts in use and not in use, and the positive-only compliance option would not permit a visual signal for an unfastened seat belt.

Accordingly, while we tentatively concluded that the proposed compliance options would help mitigate false warnings and the possibly attendant consumer acceptance issues, we explained that we were considering altering the proposed compliance options to accommodate systems that are currently being deployed, or that manufacturers may wish to deploy in the future.

### Comments

Auto Innovators, General Motors (GM), American Honda Motor Co. (Honda), and Hyundai America Technical Center, Inc. (HATCI) generally supported including multiple compliance options in the final rule. Freedman, Automotive Safety Council (ASC), Tesla, Advocates and Public Citizen, and the National Automobile Dealers Association (NADA) generally supported the proposed compliance options, although as noted below some of these commenters preferred certain compliance options or requested that additional compliance options be added.

Several commenters (Consumer Reports, Safe Kids Worldwide (SKW), Paradise, NSC, Safe Ride News (SRN), Cross, and Ms. Tombrello) argued that NHTSA should require occupant detection in the rear seats. Other commenters (Freedman, IEE<sup>74</sup>, ASC), while not explicitly recommending that occupant detection be required, either preferred options requiring occupant detection or focused on the benefits and feasibility of rear-seat occupant detection. These commenters made a variety of arguments.

Some commenters argued that the necessary technology for occupant detection is feasible. Consumer Reports commented that occupant detection does not pose unreasonable

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<sup>74</sup> A supplier of automotive sensing systems.

technical challenges, and is not prohibitively expensive (see Section VIII, Overview of Costs and Benefits). Consumer Reports and Mr. Paradise commented that rear-seat occupant detection technology is already widely available; Mr. Paradise also noted that 7 percent of vehicles already have the technological capability of occupant detection in rear seats. NSC commented that challenges with false positives (e.g., transportation of cargo and pets) can be addressed through a relatively small investment, such as with low-cost 2-D or digital cameras, and that costs would further decrease over time if it were required. Consumer Reports noted that occupant detection is already widely deployed in the front outboard passenger seats. Relatedly, although not recommending that occupant detection be required, IEE commented that today's occupant detection sensors, predominantly designed for a detection of 5th percentile adult female, can reliably differentiate occupants from cargo.

Several commenters focused on the benefits of requiring occupant detection. Consumer Reports, Mr. Paradise, SKW, SRN, ASC, Ms. Cross, NSC, and Ms. Tombrello commented that warning systems using occupant detection would be more effective than those without it. Consumer Reports, Paradise, Ms. Cross, and NSC noted that occupant detection would enable enhanced warnings, which are more effective.

Accordingly, some of these commenters recommended requiring the proposed full-status and/or negative-only options that required occupant detection. Consumer Reports argued that NHTSA should require the full-status compliance option because the "positive-only" and "negative-only" compliance options are insufficient to incentivize rear seat belt use. Consumer Reports commented that the positive-only option would be the least technically complex, but it would also be the least effective type of warning system (because it creates unnecessary mental work for the driver and allows room for human error). Consumer Reports further explained that the positive-only system would be a departure from Euro NCAP, which requires that systems without occupant detection show both the rear seat belts in use and those not in use. Consumer Reports also commented that given that both the negative-only and the full-status options require

a belt latch sensor and an occupant detection system, the negative-only option should be eliminated because the full-status option is more informative and effective. SRN, ASC, NSC, and Ms. Cross similarly commented that NHTSA should require negative-only or full-status systems, which would be more effective in alerting caregivers to an unbuckled rear passenger than “positive-only” systems. Ms. Cross commented that negative-only and full-status systems can inform the driver whether any rear seat occupants are unbuckled without having to make a comparison between number of seats to the number of occupants and an audible component can be added. ASC also noted that permitting only negative-only and full-status systems would harmonize with the requirements in Europe.

Consumer Reports, Cross, and SKW also recommended requiring occupant detection because that feature could eventually be used for other safety functions such as rear occupant alerts for vehicular heatstroke prevention and air bag suppression. SKW and Ms. Cross pointed to the potential to detect children or other vulnerable occupants in child safety seats, booster seats, or seat belts.

On the other hand, vehicle manufacturers commented that the final rule should not require occupant detection. Toyota Motor North America, Inc. and Toyota Motor Corporation (Toyota) and Auto Innovators commented that an occupant detection system can introduce false positives. Several manufacturers requested removing the requirement for occupant detection from one or both of the proposed compliance options that required it (full-status and negative-only).

Toyota argued that NHTSA should allow negative-only systems without occupant detection because an occupant detection system does not provide any additional safety benefit for the negative-only system. Toyota explained that it is reasonable to anticipate that a driver knows whether a rear occupant is in the vehicle, and, as with a positive-only system, can combine that knowledge with the information from the visual indicator. Toyota also commented

that a telltale indicating a seat belt is not fastened at an unoccupied seat is not a false positive, but is instead useful information for the driver.

More generally, several manufacturers and trade groups (Auto Innovators, Ford Motor Company (Ford), Nissan North America (Nissan), NADA, Honda, Hyundai Motor Company (Hyundai)) commented that NHTSA should permit manufacturers to convey information on positive belt status information (i.e., when belt is in use) and/or negative belt status information (i.e., when the belt is not in use) without occupant detection—that is, NHTSA should expand the proposed compliance options to permit negative-only systems without occupant detection and/or full-status systems without occupant detection.<sup>75</sup> NADA argued that these options would provide better contextual information for drivers than the proposed full-status option because they would provide seat belt status information for all seating positions regardless of occupancy. Nissan, Ford, and Auto Innovators argued that presenting information on the seat belt status regardless of whether the seat is occupied or not should not be deemed as misleading but rather as furnishing the driver with pertinent contextual information concerning seat belt usage across all positions. Nissan and Ford argued that this information would empower the driver to distinguish easily between buckled and unbuckled seat belts, particularly when compared to the locations where known passengers are situated in the rear row. Auto Innovators, Nissan, NADA and Ford commented that this approach would be consistent with European regulations. Nissan, NADA, and Ford indicated that this approach would align with ECE R16, and Ford and Auto Innovators commented that the approach aligns with the IIHS approach. Honda commented that systems without occupant detection that provide visual information on both fastened and unfastened seat belts have been in use in Europe for many years and are well understood by those that use it regularly. Auto Innovators and NADA commented that not expanding the compliance options in this way would require development and deployment of new systems and

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<sup>75</sup> Some of the comments were ambiguous with respect to whether they were referring to full-status systems, negative-only systems, or both.

increase cost and lead time for some original equipment manufacturers (OEMs), which ultimately harms consumers and hinders achievement of NHTSA's safety objective. Auto Innovators further commented that it was unaware aware of any data that would support NHTSA's claim that a visual indication of an unfastened seat belt at an unoccupied seat would annoy drivers and argued that if driver annoyance is a concern, NHTSA should consider allowing a dismissible initial warning, as is the case with both IIHS and R16.

In addition, Ford, Toyota, and Honda raised concerns with the proposed positive-only compliance option. Ford and Toyota commented that it conflicts with R16 and the IIHS protocol. Honda commented that if all rear occupants are unbuckled and there is no indication of their status, the driver may remain unaware of the system's ability to support the determination of the statuses of the belts for the rear occupants.

#### Agency Response

In response to the comments, the final rule follows the proposal in not requiring occupant detection, but modifies the proposal by revising the requirements to allow full-status and negative-only reminder systems without occupant detection.

The final rule follows the proposal in not requiring that rear seat belt reminder systems be equipped with occupant detection. There are a few reasons for this decision.

One reason is that we believe rear-seat occupant detection continues to present technical challenges. This is especially the case because we have concluded that rear-seat occupant detection systems should be able to detect, at a minimum, occupant characteristics matching a 6-year-old for determining whether a rear seat is occupied. This standard differs from ECE R16 and Euro NCAP, both of which base their requirements for occupant detection-equipped rear seat belt reminder systems on the 5th percentile female. This difference is discussed in more detail in Section VI.A.2.a.iv, Seat Occupancy Criteria and Interaction with Child Restraint Systems. Rear-seat belt reminder systems with occupant detection have only been recently deployed in vehicles sold in the U.S. (starting in MY 2021 based on our available data) and are currently

offered on only a small proportion of new vehicles.<sup>76</sup> Based on the projected sales for MY 2022, approximately 7 percent of vehicles were equipped with rear-seat occupant detection. We have no data on how the occupant detection in these vehicles is working.

While occupant detection technology is readily available and standard equipment in most front outboard passenger seats, the occupant detection technology used for the front outboard passenger seat does not necessarily translate directly to the rear seats. By comparison, vehicles subject to advanced air bag requirements comply using either suppression or low-risk deployment for different size child dummies, including the 6-year-old child dummy, in the front outboard passenger seat. Vehicles with a suppression system use some type of occupant detection technology in addition to other inputs (e.g., seat belt use, seat position, etc.) to determine whether or not to deploy the air bag. Vehicles using low-risk deployment, however, do not necessarily need to use occupant detection to meet the advanced air bag requirements for that option. The vast majority of vehicles use the suppression option in the front outboard passenger seat for at least one child dummy, and therefore use occupant detection.<sup>77,78</sup>

Vehicle manufacturers that opt to use a rear seat belt warning system with occupant detection will have to develop and implement occupant detection solutions that work for the unique seat designs and configurations found in rear seats (e.g., bench seats, folding seats, different types of seat cushions, etc.) and validate the performance to ensure that they meet the new requirements and mitigate the potential for false positives. Among other challenges, rear seats create more potential for false positives than the front seats. As we explained in the NPRM and ANPRM, while occupant detection can reduce false warnings for unoccupied seats, it can also result in false warnings, due to the limitations of the sensors and different use scenarios in

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<sup>76</sup> NHTSA does not have any specific information on the size of occupant these systems are designed to detect. However, based on the manufacturer comments requesting that NHTSA require occupant detection systems to detect a 5th percentile female occupant, it is likely that these systems are designed to detect occupants as small as the 5th percentile female.

<sup>77</sup> There is also an option to use a dynamic automatic suppression system. To date, no manufacturer has attempted to certify using this option.

<sup>78</sup> With respect to the driver's seat, while it is subject to certain advanced air bag requirements, those particular requirements do not necessitate occupant detection.

the rear seats (*e.g.*, transportation of cargo and pets). In addition, rear seats may be less well-defined than front seats (most rear seat rows, unlike the front seat rows, are comprised of three closely spaced seating positions), which could impede accurate detection. This deficiency could negatively affect consumer acceptance and/or effectiveness.

Another reason the final rule does not require occupant detection is that it adds non-trivial costs to the seat belt warning system. While we agree with Consumer Reports that rear-seat occupant detection is not prohibitively expensive in the sense that this is true for some vehicle lines, our cost-benefit analysis shows that occupant detection would be cost-beneficial only if rear seat belt use increased substantially more than we estimate it would for a warning system without occupant detection. Our teardown analysis indicates that occupant detection components cost \$39.74 per vehicle, which, added to the \$19.59 per vehicle cost of the buckle sensor, results in a combined warning system cost of \$59.33 per vehicle (2020 \$). We estimate that the total new fleet cost of a rear seat belt warning system with occupant detection would be about \$802 million (2020 \$). With respect to benefits, there is uncertainty with respect to how much more effective systems with occupant detection are compared to systems without it. Because of this uncertainty, our regulatory analysis does not attempt to estimate the net benefits or cost-effectiveness of rear seat belt reminder systems that use an occupant detection system. The regulatory analysis does, however, include a break-even analysis for a rear seat belt reminder system that requires occupant detection. For benefits and costs to break even (be equal) for this regulatory option, seat belt use for rear seat occupants 11 years and older would need to increase by approximately 5.2 percent when discounted at 3 percent and 6.4 percent when discounted at 7 percent. Furthermore, NHTSA considered the increase in seat belt use for rear seat occupants that would be required to match the net benefits under the final rule, which does not require occupant detection. When discounted at three and seven percent, seat belt use for rear seat occupants 11 years and older would need to increase by 6.43 percent to 8.57 percent to match the net benefits (taking into account the Low and High estimates) under the final rule. This is about

two to three times greater than that estimated for the compliance option without occupant detection. (For more details, see Section VIII.B.1 and the FRIA.) Accordingly, while we agree with the commenters who supported a requirement for occupant detection because there may be benefits to having occupant detection (such as facilitating enhanced or more effective warnings)<sup>79</sup> and would expect some potential increase in seat belt use from that specific functionality, an effectiveness increase of this order of magnitude seems unlikely. Therefore, we do not expect this regulatory alternative to be net beneficial and would not generate the same level of net benefits as the final rule. Manufacturers may voluntarily equip vehicles with occupant detection if they so choose. Our hope is that over time, as the systems evolve and penetrate the fleet, the technology will mature and per-unit costs will decrease.

With respect to the comment from Mr. Paradise concerning what he believed was an inconsistency between NHTSA's statements that a single-digit percentage of vehicles with rear-seat occupant detection being a small percentage of the fleet, and weighing in favor of not requiring it, and a single-digit percentage of vehicles with an indefinite reminder being non-trivial and supporting our proposal to require an indefinite reminder for the front seat belt start-of-trip warning, we do not believe these statements are inconsistent. In the context of occupant detection, we are referring to technological feasibility and likely regulatory cost; in the front seat belt warning section, we are referring solely to the optimum duration, as there is no question about feasibility. That is, a single-digit percentage has a different meaning in the two contexts.

Because we have decided not to require occupant detection, we disagreed with commenters who recommended requiring one or both of the proposed options that required occupant detection (full-status with occupant detection or negative-only with occupant detection). We continue to believe, as we explained in the NPRM, that while the full-status system (with occupant detection) does provide the driver with the most information, the other

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<sup>79</sup> With respect to SKW's comments about the benefits of monitoring children in forward- or rear-facing CRSs, as we explained in the NPRM, children restrained by child restraint systems are not part of the target population for this rule.

allowable types of systems, including those without occupant detection, will provide the driver with sufficient information to easily determine whether and where there are any unbuckled occupants and request that they fasten their seat belts.

Accordingly, the final rule allows the proposed positive-only option. These systems, while not providing information on the occupancy status of each seat, do provide information on which seat belts are buckled. The driver can combine this information with knowledge of the other occupants in the vehicle and determine if there are any unbuckled occupants and request them to fasten their belts. While this does require mental work on the part of the driver, and may not be as effective as a full-status system, we believe it is not so burdensome as to render such systems ineffectual to such a degree that we see a basis for prohibiting them. While such systems are not permitted under ECE R16 or Euro NCAP, manufacturers could select another type of system if they wished to harmonize with those protocols. (The positive-only system without occupant detection does conform with the IIHS protocol.) With respect to Honda's comment that the proposed positive-only option could potentially leave the driver unaware that the vehicle was equipped with a seat belt reminder system, we acknowledge that is a possibility, but it would not be a long-term problem. This would be limited to times when a driver is driving a vehicle new to them (unless the driver always reads owner's manuals first) and would only be an issue until a rear passenger buckles up. Once a rear passenger buckles up the driver would become aware of the existence of the warning.

We have modified the proposal so that the final rule does not dictate specific compliance options for the information conveyed by the visual warning; the finalized requirements for the visual warning allow all of the systems that would have been allowed under the proposed rule, as well as additional systems that would not have been allowed under the proposal, such as a negative-only system without occupant detection, and a full-status system without occupant detection. Both the negative-only system without occupant detection and the full-status system without occupant detection are consistent with ECE R16 and the IIHS protocol (they would not

be eligible for points under Euro NCAP). One factor underlying this choice is the lack of firm research data that could lead NHTSA to meaningfully compare the effectiveness of the different types of systems,<sup>80</sup> coupled with the fact that rear seat belt reminder systems conforming to the finalized requirements have already been deployed on vehicles sold in the United States.<sup>81</sup> These factors make us reluctant to prohibit particular design choices and inhibit manufacturer flexibility and ability to optimize system characteristics. We believe that the finalized regulatory text (“A visual warning indicating how many or which rear seat belts are in use and/or not in use must activate when the ignition switch is placed in the ‘on’ or ‘start’ position (or upon manual activation of the propulsion system, but prior to the vehicle being placed in “possible active driving mode” as defined by FMVSS No. 305))<sup>82</sup>” includes all of the systems manufacturers are currently deploying, but is specific enough to be objective and enforceable. For example, if there is one rear occupant, and that occupant is belted, a positive-only system without occupant detection that accurately indicates one buckled rear belt, and a full-status system with occupant detection that accurately indicates one rear occupant with a fastened belt, would both comply with the finalized regulatory text.

We agree with Toyota and Honda that the negative-only system requires the same cognitive effort on the part of the driver as the proposed positive-only option, and that it would still be effective and beneficial, even without occupant detection. We no longer agree with the view we expressed in the NPRM that such a signal is a false positive that might either desensitize the driver to the warning signal or lead them to circumvent or defeat the system. We now agree with Toyota that this is instead more accurately considered relevant information on seat belt

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<sup>80</sup> See Mark Freedman et al., Effectiveness and Acceptance of Enhanced Seat Belt Reminder Systems: Characteristics of Optimal Reminder Systems Final Report. DOT HS 811 097 at pg. 49 (Feb. 2009) (hereinafter “DOT 2009 Seat Belt Study”).

<sup>81</sup> An exception is a positive-only system with occupant detection, which is not prohibited by the finalized requirements and has yet to be deployed on vehicles sold in the United States. However, we believe it would be unlikely that a manufacturer would deploy such a system because the presence of occupant detection allows for more informative reminders – for example, a full-status reminder – than provided by a positive-only system. This is reflected in the fact that while we are aware of production versions of positive-only systems without occupant detection, negative-only and full-status systems with and without occupant detection, we are not aware of any vehicle equipped with both occupant detection and a positive-only reminder system.

<sup>82</sup> The language relating to EVs is discussed in Section VI.C.1.

status that the driver can use to determine whether there are any unbuckled occupants and request them to fasten their seat belts.

We reached a similar conclusion with respect to full-status systems without occupant detection. As we discussed above for the negative-only systems without occupant detection, we agree that while this system does not provide as much information as would a system with occupant detection, the information it does provide on the seat belt status at every seating position (occupied or not) is useful information for the driver. We also agree with the commenters who argued that allowing this option would support the introduction of systems that are already in widespread use, without adding in additional cost and complexity.

## **ii. Lack of an audible warning**

The NPRM recognized that warnings with an audible component are generally more effective than visual-only warnings. However, we also recognized that requiring an audio-visual warning would necessitate requiring occupant detection because, without occupant detection, an audible warning would activate every time a rear seat is empty. These “false positives” would annoy the driver (as well as other occupants) and would decrease the effectiveness of the warning. Thus, the NPRM did not propose an audible warning on start-up. However, manufacturers would be free to provide an audible warning on start-up if they so choose. This approach is also consistent with ECE R16, Euro NCAP, and IIHS.

## Comments

Many of the commenters who supported requiring occupant detection also supported requiring an audible warning (NSC, Consumer Reports, SRN, Karleigh Cross, and an anonymous commenter). SRN, Consumer Reports, and Ms. Cross commented that audible warnings are more effective than visual-only warnings. Consumer Reports also commented that requiring an audible component to the rear seat start-up warning would also make start-up warnings more consistent throughout a vehicle, regardless of the seating position.

## Agency Response

The final rule does not require a rear seat audible start-of-trip warning, for the reasons articulated in the proposal. Because the final rule does not require occupant detection in the rear seats, it does not require an audible warning. We acknowledge that audio-visual warnings are more effective than visual warnings alone, and we believe that consumers would accept them. However, we believe that a visual warning alone will still be effective. While we cannot precisely estimate effectiveness, we have used a three to five percent belt use rate increase range (“lower” and “higher” scenario) in our analysis based on the available research. This analysis is explained in detail in the FRIA. We agree that in general, consistency between the rear reminder and front reminder requirements (which do require an audio-visual start-of-trip warning) is desirable, but do not believe that not requiring an audible component to the rear start-of-trip warning will create an issue in practice. In this context, the relevant potential concern with this inconsistency is that the driver – the recipient of the warning – would be confused or annoyed by any differences in the two warnings. Ultimately, we do not believe this inconsistency is a significant problem. The front seat belt warnings have been in vehicles for many years. Rear seat belt warnings will be new to most drivers, so drivers will have to become accustomed to them. In addition, the rear reminder will be a fairly prominent visual warning. If the driver is unsure of how the warnings operate, this rule also requires that the owner’s manual include an accurate and easily understandable description of system features and operation.

**iii. Triggering conditions for start-of-trip warning (not including occupant detection criteria)**

The NPRM proposed that the rear seat start-of-trip warning (which, as discussed above, is only required to be a visual warning) activate when the ignition switch is placed in the “on” or “start” position, except for negative-only systems when there are no occupied rear seats with a seat belt not in use (for which we proposed that a warning not be required to activate). The activation criteria were modeled on the existing driver seat belt warning requirements and are also similar to those in ECE R16, Euro NCAP, and the IIHS protocol.

ECE R16 requires that the rear seat belt visual warning activate when a belt is not fastened and the ignition or master control switch activated.<sup>83</sup> It also provides that for vehicles with rear seat occupant detection, the visual signal does not need to indicate unfastened belts at unoccupied seats.<sup>84</sup>

Euro NCAP similarly requires that the warning “‘start’ at the commencement of each ‘journey’ that the vehicle makes.”<sup>85</sup> More specifically, the Euro NCAP protocol specifies that the visual signal be activated “when the ignition switch is engaged (engine running or not) and a seatbelt is not fastened.”<sup>86</sup> However, Euro NCAP allows for short breaks in the journey (up to 30 seconds) to account for events such as engine stalling where the reminder is not required to start again.<sup>87</sup> Euro NCAP also provides that for systems with rear seat occupant detection, the visual signal does not need to indicate the number of rear seat belts in use or not in use.<sup>88</sup>

For the rear seats, the IIHS protocol permits a 10-second delay between the ignition being turned on and the activation of the visual signal. Similar to ECE R16 and Euro NCAP, no visual signal is required for the rear seat belts if there are no unfastened belts at occupied seats.

The major differences between the proposal and other approaches were that, unlike ECE R16, we did not propose to refer to a “master control switch” because we did not believe it is necessary to introduce this new term into FMVSS No. 208; unlike Euro NCAP we proposed not allowing for short breaks in the journey; and unlike IIHS we did not propose allowing any delay after the ignition was turned on.

### Comments

Commenters differed on whether the start-of-trip warning should be permitted to be delayed. HATCI and Ford supported the proposed trigger conditions (which did not permit a delay). On the other hand, Auto Innovators, NADA, Freedman, and Nissan recommended

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<sup>83</sup> Section 8.4.2.3.1.

<sup>84</sup> Section 8.4.4.2.

<sup>85</sup> Section 3.4.1.

<sup>86</sup> Section 3.4.2.1 (front); § 3.4.3.1.1 (rear).

<sup>87</sup> Section 3.4.1.

<sup>88</sup> Section 3.4.3.1.3.

allowing a delay. Nissan, Auto Innovators, and NADA recommended aligning with the IIHS protocol and permitting a 10-second delay, while Freedman favored a 30-second delay. Auto Innovators also commented that while it generally supports the agency harmonizing with ECE R16, the agency should maintain flexibility for when these warnings are displayed on startup and allow for a brief delay for when the alert is provided. Freedman also commented that certain systems, such as an electronic system separate from that of the OEM system, will require a powerup and boot cycle which can take several seconds.

Auto Innovators also requested that the final rule allow the visual warning to be suppressed if all rear row seating positions are belted or determined to be empty based on occupant detection.

Lastly, RVIA explained that motor homes can be used in many ways other than for transportation, such that the ignition may be turned on with occupants seated in the rear accessing the vehicle's amenities, but with no intention of placing the vehicle in motion. RVIA was concerned that such use of the rear seats would trigger the rear seat belt visual warning, even though the motor homeowner has no intention of operating the vehicle. RVIA concluded that a visual warning system on vehicle start-up would often go unnoticed in this scenario, creating a requirement not suitable for the application of the start-up trigger in a motor home.

#### Agency response

The final rule adopts the proposal for the warning to activate on start-up, with no provision for a delay. We continue to believe that basing the trigger on the ignition switch is preferable to delaying the warning until the vehicle is placed in gear because with a delay, there could be instances where a driver would pull out onto the road before the warning starts and before passengers have belted. The finalized requirements increase the likelihood that the occupants fasten their belts before the vehicle is in motion.<sup>89</sup> With respect to mitigating interaction with other vehicle warnings, NHTSA does not believe this will be an issue at vehicle

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<sup>89</sup> See DOT 2009 Seat Belt Study at pg. 65.

start-up because critical safety warnings that activate at start-up would likely have dedicated space on the display. Interactions between warnings is discussed in more detail in Section VI.C.4. We believe consumers will accept this start-up warning. The longstanding current front seat belt warning is based on similar triggers and has not caused any issues. In addition, the rear start-of-trip warning is visual-only, so any potential annoyance is minimized. This factor distinguishes the rear-seat warning from the front seat belt warning, which we are requiring to be both audio-visual and to have two phases. We acknowledge there may be some scenarios during a trip where a rear seat belt warning is not required for an unbuckled occupant; for example, a passenger pickup scenario when the car is not turned off. In such a scenario, we are not requiring a warning because we are not requiring occupant detection, which would be necessary to detect the new occupant (and potentially avoid a false warning). Manufacturers of vehicles with rear-seat occupant detection may choose to provide warnings for such situations.

In addition, we are modifying the proposed trigger condition related to the vehicle ignition being in the “on” or “start” position for both the front and rear seat belt warning to better account for EVs. This change is discussed in Section VI.C.1. This modification generally harmonizes with ECE R16, Euro NCAP, and the IIHS protocol, so that a vehicle that complies with the finalized trigger requirements can still meet these requirements; some exceptions are discussed immediately below.

In addition, we have also modified the proposal so that the final rule does not require a visual warning in three circumstances: (1) for an unoccupied seat if the system is able to determine whether a seat is occupied; (2) for a seat belt that is in use in a system designed to indicate to the driver how many or which rear seat belts are not in use; and (3) for a seat belt that is not in use in a system designed to indicate to the driver how many or which rear seat belts are in use. This regulatory text is intended to clarify two things.

First, that, depending on the type of seat belt reminder system and belt use/occupancy scenario, a visual signal may not be necessary for a particular DSP, or may not be necessary for

any DSP. So, for example, no visual warning would be required for a negative-only system when every rear seat is occupied by a belted occupant. Another example: if no rear seats are occupied, no visual signal is required for negative-only, positive-only, or full-status systems with occupant detection; a visual warning would, however, be required in this case for a negative-only system without occupant detection (assuming that no rear belts were in use) and a full-status system without occupant detection. This requirement is consistent with ECE R16, Euro NCAP, and IIHS.

Second, this also clarifies, in response to the comments, that systems utilizing symbols or numbers may utilize colors other than green or red to indicate unoccupied seats or seating positions for which the system is not providing information on belt use. Accordingly, a negative-only system would be permitted to display a pictogram that denotes a seating position with an in-use belt as grayed-out (to give one example).<sup>90</sup>

Freedman's comment regarding certain vehicles requiring more time to boot up appears to be referring to accommodating aftermarket systems. Because the final requirements apply to vehicles before first purchase other than for resale, they do not directly apply to aftermarket systems that are installed later on. However, § 30122 of the Safety Act prohibits a vehicle modifier from taking a vehicle out of compliance with an applicable FMVSS.<sup>91</sup> (The vehicle owner is not subject to the make inoperative provision). Therefore, a vehicle modification performed after the compliance date of this final rule on a vehicle with a rear seat belt warning system certified to the requirements in this rule that modifies the vehicle such that the rear seat belt visual warning does not activate when the ignition is in the "on" or "start" position (or upon manual activation of the propulsion system, but prior to the vehicle being placed in "possible

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<sup>90</sup> See also Section VI.C.3, Visual Warning Characteristics.

<sup>91</sup> 49 U.S.C. 30122(b) ("A manufacturer, distributor, dealer, rental company, or motor vehicle repair business may not knowingly make inoperative any part of a device or element of design installed on or in a motor vehicle or motor vehicle equipment in compliance with an applicable motor vehicle safety standard prescribed under this chapter unless the manufacturer, distributor, dealer, rental company, or repair business reasonably believes the vehicle or equipment will not be used (except for testing or a similar purpose during maintenance or repair) when the device or element is inoperative."); section 30122(a) ("(a) Definition. In this section, "motor vehicle repair business" means a person holding itself out to the public to repair for compensation a motor vehicle or motor vehicle equipment.").

active driving mode” as defined by FMVSS No. 305<sup>92</sup>) would violate § 30122 and would therefore not be permitted.

The final rule does not incorporate RVIA’s request to accommodate use scenarios specific to Recreational Vehicles (RVs). We agree that in the scenarios identified by RVIA the warning would activate when the vehicle was turned on with no intent to drive (thus obviating the need for a seat belt). A speed or motion trigger could address this issue, but we believe that such a trigger is undesirable because there is a safety benefit to having occupants belted before the vehicle is in motion or when it is travelling at lower speeds. Moreover, because the rear seat belt start-of-trip warning is visual-only, there are not the same consumer acceptance concerns that led us to include a speed criterion like we have included for the second-phase front seat belt audible warning. (See Section VI.B.3.) We could also potentially address this concern by either exempting RVs or crafting trigger criteria specific to RVs. We conclude the former is undesirable due to the significant safety benefit of belts when the vehicle is in motion, and that the latter would be overly complex. In addition, the rear seat belt start-of-trip warning is a mild visual warning that should not cause meaningful consumer annoyance (or condition them to ignore the warning) in these use cases.

#### **iv. Seat occupancy criteria and interaction with child restraint systems**

For rear seat belt warning systems that manufacturers voluntarily choose to equip with occupant detection, NHTSA proposed the occupancy criteria for the test dummy (or human, at the manufacturer’s option) that NHTSA would position in the seat to conduct compliance testing of the system. NHTSA proposed that a rear designated seating position would be considered “occupied” when an occupant who weighs at least 46.5 lb (21 kg), and is at least 45 in (114 cm) tall, is seated there. These criteria are proxies for a 6-year-old child, which roughly corresponds to a typical age at which a child would begin using a seat belt (with a booster seat), transitioning

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<sup>92</sup> See Section VI.C.1.

from a forward-facing child restraint system (CRS). These are the same criteria used in FMVSS No. 208 to specify the smallest child that may be used as an alternative to the 6-year-old dummy in static suppression tests under FMVSS No. 208. We proposed using either a human being, at the manufacturer's option, or any anthropomorphic test device specified in 49 CFR part 572 that meets these proposed weight and height criteria (Section VI.C.8., Test Procedures).

The proposed criteria corresponded to a smaller occupant than ECE R16 or Euro NCAP, each of which essentially specifies an occupant (or load) no smaller than a 5th percentile adult female (e.g., the HIII-5F specified in 49 CFR part 572). In the NPRM we explained that we believed that harmonizing with ECE R16 and using a heavier dummy would not capture the child segment of the population that could be restrained with a seat belt. We also did not believe it was necessary to use a larger-size occupant because a system capable of recognizing a 6-year-old should also be capable of recognizing larger occupants.

At the same time, we tentatively believed that the proposed criteria were preferable to criteria reflecting a younger occupant (lower weight). The smallest dummy that would meet the proposed weight and height criteria is the 6-year-old dummy specified in part 572. The next smallest dummy represents a 3-year-old child (i.e., the Hybrid III 3-year-old); we believed it would not be appropriate to specify the use of the 3-year-old because a child represented by this dummy should be seated in a forward- or rear-facing CRS, not restrained with a seat belt.

NHTSA did not propose to require any sort of CRS detection capabilities. As explained in the NPRM, there are essentially three types of CRSs: rear-facing CRSs, forward-facing CRSs, and booster seats. Rear-facing and forward-facing CRSs are child seats that are installed using either Lower Anchors and Tethers for Children (LATCH) or a seat belt to secure it in place. Booster seats raise and position a child so the vehicle's lap-and-shoulder belt fits properly. We tentatively believed that a forward- or rear-facing CRS installed with the seat belt would not cause problematic false warnings; rather the system would just register the CRS as a buckled passenger. Similarly, we believed that a forward- or rear-facing CRS installed with LATCH

would not pose issues necessitating any specific requirements related to the LATCH system, such as LATCH sensors.

We also did not believe a booster seat would present any special challenges to a seat belt warning system. If an unbelted child is in a booster seat, the system would register the belt as not fastened and, if equipped with occupant detection, that the seat was occupied. The system would not have to specifically detect the booster seat because the performance criteria are weight-based. In addition, we would not expect an occupant detection system to provide a false warning for an unoccupied booster seat because the proposed seat occupancy criterion (roughly equivalent to a 6-year-old) is heavier than an unoccupied booster seat. We did not propose to specify the use of a booster seat for testing because children may be prematurely transitioned to a seat belt without the use of a booster, and we believe it is desirable to test the lower end of the possible weight range that encompasses children that could conceivably be restrained with a seat belt.

#### Comments

A number of commenters (Auto Innovators, Mercedes, GM, NADA, IEE, Honda, HATCI, and Consumer Reports) disagreed with the proposal and recommended harmonizing with ECE R16 and Euro NCAP and specifying occupancy criteria based on a 5th-percentile adult female occupant. These commenters made a variety of arguments.

Auto Innovators commented that harmonizing with the ECE requirements would avoid introducing unnecessary complexity and reduce the need for additional lead time to develop U.S.-specific designs. IEE commented that the proposed detection criterion would entail significant additional costs.

IEE also commented that a detection criterion based on the 5th percentile female would address the key target population of unbelted teenagers and adults. Relatedly, IEE noted that the NPRM analysis investigated potential benefits for the age group 6 to 10 years old and only found a very small belt usage increase (by only 0.27 percent to 0.41 percent) and concluded that

members of this age group already have high rates of seat belt use (98 percent according to the preliminary regulatory impact analysis).

Consumer Reports, IEE, Auto Innovators, Honda, HATCI, NADA, RVIA, and GM raised concerns regarding feasibility. Consumer Reports agreed with NHTSA on the importance of testing the lower end of the possible weight range that encompasses children that could conceivably be restrained with a seat belt alone, but believed that it would be premature to require the detection of dummies smaller than the 5th percentile adult female because the ability to detect occupants smaller than the 5th percentile adult female is limited. IEE commented that while detecting a 5th percentile female is well-established in the market and would not present any design or technical challenges, it was not aware of any car on the market that would be able to meet the proposed detection of the 6-year-old child scenarios, with or without a booster cushion. IEE commented that the 5th percentile female is the state-of-the art in contemporary sensing technology for seat belt reminder-related occupant detection and that no realistic alternative technologies are readily available at comparably low costs. IEE stated that it believed that the 7 percent of U.S. MY 2022 vehicles with rear seat occupant detection all meet the 5th percentile female detection criterion, not the one 6-year-old proposed in the NPRM.

IEE also commented that the proposal assumed that a 6-year-old child on the booster seat would be automatically covered and detected as it has a higher total weight than the weight proposed for the occupancy criteria. IEE stated that this assumption is wrong: rear occupant detection systems are designed to detect a load that is generating a pressure profile on the seat foam that matches the pressure profile of a human buttocks. IEE commented that the pressure profile generated by a booster seat is different and would not be classified by the system as an occupant; contemporary occupant detection sensors used for seat belt reminder systems are not designed to detect booster seats, and child seats are considered as non-detection objects. IEE indicated that this distinction is also required to differentiate between humans and objects, to avoid objects that would be likely to trigger false positives. Auto Innovators similarly

commented that the contact area between a booster seat and a seat cushion can vary, causing some of the occupant's weight to be distributed to the seat itself or to the LATCH system, rather than to the weight sensor.

Auto Innovators also pointed out that child occupants are also more likely to be out-of-position compared to an adult, further contributing to uneven weight transfer. Auto Innovators argued that if the weight of a child in a booster seat is not transferred to the weight sensor, the proposed system could misclassify the seat as empty. If this misclassification occurs, coupled with the lack of a visual warning for an unfastened seat belt at an unoccupied seat, Auto Innovators argued there would be no visual warning for cases where an age-appropriate child is sitting in a booster seat and not wearing a belt. Relatedly, IEE commented that more advanced detection technologies (such as cameras or radar sensors) are not currently used in the context of a seat belt reminder function, and that these technologies would still have to prove their reliability and robustness for the occupant detection needs of a seat belt reminder system. IEE explained that while future developments may enable the support of seat belt reminder functionalities with these technologies, it is too early to consider such a potential innovation in a regulatory pass/fail scenario.

Honda, HATCI, Auto Innovators, NADA, IEE, RVIA, Honda, and GM commented that specifying criteria matching a 6-year-old would exacerbate the problem of false positives. HATCI and IEE commented that behavioral alternatives to avoid false positives, such as moving cargo to the floor of the vehicle or buckling the belt before loading heavy cargo onto seats, may not always be feasible or reliable. Auto Innovators and Honda argued that the proposed criteria would potentially discourage manufacturers from implementing occupant detection systems due to the potential for false warnings.

IEE similarly commented that if the agency were to adopt the 6-year-old criterion proposed in the NPRM, manufacturers would be disincentivized from implementing occupant detection in rear seats. IEE explained that because the proposed detection threshold is not

technically feasible today within a regulatory pass/fail context, the threshold proposed in the NPRM would fail advanced rear seat belt reminder systems that have already entered the U.S. market and that offer a seat belt warning functionality that exceeds the proposed legal minimum. IEE stated that this requirement would force vehicle manufacturers to withdraw these advanced seat belt reminder systems from the market and downgrade the seat belt reminder systems features to the legal minimum (the positive-only compliance option). IEE argued that this result would be counterproductive from a safety perspective.

IEE and Consumer Reports commented that manufacturers could voluntarily detect occupants smaller than the 5th percentile female. IEE argued that making such detection voluntary would provide flexibility for innovation. Consumer Reports recommended that NHTSA incorporate detection of dummies smaller than the 5th percentile female into NCAP ratings for rear seat belt reminders, which would award manufacturers for going above and beyond the regulatory minimum and drive innovation.

On the other hand, NSC and SRN suggested a 3-year-old child for the occupancy criterion. NSC commented that data from the National Digital Car Seat Check Form show that many children are not riding in the appropriate CRS based on their height and weight, so specifying criteria corresponding to a 3-year-old child would protect children. SRN similarly noted that the weight of a 3-year-old dummy, though average for a toddler, is also the weight of many older children in the lower growth chart percentiles. SRN argued that since nearly all school-age children ride in seat belts or boosters (including these lighter-weight children, regardless of NHTSA best-practice recommendations), families would benefit from warnings about the belt-use status of those children. SRN explained that this is especially true for warnings that a passenger has unbuckled during a ride, which younger, less mature children may be prone to do. SRN explained that, as proposed, a system with occupant detection would not recognize some of the youngest booster/belt users, may provide inadequate warnings to families, and may cause caregivers some frustration in interpreting status indicators. SRN also

commented that in comments to the ANPRM, SRN had voiced the concern that LATCH-installed car seats could trigger false alarms. SRN was less concerned that the proposed system will rise to the level of nuisance and is more concerned that false warnings will happen, such as when relatively heavy car seats are installed using LATCH. SRN argued that owners will need clear guidance in owner's manuals on how to interpret warnings when traveling with children, and that these instructions should be included (or at least referenced) in the child passenger section of the manual.

Consumer Reports, HATCI, and Freedman agreed with NHTSA that a CRS detection requirement was not necessary. Consumer Reports stated that consumers might be better served by incorporating CRS detection into a component of NCAP for rear seat belt reminder systems to help drive safety innovation. Freedman commented that the easiest and most effective solution for LATCH-installed CRS is to continue recommending the seat belt be fastened behind the CRS.

Auto Innovators and GM recommended that NHTSA ensure a technology-neutral approach that includes consideration of compliance options that permit the use of camera- or vision-based sensors, or other technologies that may be adopted in lieu of weight-based sensors, as a means for determining occupant presence at a given designated seating position. Advocates and Public Citizen commented that the final rule should not preclude or discourage the use of existing state-of-the-art technology.

#### Agency Response

After considering the comments, NHTSA has decided to adopt the proposal to use (at the option of the manufacturer) either an anthropomorphic test device at least as large as a 49 CFR part 572, subpart N 6-year-old child dummy or a person, at the manufacturer's option, that is at least 21 kg in weight and 114 cm in height to define an occupied rear designated seating position for the purposes of testing the rear seat belt reminder system. These criteria represent a 50th percentile 6-year-old child, and only specify the low end of the occupancy criteria used for

compliance testing. Therefore, when we refer to a 6-year-old as our occupancy criteria, this includes occupants or dummies that are larger.

Before addressing the specific issues raised by the commenters, it is important to recognize that this final rule does not require or necessitate occupant detection. Moreover, we recognize that a manufacturer currently deploying reminder systems with occupant detection based on the 5th percentile female would likely need some time and effort to develop and implement new sensor solutions in the rear. Based on MY 2022 NCAP data, approximately 7 percent of vehicles sold in the U.S. are equipped with rear seat belt reminders using occupant detection. The commenters, however, did not provide specific information on what additional development would be necessary to meet the requirements when tested with a 6-year-old.

Further, as explained above (Section VI.A.2.a.i) we have revised the proposed requirements to provide greater flexibility for systems without occupant detection. The proposal only included one compliance option (the positive-only compliance option) without occupant detection. In response to the comments, the final rule would allow for additional warning systems without occupant detection (e.g., negative-only and full-status). Given this flexibility, manufacturers can simply use reminder systems without occupant detection if they believe they cannot deploy a reminder system using occupant detection that would comply with the requirements when tested with a 6-year-old.

Given the above, NHTSA has concluded that it would fulfill the MAP-21 mandate, meet the need for safety, and be practicable and appropriate to require that an occupant detection system be capable of detecting at least a 6-year-old. There are several reasons for this decision.

First, section 31503 of MAP-21 directs NHTSA to initiate (and finalize, if the § 30111 criteria are met) a rulemaking proceeding “to provide a safety belt use warning system for designated seating positions in the rear seat.” Section 31503 itself does not refer to particular classes of occupants or identify a target population. “Subtitle E—Child Safety Standards”, in which § 31503 is located, however, contains four mandates related to child passenger safety:

improving the protection seated in CRSs during side impact crashes; improving the ease of use for LATCH systems; providing seat belt reminders for rear seats; and researching the risk of hyper- or hypothermia to children or other unattended passengers in rear seating positions.<sup>93,94</sup>

In addition, the Safety Act gives NHTSA the discretionary authority to issue safety standards to address specific safety needs, provided that the standard is objective, practicable, and appropriate for the type(s) of vehicles to which it applies.<sup>95</sup> NHTSA has concluded that requiring a rear seat belt warning system equipped with occupant detection be able to detect unbelted children smaller than the size represented by the 5th percentile female crash test dummy meets a safety need and is practicable and appropriate.

Specifying occupant characteristics corresponding to a 5th percentile female would not address rear seat belt usage by children because the vast majority of children are smaller than the 5th percentile female test dummy. The population of children seated in the rear who should be restrained with a seat belt is comprised of children seated in a booster seat and children who have transitioned out of a booster seat to sit directly on the vehicle seat. As we explained in the NPRM, children typically begin sitting in a booster seat (transitioning out of a forward-facing CRS) around 4 -7 years old (depending on the height and weight of the child and the respective limits of their forward-facing car seat). Children typically transition out of a booster seat between the ages of about eight and thirteen (again, exactly when depends on the child's height and weight). The Hybrid III 5th percentile female crash test dummy weighs 108 lb (50 kg). This weight corresponds (approximately) to a 50th percentile fourteen-year-old girl and a 50th

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<sup>93</sup> See, e.g., Norman J. Singer & Shambie Singer, 2B SUTHERLAND STATUTORY CONSTRUCTION section 46:5 (7th ed.) (“[E]ach part or section of a statute should be construed in connection with every other part or section to produce a harmonious whole. Thus, it is not proper to confine interpretation to the one section to be construed.”); section 47:3 (explaining that while legislative titles cannot control a statute’s plain words they “may help resolve uncertainty” and “illuminat[e] statutory meaning”). See also *id.* section 47:6 (“Courts give effect to all the language of a purview as a harmonious whole, in light of the statute’s purpose, and regardless of sectional formatting, unless to do so is plainly contrary to legislative intent.”).

<sup>94</sup> MAP-21, Division C, Title I, “MOTOR VEHICLE AND HIGHWAY SAFETY IMPROVEMENT ACT OF 2012.”

<sup>95</sup> 49 U.S.C. 30111.

percentile thirteen-and-a-half-year-old boy.<sup>96</sup> This means that if NHTSA were to specify criteria matching the 5th percentile female, it would essentially be ignoring a large percentage of children ages 6-14, and likely some 15-18 year old children with weight lower than that of a 5th percentile female. That is, if NHTSA specified the 5th percentile female, the rear seat belt warning requirements would only be targeting older children, not younger children.<sup>97</sup> This disparity strongly suggests that NHTSA should specify a smaller occupant for testing if doing so would be practicable.

Although NHTSA has concluded that specifying occupant characteristics matching those of a 6-year-old child would meet a safety need and be fully consistent with MAP-21, MAP-21 directs NHTSA to issue a final rule only if the rule would meet the criteria set out in § 30111 of the Safety Act. These criteria include that the rule be practicable. As noted earlier, the statutory criterion of practicability is multidimensional (see Section IV. Statutory Authority). After considering the comments, NHTSA agrees that most currently deployed rear seat belt warning systems utilizing occupant detection are not able (or designed) to reliably detect a 6-year-old occupant. NHTSA also agrees with the commenters who indicated that there are a number of challenges to rear-seat occupant detection, related both to false negatives and false positives. However, while many or most currently deployed rear occupant detection systems used for seat belt warnings may not comply with the requirements in the final rule, we believe that OEMs are capable of improving the technology and meeting these challenges. Further, NHTSA believes that selecting a 6-year-old child instead of the 5th percentile female appropriately balances benefits and costs. We explain this conclusion in more detail below.

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<sup>96</sup> Center for Disease Control Growth Charts for Children 2-20 years of age: Boys Stature-for-age and Weight-for-age percentiles and Girls Stature-for-age and Weight-for-age percentiles, published in May 2000 (modified in November 2000) and *available at* <https://www.cdc.gov/growthcharts/data/set1clinical/cj41c022.pdf> and <https://www.cdc.gov/growthcharts/data/set1clinical/cj41c021.pdf>, respectively. (last accessed September 10, 2024).

<sup>97</sup> A booster seat augments the total weight on the rear seat. However, as we explained in the NPRM – and as we adopt in this final rule – we will not be testing with a booster seat because we are aware that children can be prematurely transitioned to a seat belt without the use of a booster, and we believe it is desirable to test the lower end of the possible weight range that encompasses children that could conceivably be restrained with a seat belt alone. We discuss the issue of booster seats in our discussion regarding feasibility later in this section.

NHTSA believes that while current occupant detection systems might not reliably detect a 6-year-old child, or a booster seat, such a requirement is feasible. NHTSA acknowledges the commenters who argued that many or most rear occupant detection systems that are currently deployed may not be able to reliably detect a 6-year-old occupant, either seated directly on the seat or in a booster seat. NHTSA has not tested current systems to verify or refute this claim, so we have no firm basis on which to agree or disagree with these comments. NHTSA has, though, noted that some owner's manuals inform consumers that if they place lightweight objects (such as a briefcase) on the rear seat, it may trigger the seat belt warning; this suggests that some rear seat belt occupant detection systems may be capable of detecting younger (and therefore lighter) occupants. For example, the owner's manual for the MY 2024 Cadillac Escalade states that "[t]he rear passenger seat belt reminder light and chime may come on if an object is put on the seat such as a briefcase, handbag, grocery bag, laptop, or other electronic device. To turn off the reminder light and/or chime, remove the object from the seat or buckle the seat belt."<sup>98</sup> In most cases the weights of these listed items would be less than the weight of a 6-year-old. Furthermore, we understand (although again, have not been able to verify) that at least one manufacturer's system may be able to detect a 6-year-old not in a booster.<sup>99</sup>

We also acknowledge that some rear-seat occupant detection systems may not be able to reliably classify a young child seated in a booster seat as an occupant. We explained in the NPRM that children start using belts (with a booster seat) at about 6 years old, and typically transition out of a booster seat around 8 to 13 years old. We acknowledge, as IEE commented, that some rear detection systems may not simply classify objects/occupants based on weight, but may also base the classification on other information, such as the pressure profile, so that a child seated in a booster seat may not be classified as a human occupant, regardless of the child's

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<sup>98</sup> Page 114. As another example, the owner's manual for the MY 2024 Tesla Model Y states: "If all occupants are buckled up and the [seat belt] reminder stays on, ... remove any heavy objects (such as a briefcase) from an unoccupied seat."

<sup>99</sup> NHTSA is not disclosing further details about this finding because this information is confidential.

weight and height. We recognize that manufacturers would have to develop a solution to this issue. We also acknowledge other issues pointed out by the commenters that make accurate detection a challenge, such as out-of-position children.

Nevertheless, we believe that it is feasible to develop this technology. We agree with IEE that more advanced technologies (such as radar sensors) are not yet proven. However, occupant detection technology similar to that used for advanced air bag testing in the front that is used to detect different sized dummies in different test scenarios,<sup>100</sup> including 6-year-old dummies, could potentially be reprogrammed to address our occupancy criteria needs and this would also address the comments about not being able to detect children in boosters. Testing with a 6-year-old should also be compatible with the requirements in ECE R16 and Euro NCAP; if a system can recognize a 6-year-old occupant, it should also be able to recognize an occupant with the characteristics of the 5th percentile female. Moreover, to give manufacturers flexibility, we have kept the requirements as technology-neutral as possible in order to facilitate innovation. We acknowledge that requiring an occupant detection system to meet the final requirements when tested with a dummy or human representing a 6-year-old could increase the cost of the system and may take some time to implement and test, but again, the final rule does not require occupant detection. We are also providing two years of lead time, so current occupant detection systems could be offered until then (See Section IX, Compliance Date).

With respect to the comments on cargo (or pets) leading to false warnings based on the relatively low weight specification for the occupancy criteria, while this is a potential issue, we believe that it is mitigated in a variety of ways. First, potential consumer annoyance should be mitigated by the relatively short duration of the warning (60 sec) and the fact that it does not have an audible component. The weight of the types of objects typically placed on the rear seats

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<sup>100</sup> The Advanced Air Bag rule was targeted at protecting all individuals from potential harm from air bags; specific requirements were included that were targeted at protecting children. *See* Section VI.A.2.a.1.

(such as briefcases, water bottles, and groceries) would also likely be well under the weight of a 6-year-old (46.5 lb).

There may also be technical solutions to mitigate false warnings. Several comments referred to complications with detection related to the weight of the occupant or object placed on the seat. However, occupant detection technology reliant solely on weight-based sensors may not necessarily be the only technology solution to meet the performance requirements in this final rule. We also note that, based on the comments alone, it appears that there are presently issues with false alarms for current systems which are presumably based on detecting a 5th percentile female occupant. (However, no specific data were provided on the performance of these systems with relation to false warnings or how such false warnings have affected acceptance.)

If technical solutions to mitigating any remaining consumer acceptance concerns are not readily available, NHTSA continues to believe the behavioral solutions we suggested in the NPRM (such as placing objects on the floor instead of the seat, or buckling the belt if cargo is placed on the seat) are viable. Although Honda and HATCI did not believe such behavioral solutions were viable, as noted earlier, at least some manufacturers are already providing such guidance in the owner's manual. We acknowledge that there may be some trade-off in effectiveness if consumers frequently buckle the belt when cargo is placed on the seat or become accustomed to ignoring the warning. (We are not aware of any data or research on such trade-offs.) Nevertheless, we believe that this concern would not meaningfully affect the warning's effectiveness, and that any lessening in effectiveness should be offset by the system being able to detect the full range of occupants that should be using a seat belt.

With respect to interactions between the occupant detection system and CRSs, we agree with the commenters that the final rule should not require that the occupant detection system be able to detect a forward- or rear-facing CRS installed with LATCH. We agree with Freedman and Honda that the easiest and most effective solution to avoid false warnings for LATCH-

installed CRSs is to continue recommending the seat belt be fastened behind the CRS. We encourage this practice on our website<sup>101</sup> and some manufacturers are already providing consumers with this guidance.<sup>102</sup>

NHTSA also considered the relative costs and benefits of specifying a 6-year-old child as opposed to the 5th percentile female. In particular, we considered some commenters' assertions that specifying the 6-year-old would discourage manufacturers from adopting systems with occupant detection or would force manufacturers to downgrade their systems to the positive-only option (which did not require occupant detection). We have concluded that specifying a 6-year-old as opposed to the 5th percentile female appropriately balances costs and benefits. There are several reasons for this conclusion.

First, and most important, a system that does not monitor child occupants smaller than a 5th percentile female does not monitor the entire population of children who can and should be using seat belts. As we noted above, the height and weight of the 5th percentile female dummy correspond, approximately, to that of a 14-year-old. Because the 5th percentile female dummy would not represent most younger children, the system would not work accurately for these children. This is especially worrisome given that children 12 years old and younger represent more than half of the rear seat occupant population.<sup>103</sup>

Accordingly, specifying the 5th percentile female could result in unbelted child occupants in the rear not benefiting from the seat belt warning. For instance, if a negative-only system with occupant detection did not detect an unbelted child smaller than the 5th percentile female seated in a rear seat, the visual warning would not indicate an unbelted occupant at an occupied seat

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<sup>101</sup> See [www.nhtsa.gov/road-safety/child-safety](https://www.nhtsa.gov/road-safety/child-safety) (last accessed May 16, 2024).

<sup>102</sup> For example, the owner's manual for the MY 2024 Subaru Forester advises the consumer that "[t]he seatbelt warning system of the rear seats detects if any of the seats are occupied by a passenger. Installing a child restraint system in the rear seating area, using the LATCH anchors, may result in the activation of the passenger seatbelt warning light and chime. Fastening the rear seatbelt prior to installing the child restraint system will avoid activating the passenger seatbelt warning light and chime."

<sup>103</sup> See <https://www.nhtsa.gov/crashworthiness/child-safety-crashworthiness-research#:~:text=Since%20children%2012%2Dyears%2Dold,booster%20seats%20and%20seat%20belts> (last accessed May 16, 2024).

(e.g., for systems with a pictogram that indicates which seat are not in use, the pictogram would likely display something like a “grayed-out” seat to indicate that the system was registering a seat as unoccupied). In this scenario, the driver may not realize that the system was not detecting the child occupant and may think the child is buckled when they are not. This concern is not hypothetical. The owner’s manual for the MY 2024 Subaru Forester states that “[t]he driver must check that all the passengers have fastened their seatbelts properly since the seatbelt warning system may not detect passengers under the following circumstances. - When cushions or child restraint systems, etc., are used - When a child or small adult is sitting in the seat.” The fact that the system does not work for some classes of occupants could also lead the driver to be less likely to respond to accurate warnings. These shortcomings could also affect consumer acceptance of the system.

Second, the concern about downgrading to a positive-only system is alleviated because we have modified the proposal so that the final rule does not dictate specific compliance options for the information conveyed by the visual warning; the finalized requirements for the visual warning allow all of the systems that would have been allowed under the proposed rule, as well as additional systems that would not have been allowed under the proposal.

Third, a very small percentage of vehicles currently sold in the U.S. is equipped with rear-seat occupant detection. Based on the 2022 NCAP data, approximately seven percent of light vehicles have SBWS with occupant detection for the rear seats. Relatedly, rear systems with occupant detection are a relatively new feature in the U.S. vehicle market. So even if some manufacturers were to stop offering occupant detection, it would affect a relatively new feature on a small fraction of vehicles offered for sale in the U.S. and would not be a meaningful reduction in the choices presently offered to consumers.

Fourth, this trade-off may or may not materialize. The trade-off would not occur if manufacturers develop and deploy rear-seat occupant detection systems capable of detecting a 6-year-old within the allotted lead time (two years).

Fifth, the possibility that some manufacturers may choose to forgo occupant detection because the final rule specifies the 6-year-old does not lead us to conclude that it would be preferable to specify the 5th percentile female. We considered the relative benefits and costs of specifying each of these systems.

The target population addressed by this rule will necessarily be larger if we specify the 6-year-old — and, importantly, this addition to the target population consists of children. Due to a lack of data, the FRIA was unable to establish how much more effective a rear seat belt reminder system with occupant detection would be relative to a seat belt reminder system without occupant detection. However, it is important to note that the baseline seat belt use rate for rear seat occupants ages 6 to 10 years is already very high. As it is unlikely that the seat belt use rate would reach 100 percent, this leaves very little room for improvement. Accordingly, the children who will benefit from the rule if we specify the 6-year-old is effectively children from about ages 11-18. This is still a larger target population than if we specified the 5th percentile female. Targeting this population points towards greater benefits.

On the other hand, if NHTSA specifies the 6-year-old, at least some manufacturers may offer fewer rear seat belt reminder systems with occupant detection. However, we are unable to estimate the overall impact of this potential reduction because of several unknowns: how many fewer systems with occupant detection will be offered; the difference in effectiveness between systems with occupant detection and systems without occupant detection;<sup>104</sup> and the seat belt use rates, injuries, or fatalities for children ages 11-18.<sup>105</sup> We also believe that any short-term decrease in net benefits (if that should in fact materialize) is outweighed by what we anticipate to be the greater benefits in the medium-to-long term for children. Moreover, specifying the 6-year-old would result in seat belt reminder systems that are able to reliably inform the driver of

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<sup>104</sup> The NPRM explained that while the main advantage is more informative warnings and that it can reduce false warnings for unoccupied seats, it can also (as pointed out by some commenters) result in false warnings.

<sup>105</sup> Because of data limitations, NHTSA was unable to break out this information for this age group specifically. NHTSA was only able to segment the analysis into occupants ages 6-10 and occupants 11 and older.

unbelted children in the rear seat. While our regulatory analysis is not able to quantify these benefits to an especially vulnerable occupant population, we recognize the importance of these unquantified benefits. NHTSA therefore concludes that specifying the 6-year-old appropriately balances benefits and costs compared to specifying the 5th percentile female.

#### **v. Duration**

NHTSA proposed that the start-of-trip warning last for at least 60 seconds. We believed that 60 seconds would be sufficient to capture the driver's attention and appropriately balanced effectiveness and acceptance.

60 seconds is a shorter warning than we proposed for the front outboard seats. There were a couple of reasons for our tentative decision that a shorter warning is warranted for the rear seats. First, we did not propose to require occupant detection for the rear seat belt warning system; the positive-only compliance option would require that the driver be informed of which rear seat belts are fastened. This type of "warning" functions more to provide information to the driver, rather than a true warning (because it will be providing information to the driver even if all rear occupants have fastened their seat belts), so we tentatively believed that it is not necessary to require that it be particularly long-lasting. Second, and related, even for the compliance options that would entail occupant detection, the complexities of occupant detection in the rear seats and the possibilities for false positives provide another reason for not requiring an extremely long-lasting warning. Manufacturers would be free to provide a longer warning.

This duration was consistent with ECE R16, Euro NCAP, and the IIHS protocol, each of which requires a visual warning at the start of the trip for the rear seat belts lasting at least 60 seconds. It is also consistent with many of the rear seat belt warning systems currently deployed in the United States. In the NPRM we noted that, of the fifteen manufacturers that provide vehicle models with a rear seat belt warning system in the United States, eight appeared to provide systems with initial visual warnings that are active for at least 60 seconds. An additional three manufacturers appeared to provide visual warnings until the seat belt is fastened.

## Comments

Auto Innovators, Freedman, Honda, HATCI, and Consumer Reports supported a 60-second minimum requirement. Auto Innovators and HATCI commented that this requirement would align with ECE R16.

SRN requested a longer-duration warning requirement. It argued that the proposed warning would be only moderately effective (especially for occupants of rideshare vehicles) because it could be easily ignored. SRN also commented that caregivers, who may have children in car seats and boosters, may need more time to interpret the warning. SRN also suggested that a seat belt status indicator could be valuable as a constant readout on the dashboard, as warning lights are sometimes dismissed or ignored.

## Agency Response

The final rule adopts the proposed 60-second minimum duration. We believe this requirement appropriately balances effectiveness and acceptance. A 2015 survey of drivers of vehicles with RSBWSs found that 28 percent of GM drivers noticed an increase in rear seat belt usage, and 23 percent of Volvo drivers reported an increase in rear seat belt usage.<sup>106</sup> The GM system used a 30-second visual warning at start-up and the Volvo system provided a short message at start-up, suggesting that a 60-second warning would be at least as effective. The 60-second minimum duration also harmonizes with ECE R16, Euro NCAP, and the IIHS protocol.

A longer warning than 60 seconds could be annoying (in particular for systems without occupant detection that display unfastened belts). We also believe that 60 seconds is long enough to interpret the warning. This is what some current systems use, and we have no information to suggest that consumers have had difficulty interpreting the warning. This is a minimum performance requirement so manufacturers may voluntarily provide warnings lasting

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<sup>106</sup> Paul Schroeder & Melanie Wilbur, Survey of Principal Drivers of Vehicles with a Rear Seat Belt Reminder System. Washington, DC: National Highway Traffic Safety Administration (2015).

longer than 60 seconds. On the other hand, we are aware of vehicles that provide shorter warnings, so having a 60-second requirement will ensure a minimum level of performance.

#### **vi. Other aspects**

NHTSA also received comments on other aspects of the proposed rear seat belt warning requirements.

##### Comments

Tesla requested that NHTSA clarify whether the “rear rows” reference includes all designated rear seating positions. Tesla also commented asking if the agency had a plan to also address integrated child seats that have seat belt reminder technology. Auto Innovators commented that the proposed S7.5(c)(1)(ii), requiring a visual and audible change of status warning, and S7.5(c)(2)(ii), prohibiting a visual warning that a seat belt is not in use for an unoccupied seat, are inconsistent and require clarification.

##### Agency Response

The final rule retains the reference to “all rear designated seating positions.” The proposed regulatory text did not refer to “rows”; it simply referred to “rear designated seating positions.” Accordingly, it applies to all rear designated seating positions in applicable vehicles.

It is not necessary that the rule specifically address integrated child seats. Integrated child seats are CRSs or booster seats that are built into the vehicle seat. A child seated in an integrated child seat is secured with either a seat belt or a harness. If the child is secured with a seat belt, then the seat belt warning should monitor belt use as with any seat belt. If the child is secured with a harness, the seat belt reminder would not be required for the harness, because children in an integrated seat with a harness are not part of the target population for this rule just as children in rear- and forward-facing CRSs are not part of the target population. In addition, we were unable to identify any new vehicles with integrated child seats that use a harness. Integrated booster seats would not pose an issue for the seat belt warning system, and we are aware of only one vehicle manufacturer that offers integrated booster seats on some vehicles as

an option.<sup>107</sup> Regarding Auto Innovators comment, the final rule does not include the proposed requirement that the warning is not permitted to indicate a seat belt is not in use for an unoccupied seat because we do not believe this is necessary.

#### **b. Audio-visual change-of-status warning**

NHTSA proposed requiring an audio-visual warning when a rear seat belt is unbuckled during a trip. We proposed that an audio-visual warning must activate when the ignition switch is in the “on” or “start” position, the vehicle is in forward or reverse drive mode, and the status of the seat belt changes from in use to not in use, unless any rear door is open, in which case a change-of-status warning would not be required. The exception for an open rear door was intended to allow for passengers to exit the vehicle when the driver does not shift into park without activating the change-of-status warning.

The audio-visual warning would have to last for at least 30 seconds or until the seat belt that triggered the warning is in use. We proposed that the audible signal may be “intermittent” (i.e., not continuous), which mirrors the longstanding requirements for the driver’s seat belt warning. If intermittent, we proposed that inactive periods longer than three seconds would not be counted toward the total minimum duration of the audible warning. Because the required minimum duration was relatively short, we did not propose additional audible signal characteristics, such as a duty cycle. (In contrast, we proposed additional signal characteristics for the front seat belt change-of-status warning because of the required longer duration for that warning. The final rule decisions on these aspects of the front seat warning are discussed in Section VI.B.3).

ECE R16 similarly specifies an audio-visual change-of-status warning for rear seats. Specifically, if a fastened belt becomes unfastened when the vehicle is in “normal operation” (defined as forward motion at a speed greater than 10 km/h (6.2 mph)),<sup>108</sup> ECE R16 specifies an

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<sup>107</sup> See <https://www.volvocars.com/lb/support/car/x90/article/3212aabb4f810a77c0a8015146e81cc9> (last accessed May 16, 2024).

<sup>108</sup> Section 2.47.

audio-visual warning (second level) when certain distance, time, and/or speed threshold(s) (at the choice of the manufacturer) are exceeded.<sup>109</sup> The additional thresholds are distance traveled (not to exceed 500 meters), vehicle speed (not to exceed 25 km/h (15.5 mph), and/or travel time (not to exceed 60 sec). This warning must last for at least 30 seconds unless the unfastened belt becomes fastened, the seat associated with the unfastened belt is no longer occupied, or the vehicle is no longer in normal operation.<sup>110</sup> This warning may not be canceled by the driver.

Euro NCAP also requires (to earn points) an audio-visual change-of-status warning at vehicle speeds of 25 km/h (15.5 mph) and above.<sup>111</sup> If the change of status occurs below 25 km/h (15.5 mph) and no doors are opened, the signal may be delayed until the vehicle has been in forward motion for 500 meters or has reached a forward speed of 25 km/h (15.5 mph).<sup>112</sup> A warning is not required if the system has occupant detection as long as all doors remain closed and the number of buckled positions remains the same, in order to minimize the number of false positives (e.g., children remaining in the vehicle but swapping seats in the rear while at a traffic light).<sup>113</sup> The warning duration differs for the visual and audible warnings. With respect to the visual warning, if the system does not have occupant detection, the warning must last until the seat belt is fastened or 60 seconds have elapsed.<sup>114</sup> If the system does have occupant detection, the signal must remain on until the belt is fastened. The audible warning must last until the belt is fastened,<sup>115</sup> 30 seconds have elapsed,<sup>116</sup> or the vehicle speed falls below 10 km/h (6.2 mph).<sup>117</sup>

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<sup>109</sup> Section 8.4.3.3 (front seat belts) and section 8.4.4.5 (rear seat belts).

<sup>110</sup> These summaries simplify the requirements somewhat. They will be discussed in greater detail later in the preamble where relevant.

<sup>111</sup> Section 3.4.1.5.

<sup>112</sup> Section 3.4.1.5.

<sup>113</sup> Section 3.4.1.5.

<sup>114</sup> Section 3.4.3.1.1.

<sup>115</sup> Section 3.4.1.6.

<sup>116</sup> Section 3.4.3.2.

<sup>117</sup> Section 3.4.1.6. The audio signal must resume when the speed goes above 25 km/h (15.5 mph) and no doors have been opened and the seat belt(s) remain unbuckled. In addition, the audible signal may instead meet the requirements for the front seating positions, if the vehicle is equipped with occupant detection.

ECE R16<sup>118</sup> and Euro NCAP<sup>119</sup> do not count periods in which the warning stops for longer than three seconds as part of the overall duration.

The IIHS protocol also requires an audio-visual change-of-status warning lasting at least 30 seconds when the vehicle is in motion. The exact trigger depends on vehicle speed. When vehicle speed is between 10 and 40 km/h (6.2 and 24.9 mph), the audio-visual warning must start within 30 seconds of continuous forward motion, and when the speed exceeds 40 km/h (24.9 mph), the audio-visual warning must begin within two seconds if the signal has not already begun. The warning can deactivate when the seat belt that triggered the warning is fastened; the vehicle is no longer in forward motion above 10 km/h (6.2 mph); or the seat or seats that triggered the warning are no longer occupied. Similar to Euro NCAP, the thresholds to trigger the primary audible signal and visual signal may be reset if any doors have been opened when the vehicle is not in motion.

The proposal differed from ECE R16, Euro NCAP, and the IIHS protocol in some respects. The proposed 30-second duration was shorter than the 60-second duration for the visual signal specified in Euro NCAP, but consistent with the 30-second duration for the audible signal. We also did not propose any speed, distance, or time triggers. And we did not propose the Euro NCAP allowance for not requiring a change-of-status warning when all doors remain closed and the number of buckled positions remains the same because it would require a delay in the activation of the change-of-status warning; also, these types of events are likely uncommon and require very little time to complete, so exposure to the warning would be very limited.

#### Comments

Consumer Reports agreed with the agency's decision to require the change-of-status warning to include both audible and visual components. It also supported departing from ECE R16 and Euro NCAP and requiring a warning whether or not a vehicle is in motion because a

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<sup>118</sup> Section 8.4.2.4.1.

<sup>119</sup> Section 3.4.3.2.3.

stopped vehicle presents the best opportunity for the driver to ensure that the occupants are belted.

On the other hand, Honda, Nissan, NADA, Tesla, Ford, Auto Innovators, and HATCI commented that reminder trigger conditions should harmonize with ECE R16 and/or Euro NCAP and be based on vehicle motion. Auto Innovators and Honda commented that the proposed requirements for providing an audible alert may result in widespread consumer acceptance issues. For example, Auto Innovators argued that establishing a trigger threshold based solely on the ignition being on, absent vehicle motion, will result in scenarios where an unbelted condition that may otherwise be viewed as reasonably acceptable would result in an audible alarm, including those where the vehicle is either stopped (and in drive) or slowing in anticipation of an upcoming stop (e.g., in a rideshare scenario or school drop-off). Auto Innovators recommended that NHTSA harmonize with ECE R16, which requires the audio-visual warning to be provided only when there is a change in seat belt status when the vehicle is traveling above 25 km/h (15.5 mph) or moving below 25 km/h (15.5 mph) for a period of 60 seconds.

Auto Innovators further commented that the agency did not articulate why it has proposed that an audible alert occur when the vehicle is in reverse. Auto Innovators explained that such maneuvers are typically low-speed events, and that the agency has not provided clear justification for why an audible alert is needed in these scenarios.

Honda commented that if NHTSA does not adopt a speed threshold, it could consider an alternative approach that would allow a single chime when the change of status occurs (assuming the vehicle is stationary) and then resume the full alarm when the vehicle begins moving. Honda commented this modification would minimize intrusive and annoying alarms, ensuring that the system still provides a warning but does not cause excessive consumer annoyance.

We also received comments both in support of the proposed warning duration, as well as comments that recommended alternative durations. Auto Innovators, HATCI, and Honda

support the proposed 30 second duration and harmonizing with ECE R16. Tesla encouraged harmonizing with either ECE R16 or Euro NCAP.

Some commenters favored a longer minimum duration. Freedman argued that the audio warning should be the same as that for the driver seat (indefinite). Consumer Reports commented that the warning should last at least 60 seconds unless the belt is buckled, to be consistent with the start-of-trip visual warning. Ms. Cross proposed requiring at least a 90 second minimum duration, pointing to, for example, consumer surveys showing that many consumers favor persistent warnings.

Honda and Auto Innovators recommended that NHTSA allow the change-of-status warning to cease if a different belt is buckled (and the total number of buckled seats is restored) to allow the driver to recognize that a rear occupant has changed seats and refastened the belt.

Tesla requested that NHTSA define the start time to measure the 30 seconds duration. Tesla further commented that if the warning continues after the seat belt is fastened, it may lead to a potential confusion on system functionality, which could lead to occupants ignoring future warnings.

#### Agency response

In response to the comments, the final rule adds a provision to accommodate occupants switching seats. However, we are declining to adopt additional trigger conditions, such as a speed criterion. The final rule also includes the proposed 30-second duration. Our reasoning for these and other choices is detailed below.

The final rule includes the proposed exception from activation when a rear door is opened, i.e., for a drop-off scenario: a change-of-status warning is not required if a rear passenger unbuckles and exits the vehicle. However, the final rule omits the additional proposed language that “the system may consider this situation as a new trip with respect to that seat belt and reset the warning system.” This language is vague and superfluous. The exception is based on the door opening, and there is no need to permit the system to “reset”; manufacturers can

program the system logic for the state of the system after a belt is unfastened and a door is opened as they deem appropriate, as long as the system complies with the finalized requirements.

The final rule implements the recommendation from Auto Innovators and Honda to follow Euro NCAP and allow the change-of-status warning to deactivate if the system is able to recognize passenger(s) switching seats when all the doors are closed and the number of buckled positions remains the same. This change would limit the exposure to the warning if the occupant(s) changes seats and refastens the belt in another seat. Without this allowance, the warning would remain activated when all occupants were belted and would be unnecessarily annoying. This condition will also accommodate situations where a passenger buckles into a wrong buckle and corrects it. The additional regulatory text is based on Euro NCAP.<sup>120</sup>

However, we are declining to add the additional requested trigger conditions, or to simply require a single chime when a change of status occurs because, as we explained in the NPRM, seat belts provide a safety benefit even at lower speeds, and regardless of the direction of motion. We also believe a warning would be beneficial even if the vehicle is not moving. A driver may want to know if any rear seat occupants – especially children – have been unbuckled while the vehicle is temporarily stopped (e.g., at a traffic light) or slowed (e.g., in a parking lot), because the vehicle could soon be resuming travel. In addition, providing a warning when the vehicle is stationary would allow the driver to attend to the unbuckled passengers before having to focus attention on the driving task. We similarly believe that a warning would be useful before the vehicle has reached any distance or trip time threshold. The final rule also includes the reverse driving mode as a trigger as proposed. We believe this trigger is beneficial because it will require a warning before a vehicle begins driving on the road (e.g., before pulling out on to the road). We believe the benefits of having a warning activate in these circumstances outweighs the

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<sup>120</sup> Section 3.4.1.5 (“Where the system is able to track the number of buckled positions in the rear, no change of status signal (for the rear seats) is required as long as all doors remain closed, and the number of buckled positions remains the same. This is to minimize the number of false positives (ex: children remaining in the vehicle but swapping seats in the rear while at a traffic light.”)).

potential drawbacks identified by the commenters (for example, when the vehicle is stopped and the belt is unbuckled before a door is opened). In addition, we have eliminated the condition that the ignition switch be in the “on” or “start” position because it was redundant with the condition that the vehicle be in a forward or reverse drive mode.

We do not believe that a visual warning alone, without an audible component, would be sufficient; a change of status is a serious event, due to the higher risk that comes with riding unbelted, and we believe this risk warrants a more effective audio-visual warning. In addition, the relatively short duration of the warning (30 seconds) should help minimize consumer annoyance in other scenarios that might result in an unbelted occupant in very low-risk scenarios. We therefore believe that consumers will accept the warning.

NHTSA is also finalizing the proposal that the audio-visual change-of-status warning last at least 30 seconds (or until a rear door is opened). As we explained in the NPRM, this requirement is comparable to the change-of-status warnings on vehicles currently equipped with rear seat belt warnings. While we recognize that longer warnings may be more effective, we are not requiring a longer warning for the rear change-of-status warning. This requirement differs from the front seat, for which we are requiring a visual warning that lasts until the belt is re-buckled and a speed threshold for the indefinite audible warning. The main reason we are not requiring a longer rear change-of-status warning is to mitigate driver distraction. Because the majority of rear passengers are children, the driver would not necessarily be able to address the issue immediately and a longer warning could distract from the driving task.<sup>121</sup> With respect to Ms. Cross’s comment, the survey on consumer acceptance for rear warnings does not support a specific duration, just that the majority found the feature acceptable, and the data on the majority of vehicles having at least a 90 second warning is for the front seat belt warning at the start of a trip, not a change-of-status warning, so they are not necessarily directly comparable.

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<sup>121</sup> The change-of-status warning does not present the same concerns with false warnings as does the start-of-trip warning because the change-of-status warning is not triggered by occupancy.

With respect to Tesla's question about start time, the 30-second clock commences when the trigger conditions specified in the rule are met. The warning is permitted to stop if the occupant of the seat with the belt triggering the warning buckles within 30 seconds.

### **c. Electrical connections/Removable seats**

In the NPRM we explained that we had tentatively decided not to propose any requirements with respect to the electrical connections for folding, rotating, or stowable seats. Because these seats are not readily removable, the electrical connections should not be disturbed and could be accommodated with additional wiring. We did, however, propose two requirements related to the electrical connections for readily removable seats.

First, we proposed that readily removable seats must either automatically connect the electrical connections when the seat is put in place or, if a manual connection is required, the connectors must be readily accessible. A system using a wireless connection could be classified as either automatic or manual, depending on whether the user needs to take any additional actions to establish the wireless connection when the seat is installed. We agreed with the commenters who recommended no prescriptive requirements to ensure manufacturers have flexibility in system design.

Second, we proposed that vehicles using the negative-only compliance option provide a visual warning to the driver if a proper electrical connection has not been established for a readily removable seat because we were concerned that consumers could reinstall removable seats without making a proper electrical connection. We proposed requiring a visual warning for negative-only systems only because a faulty connection would result in the system not triggering any warning of an unbelted rear seat occupant. Moreover, for a negative-only system, the driver would otherwise have no reason to suspect that the system was malfunctioning, and so might mistake the lack of a warning as an indication that the rear seat occupant was belted. In the NPRM we explained why we believed that these issues were not present in full-status or positive-only warning systems.

In the NPRM we stated our belief that both requirements would mainly affect minivans, which make up a small percentage of the fleet, but further explained that it might be possible to use the rear seat belt visual warning signal, with slight modifications (e.g., a different color) to comply.

#### Comments

Freedman, ASC, Honda, and Consumer reports commented that they agree that readily removable seats should not be exempt from the proposed requirements.

ASC also commented on potential challenges in establishing reliable electrical connections, explaining that seat belt technology to support seat belt reminder systems in the field today is contained within an electrical switch inside the buckle. According to ASC, this functionality presents two challenges. First, since the removal and reattachment of the seat will result in disconnecting/reconnecting the buckle wiring to the vehicle wire harness, the reliability of this connection needs to be studied to ensure it is robust against malfunction considering its use case. (RVIA also raised this concern in its comment.) Second, a user's handling of the electrical interface presents an opportunity for accidental damage. ASC recommended further study to determine the robustness of this connection in these systems.

RVIA commented that motor homes are also often equipped with non-conventional, custom-made rear seating, so that developing wiring and sensors for the seat belt warning system that are not damaged in the conversion process from seat to bed would be challenging if not impossible. RVIA further commented that the NPRM does not consider convertible seats.

IEE recommended that a visual warning be required for all systems, not just the negative-only system.

#### Agency response

The final rule includes the proposed electrical connection requirements for readily removable seats. We agree with the commenters who supported including these requirements that doing so would provide important safety benefits by helping to ensure that proper electrical

connections are made and the warning system operates correctly, and, in the case of negative-only systems, warns users that a proper connection has not been made. We agree with ASC that there is a foreseeable possibility that users can accidentally damage the system. This risk is why the final rule requires a warning that alerts the driver if a connection has not been properly made or if there is a malfunction for negative-only systems (where there is a risk of the driver not being aware of the issue).

We acknowledge the potential challenges associated with electrical connections pointed out by some of the commenters, but we believe the requirements are feasible. NHTSA's understanding is that removable rear seats are relatively rare, and typically only installed in the second row of passenger vans (a very small percentage of the fleet). In the vehicles in which they are present, it is likely that the seats are not frequently removed, which would suggest that the electrical connections would not be exposed to constant removal and re-installation that could increase the likelihood of damage. Moreover, the fact that the seat is removable does not necessarily mean that removing the seat means disturbing the electrical connection. NHTSA is aware of one minivan model with a rear seat belt reminder and a removable seat (MY 2024 Toyota Sienna Hybrid); in that vehicle, the seat belt anchors – which contain the wiring necessary for the rear reminder signal to function – remain in place when the seat is removed, obviating any need to re-establish any electrical connections when the seat is re-installed.

Furthermore, the technology at issue here is not complex; re-installing the seats simply would require re-establishing a connection. If a seat is designed to be removable, it would not be unreasonable to expect that the seat, when re-installed, continues to have the same functionality it had before it was removed. The fact that removable seats are not exempted by ECE R16 or Euro NCAP strongly suggests that this requirement is not unreasonable.<sup>122</sup> Accordingly, we do

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<sup>122</sup> NHTSA did some limited market research of European models with removable rear seats. In one (MY 2023 Peugeot 5008) the seat belt anchors did not appear to be affected by the removal of the seat. In another (MY 2023 Ford Tourneo Connect), visual indicators where the seat locks in place were used to confirm proper installation, but not pertaining to electrical connections specifically.

not believe more study is necessary to determine the robustness of the connection. Electrical connections may not be necessary for every removable seat and only a limited number of vehicles are equipped with removable rear seats. It is also unlikely that seats are removed and reinstalled frequently. Therefore, this issue does not appear to warrant further study. In addition, the requirement for a warning if there is a malfunction also addresses safety risks associated with potential damage over time.

With respect to RVIA's comment regarding seating specific to motor homes, such as dinette seating, it is unlikely the requirements apply to motor home convertible seats. Motor homes not greater than 10,000 lb GVWR are generally not required to have rear seat belts.<sup>123</sup> And NHTSA's regulations exempt motor home seating locations labeled in accordance with S4.4 of FMVSS No. 207 from being classified as "designated seating positions," so that the seat belt and seat belt reminder requirements do not apply to motor home seats so labeled.<sup>124</sup>

The final rule does not expand the connection warning requirements to systems beyond the negative-only system. As mentioned in the NPRM, we only think this issue would pose a serious risk for negative-only systems.

#### **d. Owner's manual instructions**

NHTSA proposed that the owner's manual (which includes information provided by the vehicle manufacturer to the consumer, whether in digital or printed form) describe the warning system's features, including the location, format, and meaning of the visual warnings. We also proposed that the owner's manual include instructions on how to make any manual electrical connections for readily removable seats. These proposed additions would require a revision to the approved collection of information in OMB No. 2127-0541.

#### Comments

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<sup>123</sup> FMVSS No. 208 S4.2.7.

<sup>124</sup> 49 CFR 571.3(b) (definition of "designated seating position").

We received comments both in support of and in opposition to the proposed owner's manual instructions.

ASC agreed with the proposal to include information regarding seat belt reminder systems in the owner's manual instructions. NSC commented that the owner's manual instructions should include instructions on how to make any manual electrical connections for readily removable seats, like child passenger safety seats. NSC urged NHTSA to consider standardizing generic nomenclature as well as standardizing warning and icon symbols to reduce driver confusion. SRN requested that instructions regarding false warnings, such as when relatively heavy car seats are installed using LATCH, be provided.

Auto Innovators opposed any specific owner's manual requirements, particularly if the required language is not relevant or applicable to all vehicles. Auto Innovators commented that the extent to which guidance may need to be included in the owner's manual is a function of how the system is designed; if there are certain aspects of the system design that may require additional instruction, this information should be provided at the discretion of the manufacturer.

#### Agency response

The final rule includes, without any substantive changes, the proposed owner's manual requirements. We agree that these requirements will aid in public adoption of the warning systems and help to achieve their full safety potential. In addition, with increased system complexity, greater knowledge and understanding of the system is required. Including detailed information in the vehicle itself is not practical.

The final rule to some extent standardizes nomenclature by defining some terms used in the regulation and by specifying requirements for the visual warning characteristics. However, we attempted to minimize such requirements to the extent possible to provide manufacturers with design flexibility. We agree with Auto Innovators not to require including specific information on how warning systems with occupant detection function when a CRS is installed with LATCH and guidance on how to avoid activating the warning (e.g., by fastening the seat

belt). As Auto Innovators points out, the extent of the guidance needed to potentially limit false warnings depends on the type of system and its technology and should be left up to the discretion of the manufacturer. Manufacturers may include language in the child passenger section of their manuals for further guidance on potential false warnings that is specific to their system capabilities.

#### **e. Telltale location**

The NPRM proposed that the visual warning signal be required to be visible to the driver only and not the rear passengers.

##### Comments

Auto Innovators supported the proposal to provide flexibility for manufacturers to specify the location of any necessary telltales related to rear row seat belt use, provided they are visible to the driver. On the other hand, Freedman commented it would be beneficial for passengers to see the seat belt status in those vehicles with multiple rows of rear seats, and indicated that this requirement could be accomplished with additional monitors in the passenger seating area.

##### Agency response

The final rule adopts the proposed requirement that the visual signal needs to be visible only to the driver. Although we agree with Freedman that it could be beneficial for rear passengers to see the warning, we conclude that the increased cost, complexity, and redesign such a requirement would entail would not be justified. However, manufacturers would have the flexibility to place the visual warning where it could be seen by some or all rear seat occupants. In Section VI.C.7. we discuss the implications of the telltale location as it relates to automated vehicles. This requirement harmonizes with ECE R16,<sup>125</sup> Euro NCAP,<sup>126</sup> and IIHS,<sup>127</sup> all of which require that the rear seat belt visual warning be visible only to the driver.

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<sup>125</sup> Section 8.4.4.2.

<sup>126</sup> Section 3.4.1.1.

<sup>127</sup> Insurance Institute for Highway Safety. (April 2024.) Seat Belt Reminder System Test and Rating Protocol, Version III, pg. 7.

### **3. Alternative warning signals**

In the NPRM, we noted that the ANPRM had sought comment on requiring or specifying as a compliance option a rear seat belt warning that differs from the type of audio-visual warning that is currently required for the driver's seat belt, such as a haptic warning. Commenters to the ANPRM generally argued that an alternative warning is not necessary and that an audio-visual warning would be appropriate.

#### Comments

We received one comment on this issue. Auto Innovators agreed that an alternative warning is not necessary in addition to the audio-visual warnings proposed. However, Auto Innovators commented that manufacturers should not be prohibited from using alternate warnings (in addition to the required alerts) if they choose to do so.

#### Agency response

We are moving forward with the originally proposed requirements for audio-visual warnings, while neither requiring nor prohibiting alternative warning signals. We are specifying minimum performance requirements to balance the effectiveness and acceptability of these systems. Manufacturers may go beyond our requirements, such as by providing a warning on the instrument panel that must be acknowledged by the driver before any other use of the instrument panel is permitted. Manufacturers interested in implementing supplementary alternative warnings signals should take steps to ensure that what is used will not cause unnecessary confusion or annoyance.

## **B. Front Seat Belt Warning Requirements**

### **1. Applicability**

In the NPRM, NHTSA proposed to require an audio-visual seat belt warning for any front outboard seating positions in passenger cars, and all front outboard designated seating positions certified to a compliance option requiring seat belts in trucks, MPVs, and buses with a

GVWR of 4,536 kg (10,000 lb) or less.<sup>128</sup> NHTSA also proposed not to extend the seat belt warning requirements to front center seats. Additionally, in the NPRM the agency noted that the 2022 automated driving system (ADS) final rule<sup>129</sup> also addresses situations where an ADS-equipped vehicle without manual driving controls has one or no outboard seats in the front row (e.g., an ADS-equipped vehicle with only two seats in the front row, one or both of which would be classified as inboard passenger seating positions under 49 CFR 571.3) and requires seat belt warnings for certain inboard seats in such vehicles. We proposed that these front inboard passenger seats have the same seat belt warnings as front outboard seats. However, although the proposed regulatory text for passenger cars addressed this ADS-related applicability issue, the regulatory text for trucks, MPVs, and buses did not have conforming revisions.

ECE R16 requires a warning for seats in the same row as the driver in passenger vehicles up to 5 tons (~11,000 lb) and vehicles used for carrying goods (e.g., pick-up trucks, vans, commercial trucks) up to 12 tons (~26,000 lb).<sup>130</sup> Euro NCAP awards points for warnings for all front row seating positions.

### Comments

Several commenters, including Consumer Reports, Ms. Freeman, Honda, Tesla, Mothers Against Drunk Driving (MADD), and Ms. Tombrello commented in support of requiring an audio-visual seat belt warning for front outboard passenger seats. Consumer Reports commented that most manufacturers already implement audible warnings for front outboard passenger seats that last more than eight seconds, and they agreed with updating the requirements to reflect marketplace changes that have resulted in more substantial audible warnings. Ms. Tombrello

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<sup>128</sup> There are some compliance options for certain trucks and MPVs that permit passive protection in lieu of seat belts at the front outboard seating positions. See FMVSS 208 S4.2.3 (compliance options for trucks and MPVs weighing between 8,500-10,000 lb); S4.2.6 & S4.2.1.1 (compliance options for walk-in van-type trucks and vehicles designed to be sold exclusively to the U.S. Postal Service 8,500 lb and less).

<sup>129</sup> 87 FR 18560 (Mar. 30, 2022)

<sup>130</sup> Section 8.4.1.1. ECE R16 requires seat belt reminders in vehicle categories M (passenger vehicles) and N (vehicles carrying goods). Category M vehicles have a maximum mass of 5 tons (approximately 11,000 lb) and category N vehicles have a maximum mass of 12 tons (approximately 26,500 lb).

emphasized the value in mandating this technology to cover the remaining vehicles that have not yet incorporated it.

IEE commented that NHTSA should consider mandating a seat belt reminder warning for the front row seats of vehicles with a GVWR beyond 10,000 lb. IEE indicated that such vehicles are included in ECE R16, and it would be a safety relevant gain to cover the whole vehicle fleet. They also noted that ECE R16 includes some exemptions, such as foldable seats in entry areas of coaches, that could also be incorporated.

Ms. Tombrello, MADD, Advocates and Public Citizen, and IEE supported extending the requirements to the front center seating position. Ms. Tombrello noted the high percentage of center-seat fatalities that were unrestrained and stated that many children may be seated in the front center seat. IEE commented that even with a possibly still negative cost-benefit analysis, NHTSA should consider including the front center seat because the market share of vehicles with front center seats can be expected to increase as EVs no longer have a transmission tunnel. IEE also noted that because ECE R16 includes the front center seating position, established technical solutions are available.

#### Agency Response

We are finalizing the applicability of the front seat warning requirements as proposed in the NPRM, except for a correction to the regulatory text for certain ADS-equipped vehicles. NHTSA appreciates IEE's concerns regarding the harmonization and safety benefits that could be gained by expanding this rule to cover vehicles with a GVWR over 10,000 lb. However, the agency will not do so in this final rule because we lack information on implementation cost to support such a requirement for heavy vehicles. The Safety Act requires that FMVSS be practicable, which includes appropriately weighting the benefits and costs of a requirement while ensuring that the standard meets the need for motor vehicle safety. As we explained in the NPRM, long duration or indefinite audio-visual warnings are typically appropriate only for occupied seats due to the nuisance and desensitization effects that occur when warnings are

activated for unoccupied seats.<sup>131</sup> We also noted several factors that enabled us to conclude that no cost is associated with requiring front outboard passenger seat occupant detection technology in the light vehicle fleet (the vehicles to which this rule applies). Specifically, light vehicles are covered by the advanced air bag requirements in FMVSS No. 208, so occupant detection in the front outboard passenger seat is already widely deployed as part of the air bag system.

Additionally, passenger seat occupant detection systems are often installed in the light vehicle fleet in part for use in voluntary seat belt warning systems. Based on compliance and consumer information submitted to NHTSA, the agency was, and still is, unaware of any vehicles to which the requirements will apply which do not already have occupant detection for the front outboard passenger seating position.

However, we do not currently have such information regarding the heavy vehicle fleet and therefore cannot come to the same (or any) conclusion about the costs associated with implementation of a similar requirement for heavy vehicles, so we are not going to extend the requirements in this final rule. Heavy vehicles are not covered by the advanced air bag requirements in FMVSS No. 208<sup>132</sup> and we do not have data indicating the market penetration of occupant detection systems for front outboard passengers in the heavy vehicle fleet in the United States. Without this or other information indicating the adoption of occupant detection technology, NHTSA is unable to determine whether additional occupant detection systems may need to be incorporated into vehicle designs to support a seat belt reminder system and the associated cost, and therefore at this time cannot determine that such a requirement would be practicable. Given the safety problem associated with a lack of seat belt use in light vehicles, and the availability and strength of data for systems in light vehicles, delaying this rule to obtain information for heavy vehicles would not be prudent. Instead, we are finalizing this rule to cover light vehicles and achieve those safety benefits quickly. In the future, as more data regarding

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<sup>131</sup> 88 FR 61674, 61691 (Sept. 7, 2023).

<sup>132</sup> 49 CFR 571.208, S14.

heavy vehicles is available, we may choose to extend these requirements. However, we are not doing so in this final rule.

Additionally, NHTSA is finalizing this rule without a requirement for front center seats. As we explained in the NPRM, a system for the front center seat without occupant detection would provide limited benefit because it would be only a visible and not an audible warning, the low occupancy of the front center seat, and the limited number of vehicles in the fleet with a front center seat. In addition, we estimated that requiring a system with occupant detection for the front center seats would not be cost effective.<sup>133</sup> This is discussed further in Section VIII.B.3 as well as in the docketed FRIA. While EVs present fewer technical barriers to having a front center seat, we do not have data suggesting that manufacturers of EVs are incorporating front center seats at higher rates, or that if they did so, the requirement would become cost effective.

Finally, NHTSA is correcting the regulatory text for trucks, MPVs, and buses to address the potential for ADS-equipped vehicles that may have one or no outboard seats in the front row. We discuss other considerations related to ADS vehicles in Section VI.C.7.

## **2. Driver's seat belt warning for light buses**

In the NPRM we proposed to require buses with a GVWR greater than 3,855 kg (8,500 lb) and less than or equal to 4,536 kg (10,000 lb), or with a GVWR less than or equal to 3,855 kg (8,500 lb) and an unloaded weight greater than 2,495 kg (5,500 lb), to be equipped with a driver seat belt warning. This requirement would close a loophole in FMVSS No. 208.<sup>134</sup>

### Comments

Consumer Reports supported NHTSA's efforts to close this regulatory gap.

### Agency Response

NHTSA is finalizing this provision as proposed without change.

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<sup>133</sup> Due to lack of data, NHTSA was unable to establish seat belt use rates for front center seat passengers under the baseline. The analysis therefore used the use rates for front outboard passengers.

<sup>134</sup> In the NPRM, NHTSA mistakenly referred to these vehicles as "medium-sized buses." This was incorrect. "Medium-sized buses" refers to buses with GVWRs between 10,000 lb and 26,000 lb.

### **3. Visual and audible warning duration and activation**

In the NPRM, we proposed two separate audio-visual warnings for the driver and front outboard passenger seats. First, we proposed an audio-visual “start-of-trip” warning that must activate when the ignition switch is placed in the “on” or “start” position if the seat is occupied and the seat belt is not in use. This warning would be required to continue until the seat belt that triggered the warning is in use. Second, we proposed an audio-visual change-of-status warning that would be required to activate when the ignition switch is in the “on” or “start” position, the vehicle is in forward or reverse drive mode, and the status of the seat belt changes from in use to not in use. We also proposed that if the change-of-status occurs and a front door on the same side of the vehicle as the belt triggering the warning is open, the system can consider that the start of a new trip. The warning would be required to continue until the seat belt that triggered the warning is in use. We also proposed that the audio-visual warning would otherwise not be permitted to activate.

ECE R16 requires a first-level visual warning and a second level audio-visual warning. The first level visual warning is a start-of-trip warning that must activate for at least 30 seconds a front seat belt is not fastened and the ignition is activated. The second-level audio-visual warning must activate when a seat belt at an occupied seat is or becomes unfastened when the vehicle is in “normal operation” (defined as forward motion at a speed greater than 10 km/h) and specific threshold criteria are met (distance traveled, speed, time). The second-level warning must remain activated for at least 30 seconds, unless the safety belt is fastened, the seat is no longer occupied, or the vehicle is no longer in “normal operation.”

The Euro NCAP specifications are largely similar to those in ECE R16, with some differences. For example, Euro NCAP requires a longer-duration “Loud and Clear” audible warning (90 seconds) when an additional speed, time or distance threshold is met. The audio-visual signal must also immediately deploy if a change of status to unbuckled occurs at speeds over 25 km/h (15.5 mph). When the change of status occurs below 25 km/h and the doors are

opened, the system may consider this a “new journey.” To prevent unnecessary signals, both ECE R16 and Euro NCAP require that the system be capable of detecting whether the front passenger seat is occupied.

The IIHS ratings protocol for the initial signal specifies that if a seat belt at an occupied outboard front-row seating position is unfastened at ignition and the vehicle achieves continuous forward motion (at least 10 km/h (6.2 mph)), the audible signal must begin within 30 seconds when the vehicle speed remains between 10 and 40 km/h (6.2 and 24.9 mph) and within 2 seconds once the vehicle speed exceeds 40 km/h (24.9 mph), if not already active. For the change-of-status signal, IIHS specifies the following: If a fastened seat belt at an occupied outboard front-row seating position is unfastened when the vehicle’s forward motion is between 10 and 40 km/h (6.2 and 24.9 mph), then the primary audible signal must begin within 30 seconds of continuous forward motion; if a seat belt at an occupied outboard front-row seating position is unfastened when the vehicle’s forward motion exceeds 40 km/h (24.9 mph), then the primary audible signal must begin within 2 seconds if it has not already begun.

In the NPRM, NHTSA proposed to require that the audio-visual reminder last indefinitely until the belts are fastened (or refastened, in the case of a change-of-status scenario) at any occupied front outboard seating position. We proposed that this requirement be both upon start-up as well as in a change-of-status scenario. We based this proposal on five reasons that supported our belief that the proposal would be practicable, objective, and meet the need for motor vehicle safety. First, the existing requirements are significantly exceeded by the warnings provided in current vehicles. Second, we tentatively found (in agreement with IIHS) that the current audible signal duration upper limit of eight seconds is ineffective for increasing seat belt use. Third, we tentatively believed that contemporary consumers would accept a longer warning. Fourth, the technology necessary to implement such an enhanced warning is already standard equipment on almost all light vehicles. Fifth, a longer duration would be consistent with seat belt warning durations required or encouraged in other markets and ratings programs.

We also sought comment on other duration alternatives, including those specified in or by ECE R16, Euro NCAP, and the IIHS. ECE R16 requires a 30 second visual warning when the front seat belts are not fastened and the ignition is activated as well as an audio-visual warning that must activate for at least 30 seconds if the seat belt remains unfastened and specific onset criteria are met (e.g., distance traveled, speed, etc.). The Euro NCAP assessment protocol requires a visual signal that remains active until the seat belt is fastened, and a two-stage audible signal; the initial audible signal must not exceed 30 seconds and the final audible signal must be at least 90 seconds. Under the IIHS ratings protocol, the primary audible reminder signal for the front outboard seats must be at least 90 seconds in total duration to obtain an “acceptable” or “good” rating.

## **Comments**

### Duration

NSC, Consumer Reports, and Ms. Freeman supported the proposed indefinite warning. NSC and GM cited IIHS studies estimating that audible reminders lasting at least 90 seconds were significantly more effective for increasing seat belt use than an intermittent audible reminder and could save up to 1,489 lives annually. NSC also noted IIHS research that suggests that indefinite and 100 second constant reminders increased seat belt use by 30-34 percent over an intermittent reminder. Consumer Reports agreed with updating the requirements to reflect that the marketplace now accepts more substantial audible warnings.

Auto Innovators, Mercedes, Honda, NADA, GM, Tesla, Nissan, and Rivian Automotive (Rivian) opposed the proposed indefinite reminder. Commenters cited consumer acceptance concerns, and some, such as Mercedes, Ford, and Auto Innovators, expressed concern that vehicle owners might seek to circumvent use of the system in various ways. Auto Innovators also commented that requiring a persistent audible warning may distract the driver from the driving task and other relevant safety warnings and may also result in desensitization. Honda

noted that these concerns may lead to consumer backlash if the triggering conditions fail to accurately target risky situations when trips commence or when trips are actively occurring.

Auto Innovators commented that the proposal is inconsistent with the agency's assertions with respect to the rear seat where a 60-second visual warning would be effective. They argued that 60 seconds is sufficient to capture the driver's attention and that a longer warning would have the potential to become distracting or a nuisance.

Commenters suggested a variety of alternative warning durations. Auto Innovators, Mercedes, NADA, and Nissan encouraged NHTSA to align the final requirement with the ECE R16 requirement of 30 seconds.

Honda and General Motors both recommended adopting a 90-second continuous audio-visual warning because it would be the most effective and is sufficiently persistent to ensure that occupants buckle up. Honda also encouraged the agency to consider whether adopting a warning that is continuously active (i.e., 100 percent duty cycle) for a definite duration of 90 seconds would be as effective as the proposal to require an indefinite warning with a minimum duty cycle of 20 percent. Honda comments that it believes that a continuous 90-second chime is sufficiently persistent and might offer greater effectiveness compared to an indefinite warning that delivers only a 6-second chime followed by a 24-second pause between chimes. GM cited the IIHS research mentioned above and an internal research study with the Virginia Tech Transportation Institute that they stated showed that even a seat belt reminder chime lasting only approximately 34 seconds could result in all vehicle occupants in the study buckling their seat belts.

Tesla and Rivian suggested maintaining the current 4-second regulatory duration. Tesla noted that longer duration warnings may increase the risk of distraction if a sensor malfunctions as well as lead to defeat attempts. Rivian commented that, based on the proposed triggers, the proposed continuous audible warning would sound in EVs even if the occupant does not intend to initiate a trip but rather just sits in the vehicle. It explained that depressing the brake at ignition places the vehicle in "Go" power mode and provides access to the vehicle's full feature

set. As a result, a driver occupying the vehicle and depressing the brake, even without shifting the vehicle into Drive mode, would initiate the continuous chime. Rivian suggested that the current requirement resolves this concern, or alternatively, NHTSA could allow a manual reset or discontinue feature.

#### Start-up Warning Trigger

NADA, Nissan, Auto Innovators, Ford, Mercedes, Rivian, Honda, and HATCI specifically disagreed with the proposed ignition trigger for the indefinite warning and argued that it would result in consumer annoyance.

Some commenters, such as Auto Innovators, HATCI, and NADA, suggested that the agency should more closely align with the trigger requirements of ECE R16, which requires a first level visual warning on start-up but does not require an audible alert to be provided until the vehicle travels 500 m, the vehicle speed exceeds 25 km/h (15.5 mph), or the duration time (engine running, propulsion system activated, etc.) is more than 60 seconds (second level warning). Nissan, Ford, and Honda urged NHTSA to contemplate harmonization with Euro NCAP and ECE R16 by including a minimum speed criterion for the trigger.

Mercedes made a similar comment and argued that harmonization would allow for new seat belt reminder technology/designs to be implemented faster in the U.S. market. It also commented that it would support implementing the approach taken in IIHS's protocol, which requires an audible warning to begin after driving for 30 seconds while exceeding 10 km/h (6.2 mph) or within 2 seconds while exceeding 40 km/h (24.9 mph). Rivian also suggested use of the 10 km/h (6.2 mph) IIHS threshold for the indefinite audible alert because it largely mitigates low speed crash concerns. Rivian also noted that this requirement would resolve concerns with activating the reminder during activation of Auto Hold, which applies the brakes when the vehicle is stopped even though the brake pedal is released. Ford supported using a visual warning when the vehicle is stationary because it offers the best balance of providing an

important reminder before the start of a trip without the potential annoyance of a persistent audio warning, especially in use cases where an audio warning is not warranted.

Several commenters, including Nissan, Ford, Auto Innovators, and Honda, had concerns regarding the proposed triggering conditions when it comes to consumer acceptance. Honda commented that the start-of-trip audio-visual warning should be triggered by vehicle motion (or, alternatively, by the vehicle being shifted into drive or reverse), not by the vehicle's ignition being turned on. Honda referred to consumer research suggesting desensitization regarding the intended purpose of the existing start-up alarm, which it argued might worsen under the proposed approach. Honda commented that most individuals do not comprehend why their car chimes at start-up and that consumers also often incorrectly identify this chime as being merely a normal start-up sound. Honda argued that an alarm should sound only when genuine need for the alarm exists.

Honda also requested a clarification, if NHTSA were to retain the status of the ignition switch as a trigger. It pointed out that as proposed, the start-of-trip warning “must activate when the ignition switch is *placed* in the ‘on’ or ‘start’ position” (emphasis Honda’s). Relatedly, the proposed trigger for the change-of-status warning was tied to the vehicle being in forward or reverse gear. Honda pointed to a scenario where the driver buckles after turning on the ignition, and then unbuckles while the vehicle is still in park. In such a case, a warning would not be required (either start-of-trip or change-of-status). Accordingly, Honda suggested modifying the logic of the start-of-trip and/or change-of-status warning to require a warning in this situation.

A number of commenters, such as Ford, HATCI, and Mercedes, noted specific consumer acceptance concerns with an ignition trigger in circumstances where a vehicle has been started but a trip has not begun or is not going to occur or when a vehicle is going to be travelling at low speeds. Commenters described situations including: when idling, waiting for passenger(s), warming up or cooling down a vehicle prior to a trip (Honda), waiting out inclement weather inside a vehicle, sitting in a stationary vehicle listening to audio (Honda), and, in the case of

EVs, keeping the vehicle “ignition” on for extended periods while charging to allow use of air conditioning (Mercedes and Honda).

Honda also commented that the proposed trigger is excessively stringent to meet the safety need and asked that the agency reevaluate the trigger mechanism to ensure it aligns with safe consumer expectations and behavior. Auto Innovators commented similarly, noting that the proposed approach does not meet the need for safety. Auto Innovators noted customer complaints regarding overly aggressive start-of-trip warnings that begin on start-up, before the driver even has the opportunity to put the belt on. Honda argued that crash data illustrate that crashes at sufficiently low speeds are not likely to lead to injury, and pointed to data indicating that occupants are highly unlikely to sustain injuries in crashes occurring below 10 mph. Honda also argued that speeds below 15 mph are typically not associated with regular roadway driving. The lowest posted speed limits on residential or urban roadways in the U.S. are typically set at 25 mph. Speed limits of 15 mph are more common in non-roadway settings like residential neighborhoods or parking lots.

Some commenters suggested other alternatives beyond incorporation of a speed-based trigger. For example, HATCI and Honda suggested a trigger in which the audible warning begins when the transmission is placed into a forward or reverse gear. HATCI commented that this trigger would resolve some concerns with a stationary vehicle pre-trip or during pick-up and drop-off and for EVs. Auto Innovators posited a short visual warning as an alternative to an ECE R16 harmonization. It noted that this approach would be consistent with the IIHS requirements for front-row seating positions, which also predicate second level audible alerts based on forward motion of the vehicle. Additionally, Auto Innovators argued that for the front outboard passenger seat, the triggering conditions should provide for a delay before a visual warning is required. Auto Innovators argued that this delay would be consistent with the proposal to allow for a similar delay for rear row occupants. It expected that this delay would address challenges in detecting seat occupancy instantaneously upon ignition.

## Change-of-Status Warning Trigger

With regard to the change-of-status warning, commenters generally supported a requirement but several, including Mercedes, NADA, Honda, and Tesla, commented that the trigger for the change-of-status warning should include a minimum vehicle speed. Mercedes and NADA recommended NHTSA harmonize with the ECE R16 on this issue and require only a visual warning if the vehicle is stopped or travelling at slow speeds and incorporate an audio warning if the vehicle is travelling at speeds of 25 km/h (15.5 mph) or greater. Nissan emphasized that when the trigger for audio warnings is solely based on gear selection, and these warnings are activated even when the vehicle is stationary, it has the potential to be irritating for the occupants, especially in situations such as being stuck in heavy traffic or waiting in drop-off lines. Honda commented that using vehicle speed would be more aligned with safety needs, and that triggering the warning any time the vehicle is in the drive mode would result in unnecessary alarms for individuals who are otherwise consistent belt users. Honda commented that this trigger would reduce acceptance of the system among regular belt users and desensitize consumers to the alarm. Honda also suggested adding seat occupancy as one of the activation criteria for the change-of-status warning to address use cases where an occupant buckles a seat belt for another seat that is unoccupied, and then unbuckles it.

Nissan and HATCI emphasized consumer acceptance concerns with the proposed change of-status warning, in particular regarding drop-off. HATCI noted that the ECE R16 triggers are particularly useful for addressing these scenarios. It explained that in these drop-off scenarios, the proposed audible alert would sound until the passenger opens the door, which could be considered a nuisance to the occupants. Ford also noted that its vehicles tend to experience frequent ingress/egress scenarios (e.g., work use of farmers, ranchers or construction workers) where a persistent warning is not warranted.

Honda suggested that if the agency retains the drive mode trigger for the change-of-status warning, an alternative could be to use a single chime when the vehicle speed is below a certain

threshold at the time of unbuckling that becomes a persistent reminder of indefinite duration once the vehicle resumes motion (if the door remains closed). Honda argued that if NHTSA believes that a notification is needed, the single-chime approach would adequately notify the occupants in a non-intrusive manner.

Mr. Gaal suggested that once a driver or front outboard seat passenger has unbuckled their seat belt during a trip, a visual change-of-status warning should immediately appear along with a singular audible beep, followed by a two-minute gap allowed before the indefinite audible component of the change-of-status warning occurs again.

In the NPRM, the agency sought comment on the possibility of allowing deactivation of the audio-visual system and the situations under which it would be warranted. While comments on this topic are discussed more broadly in Section VI.C.6, we note here that a few commenters, such as Rivian, suggested a manual reset or discontinue feature as an alternative to a speed-based trigger. Honda, however, commented that if deactivation requires a complicated procedure, it is impractical to deactivate nuisance warnings for short trips and therefore this approach does not effectively mitigate driver annoyance, especially in comparison to alternative triggers, like vehicle motion. Honda noted that the use of a motion-based trigger would eliminate the need for deactivation.

Tesla requested clarification on the definition of “during the trip.” Tesla also asked how the front change-of-status warning is envisioned to be applied to vehicles in automated mode or full automation.

Auto Innovators commented that NHTSA proposed unnecessary restrictions on when an audio-visual warning for a front outboard seat belt warning system is permitted to activate and requested that they be removed. It argued that there may be other circumstances, including those currently unforeseen by the agency, where a manufacturer may seek to provide a similar audio-visual warning. It also stated that it is unclear whether these restrictions prevent standardization of the audible alert used for both front and rear rows.

AVIA observed, with regard to vehicles with automated driving systems, that the NPRM proposed that the front outboard seats be allowed to suppress and reset the change-of-status warning only when the front door being opened is on the same side of the vehicle as the seat belt triggering the warning. In contrast, the NPRM proposed that the rear seat belt warning system may suppress and reset the change-of-status warning when any rear door is opened. AVIA commented that while this distinction makes sense for a conventional vehicle, some vehicles with automated driving systems may have interior configurations that allow for a front outboard occupant to exit through a door that is not adjacent to their seat. Further, AVIA indicated that autonomous ride hailing manufacturers or operators may implement safety measures that only permit the door(s) on a particular side to be opened to encourage safer egress, even though the door(s) may not be adjacent to the occupant's seat. AVIA noted that this scenario could lead to a seat belt change-of-status warning remaining active indefinitely after a front row occupant exits the vehicle. AVIA suggested the language of the change-of-status warnings (both front and rear) be updated to allow the change-of-status warning to be reset when any door designed to provide egress for the seat is opened.

### **Agency Response**

After considering the comments, NHTSA has decided to modify the proposed front seat belt warning requirements. The final rule requires a visual warning whenever a driver or front outboard occupant is unbelted, and a two-phase audible warning.<sup>135</sup>

The first-phase audible warning is required to activate whenever the ignition switch is placed in the "on" or "start" position (or upon manual activation of the propulsion system, but prior to the vehicle being placed in "possible active driving mode" as defined by FMVSS No. 305), the seat is occupied, and the seat belt is not in use. The first-phase audible warning must

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<sup>135</sup> The final rule also applies to any inboard designated seating position for which a seat belt warning is required in S4.1.5.6 (which concerns inboard designated seating positions in passenger cars without manually operated driving controls).

continue for 30 seconds, until the seat belt that triggered the warning is in use, until the seat is no longer occupied, or until the second-phase warning activates, whichever comes first.

The second-phase audible warning must activate and remain active when the vehicle speed is equal to or greater than 10 km/h (6.2 mph), the seat is occupied, and the seat belt is not in use.

Under this approach, there is a start-of-trip audio-visual warning, with the visual warning lasting until the driver and any front outboard passenger have fastened their belts, and the audible component lasting at least 30 seconds (regardless of vehicle speed) and remaining activated whenever the vehicle speed is 10 km/h or more. Thus, if the vehicle is on but not traveling at least 10 km/h (6.2 mph), the audible warning would end after 30 seconds, but would either continue or reactivate should the vehicle speed reach 10 km/h or more. Similarly, the final rule requires an audio-visual change-of-status warning, with the visual warning required to activate and remain activated as long as the occupant remains unbuckled, and the audible component required to activate and remain activated whenever the vehicle is traveling at least 10 km/h.

We are making these accommodations to reduce the potential that frequent belt users will interact with the audible warning. Additionally, as explained later in Section VI.C.5 and in the NPRM, we are specifying a level of audible characteristics, i.e., 30 second warning cycle, 0.5 Hz chime frequency, and a 20 percent duty cycle, which we believe will allow manufacturers to optimize for acceptability while maintaining effectiveness.

This brief summary only gives a high-level overview of the requirements; the final rule contains additional specifications and nuances. These, as well as a response to the comments, are covered in detail below. First, we discuss the audible warning; then we discuss the visual warning.

#### Audible warning duration

NHTSA has chosen to finalize the indefinite warning (subject to certain triggers and conditions) because NHTSA has concluded that it strikes an appropriate balance between effectiveness and annoyance and meets the need for safety.

As NHTSA explained in the NPRM and PRIA, and explains in the FRIA, over the years there have been a number of studies of reminder effectiveness by NHTSA and others. The results of these studies have been consistent though somewhat fragmentary. In general, longer warnings are more effective than shorter warnings, and audio-visual warnings are more effective than visual warnings alone. Overall, these studies provide evidence that the relative annoyance (*e.g.*, longer duration, more frequent cycle) of a warning increases the effectiveness. The studies also suggest that annoyance and effectiveness are inversely related to acceptance, although not necessarily in the same way. Therefore, there is the potential to optimize systems so as to increase effectiveness and also enhance acceptance. However, NHTSA's research also found that the evidence to date was not sufficient to clearly identify which specific signal characteristics were optimal.

The proposal explained that in developing our estimate of the effectiveness of a front seat belt reminder with an indefinite duration, we used the results of a study conducted by the Insurance Institute for Highway Safety (IIHS) by Kidd et al. (2019).<sup>136</sup> We explained that the study found that, relative to a short intermittent reminder, an audio-visual seat belt warning with a 100-second audible component increased seat belt use by 30 percent, and an audio-visual seat belt warning with an indefinite audible component increased belt use by 34 percent. In the NPRM, we explained that there were several limitations in this study, the main one being that the number of study participants was small, and, consequently, there was limited statistical power when comparing the change in rate of belt use between the different vehicle technology

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<sup>136</sup> "The effects of persistent audible seat belt reminders and a speed-limiting interlock on the seat belt use of drivers who do not always use a seat belt," April 2019, David G. Kidd Insurance Institute for Highway Safety, Jeremiah Singer Westat, Inc.

conditions. We noted that the study further discusses this and other limitations, such as how the demographics of the study sample differs from part-time belt users nationwide.

Another limitation in the study is that the confidence intervals for the reported estimates are large. The 34 percent effectiveness estimate for the indefinite reminder had a 95 percent confidence interval of (12.7, 59.9), and the 30 percent effectiveness estimate for the 100-second reminder had a 95 percent confidence interval of (10.9, 52.4.). Not only are the confidence intervals large, they also substantially overlap.

We also note that the Kidd study further adjusted these effectiveness estimates to account for potential circumvention by study participants (e.g., buckling the seat belt behind the driver's back). Four of the seventeen study participants assigned to the vehicle with the 100 second reminder and three of the sixteen participants assigned to the vehicle with the indefinite reminder circumvented the warning. Accordingly, "due to concern that the rate of seat belt use for participants who circumvented the vehicle technologies could bias the comparisons being made,"<sup>137</sup> the study authors repeated the analysis, except this time excluding those individuals who circumvented the warning. With that adjustment, the indefinite reminder increased seat belt use by 23 percent (95 percent CI [6.5, 42.6]) and the 100 second reminder increased seat belt use by 25 percent (95 percent C I [8.2, 44.3]).<sup>138</sup>

In addition to these limitations in the Kidd study, the estimation of the effectiveness in the regulatory analysis has several other limitations or assumptions. These are discussed in detail in the FRIA. Thus, while the research is clear that longer durations are generally more effective than shorter durations, there is no conclusive evidence regarding what duration will maximize effectiveness (recognizing, of course, that duration is not the only warning

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<sup>137</sup> *Id.* at pg. 16.

<sup>138</sup> The study does not report how often these excluded participants circumvented the warning. Accordingly, this exclusion could lead the effectiveness estimate to be lower than it actually was. And to the extent that the rate of circumvention for the excluded BMW and Subaru participants differed, that could also affect the relative effectiveness of the indefinite and 100-second warnings.

characteristic and that other attributes, such as duty cycle, also affect effectiveness as well as annoyance).

Nevertheless, the evidence is such that we are able to easily reject some of the specific suggestions from commenters for shorter warning durations. The 4-second and 30-second warnings suggested by some commenters are well below the typical duration for an audible warning in current vehicles. Further, a 4- or 30-second reminder is shorter and less persistent than the intermittent Chevy Cruise reminder<sup>139</sup> included in the Kidd study, compared to which both the 100-second and indefinite audible warnings were significantly more effective. We are similarly unable to agree with General Motors, which referred to internal research showing that an audible warning lasting 34 seconds would be sufficient. (In addition, NHTSA has not seen the underlying research or data.)

The available evidence also does not lead us to conclude with confidence that, as asserted by Honda and General Motors, a 90-second continuous warning would be most effective. As we explained earlier, the Kidd study, while informative, still leaves uncertainty about whether a 90-second or indefinite warning would be most effective. We are also unaware of any study, as suggested by Honda, comparing a 90-second continuous warning to an indefinite 20 percent duty cycle warning. However, a study of indefinite warnings with 100 percent and 20 percent duty cycles found no difference in their relative effectiveness, which suggests that a 90-second continuous warning would not necessarily be more effective than a 20 percent duty cycle indefinite warning.<sup>140</sup> Similarly, we are not aware of – and the commenters did not present – any persuasive evidence that an audible warning lasting greater than 90 seconds and less than indefinite would be at least as effective as an indefinite warning.

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<sup>139</sup> This was an enhanced reminder with three cycles that occurred at ignition, 105 seconds after ignition, and 360 seconds after ignition. Each cycle was 20 seconds in duration.

<sup>140</sup> Kidd, D.G. (2012). Response of part-time belt users to enhanced seat belt reminder systems of different duty cycles and duration. *Transportation Research Part F*, 15, 525–534.

In light of the available evidence, NHTSA has therefore concluded that requiring an audible warning that lasts until all front outboard occupants are belted best and appropriately balances effectiveness and annoyance, and will help to ensure that as many as possible occupants take advantage of one of the most safety-enhancing technologies, the seat belt. As we explained above, there is uncertainty about the most effective duration and the magnitude of the effectiveness. The commenters did not provide any persuasive evidence or data that a shorter audible warning would be at least as effective as an indefinite warning.

At the same time, there is no uncertainty that seat belts save lives, and there would appear to be little uncertainty that, regardless of assumptions and estimates, the monetized net benefits of a long warning would almost certainly be positive, because almost all subject vehicles already provide a seat belt warning for the front outboard seats, and any necessary changes to implement a longer warning (such as re-programming to optimize the warning characteristics) would likely be quite low-cost. Moreover, although an indefinite-duration warning would likely require some re-engineering, audio-visual seat belt warnings are a longstanding and established technology, so there should be no concerns about the technical feasibility of such a warning.

Of course, effectiveness and component cost are not the only considerations in deciding what duration to require. Consumer acceptance is also crucial, and the Safety Act requires NHTSA to consider it. NHTSA is cognizant of – and takes seriously – likely disbenefits from annoyance. Many of the commenters’ criticisms relate to the potential for an indefinite warning being annoying. In the NPRM the agency acknowledged past studies that found a correlation between annoyance and warning effectiveness.<sup>141, 142</sup> Elsewhere in this preamble we discuss the modifications NHTSA has made to the proposal in response to the comments in order to address concerns related to consumer acceptance, such as including a speed threshold for the indefinite

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<sup>141</sup> N. Lerner et al. (2007). Acceptability and Potential Effectiveness of Enhanced Seat Belt Reminder System Features. (Report No. DOT HS 810 848). National Highway Traffic Safety Administration.

<sup>142</sup> Kidd, D.G. (2012). Response of part-time belt users to enhanced seat belt reminder systems of different duty cycles and duration. Transportation Research Part F, 15, 525–534.

audible warning. However, despite the steps the agency is taking to make the audible warning acceptable, it is not unreasonable to expect that there will be some level of annoyance, particularly from hardcore non-belt users, for an effective reminder. Similarly, it would be expected that with annoyance would come some level of distraction. Consequently, we would expect some level of lack of acceptance from hardcore non-users.<sup>143</sup> Additionally, we understand that this lack of acceptance could lead to some level of misuse or attempts to defeat the system for some in this same group. The agency has studied such potential misuse in previous research<sup>144</sup>, and, as noted earlier, some of the Kidd study participants circumvented both the indefinite and 90 second audible warnings.

NHTSA, however, believes that the population of occupants who will not respond to the warning by fastening the belt will be relatively small in number; as noted earlier, about 5.4 percent of occupants never or seldom use a seat belt. Moreover, we note that NHTSA's survey data does suggest that even though "[s]eat belt reminder systems are likely to have little effect on hard-core nonusers who choose not to buckle up"<sup>145</sup>, some individuals who report never using a belt would likely be responsive to a reminder. When asked about their reasons for not using a seat belt, many people who report never using a seat belt give reasons suggestive of some amenability to a reminder (for example, only driving a short distance or forgetting), as opposed to reasons that indicate general opposition to belts (such as e.g., "don't like being told what to do" or "belts sometimes cause injuries").<sup>146</sup> In addition, many of those who never or rarely used

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<sup>143</sup> The Kidd study excluded from participation individuals who reported never using a seat belt from participating in the study. As we explain in Section VIII, Overview of Benefits and Costs and the FRIA, our benefits estimates conservatively assume that an indefinite audible warning will not cause occupants who "never" use a seat belt to begin using a seat belt. This is a change from the PRIA, which assumed that the indefinite reminder would be effective for such occupants. We note that the NPRM incorrectly stated that "for the purposes of our effectiveness (and benefits) analysis, we conservatively assume that the increase in belt use would be due entirely to part-time nonusers" (pg. 61711, n.231).

<sup>144</sup> Mazzae, E. N., Baldwin, G. H. S., & Andrella, A. T. (2018, October). Performance assessment of prototype seat belt misuse detection system. (Report No. DOT HS 812 593). National Highway Traffic Safety Administration. NHTSA has chosen not to implement measures to harden the systems against misuse at this time, for the reasons expressed in the NPRM. However, the agency will monitor this situation and act in the future if need be.

<sup>145</sup> Buckling Up: Technologies to Increase Seat Belt Use. Special Report 278, Committee for the Safety Belt Technology Study, Transportation Research Board of The National Academies (2003), pg. 40.

<sup>146</sup> 2016 MVOSS, pg. 71(Fig. 53).

a belt do not necessarily hold strongly negative beliefs about seat belts or seat belt use. For example, of drivers who never or rarely used a belt, 43 percent do not report disliking seat belts or finding them annoying;<sup>147</sup> about half do not believe that the belt is just as likely to harm them as help them;<sup>148</sup> and only 20 percent report that putting on a seat belt makes them worry.<sup>149</sup> And, when asked whether they would want a belt on in a crash, 63 percent of drivers who never or rarely use a belt strongly or somewhat agreed that they would want to be wearing a belt in a crash.<sup>150</sup> This is consistent with NHTSA's other research, which acknowledges that occupants who sometimes use belts are the primary target for seat belt reminders, but not necessarily the only target.<sup>151</sup> Therefore, while our benefits analysis excludes occupants who never use a seat belt, we would expect at least some of these nonusers to begin using a seat belt. Accordingly, overall we believe that the public will accept the required reminder, and that it will not negatively impact public acceptance of warnings in general.

On the whole, in light of the uncertainty about the duration that will be most beneficial; the unquestioned benefit and effectiveness of seat belts; the relatively small proportion of users who will choose not to use the belt and will either experience annoyance from the reminder or choose to circumvent it; and recognizing that in MAP-21 Congress removed the statutory limitation on the required duration for an audible seat belt warning, NHTSA is choosing to require an audible warning that lasts until the front outboard occupants are belted (again, subject to additional triggering criteria, such as the 10 km/h speed threshold).

The other points raised by the commenters also do not persuade us to require a shorter warning. Commenters opposed to the indefinite warning also argued that it would be desensitizing. This conclusion does not seem to be consistent with the IIHS study where the

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<sup>147</sup> 2016 MVOSS, pg. 79 (Fig. 55).

<sup>148</sup> 2016 MVOSS, pg. 89 (Fig. 64).

<sup>149</sup> 2016 MVOSS, pg. 90 (Fig. 65).

<sup>150</sup> 2016 MVOSS, pg. 88 (Fig. 63).

<sup>151</sup> For example, as we stated in the NPRM (pg. 61705), the 2004 Transportation Research Board Report notes that part-time belt users are the primary (not sole) target group for seat belt warnings.

findings indicate that a long duration warning may have a greater impact on seat belt use,<sup>152</sup> and the comments by Honda and GM that warnings lasting 90 or 34 seconds (respectively) may be more effective than an indefinite warning. As to the comments that a seat belt warning will cause other warnings to not be recognized, we address this in the Section VI.C.4. As to the comment by Auto Innovators that an indefinite warning in the front would be inconsistent with the agency's conclusion to limit the rear seat warning to 60 seconds because a longer warning could be distracting, the commenter did not provide the full context of the rationale for the agency's conclusion. Our conclusion was partially based on the fact that the rear seat warning system does not require occupant detection. Because of this, the rear seat belt warnings (particularly what the NPRM referred to as positive-only or full-status systems, which provide information on belted, as well as unbelted, occupants) function more as a source of information for the driver, rather than as a true "warning" for an unbelted occupant. It was for this reason that we believed that it was not necessary to require a particularly long-lasting warning for the rear. This logic does not apply to the front seats, for which occupant detection is either required or (for a driver's seat) can be assumed. Accordingly, the audio-visual signal functions more as a warning than as a source of information, because it is not activated for a belted occupant.

#### Audible warning activation

The final rule incorporates a two-phased audible warning. The first-phase audible warning is required to activate whenever the ignition switch is placed in the "on" or "start" position (or upon manual activation of the propulsion system, but prior to the vehicle being placed in "possible active driving mode" as defined by FMVSS No. 305)<sup>153</sup>, the seat is occupied, and the seat belt is not in use. The first-phase audible warning must continue for 30 seconds, until the seat belt that triggered the warning is in use, until the seat is no longer occupied, or until

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<sup>152</sup> Kidd, D.G., and Singer, J. (2019, April) The effects of persistent audible seat belt reminders and a speed-limiting interlock on the seat belt use of drivers who do not always use a seat belt. Insurance Institute for Highway Safety, Westat, Inc.

<sup>153</sup> This EV-specific language is discussed in Section VI.C.1.

the second-phase warning activates, whichever comes first. The second-phase audible warning must activate and remain active when the vehicle speed is equal to or greater than 10 km/h (6.2 mph), the seat is occupied, and the seat belt is not in use.

The agency believes that this change in the triggering strategy from that specified in the NPRM will address many of the concerns expressed by the commenters related to potential user annoyance such as when the vehicle occupant is in a stationary vehicle, e.g., interacting with non-driving aspects of the vehicle or waiting for the vehicle's climate control. This change will also ameliorate the concerns related to EVs triggering the indefinite warning while being on, but stationary (Auto Hold applied).

We are rejecting advice from commenters suggesting requiring only a visual warning upon vehicle start. Such a requirement would not even be consistent with the 4–8 second audible warning requirement currently in FMVSS No. 208. The initial 30-second audible warning remains important for the reasons expressed in the NPRM for why we want such a warning to initiate at vehicle start. We believe basing the trigger on the ignition switch is preferable to delaying the warning until the vehicle is placed in gear because the proposed requirement would make it more likely that the occupants fasten their belts before the vehicle is in motion.<sup>154</sup>

The selection of 30 seconds is consistent with the ECE R16 start-up visual warning duration and the rear seat change-of-status audible warning for this final rule. We believe the 30-second audible warning will maintain the agency's goal of an effective warning at the start of a trip, while increasing the level of acceptance from what might be the case if the start-up warning remained indefinitely active. The initial 30-second audible warning will have the same characteristics as the rear seat change-of-status audible warning, i.e., the warning may be continuous or intermittent. If intermittent, inactive periods longer than 3 seconds will not be counted toward the total duration of the warning and no gap longer than 10 seconds is allowed.

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<sup>154</sup> DOT 2009 Seat Belt Study at pg. 65.

These are also characteristics required by the ECE R16 audible warning, except for the 10-second gap limit, which is required by Euro NCAP.

The second-phase audible warning is important to encourage belt use for occupants that would otherwise wait out a finite warning and not buckle their belt. The 30-second start-up warning alone would have very little additional safety benefit, given that nearly all new vehicles already have audible warnings of this length or greater. Additionally, the agency agrees with commenters that a speed-based approach for the indefinite audible warning should address pick-up and drop-off situations that could lead to consumer backlash, particularly for frequent belt users.

The selected speed threshold (10 km/h (6.2 mph)) is aligned with the IIHS rating system and Rivian's recommendation. ECE R16 also uses a 10 km/h (6.2 mph) threshold for its definition of when a vehicle is in normal operation, and 10 km/h (6.2 mph) is within its maximum allowed speed threshold (25 km/h (15.5 mph)). The selected speed threshold is meant to address such scenarios as where the vehicle is parked, driving to a mailbox, on a long driveway, driving in a parking lot/garage, or dropping off passengers, but is not high enough that vehicles will be able to drive on roadways and not get a warning. Once the vehicle is traveling below 10 km/h (6.2 mph), the warning may deactivate. We are not allowing for any delay in the warning after the speed threshold is reached as is allowed by the IIHS rating,<sup>155</sup> as we do not believe such a delay is necessary to achieve our goal of limiting the activation of the audible warning for regular belt users and would be counterproductive (i.e., increase the amount of time at which unbelted occupants do not get a warning).

The agency is not allowing manufacturers the choice to initiate the warning based on a combination of speed, timing, or distance traveled, such as is the case for the second level ECE R16 warning. We believe that vehicle speed is the most relevant parameter and that 10 km/h

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<sup>155</sup> IIHS allows for a 30-second delay at speeds between 10 and 40 km/h (6.2 and 24.9 mph) and a 2-second delay at speeds at and above 40 km/h (24.9 mph).

(6.2 mph) limit is sufficiently low to achieve the agency's safety goals. Analysis of agency field data indicates that a 10 km/h (6.2 mph) delta V frontal crash shows a 28 percent probability of MAIS1 and 1.7 percent MAIS2 injuries and essentially no risk of higher level injury, whereas at 20 km/h (12.4 mph) there is a 39 percent probability of MAIS1 and 4.0 percent MAIS2.<sup>156</sup> Though still low probability, this is a 2.4-fold increase in the risk of MAIS2.<sup>157</sup> Although equating vehicle travel speed to delta V would tend to overestimate occupant injury, the results are directionally correct, and a higher speed threshold (or delay in initiating a particular speed threshold) would tend to increase injury risk.

We acknowledge that the data show that MAIS1 and MAIS2 injuries, which are meaningful safety concerns, occur frequently in collisions with delta V at 10 km/h, and that this final rule appears to depart from the NPRM's stated belief that seat belts provide a safety benefit even at lower speeds, regardless of the direction of motion. We also grant that in rare cases a vehicle traveling at a speed below 10 km/h (6.2 mph) may be struck by another vehicle traveling at a higher speed and that seat belt protection would be beneficial in such cases. However, we believe that the resulting increase in the warning systems' overall level of acceptability (which is an important consideration for both meeting the safety need and practicability), particularly for those that regularly wear seat belts, will outweigh the negative effects from non-activation of the warning system below 10 km/h.

The second phase indefinite audible warning will also serve as a change-of-status warning, except that now that the indefinite audible warning is speed based, there is no need to relate activation to the gear selection or door opening status as was proposed. The fact that the speed threshold is exceeded is a sufficient reason for the audible warning to be active.

With respect to AVIA's comment about modifying the provision for resetting the system when a door is opened for the front seats to address novel seating configurations, NHTSA

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<sup>156</sup> Wang, J.-S. (2022, May). MAIS(05/08) injury probability curves as functions of delta V (Report No. DOT HS 813 219). National Highway Traffic Safety Administration.

<sup>157</sup> At 25 km/h (15.5 mph) there is a 41 percent probability of MAIS1 and 4.3 percent MAIS2.

believes these types of vehicles, specifically vehicles without a driver's seating position where all seats in the front and/or rear rows may be accessed via a common door, are beyond the scope of this rule. The agency did not develop the finalized seat belt warning requirements with these specific vehicles in mind. In any case, AVIA's concern about exposure to the proposed audio-visual change-of-status warning in these vehicles under the scenario it described in its comment is largely addressed by the finalized requirements for the front seat for change-of-status events, which only requires the activation of a visual warning in a drop-off scenario given the speed trigger criteria for the audible component.

### Visual warning

The final rule requires that a visual warning activate and remain active whenever the ignition switch is in the "on" or "start" position (or the propulsion system is activated), the seat is occupied, and the seat belt is not in use. The final rule condenses the proposed "start of trip" and "change-of-status" visual warnings into a single requirement and changes the proposed activation triggers in a few ways.

We agreed with Honda's comment that under the proposed rule, if an occupant unbuckled while the vehicle was in park, no warning would be required to activate, even if the vehicle were subsequently placed in gear and commenced moving. We therefore believe that a "change-of-status" visual warning should not be limited to when the vehicle is in a forward or reverse drive mode. Accordingly, for the visual warning, we removed the activation triggers that referred to the ignition switch being placed in the "on" or "start" position and to the transmission gear position. (We have also made analogous changes to the regulatory text related to EVs. These changes are discussed in Section VI.C.1.) These changes will ensure that a warning is activated whenever the vehicle is on and a driver or front outboard passenger is in the seat and not belted. Because this only applies to the visual warning – and not the audible warning – we do not believe this will lead to issues with consumer acceptance, because a visual warning is not nearly as intrusive as an audible warning. (On the other hand, as we explain in the preceding section,

we have modified the proposed triggers for the audible warning to limit the scenarios in which it will activate to address concerns with consumer acceptance.) Concerns with consumer acceptance are further allayed by the fact that the warning requirement is tied to seat occupancy, so there will not be nuisance alarms for an unfastened belt at an unoccupied seat.

The finalized regulatory text also adopts Honda's suggestion that the proposed change-of-status warning include seat occupancy as one of the triggering conditions. Because the front seats are either equipped with occupant detection or (for the driver's seat) occupancy can be assumed,<sup>158</sup> there is no reason to require a visual warning for an unoccupied seat. This also addresses the misuse case Honda identifies. Including seat occupancy as a trigger also allows us to further simplify the triggering logic for the visual warning by deleting the exception to the proposed change-of-status warning for when a front door on the same side of the vehicle as the seat belt triggering the warning is open. This language is now unnecessary because seat occupancy is one of the triggers for the visual warning—in a scenario where a driver or front outboard passenger unbuckles and disembarks, a visual warning is not required because the seat is no longer occupied, and any reference to a door opening is unnecessary.

We also implemented Auto Innovators' recommendation to delete the proposed restriction that the audio-visual warning is permitted to activate only to comply with the requirements in this rule.

The finalized requirements for the visual warning are also generally consistent with the broad tenor of the comments on the proposed audio-visual warning, which, as we discussed earlier, were primarily concerned with the proposed indefinite audible warning and the proposed triggers for that warning. For example, we agreed with Mercedes and NADA that the change-of-status warning should better harmonize with ECE R16 and now require only a visual warning if the vehicle is stationary or travelling at low speeds. We did disagree with the commenters who suggested a shorter visual warning (at or below the 30 seconds required in ECE R16) because,

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<sup>158</sup> See Section VI.B.5.

among other things, we believe both that a longer visual warning will be more effective than a shorter warning and also that a long visual warning does not pose the same consumer acceptance concerns as does a long audible warning.

#### **4. Visibility of visual warning for front outboard passenger seat belt**

We proposed requiring that if there is a driver's designated seating position, the visual warning for the driver's seat belt must be visible from the driver's seat and the visual warning for the front outboard passenger seat belt must be visible from both the driver's seat and the front outboard passenger seat. We did not propose to specify more detailed criteria for location or visibility of the telltale. (For discussion of vehicles with no driver's designated seating position, such as ADS-equipped vehicles without any manual driving controls, see Section VI.C.7.) We proposed requiring that the visual warning for the front outboard passenger seat belt be visible to both the driver and the front outboard passenger because NHTSA's study on front seat belt warning systems suggests that visual warnings for front outboard passenger seat belts are more effective when they are visible to the passenger as well as the driver.<sup>159</sup> We tentatively believed it would be practicable for manufacturers to comply with this requirement; for example, the warning could be located in the center console display (which might be a salient place to present visual displays, both because of its location and because it may allow larger size icons or text).<sup>160</sup> Some manufacturers already provide a passenger seat belt warning in close proximity to the passenger air bag status indicator, which is visible to both the driver and front passenger.

We did not propose more detailed criteria for the location or visibility of the telltale as, for example, are provided in FMVSS No. 208 S19.2.2 for the passenger air bag telltale. A visual warning for the driver's seat belt has been required since the early 1970s and we are not aware of any issues with the visibility of that telltale, so we tentatively believed more detailed requirements to be unnecessary.

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<sup>159</sup> See DOT 2009 Seat Belt Study at pgs. 67-68.

<sup>160</sup> *Id.*

IIHS's ratings system specifies for the front outboard passenger seat that a visual signal must be displayed in the instrument panel, overhead panel, or center console, indicating an unfastened belt.

ECE R16 specifies only that the visual warning must be readily visible and recognizable in the daylight and at nighttime by the driver and distinguishable from other alerts.<sup>161</sup> Euro NCAP recommends that the visual signal must be clearly visible to the driver, without the need for the head to be moved from the normal driving position (such as in the instrument panel, head-up display, rear-view mirror, or center console).<sup>162</sup>

### Comments

A number of commenters, such as Auto Innovators, Mercedes, Ford, Nissan, HATCI, NADA, Toyota, and Honda, commented that the rule should require only that the front outboard passenger seat visual warning be visible to the driver. Mercedes noted that the agency did not provide any insight on how to achieve the passenger visibility requirement. Ford commented that a visual warning for front row passenger belt use that is visible to both driver and passenger may be unnecessary, overly complex to implement, and delay implementation. Auto Innovators and Mercedes commented that requiring passenger visibility of the visual reminder would be inconsistent with ECE R16 and Euro NCAP.

Auto Innovators, Nissan, HATCI, Mercedes, Ford, and NADA all commented that the driver has primary responsibility to notify and ensure occupants fasten their seat belts and that the occupant in the front passenger seat will be alerted by the audible warning if the seat belt is not fastened. Honda noted that the primary mechanism for encouraging seat belt use is the audible alarm, and that the visual indicator primarily serves to explain the cause of the alarm.

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<sup>161</sup> Section 8.4.2.1.1.

<sup>162</sup> Section 3.4.1.1. We note that the NPRM incorrectly referenced a prior version of the Euro NCAP protocols which specified visibility to the passenger. NHTSA appreciates Auto Innovators' comment noting that the referenced material was removed in v8.0 of the assessment protocol.

Honda stated that because the driver can hear the audible alarm and interpret the visual alarm, the passenger telltale becomes a matter of convenience.

Honda also commented that the proposed outboard passenger visibility requirements have questionable merit because the DOT 2009 Seat Belt Study, the research upon which much of the expected benefits of the requirement was based, has limitations. Honda noted aspects of the study and the design of the warnings used in the study, such as unusually large and aggressive indicators, which may limit the effectiveness conclusions that can be drawn from the study. Honda commented the study noted that in actual tests the most effective seat belt warning modality was the audible chime that repeated at a frequent interval, which suggested that the placement of the passenger telltale being visible to the passenger is of questionable efficacy.

Auto Innovators, HATCI, Nissan, Mercedes, Ford, NADA, and Honda all commented that requiring that a warning also be visible to the front outboard passenger would require significant interior redesign of displays. Auto Innovators commented that this requirement would likely require either all visual warnings be in a central position (outside of the instrument cluster) so that they are visible to both the driver and right front passenger, or a second visual warning located in a central position to solely communicate the status of the passenger seat belt. Several of the commenters stated that this requirement would necessitate additional lead time.

Toyota, Auto Innovators, and Honda commented that requiring front outboard passenger visibility would be unnecessary and inconsistent with the agency's proposed approach to the rear seat reminder requirements. They emphasized that the agency did not propose a requirement that visual warnings/indicators be visible to rear seat occupants, and that the agency is being inconsistent by proposing a requirement that the front seat visual reminder must be visible to the passenger, while the rear seat visual reminder only must be visible to the driver. These commenters expressed that the visual alert visible to the driver combined with the required audible alert would be sufficient to ensure that occupants in both the rear and the front passenger seats know their belt status.

Auto Innovators and Honda commented that while FMVSS No. 208 specifies requirements for a telltale to indicate the status of the passenger air bag for those seated in the front outboard passenger seat, this does not create a precedent, or support the need for, a similar front outboard passenger belt reminder telltale. Auto Innovators and Honda argued that with respect to seat belt use, the passenger can verify, based on a visual or manual check, whether their seat belt is buckled. This is not the case for air bag systems.

#### Agency Response

The final rule requires that the front outboard passenger seat belt visual warning be visible only to the driver, with two exceptions related to ADS-equipped vehicles. In response to comments, we have decided not to require that the visual warning for the front outboard passenger seat belt be visible from the front outboard passenger seat. Retaining this requirement for the driver is critical for generating a communication dynamic between the driver and passenger, which is discussed further in this section and in Section VI.C.3 below. Manufacturers retain the flexibility to incorporate a visual signal that is visible to both the driver and front outboard passenger (or an additional signal visible to the passenger), and many already do. The final rule harmonizes with ECE R16 and Euro NCAP. It also matches the requirements for the visibility of alerts for the front passenger and rear seat belt reminders.

Although there is limited information available on the safety benefits and compliance costs of a passenger visibility requirement, what information we have suggests that both would likely be low, at least in the context of this final rule. In this instance we feel that the relatively minimal benefits do not justify the costs that could be realized.

With respect to benefits, because this final rule requires an audible alert, it (along with the visual warning provided to the driver) can serve the role provided by a visual warning to the passenger. The primary study we used to support this proposal does suggest that visual alerts may be more effective when the passenger sees them. It also notes that the visual alert may present an opportunity for communication between driver and passenger to prompt passenger

belt usage.<sup>163</sup> However, given that this rule requires an audible warning which can initiate this communication, the visual alert for the passenger would likely serve a supporting role, limiting its added benefit.<sup>164</sup>

It is also worth noting that under the requirements of this final rule there are only rare scenarios in which a visual alert is the only alert required to be active. We are requiring an indefinite audible alert if the vehicle is traveling at or over 10 km/h (6.2 mph) and a 30 second minimum start-of-trip audible warning if there is an unbelted front passenger. Therefore, the only situation in which the visual alert is the only active warning is when the vehicle is traveling under 10 km/h (6.2 mph) (or stopped) and the start-of-trip warning has elapsed. These situations are limited, and field data shows only small risks of injuries with severity above MAIS1 and almost no risk of injuries with severity above MAIS2 in frontal crashes at these speeds. Therefore, while research suggests the proposed visibility requirement might generate some safety benefits, given the structure of this final rule those additional benefits are hard to determine and may only be minor.<sup>165</sup>

Regarding costs, we disagree with commenters about the size and scope of the costs associated with incorporating a signal visible to the passenger. However, we understand that, depending on how manufacturers decided to implement the proposed requirement, there could be more than de minimis costs for certain vehicles and these costs may outweigh the benefits of this

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<sup>163</sup> DOT 2009 Seat Belt Study at pg. 66.

<sup>164</sup> We also note that this research noted the efficacy of audible alerts, but suggested not using an alert audible to drivers for the passenger's belt due to consumer acceptance concerns. However, as discussed in the NPRM and elsewhere in this final rule, research shows that consumers are now far more accepting of audible alerts. Therefore, the audible alert required by this final rule may serve to more effectively perform the communication role that this research suggested the visual alert to the passenger did. See DOT 2009 Seat Belt Study at pgs. 67-68.

<sup>165</sup> Other research referenced in the NPRM that suggested a passenger visibility requirement might increase effectiveness was preliminary on this point and precluded firm conclusions. For example, some research noted that it is not evident to what extent improved effectiveness is due to direct message effects on the passenger and to what extent it may be due to more complex social dynamics between the driver and the passenger. We also cited studies that suggest that center console display locations might be more effective than dashboard display locations but were not conclusive due to other differentiating factors in the visual designs, such as character size, display size, and color, which may be covaried. See N. Lerner et al. (2007). Acceptability and Potential Effectiveness of Enhanced Seat Belt Reminder System Features. (Report No. DOT HS 810 848). National Highway Traffic Safety Administration; DOT 2009 Seat Belt Study.

requirement.<sup>166</sup> Given this potential imbalance and our belief that most if not all of the desired benefits will be achieved by the indefinite audible warning, we are only finalizing that the front passenger's visual seat belt warning be visible to the driver.

This approach is consistent with the approach we took for the rear seat belt warning. In the NPRM, we did not propose that the rear seat visual warning be visible to the rear passenger because we did not believe that the benefits would outweigh the costs (viewed qualitatively). On the other hand, the NPRM did propose this for the front outboard passenger seat belt warning, because in that case we did expect the benefits to be greater than the costs. We now agree with the commenters, however, that because of the relatively low benefits; potentially non-de minimis costs for at least some vehicles; and the interplay between the visual and audible signals, that it is appropriate not to require that the visual warning for the front outboard passenger be visible to that passenger.

We also wish to clarify the purpose of our reference, in the NPRM, to the advanced air bag visual signal because Honda's and Auto Innovators' comments suggest it may have caused some confusion. In the context of visibility, we referenced the advanced air bag telltale for the passenger only to indicate that it provides a location some manufacturers already use for a visual signal that is visible to the passenger. We did not intend to make any statements about the purpose of these signals within the structure of the FMVSS, their relative safety benefits, or the meanings they convey.

Finally, we believe it is important to address two potential future situations where only requiring the visual warning to be visible to the driver would not be sufficient. The first is for dual-mode ADS-equipped vehicles that still have a driver's seat and driving controls.<sup>167</sup> For such vehicles the driver's seat could remain unoccupied throughout the vehicle's operation. In

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<sup>166</sup> Given that many manufacturers currently provide visual alerts in the center console or in proximity to the passenger advanced air bag signal, we maintain our confidence that in many cases the cost would be limited and encourage manufacturers to voluntarily provide visual warnings to the passenger.

<sup>167</sup> An ADS-Equipped Dual-Mode Vehicle is defined as "[a] type of ADS-equipped vehicle designed for both driverless operation and operation by a conventional driver for complete trips." SAE J3016\_201806 Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles.

this situation, limiting the visibility of the front seat warnings to the driver's seat would result in the passenger not seeing the warning. The second is for ADS-equipped vehicles without a driver's designated seating position. For the former, the final rule requires that the visual warning for the front outboard passenger seat belt must be visible from the front outboard passenger seat, and for the latter the final rule requires that the visual warning for each outboard designated seating position be visible from each outboard passenger seating position.

### **5. Front seat occupant detection and seat occupancy criteria**

In the NPRM, we proposed a single compliance option that requires a start-of-trip audio-visual warning that lasts until the seat belt at any occupied front outboard seat is fastened. We proposed that the warning system consider the front outboard passenger seating position "occupied" when an occupant or dummy that weighs at least 46.7 kg (103 lb) and is at least 139.7 cm (55 in) tall is seated in the seat, which matches the specification in FMVSS No. 208 for a person who is used as an alternative for the 5th percentile adult female test dummy for compliance testing of advanced air bag systems using static suppression. The NPRM also proposed giving the manufacturers the option to use a human being instead of using test dummies for testing purposes. Requiring occupant detection for front outboard passenger seating is consistent with Euro NCAP and IIHS ratings protocols, and the specification is consistent with Euro NCAP and the ECE R16 test procedures. IIHS does not specify any occupancy criteria for either front outboard seating positions.

However, the NPRM was unclear about the occupancy requirements pertaining to the driver's designated seating position. The proposal included occupancy as a condition to trigger the warning for the driver's seat. The proposed test procedures also specified they applied to "front designated seating positions." Thus, the test procedures would have applied to both front outboard seating positions and therefore may have required NHTSA to place a dummy or a

human being in the driver's seat to establish occupancy for the test. However, we did not propose to define "occupied" for the driver's seat.<sup>168</sup>

Euro NCAP and IIHS allow occupancy for the driver's seat to be assumed. ECE R16 does not require the driver's seat to be occupied in its test procedures for the start-of-trip warning.

For the change-of-status warning for the front outboard passenger seat, NHTSA did not propose that the seat must be occupied when the buckle is unfastened to trigger the alarm. On the other hand, IIHS protocol requires occupancy to trigger the change-of-status warning and ECE R16 allows the warning to be discontinued if the seat which triggered the warning is no longer occupied. This is also true of IIHS's and ECE R16's specification for the driver's seat.

#### Comments

IEE, Honda, and Consumer Reports expressed support for requiring occupant detection for the front outboard passenger seat and for using occupancy as an element of the trigger for the front outboard passenger seat warning. Consumer Reports commented that it agrees with NHTSA's decision to align with Euro NCAP and require an occupant detection system for the front outboard passenger seat. Consumer Reports further explained that occupant detection is already widely deployed in these seats, either as part of an advanced air bag system or as part of a voluntary seat belt warning system, reinforcing the feasibility of equipping vehicles with occupant detection technology. IEE commented that it supports NHTSA's proposal to use the 5th percentile female as occupant detection criteria for the front outboard passenger seat because it aligns with the requirements for the sensors installed in the front passenger seats of vehicles complying with the advanced air bag requirements of FMVSS No. 208 and the same sensors are widely used for the voluntary front passenger seat belt warning systems.

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<sup>168</sup> Occupant detection systems are currently used for front outboard passenger seating positions to comply with the advanced air bag requirements in FMVSS No. 208. However, this is not the case for driver's designated seating positions, which do not have the same considerations.

Honda commented requesting clarification on occupant detection for the driver's seat. Honda explained that the NPRM proposed that the start-of-trip warning for front outboard seats must activate "if the seat is occupied," among other conditions. It commented that while this language is an appropriate condition for the front outboard passenger seat, it is unnecessary for the driver seat. Honda further commented that FMVSS No. 208 does not contemplate an occupant detection system because a driver is assumed to be present in a conventional vehicle. Honda recommended that this language be revised so that occupant detection requirements are not unintentionally prescribed for the driver's seat.

Honda commented that if a speed threshold is not adopted for the change-of-status warning and the proposed transmission trigger is retained, NHTSA should also use occupant detection as a trigger.<sup>169</sup> Honda believes this recommendation would resolve a misuse case in which someone buckles an empty seat and then unbuckles it. Honda expressed concern that under the proposal this type of scenario would require an unending alarm until the seat is rebuckled or the door is opened.

#### Agency Response

NHTSA appreciates IEE's, Honda's, and Consumer Reports' support for requiring occupant detection for the front outboard passenger seat and for using occupant detection as an element of the trigger for the front outboard passenger seat warning. In addition, NHTSA received no comments in opposition to requiring vehicles to have occupant detection capability for front outboard passenger seats or for including front outboard passenger seat occupancy as one of the trigger conditions for the start-of-trip front outboard passenger seat belt warning. Likewise, NHTSA received no comments in opposition to specifying that the warning system consider a front outboard passenger seating position "occupied" when an occupant or dummy

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<sup>169</sup> Specifically, Honda recommended the change-of-status warning should be revised to read as follows: "An audio-visual warning must activate when the ignition switch is in the 'on' or 'start' position, the vehicle is in forward or reverse drive mode, the seat is occupied (other than the driver's seat for vehicles with a designated driver seating position), and the status of the seat belt changes from in use to not in use, unless a front door on the same side of the vehicle as the seat belt triggering the warning is open, in which case a warning is not required and the system may consider this as a new trip with respect to that seat belt and reset the warning system."

that weighs at least 46.7 kg (103 lb) and is at least 139.7 cm (55 in) tall is seated in the seat. We are finalizing these provisions proposed in the NPRM with some revisions to the final regulatory text for clarity.

With respect to a driver's seat, we have modified the proposal to clarify that the final rule does not require occupant detection for the driver's seat. The final rule does specify seat occupancy as one of the criteria for activation of all of the required front seat belt warnings (the visual warning and first- and second-phase audible warnings). However, the final rule also provides manufacturers with three compliance options for certifying that a driver's seat belt warning complies with these requirements. First, a manufacturer may certify that the system meets the requirements when the 5th percentile female test dummy described in part 572<sup>170</sup> of this chapter, as well as any larger dummy described in part 572, is seated in the seat. Second, a manufacturer may certify that the system meets the requirements when any human occupant that weighs 46.7 kg (103 lb) or more and is 139.7 cm (55 inches) tall or taller is seated in the seat.<sup>171</sup> Third, a manufacturer may certify that the system meets the requirements when, instead of seating a dummy or human, the seat is considered occupied when the ignition switch is in the "on" or "start" position (or the propulsion system is activated). Similar to the front outboard passenger seat, the first two options would necessitate occupant detection technology and is technology-neutral with respect to the type of occupant detection technology used. The third option is consistent with our understanding of how these systems currently work as well as the approaches taken by Euro NCAP and ECE R16, and essentially allows the vehicle to infer that the driver's seat is occupied based on the fact that the vehicle has been turned on.<sup>172</sup>

We are finalizing the rule this way for three reasons. First, requiring that the system activates only when the seating positions are occupied reduces false activations, which is

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<sup>170</sup> 49 CFR Part 572, Subpart O.

<sup>171</sup> These are the bottom of the ranges specified in FMVSS 208 S29.1(f) for the weight and weight of a human female who may be used in certain of the advanced air bag testing in place of the 5th percentile female dummy.

<sup>172</sup> To be clear, although a vehicle might be placed in these conditions without an occupant in the driver's seat, this is not a typical or likely scenario in the field because it is the driver that initiates these conditions (other than for vehicles without a driver's designated seating position).

important both for effectiveness and consumer acceptance. Although this is a larger concern for long or indefinite reminders, it is also relevant for the start-of-trip 30-second audible warning.

Second, requiring occupancy for the driver's seat aligns the activation criteria for the front outboard passenger and driver's seating positions. Although Honda suggested that regulatory language is not necessary because driver's seat occupancy can be inferred, including it avoids confusion about when the warning needs to or can activate that could come from specifying different activation criteria.

Third, the first and second compliance options provide manufacturers the flexibility to optimize systems for vehicles with a driver's designated seating position, but which may be "on" without a driver in the vehicle, such as dual-mode vehicles equipped with ADS but which still have a driver's seat and driving controls, as well as vehicles which use remote start. Because dual-mode vehicles could operate without an occupant in the driver's seat, we do not believe that inferring or assuming occupancy (which Euro NCAP and ECE R16 do) fully accounts for these vehicles. Without the option to use occupant detection, these vehicles could be required to initiate the driver's seat start-of-trip audible warning when the ignition switch is placed in the "on" position (or for an EV, when the propulsion system is activated. Such scenarios would therefore result in false positives. By allowing manufacturers to select the occupancy method, our approach is similar in application to the inference approach taken by Euro NCAP and ECE R16 for conventional vehicles, while being forward-looking for vehicles with ADS.

To clarify, although adding an activation condition that the seat is occupied is a change to the current driver's seat belt warning requirements in FMVSS No. 208, we do not intend it to increase the stringency of the existing requirement for the driver's seat. The activation criteria for the current driver's seat belt warning do not include seat occupancy.<sup>173</sup> Although the final rule introduces an occupancy criterion, it does not require occupant detection technology for the

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<sup>173</sup> The activation criteria are (1) the vehicle's ignition switch is moved to the "on" position or to the "start" position; and (2) the driver's lap belt is not in use, as determined either by the belt latch mechanism not being fastened, or by the belt not being extended at least 4 inches from its stowed position.

driver's seat. Indeed, we are not defining occupancy for the driver's seat as we have for the front outboard passenger seat, and the test procedure for the third compliance option does not require placing a test dummy (or human) in the driver's seat. Instead, under this final rule, manufacturers will have the discretion to choose the method by which the seat belt warning system determines whether the driver's seat is occupied in the context of seat belt warning activation. The third option enables systems that do not use occupant detection to certify to occupancy, while the first and second options enable manufacturers, if they so choose, to certify using a test dummy or a person (respectively), which may enable them to optimize a system for vehicles which may not have a person in the driver's seat at start-up.

Finally, in response to a comment from Honda and to incorporate considerations for certain vehicles with ADS, the finalized regulatory text implements Honda's suggestion that the proposed change-of-status warning have occupancy as one of the triggering conditions. Because in the final rule, the visual warning and the second-phase audible warning function as a change-of-status warning, the regulatory text for these warnings includes seat occupancy as one of the triggering conditions.

### **C. Issues Common to the Front and Rear Seat Belt Warning Requirements**

#### **1. Modification of start-of-trip warning trigger related ignition switch position to accommodate EVs**

As noted earlier, the NPRM proposed that the activation of both the front and rear seat belt warnings be triggered when, among other things, "the ignition switch is placed in the 'on' or 'start' position." We also stated that this same condition appears in the existing driver seat belt warning requirements and is similar to ECE R16 and Euro NCAP.

ECE R16 specifies that the first-level visual warning activates "when the safety-belt of any of the seats is not fastened and the ignition switch or master control switch is activated."<sup>174</sup> In the NPRM we explained that we were not proposing to follow ECE R16 and refer to a "master

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<sup>174</sup> Section 8.4.2.3.1.

control switch” because we did not believe it necessary to introduce this new term into FMVSS No. 208. The second-level warning and the change-of-status warning have different triggers that are all based on the vehicle being in motion.

Euro NCAP similarly specifies that the visual signal activate “when the ignition switch is engaged (engine running or not)” and the seatbelt is not fastened.”<sup>175</sup> Like ECE R16, the audible and change-of-status warnings have different triggers, mostly related to the vehicle being in motion.

The IIHS protocol similarly links the start-of-trip visual signal to the vehicle engine being “turned on (i.e., powered and capable of propulsion).”

### Comments

Tesla requested that NHTSA broaden the definition of “ignition switch” to cover, for example, EVs which do not have one. As an example, Tesla noted that the “ignition switch” definition could be expanded to the moment when power is delivered to wheels to initiate vehicle motion. Tesla also requested clarity on the definition of “vehicle start-up.” Tesla noted that this clarification is especially important for EVs.

Honda had similar concerns, noting that electrified vehicles may differ from traditional internal combustion vehicles in that they may not have a distinct moment when the ignition switch is turned “on” or “started.” Instead, Honda explained that these vehicles typically use automatic “wake” and “sleep” modes, which are activated based on various sensing and detection algorithms. While Honda preferred that NHTSA reconsider using the ignition switch as a trigger, it requested clarification on the start-of-trip warning if it is retained.

### Agency Response

We agree with Tesla and Honda that it would be helpful to provide clarity regarding warning activation for vehicles that do not have a traditional ignition switch or button with “on”

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<sup>175</sup> Section 3.4.2.1 (front); section 3.4.3.1.1 (rear).

and “start” positions or conditions, which could be the case for EVs. Therefore, we are adding regulatory text to address these vehicles.

The start-of-trip warnings (front seat belt visual and first-phase audible warnings and rear seat belt warning) are required to activate when (among other things) the ignition switch is “placed in” the “on” or “start” position or upon manual activation of the propulsion system, but before the vehicle is placed in “possible active driving mode” as defined by FMVSS No. 305.<sup>176</sup> In developing this language, our goal was to specify a time in the start-up process to begin the start-of-trip warning for EVs that is roughly the same as the time we specified for vehicles with a conventional ignition switch such that the safety benefits for EVs would be the same as for ignition-equipped vehicles. For an ignition-equipped vehicle, while in the “on” position the vehicle electrical systems have been powered. While in the “start” position, the engine has been started and in this state a conventional vehicle is ready to be placed in a drive mode. An additional consideration is that, for an ignition-equipped vehicle certified to the option that the system determines the driver’s seat is occupied through movement of the ignition switch to both the “on” or “start” position, the driver is presumed to be in the vehicle to initiate the action. However, what actions by the driver initiate these modes, and whether a vehicle even has an analogous state to “on,” varies widely across EV models. For instance, some EVs, upon the door being opened, may activate some systems without providing electrical power to the motors, and may not be ready to be moved into a drive mode until another action is taken (such as depressing the brake pedal) which would typically entail the driver being seated. Others, however, may provide power to the motors upon the door being opened. Therefore, the agency attempted to incorporate language that approximates the following moment in a start-up sequence for an EV:

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<sup>176</sup> More specifically, the “placed in” language is used to specify the rear seat belt start-of-trip warning and the front seat belt first-phase audible warning but not the front seat belt visual warning. The front seat belt visual warning is required to “activate and remain active whenever the ignition switch is in the “on” or “start” position (or the propulsion system is activated), the seat is occupied, and the seat belt is not in use” (emphasis added). Because this visual warning is also serving as a change-of-status warning, this text refers to the ignition switch being “in” the on or start position, not being “placed in” on or start. However, in order for the ignition switch to be “in” the on or start position, it must first be “placed in” that position. Accordingly, this language necessarily includes the start of the trip. Similar reasoning applies to the EV-specific language for the front seat belt visual warning.

an occupied outboard seat, ready to drive, but not yet in a drive mode. (This condition also closely approximates when the ignition of a conventional vehicle, certified to the option which uses the ignition switch “on” or “start” to indicate occupancy, is moved to the “start” position). These requirements should equalize the safety benefits of the start-of-trip warning across vehicles with and without ignition switches.

To accomplish this objective, we are adding language from FMVSS No. 305; “Electric-powered vehicles: electrolyte spillage and electrical shock protection.” That standard defines “possible active driving mode” as “the vehicle mode when application of pressure to the accelerator pedal (or activation of an equivalent control) or release of the brake system causes the electric power train to move the vehicle.”<sup>177</sup> As such, the mode is analogous to the vehicle being placed in a drive gear. Additionally, FMVSS No. 305, S5.4.6.1 *Indicator of possible active driving mode*, states that “[a]t least a momentary indication shall be given to the driver each time the vehicle is first placed in possible active driving mode after manual activation of the propulsion system.” This language implies that “manual activation of the propulsion system” precedes the “possible active driving mode.” In the final rule that added this language to FMVSS No. 305, we explained that the phrase “when the vehicle is first placed in possible active driving mode after manual activation of the propulsion system” was meant to indicate “start up.”<sup>178</sup> Thus, we believe that the appropriate time in the start-up sequence of an EV (which is roughly analogous to the movement of the ignition of a conventional vehicle to the “start” position) is upon manual activation of the propulsion system, but prior to the vehicle being placed in “possible active driving mode” as defined by FMVSS No. 305. We understand that the

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<sup>177</sup> NHTSA recently proposed to establish FMVSS No. 305a to replace FMVSS No. 305. The proposed FMVSS No. 305a refers to this state as “active driving possible mode.” However, the definition is the same. The terminology is originally from Global Technical Regulation No. 13.

<sup>178</sup> 82 FR 44945, 44956.

process of driving system activation could vary from vehicle to vehicle but believe that the criteria in the final rule encompass all or most EV start-up sequences.<sup>179</sup>

## 2. Belt use criteria

The current driver's belt warning requirements specify that a belt is "not in use" when, at the option of the manufacturer, either the seat belt latch mechanism is not fastened or the belt is not extended at least 10.16 centimeters (cm) (4 inches (in)) from its stowed position.<sup>180</sup>

We proposed amending these current criteria by specifying criteria related only to the seat belt latch mechanism. Specifically, we proposed that a manual seat belt would be considered "not in use" when the seat belt latch mechanism is not fastened, and "in use" when the seat belt latch mechanism is fastened. We proposed eliminating the spool-out sensor requirements because we tentatively believed that accommodating the use of a spool-out sensor would not allow for an objective or reliable criterion for the proposed change-of-status warning. For instance, there may be instances where the webbing may not readily spool back in when the seat belt is unbuckled (e.g., due to the use of shoulder belt routing features or the use of a belt positioning booster seat), and thus would not reliably trigger the change-of-status warning.

The proposal differed from ECE R16,<sup>181</sup> which gives manufacturers the option of using either a belt latch or spool-out sensor.<sup>182</sup> Euro NCAP does not specify webbing spool-out criteria, and only refers to the status of the belt buckle. The IIHS protocol does not specify such criteria.

### Comments

We received one comment from Auto Innovators, which generally agreed with the agency's proposal to enable compliance with the regulation through the use of seat belt latch sensors. Auto Innovators indicated that this proposal is consistent with ECE R16 and avoids

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<sup>179</sup> We also anticipate that if a vehicle activates the propulsion system before the driver is inside the vehicle, the warning will be delayed until the driver has entered the vehicle to comply with the occupancy requirement, even if such a vehicle is certified to the first option.

<sup>180</sup> S7.3(c). These are the definitions for manual belts. For automatic belts, see *supra* n.18.

<sup>181</sup> Section 2.46.

<sup>182</sup> Section 2.46.

introducing unnecessary complexity in redesigning rear belt reminder systems for the U.S. market. However, Auto Innovators requested that NHTSA update the definitions for S7.5 to ensure the regulation supports additional compliance options for classifying seat belt use, including systems that rely on camera-based sensors (or other advanced sensor technology). Auto Innovators commented that, currently, these options would not be permitted unless the belt use reminder system also included a belt latch mechanism.

#### Agency response

In the NPRM we stated that the current FMVSS No. 208 belt use criteria for the driver's seat belt warning requirements allow for the use of a belt latch or spool-out sensor, and that we were proposing to amend the belt use criteria to rely solely on the use of a belt latch sensor, and not provide requirements that would accommodate the use of a spool-out sensor. These statements were imprecise. The intent of the NPRM was not to restrict the types of technology manufacturers may use to determine whether or not an occupant is belted. The proposal was intended to identify objective criteria that NHTSA would use to determine whether or not a belt is in use. A manufacturer may use whatever technology it chooses to detect whether a belt is in use or not. However, regardless of the technology a manufacturer uses – whether it is a latch sensor or a camera – NHTSA, for the purposes of its compliance test, will consider a belt to be “not in use” when the belt latch is not fastened. Suppose, for example, that NHTSA tests a seating position equipped with a spool-out sensor for compliance with the change-of-status warning requirements. Suppose further that, in the test, a fastened belt is unfastened, but the spool-out sensor malfunctions so that the change-of-status warning does not activate. This would be considered an apparent test failure because the warning system did not activate when the status of the belt changed from in use to not in use (*i.e.*, the belt latch became unfastened).

### **3. Visual warning characteristics**

NHTSA proposed different requirements for the rear and front seat belt visual warnings.

#### Rear Seat Belt Visual Warning

We proposed that the visual warning be continuous or flashing and consist of icons or text and indicate how many or which rear seat belts are in use or not in use depending on the type of warning system. If icons are used to indicate how many or which rear belts are in use, we proposed that the icon(s) must be green; if icons are used to indicate to the driver how many or which belts are not in use, we proposed that the icon(s) be red. If text is used to indicate to the driver how many or which rear seat belts are in use or not in use, we proposed that the text contain the words “rear belt(s) in use” or “rear belt(s) not in use.” We also proposed to amend table 2 in FMVSS No. 101, “Controls and displays,” to clarify that the “Seat Belt Unfastened Telltale” depicted there does not apply to the rear seat belt reminder and to amend table 1 by adding in a row for the proposed rear seat belt warning.

The requirement that the visual warning be continuous or flashing mirrors the current driver’s seat belt visual warning requirement and is also consistent with ECE R16. However, we proposed to depart from the current driver’s warning and from ECE R16 and standardize the color of the icons and text for the warnings to increase the likelihood that consumers would notice, recognize, and respond to the warnings. We believed that standardized colors and text will facilitate the interpretation of the signal. We departed from the current driver’s warning requirements and followed ECE R16 by not requiring specific icons because we believe the choice of icons would largely depend on whether the system displayed the number of seat belts in use or which seat belts are in use.

Another difference between the proposal and ECE R16 was that ECE R16 requires that the visual warning “indicate at least all rear seating positions.” We understood this requirement to mean that the visual warning must depict all the rear seating positions. To give manufacturers design flexibility, we did not propose to require that the warning depict all rear seating positions. Instead, the proposed requirements would allow the visual warning to consist of text or icons indicating how many or which rear seats are fastened or unfastened. For example, the warning text might consist of “Middle and Right rear seat belts fastened.” Another visual warning option

would be the seat belt icon with an adjacent numeral indicating the number of rear seat belts fastened. Accordingly, the proposal would allow, but not require, use of a pictogram.

#### Front Seat Belt Visual Warning

The current requirements for the driver telltale differ from those we proposed for the rear seat belts. As noted earlier in this document, some vehicles already equipped with a rear seat belt warning system in addition to a front seat belt warning system combine the two (such as with a pictogram depicting all seating positions). These vehicles also must continue to meet the current requirements for the driver seat belt telltale. These require that the warning be continuous or intermittent (flashing) and display either the identifying symbol or the words (“Fasten Belts” or “Fasten Seat belts”) specified in table 2 of FMVSS No. 101. Thus, vehicles that currently have a rear seat belt warning system using a pictogram also provide a separate, FMVSS No. 101-compliant telltale for the driver’s seat belt warning.

We proposed generally retaining, for both front outboard seats, the current visual warning requirement for the symbols or text specified in FMVSS No. 101 because these visual warnings have been in place for decades and we believe that consumers are accustomed to them. Removing the requirement may have unintended negative effects if drivers and front passengers are not accustomed to new visual warnings or do not find the new visual warnings as effective. This means that if a manufacturer chose to use a pictogram format to comply with the new rear seat belt warning requirements, it could – as many manufacturers are already doing – include the front seat belts in this pictogram, but it would also have to provide the telltale specified in FMVSS No. 101, table 2. As we explained earlier, we proposed that the telltale for the front outboard passenger seat would also have to be visible to that passenger. We also proposed to require that for telltales associated with multiple front outboard seats, the seat with which each telltale is associated must be clearly recognizable to the driver and front outboard passenger.

#### Comments

Regarding the rear seat belt warning telltale, several commenters suggested that NHTSA should require visual warnings that indicated all rear seating positions. Consumer Reports encouraged NHTSA to align with ECE R16 by requiring that visual warnings indicate all rear seating positions. It argued that although a seating map may require a somewhat more sophisticated display, it is preferable because it offers the driver complete information while facing forward. Auto Innovators and HATCI commented that contextual displays or pictograms are generally feasible and useful. Auto Innovators also added that several automakers have already implemented seat belt warning systems that use a contextual display diagram to provide the driver with information on the status of passenger belt use.

Some commenters such as HATCI and NADA also explicitly requested flexibility in telltale design. Rivian requested flexibility in choosing icons for the front and rear seat belt reminder warnings and that NHTSA not require the FMVSS No. 101 icon for the front seat belt reminder warning icon. HATCI supported providing manufacturers flexibility in the rear seat telltale and commented that the use of a pictogram for the rear seat belt warning will allow for more flexibility for different vehicles and vehicle sizes. Consumer Reports also commented that, within a seating map, easily recognizable icons are preferable to text, as icons enable a driver to assess seating usage at a quick glance, without having to read. Consumer Reports also argued that easily recognizable icons are also useful for drivers for whom English is not a first language.

NSC commented that seat belt warning systems have different operational parameters, generic names, and limitations across manufacturers and sometimes even across the same manufacturer's varying models. It urged NHTSA to consider standardizing generic nomenclature as well as standardizing warning and icon symbols to reduce driver confusion.

Mercedes commented that, based on the requirements in the proposal, there would be technical challenges with providing the driver seat belt status information within the instrument cluster for seating configurations that can hold up to 13 rear passengers.

Auto Innovators commented that in addition to issues related to the symbol, standardizing the text to say “Rear belt(s) in use” or “rear belt(s) not in use” may be difficult to package on the instrument cluster. Auto Innovators requested that the agency permit the use of either the word “Rear” or a corresponding number next to the seat belt icon referencing which seating position is unbuckled as an acceptable alternative. It noted that this request is similar to the number 2 notation used next to the air bag symbol for specifying the icon is relevant to the passenger-side air bag.

Auto Innovators and Rivian supported harmonizing the telltale symbol with ECE R16. However, Auto Innovators, Mercedes, Honda, NADA, and HATCI requested that the agency also permit the use of a neutral color (e.g., gray) that could be used to display either an unoccupied seat or, for positive only systems, a seat that remained in the unbuckled condition. For negative only and full-status systems, the symbol would be required to be red to indicate occupancy in an unbelted condition. Auto Innovators commented that this approach is being widely adopted in the U.S. and other markets and is understood by consumers. Accordingly, Auto Innovators requested aligning the color requirements with ECE R16. Mercedes expressed concern that red icons should not be used if the buckle has not changed status because there is no critical information to be shared with the driver, and red could provide a false alarm and lead to desensitization if it is always on. Hyundai also noted that it is not aware of consumer complaints or requests to deactivate existing visual seat belt displays.

Auto Innovators and Rivian argued that, given the prevalence of red-green color vision deficiency among the U.S. population, the requirement should not limit the ability of manufacturers to implement approaches that may be more easily understood or recognized by consumers. Auto Innovators indicated that the rule should include allowances for providing a visual diagram of all seating positions whereby belt use can either be communicated through the presence or absence of the belted symbol or through the use of a bi- or tri-color scheme consisting of green and red symbols to indicate belt status, and either gray or white symbols to

denote either unoccupied seats (for systems with occupant detection) or unbelted seats (for systems without occupant detection) at the manufacturer's discretion.

Rivian and GM also noted that permitting the use of other icons, such as a checkmark to indicate belts in-use and a "x" to indicate belts not-in use for both front and rear occupants seat belt status, could help mitigate the challenges with red and green coloration if manufacturers were permitted flexibility in the use of different icons for both the front and rear locations. Rivian further commented that the agency proposed that the "Seat Belt Unfastened Telltale" requirement, depicted in table 2 in FMVSS 101, Controls and displays, does not apply to the rear seat belt reminder. Rivian stated that its interpretation of the proposal is that manufacturers may use other icons such as a checkmark to indicate belts in-use and a "x" to indicate belts not in use. Rivian recommended that for consistency and occupant recognition, NHTSA allow this design flexibility for the front and rear belt reminders. It stated that this commonality is particularly important for pictogram designs driven by other protocols, such as IIHS, and would help address the color issue.

GM also indicated that glanceability can be significantly improved through redundancy, which involves combining both color and forms as cues. It cited several studies in support of this assertion. GM argued that the symbols, along with the colors of green representing success, red representing failure, and gray representing an empty seat, can ensure clear communication of the belt status to the customers.

Honda commented requesting clarification on the proposed requirement that for telltales associated with multiple front outboard seats, the seat with which each telltale is associated must be clearly recognizable to a driver and to any front outboard passenger. Honda indicated that it understands the final rule to require the telltale to use the identifying symbol or words specified in table 2 of FMVSS No. 101 and to also allow the use of a single telltale to be associated with multiple front outboard seats. However, Honda suggested that the "clearly recognizable" language may be contrary to Honda's understanding. Honda commented that it is not aware of

any consumer concerns with distinguishing the front seat positions to which this single telltale is associated and believes that maintaining this standardized approach will facilitate continued consumer understanding. Honda also expressed concern about the cost burden if this requirement cannot be met with a single telltale and concern about the extra visual indicator overriding other warnings. Honda provided a list of telltale designs and requested clarity regarding whether they would meet the “clearly recognizable” language. Honda also requested that the rule allow for a single telltale to display all seating positions.

#### Agency response

NHTSA generally agrees with the commenters who recommended that the rule provide manufacturers flexibility, but we do believe that some standardization of the visual warning would provide safety benefits. We note that while many of the requirements discussed below apply only to the rear seat belt warning, manufacturers may choose to integrate the warnings for the front and rear, so we are presenting this material together.

#### Requirements for the rear seat belt visual warning

We disagreed with Consumer Reports and have decided to depart from ECE R16 and not require that all rear seating positions be depicted. While such a requirement would provide the driver with more information, we have decided to give manufacturers design flexibility (such as by using text, number of seats buckled/unbuckled, etc.) so that they can decide how to optimize design for each particular vehicle.

One situation in which this flexibility would be particularly important is for buses and vans with many rear seats. As we explain above (see Section VI.A.1, Applicability) one difference between the final rule and ECE R16 is that the final rule applies to small buses such as 15-passenger vans, while the ECE R16 rear seat belt warning requirements do not apply to vehicles with more than 9 seats (including the driver). As we acknowledged in the NPRM, vehicles with a larger number of rear seats, such as passenger vans and buses, may encounter visual signal complexities; not dictating specific types of signals should provide manufacturers

with adequate flexibility to address these types of issues. We believe these vehicles, in particular, would benefit from the option to indicate how many rear seats are fastened; for example, a visual warning option for vehicles with multiple rows would be the seat belt icon with an adjacent numeral indicating the number of rear seat belts fastened. We recognize that such a requirement would require more space if a manufacturer decides to display a warning with multiple rear rows and may entail redesign of the instrument panel or display space. We note that while one commenter (InterMotive) indicated that it has an aftermarket solution for a rear warning system for such higher-occupancy vehicles, NHTSA is not aware of any new vehicles equipped with such systems. In light of the current state of the market, we are providing two years of lead time and have attempted to specify the final requirements in such a way as to provide manufacturers as much flexibility as possible so that they can devise solutions for their specific vehicles.

Similarly, with respect to the visual warning for the rear seat belts, we have decided to finalize the proposal and permit both icons (symbols) and text. However, we are modifying the proposal and not specifying standardized text. We are also clarifying that numbers may also be used in addition to symbols, and are finalizing the proposal to standardize colors for symbols (and numbers). While we recognize that standardized icons would help drivers recognize the icon when driving different (multiple) vehicles, we believe there are even greater benefits to providing manufacturers with flexibility; manufacturers can optimize the visual warning based on the vehicle design and consumer preferences, particularly since there are a range of different approaches being used already. (Icons appear to be prevalent in newer vehicles.) We have also decided to allow the use of text and/or numbers other than what we proposed for the rear seat belt warning to afford manufacturers as much flexibility as possible. We note that the effectiveness of numbers depends on how well the design is executed; for example, one commenter provided an example showing that it can be confusing. Accordingly, manufacturers should not assume drivers will be familiar with seat numbers when developing their warning.

On the other hand, as discussed below, we are standardizing colors to facilitate the interpretation of the signal.

We have decided to finalize the requirements for the color of symbols or numbers if used to indicate how many or which rear seat belts are (not) in use. After considering the comments, NHTSA concludes that the advantages of standardizing colors outweigh the drawbacks. We believe that standardizing colors limits confusion and allows for faster interpretation. We note that the FMVSS generally do not address color blindness. Importantly, however, this requirement does not prevent manufacturers from designing the visual warning so that it can be perceived by colorblind consumers. For example, OEMs could design systems using a combination of color and a positive/negative symbol. Moreover, we agree with GM that such redundancy can aid in rapid interpretation of the warning (glanceability). Use of a symbol without a color would be prohibited but we believe this requirement is warranted because use of a color would aid in faster identification of buckled/unbuckled seats for most users. Similarly, the final rule provides that the change-of-status visual warning may use the same telltale as the start of trip warning, provided that the color of an illuminated symbol or number used to indicate to the driver how many or which rear seat belts experienced a change of status from in use to not in use is red.

NHTSA is, however, clarifying that the proposed requirements were not intended to prohibit the use of gray or other neutral colors or signifiers (such as a non-illuminated indicator) to denote seats that are unoccupied or to denote a seating position for which information about buckle status is not being conveyed (e.g., using gray to indicate seating positions at which the belt is fastened in a negative-only system that does not use occupant detection). This approach is being widely adopted in the U.S. and other markets and, in our view, is understood by consumers. To more clearly convey our intent here, the final rule explicitly provides that a visual warning is not required for (1) an unoccupied seat if the system is able to determine whether or not a seat is occupied; (2) a seat belt that is in use in a system designed to indicate to

the driver how many or which rear seat belts are not in use; and (3) a seat belt that is not in use in a system designed to indicate to the driver how many or which rear seat belts are in use. Therefore, the color requirements will not apply to symbols or numbers that are conveying any of these three types of information, because such information is not considered part of the required warning.

#### Requirements for the front outboard seat belt visual warning

We have decided to finalize the proposal to maintain the FMVSS No. 101 icon for the driver's seat belt warning and extend it to the front outboard passenger seat belt warning. We continue to believe, as we explained in the NPRM, that this requirement is beneficial because these visual warnings have been in place for decades and we believe that consumers are accustomed to them. It is also in line with ECE R16, which requires the same icon for the front seats.<sup>183</sup> At this time we therefore do not see a need to remove this requirement.

As stated in Section VI.B.4, in response to the comments, NHTSA has modified the proposal so that the final rule requires that the front outboard passenger visible warning be visible only to the driver, except for two potential future situations where only requiring the visual warning to be visible to the driver would not be sufficient. The first is for dual-mode ADS-equipped vehicles that still have a driver's seat and driving controls. For such vehicles the driver's seat could remain unoccupied throughout the vehicle's operation. In this situation, limiting the visibility of the front seat warnings to the driver's seat would result in the passenger not seeing the warning. The second is for ADS-equipped vehicles without a driver's designated seating position. For the first, the final rule requires that the visual warning for the front outboard passenger seat belt must be visible from the front outboard passenger seat, and for the second the final rule requires that the visual warning for each outboard designated seating position be visible from each outboard passenger seating position.

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<sup>183</sup> Section 8.4.3.2.

Accordingly, while we proposed that for telltales associated with multiple front outboard seats the seat with which each telltale is associated must be clearly recognizable to a driver and to “any front outboard passenger,” the final rule instead requires that a visual warning associated with multiple front outboard seats must “clearly identify the seating positions for which the warnings are intended.” Honda’s comment concerned the proposed “clearly recognizable” language. NHTSA clarifies that this final rule does not require a separate telltale (*i.e.*, a telltale with the identifying symbol specified in table 2 of FMVSS No. 101) for each front seating position nor does it require any particular visual warning design. We believe that one telltale which distinguishes which position is unbuckled would be acceptable, as would separate telltales, as long as the visual warning clearly identifies the seating position(s) for which the warning(s) is intended. We leave it to manufacturers to design their systems such that they can certify in good faith that they meet the standard, and the final rule does not further specify how to do so to preserve that design flexibility.<sup>184,185</sup>

#### **4. Interaction with other vehicle warnings**

NHTSA proposed that neither the visual nor the audible component of the seat belt warning for the both the front and rear seat belts could be overridden by other warnings for the required durations.<sup>186</sup> This proposal was consistent with the current requirements in FMVSS No.

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<sup>184</sup> It is possible to design single telltales that comply both with FMVSS No. 101, Table 2 and the requirement that for telltales associated with multiple front outboard seats, the seat with which each telltale is associated must be clearly identified because FMVSS No. 101 allows supplemental symbols and information. See S5.2.3 (“Supplementary symbols, words, or abbreviations may be used at the manufacturer’s discretion in conjunction with any symbol, word, or abbreviation specified in Table 1 or Table 2.”).

<sup>185</sup> We note that the proposed “clearly recognizable” language was identical to language currently found in S19.2.2 of FMVSS 208. That language was added to the standard in a 2022 final rule on Occupant Protection for Vehicles with Automated Driving Systems. In the preamble to that final rule, we explained that that provision would not permit a single telltale for both front outboard seating positions: “[t]he Alliance and GM requested allowing a single telltale for both front outboard seating positions. It is NHTSA’s position that, while a single telltale unit that distinguishes both indicators would be acceptable, a single light indicating the suppression status of both air bag systems, but not distinguishing their individual state of suppression would not. Separate suppression telltales clarify which associated seating position is suppressed, allowing the corresponding passenger to respond to the information with appropriate action.” 87 FR 18560. While NHTSA continues to believe that requiring separate telltales for two front seating positions was justified for the reasons given in that rulemaking, after considering the comments, we believe that it would be appropriate for this final rule to allow a single telltale for two seating positions, as long as the visual warning clearly identifies the seating position(s) for which the warning is intended.

<sup>186</sup> 88 FR 61674 61742-43 (Sept. 7, 2023) (proposed front and rear warnings at S7.5(b)(5) and S7.5(c)(5), respectively). Proposed S7.5(c)(1)(v), which also required that the rear seat belt visual warning not be overridden, was redundant. This issue is discussed later in this document.

101 for the driver's seat belt telltale which specify, among other things, that the seat belt telltale must displace any other symbol or message in that common space while the underlying condition for the telltale's activation exists.<sup>187</sup> We did not believe that the seat belt warning requirements would interfere with warnings for other safety systems because we believed that those other warnings have dedicated warning signals, and that manufacturers would have enough flexibility to determine the best way to implement the various warnings. For instance, warnings for another potential safety risk may be more aggressive than those for the seat belts. With regard to available space, we proposed that the visual signal might be displayed as a telltale on the instrument panel or on the vehicle's information display screen. We noted that manufacturers would also have to determine whether the driver and rear passenger seat belt visual warning would be treated the same. Neither ECE R16 nor Euro NCAP address interaction with other vehicle warnings.

#### Comments

A number of commenters expressed concern about the proposed requirement that the visual warning could not be overridden. HATCI, for example, commented that if manufacturers display the rear telltale in the visual information screen, they would display the rear seat pictogram in the same location often used to display advanced safety feature warnings such as Forward Collision Warning (FCW) or Automatic Emergency Braking (AEB) and may impede or prevent those warnings. Auto Innovators commented that several automakers currently have warning systems that use a contextual display diagram to provide the driver with information on the status of passenger belt use. However, they noted that these displays can be relatively large and necessitate sharing limited display space in the instrument panel, and therefore may need to be temporarily overridden to convey other safety urgent warnings.

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<sup>187</sup> 49 CFR 571.101, S5.5.5. *See also* S5.5.2 ("The telltales for any brake system malfunction required by Table 1 to be red, air bag malfunction, low tire pressure, electronic stability control malfunction (as of September 1, 2011), passenger air bag off, high beam, turn signal, and seat belt must not be shown in the same common space.")

To address this concern, Auto Innovators, NADA, Nissan, Rivian, Honda, and HATCI requested that NHTSA remove the proposed override requirements, or provide a general exception that manufacturers have discretion to prioritize other safety relevant warnings as needed. Auto Innovators commented that NHTSA should harmonize with ECE R16 and remove the override requirements for both front and rear row seating positions to provide flexibility for manufacturers to implement in-vehicle displays such that important information can temporarily override the reminder alert on an as-needed basis.

Specific to the front reminder, HATCI recommended allowing a warning displayed in the vehicle's information display screen to be temporarily suppressed when it is necessary to alert or redirect the driver's attention to an advanced safety warning related to vehicle operation. On the other hand, Honda commented that the front seat belt unfastened telltale, as currently specified in FMVSS 101, should remain a dedicated warning that cannot be interrupted.

Auto Innovators supported providing manufacturers with the flexibility to prioritize safety alerts for the duration that other safety critical warnings may be required. Honda and Mercedes commented that it is not essential for the rear seat belt visual warning to be provided uninterrupted 100 percent of the time because it is supplemental to the audible warning. Because of this redundancy, in Auto Innovators' view, other critical information should be allowed to be presented to the driver.

Honda and Auto Innovators urged NHTSA to allow visual warnings, with the exception of the dedicated telltale currently specified in table 2 of FMVSS No. 101, to be temporarily overridden by system failure warnings and warnings requiring an urgent response. Honda stated that doing so would allow existing high-visibility display locations to convey the most urgent warning to the driver, while retaining a baseline warning that would convey whether there is an unbelted occupant. Honda and Auto Innovators argued that this approach would also align with the current FMVSS No. 101 requirements prescribed in section 5.5 where the seat belt unfastened symbol or text ("Fasten Seat Belts") must have a dedicated telltale, but other

supplemental warnings may be displayed in a common display space. Auto Innovators requested additional clarification on the applicability of the override prohibition and whether it applies to suppression of the visual warning, audible warning, or both. It requested that both be able to be overridden.

Honda and Auto Innovators also commented that the proposal would necessitate several changes to systems currently deployed without any substantiated benefit. First, Honda explained that the visible display space for the driver, particularly the instrument cluster, is already allocated. Therefore, the proposal would require either the implementation of a new standalone indicator, dedicated to only the rear seating positions, or repositioning the warning to a less ideal area of the instrument cluster. Honda indicated an example in which it may become necessary to minimize the seat belt warning size in order for the warning to have a dedicated space. Honda and Auto Innovators argued that these changes would require substantial redevelopment and that implementing such a system within the proposed time frame would be impractical.

Rivian commented that the proposal does not contain volume or tone requirements for the chime. Rivian inquired about whether a change in volume for the audible chimes during the required duration of the warning to increase the volume of a competing safety-critical warning would or would not constitute an override.

Finally, InterMotive commented that the proposed requirements should not create interaction issues between different vehicle systems. InterMotive noted that it has a product in the market that would comply with the proposed requirements and that there have been no issues with the product interacting with other warning systems.

#### Agency Response

NHTSA has decided to finalize the proposal that the visual seat belt warning not be overridden by other vehicle warnings. However, in response to the comments we have decided to modify the proposal and permit the audible component of the front and rear seat belt warnings

to be overridden by certain safety-critical warnings that require the driver to take some immediate action.

### Visual Warning

We are finalizing the proposal that the visual seat belt warnings not be overridden by other vehicle warnings. FMVSS No. 101 has long required that the driver's seat belt visual warning not be displaced by other warnings. We do not believe that these amendments to the seat belt warning requirements should lead us to alter this requirement.<sup>188</sup> There are several reasons for this conclusion.

First, while the final rule requires an additional telltale for the rear seat belt warning, we believe that there is sufficient room on the vehicle's instrument panel or on the vehicle's information display screen. Most safety telltales have a dedicated icon and display space. In particular, we believe most critical safety warnings have dedicated space for their respective icons/symbols. NHTSA's understanding of contemporary vehicle designs is that they are more likely to feature a larger combined display instead of separate instrument panels and center stack displays, so there should be sufficient space to present two simultaneous visual warning signals separately. Whether prohibiting override of the seat belt warning would require redesign of the display area depends on whether the competing warnings are supplemental. If they are, then not allowing the seat belt warning to be overridden would not necessarily require redesign; while the supplemental warning could not be displayed in the space common to the seat belt warning, the primary warning could still be displayed. However, if the competing warning were not simply supplemental, then we acknowledge that redesign would be necessary. If an OEM chose to redesign in such a way as to have dedicated space for all the different warnings, we believe it would be possible, but acknowledge it might be burdensome. However, we believe the final rule

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<sup>188</sup> The final rule does not prohibit manufacturers from designing vehicles so that a crash-imminent visual warning, or other visual warning that alerts the driver to take some immediate action, is more prominent than the seat belt warning.

provides manufacturers with ample flexibility in terms of what types of warnings are allowed and not dictating a specific location for the warning.<sup>189</sup>

Second, it would likely be rare for the seat belt warning and other warnings to occur at the same time. With respect to the front seat belt warning, because these systems have been in place for decades, and because FMVSS No. 101 has long required that the driver's seat belt visual warning not be displaced by other warnings, we believe these visual warnings have their dedicated display space already and thus do not warrant allowing override for other safety critical warnings because the warnings can activate simultaneously. With respect to the rear seat belt start-of-trip warning, given the relatively short duration (30 seconds) and timing (ignition on or start), it should be relatively unlikely for another safety-critical warning to be necessary in that time. With respect to the rear seat belt change-of-status warning, because we are requiring that the start-of-trip visual warning not be overridden, we believe that although a safety critical warning may need to activate at the same time as the change-of-status warning, the warnings will have been designed to not be in the same space and they can both activate simultaneously.

Third, extinguishing the seat belt reminder visual warning during other warnings might confuse drivers. If they notice that the warning deactivates and then re-activates with no corresponding change in seat belt status, they may believe the system is malfunctioning.

We are also declining to adopt Honda's suggestion to allow override of the larger warning and rely on the use of the single FMVSS No. 101 front seat belt warning telltale for all seats. We believe that this would confuse the driver, because the driver would not know what seat the warning applies to. The current FMVSS No. 101 seat belt warning requirements apply only to the driver's seat belt warning (with this final rule extending them to the front outboard passenger's seat and the rear seats), and not to other seating positions.

### Audible Warning

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<sup>189</sup> With respect to InterMotive's comment, its aftermarket product has a separate display, so it is not relevant to this discussion.

The final rule, however, does permit the audible component of the seat belt warnings to be overridden by certain safety-critical warnings that require the driver to take an immediate action. As an initial matter, we clarify that the proposal would have prohibited the audible component of the reminder from being overridden as well as the visual component.<sup>190</sup> The proposed regulatory text contained a redundant provision that required that the rear seat belt visual warning not be overridden by other visual warnings that was likely the source of confusion.<sup>191</sup> However, in response to the comments, NHTSA has decided to permit the seat belt audible warning to be overridden by certain warnings. Specifically, NHTSA believes it is reasonable to allow a pause in the audible seat belt warning to allow for a safety critical warning that requires the driver to take some immediate action. This includes crash avoidance warnings that require immediate action by the driver, such as braking or steering. With respect to Rivian's comment, a change in volume of the chime would not constitute an override of the warning because the final rule does not regulate audible warning volume. See Section VI.C.5, Audible Warning Characteristics.

#### **5. Audible warning characteristics (other than duration)**

The NPRM proposed a variety of specifications for the audible warnings. The proposed requirements were different for the front and rear audible warnings.

For the rear change-of-status warning (which had a minimum required duration of 30 seconds), we proposed that the audible signal could be intermittent or continuous and that if intermittent, inactive periods longer than 3 seconds would not be counted toward the total duration of the audible warning. We did not propose to specify minimum duty cycle, chime frequency, or warning cycle.

For the front seat belt audible component of the start-of-trip and change-of-status warnings, we proposed more detailed requirements than for the rear seat belt audible warning

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<sup>190</sup> See 88 FR 61674, 61742 (Sept. 7, 2023) (Proposed S7.5(b)(5) and S7.5(c)(5)).

<sup>191</sup> See 88 FR at pg. 61743 (Proposed S7.5(c)(v)).

because the minimum duration was much longer (essentially until all front outboard occupants were belted, for both the start-of-trip and change-of-status warnings). We proposed that the front seat belt audible warning may be continuous or intermittent. If intermittent, we proposed that, when active, the audible warning must be continuous or have a chime frequency of at least 0.5 Hz and a duty cycle of at least 0.2. The proposal defined, for an intermittent audible warning, the terms warning cycle, chime frequency, and duty cycle. The proposal defined “warning cycle” as consisting of period(s) when the warning is active at the chime frequency or continuously, and inactive period(s). A warning cycle would begin with an active period and would be 30 seconds in duration. “Chime Frequency” meant the repetition rate for an intermittent audible warning when the warning is active. “Duty Cycle” meant the total amount of time an intermittent audible warning is active during a warning cycle at the chime frequency or continuously, divided by the total warning cycle duration (30 seconds). These requirements were largely based on the results of a 2012 IIHS study on duty cycles.<sup>192</sup> IIHS test protocols do not specify a duty cycle. We proposed that the same audible warning may be used for all seats. We did not propose a limit on the maximum duration of audible gaps for the purposes of determining the warning’s total duration because we did not propose a finite minimum duration.

These proposals deviated from Euro NCAP and ECE R16’s specifications in some ways. Euro NCAP specifies that for the front seats the audible signal must not have gaps greater than 10 seconds, and that gaps longer than 3 seconds would not count toward the warning’s total duration. The final audible signal must be “loud and clear” for the driver. The 10 second limit, in addition to its specification of a 3 second gap limit toward the calculation of the warning’s total duration, would not be sufficient to ensure a 0.20 duty cycle warning. ECE R16 also does not count warning gaps longer than 3 seconds toward the required minimum warning duration requirement.

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<sup>192</sup> Kidd, D.G. (2012). Response of part-time belt users to enhanced seat belt reminder systems of different duty cycles and duration. *Transportation Research Part F*, 15, 525–534.

## Comments

Auto Innovators and NADA requested that NHTSA harmonize with ECE R16, which provides increased flexibility for manufacturers determining the characteristics of both front and rear row belt reminder alerts.

Auto Innovators recommended that the agency avoid defining characteristics (such as the warning and duty cycles) that would prevent a manufacturer from implementing different alerts such as escalating alerts.

Mercedes commented that its current seat belt reminder system design starts a baseline alert once the criteria have been met; if the conditions of the seat belts at the occupied seats have not changed after 30 seconds, the system will escalate the warning. Mercedes stated that this approach does not cause excessive annoyance to drivers and does not negatively affect the efficacy of the warning system. Mercedes urged NHTSA to remove the continuous series requirement for manufacturers to develop systems with effective escalating alerts. Consumer Reports also commented that audible warnings should escalate.

Honda sought clarity on the “warning cycle” requirements as proposed. Additionally, it encouraged the agency to consider whether adopting a warning that is continuously active (i.e., 100 percent duty cycle) for a definite duration of 90 seconds would be as effective as the proposal to require an indefinite warning with a minimum duty cycle of 20 percent. Honda explained that its experience is that a continuous 90-second chime is sufficiently persistent and might offer greater effectiveness compared to an indefinite warning that delivers only a 6-second chime followed by a 24-second pause between chimes. IIHS, identifying the same concern, urged NHTSA to require auditory signals to be separated by no more than 3 seconds in addition to requiring a minimum 20 percent duty cycle.

IIHS, supported by MADD, Advocates and Public Citizen, and the National Association of Mutual Insurance Companies (NAMIC), requested that NHTSA set minimum requirements for the volume and fundamental frequency of an auditory reminder to ensure it is “loud and

clear” and will be noticed by vehicle occupants. IIHS provided supporting materials for the volume and fundamental frequency minimums that it requires. It also commented that NHTSA should require the same auditory reminder characteristics (e.g., volume, fundamental frequency, gap between signals, duty cycle) for the front and rear rows. It stated that consistency makes the requirements easier to implement for automakers, easier for consumers to understand, and would align with current practice.

#### Agency Response

After reviewing comments, we are finalizing the proposed audible warning requirements for both the front and the rear warnings with minor changes. The first change is that the front start-of-trip warning now must meet only the same minimum requirements as the rear change-of-status warning, because both are time-defined. The second change is that we are adding a 10-second maximum gap limitation, similar to Euro NCAP, to both of these warnings. Because this final rule requires that gaps longer than 3 seconds do not count toward the required duration for these two warnings, without a maximum gap limitation there would be no limit on the amount of time it would take for the warning to reach the 30 second minimum cumulative warning duration. Allowing audible warnings that take too long to meet the 30 second minimum cumulative warning duration could degrade the effectiveness of the warning. We also believe that this requirement will not impede the manufacturer’s design flexibility significantly and that these parameters meet the need for safety, are objective, and are practicable, because they provide an acceptable minimum level of effectiveness while allowing manufacturers latitude to optimize the warning for effectiveness and vehicle occupant acceptance. We continue to believe that the parameters stated for the front second phase warning – warning cycle, duty cycle, and chime frequency – are essential for an indefinite warning to meet the need for safety. Similarly, we believe that the 30-second front start-of trip-warning and rear change-of-status warning will be effective with the specified signal gap limitations.

We have concluded that specifying minimum requirements for chime frequency and duty cycle for the second phase front audible warning is critical for ensuring a minimum baseline of effectiveness. This approach is based on the existing research which suggests that warning signal characteristics—such as duty cycle, frequency, volume, or timbre—can be adjusted to balance effectiveness and consumer acceptance but also shows that there is a minimum level of effectiveness provided by requiring a 30-second repeating warning cycle, with a minimum 0.5 Hz chime frequency and a 20 percent duty cycle.<sup>193</sup> Because ECE R16 requires very short time-defined alerts for the front seat belt warning (30 seconds), a duty cycle requirement is not necessary. We are incorporating a duty cycle requirement because in the context of an indefinite warning this requirement ensures a minimum time that the audible warning chime will be active. Additionally, we are not incorporating one of the approaches taken by ECE R16 and Euro NCAP to limit gaps in the audible warning (that gaps longer than 3 seconds would not count toward the warning's total duration) because we do not have research suggesting that it would increase effectiveness. Additionally, a sole requirement that gaps longer than 3 seconds would not count toward the warning's total duration would be inadequate in the context of an indefinite warning. Therefore, at this time, the agency is making the judgement that specifying a maximum signal gap of 3 seconds, either with or without a duty cycle, unnecessarily limits manufacturer's flexibility for the speed-initiated warning. Finally, this final rule does not prevent the design of escalating alerts, as some manufacturers such as Mercedes suggested in their comments. The duty cycle and chime frequency are minimum requirements, and the warning cycle specification does not require each cycle to be identical. Manufacturers may design escalating alerts within the minimum requirements of this final rule.

Additionally, given the required duty cycle for the front indefinite warning, we do not need to incorporate a maximum signal gap (i.e., no gaps longer than 10 seconds) like the one used by Euro NCAP. Some comments suggested that the proposal contained a flaw: that given

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<sup>193</sup> *Id.*

the 20 percent duty cycle and 30 second warning cycle requirements, this rule would allow a warning that was active for 6 seconds, with a 24-second gap. However, this was not an error. Commenters did not demonstrate that the proposed warning would be ineffective, and that notion is inconsistent with available data. Increasing the duty cycle would, after a point, cause a reduction in signal gaps, even if no specific signal gap limitation were required. Therefore, if those commenters were correct, and the gap in the signal were a meaningful characteristic, we would expect higher duty cycles to increase effectiveness. However, the 2012 IIHS study on duty cycles, referenced in the NPRM, indicated that there was not a statistically significant difference in effectiveness between the 20 percent, 50 percent, and 100 percent duty cycles, which cycled over 30 second warning periods. This suggests that beyond the maximum gap established by a 20 percent duty cycle, reducing the gap does not increase effectiveness. Without demonstrable safety benefits, such a limit would unnecessarily restrict manufacturers' design flexibility. Therefore, we are not specifying a maximum signal gap in this final rule for the front seat belt indefinite warning. Only the time-defined front start-of-trip warning and the rear change-of-status warning have a signal gap rule (that gaps longer than 3 seconds would not count toward the warning's total duration) and maximum signal gap requirement (10 seconds). Importantly, meeting the requirements of this rule does not preclude designing an alert that complies with the signal gap rules in ECE R16. As an example, with a 20 percent duty cycle requirement and a gap duration of 3 seconds, a compliant alert could be active for at least 0.75 seconds regardless of the chime frequency.<sup>194</sup>

With regard to requests to harmonize the requirements for the front and rear audible alerts, we do not believe it is necessary to require that the alerts have the same minimum characteristics across seating positions. Instead, we structured this final rule so that manufacturers, if they choose, may design one audible alert that complies with the requirements

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<sup>194</sup> This was calculated as follows:  $(0.2 = 0.75 / (3 + 0.75))$  (duty cycle is the total amount of time an intermittent audible warning is active (.75 seconds) divided by the total warning cycle duration (time active plus the duration of the gap)).

for both the front and rear alerts. We also continue to believe that given the short duration of the rear change-of-status warning, it is not necessary to specify characteristics such as duty cycle, chime frequency, and warning cycle. As we stated in the NPRM, we believe establishing minimums for these characteristics is primarily needed for longer or indefinite alerts to ensure that the warnings have at least a minimum level of persistence. As such, since we have revised the requirements for the front seats so that the start-of-trip warning is required only to be at least 30 seconds long, we have decided that the audible portion of the start-of-trip warning should be subject to the same characteristics as the rear change-of-status warning. Therefore, as mentioned above, for consistency we are finalizing for both the front start-of-trip warning and the rear change-of-status warning only that inactive periods longer than 3 seconds would not be counted toward the total duration of the audible warning and that there be no gaps in the warning greater than 10 seconds. The proposed minimum characteristics for the audible component of the front seat belt warning, as finalized, will now only apply to the audible front seat second phase warning.

Finally, we are not incorporating the specifications for volume and frequency IIHS suggested. We have designed the final requirements to give manufacturer the flexibility to design warnings that are both effective and acceptable to consumers. We believe that sound volume and frequency can be used by manufacturers to make their warnings more effective and/or more acceptable, which is particularly important for an indefinite warning. Similarly, we are skeptical that a volume specification is needed because it has never been needed in the past. Since the early 1970s, FMVSS No. 208 has required an audible driver's seat belt warning with no additional audible warning requirements and manufacturers have been designing and implementing warnings under that structure without issue. Additionally, regarding frequency, IIHS indicated that nearly all systems tested already meet their suggested specification, so a regulatory requirement may not be needed. Nonetheless, as the new requirements are

implemented, the agency will monitor these characteristics and assess whether additional rulemaking action is warranted.<sup>195</sup>

## **6. Warning deactivation and acknowledgement and hardening**

In the NPRM, we proposed not to allow features which would permit the driver to acknowledge the warning and cancel it before the end of the required duration or to deactivate the warning for an entire trip or for a specified time period (thus preventing it from activating in the first place).<sup>196</sup> We also did not propose requiring features to harden the system against circumvention due to concerns about the cost and effectiveness of such features. We sought comment on both issues and whether these features would impact the effectiveness of the rule.

ECE R16 allows both short-term and long-term deactivation of the audible warning (with a variety of restrictions, such as that it be more difficult to effectuate a short-term deactivation than to buckle the belt). Euro NCAP does not provide any specifications for deactivation or acknowledgement of the warnings for the front seats; it allows acknowledgement only of warnings for rear seats, except for change-of-status warnings. Neither ECE R16 nor Euro NCAP requires hardening features.

### Comments

Some commenters suggested making the visual warning, audible warning, or both dismissible, and presented a variety of approaches. For example, Auto Innovators and HATCI suggested harmonization with IIHS and ECE R16. HATCI specified making the dismissal procedure more complex than buckling the belt. NADA noted that dismissal or suppression would help address consumer acceptance concerns with the indefinite warning. Auto Innovators also suggested allowing deactivation of the audible rear seat warning. Auto Innovators believes that this approach would minimize potential consumer acceptance issue in circumstances where there may be a frequent change in the status of rear row occupancy and movement of occupants

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<sup>195</sup> Accordingly, we explain in Section VI.C.4, Interaction with other vehicle warnings, that a change in the volume of the audible warning would not constitute an override of the warning.

<sup>196</sup> 88 FR 61674, 61704 (Sept. 7, 2023).

between seating positions such as ridesharing. Rivian recommended that NHTSA permit a reset or discontinue feature for instances in which a system with occupant detection detects that a seat becomes or is unoccupied to clear the audio-visual warning for front and rear occupants who exit the vehicle. Consumer Reports commented that it would be reasonable to allow drivers to “acknowledge and dismiss” warnings on a trip-by-trip basis to address drop-off situations, seat position changes, and situations involving fastening the wrong buckle.

Anonymous #24 and Anonymous #33 commented that a potential issue with the rear seat belt warning systems is the frequency with which individuals use rear seat space for storage or transportation of items large enough to trigger a seat belt warning system. Accordingly, Anonymous #24 argued that there should be an option for the vehicle operator to dismiss the warning in situations in which the seat belt reminder system is triggered by items other than people in the rear seat.

Regarding hardening features, Auto Innovators and HATCI did not support additional hardening features due to the added technical complexity and implementation cost that would be required to reduce the potential for intentional and inadvertent defeat and activation.

On the other hand, Ms. Tombrello commented that it is important to address occupants who may intentionally try to circumvent seat belt reminder systems such as a scenario in which seat belts are buckled while passengers sit on top of the belt.

GM commented that NHTSA should also consider allowing suppression or dismissal of the front seat reminder audible warning in specialty vehicles such as police cars to allow for cases where the officer needs to communicate, whether with other law enforcement, first responders, or on radio devices, without the interference of background chimes in the vehicle.

#### Agency Response

The final rule does not allow deactivation or acknowledgement and dismissal of the front or rear seat belt warnings. As 87.7 percent of front seat occupants already always use their seat belts, the large majority of the overall population will not encounter the indefinite warning and,

therefore, are unlikely to find it annoying. Furthermore, based on the Kidd and Chu study, we have at the very most only 8.4 percent (5.4 percent (never users) + 3.0 percent (44 percent x 6.9 percent of sometimes users)) of the total population that would not be accepting of this as a standard feature. Therefore, allowing deactivation or acknowledgement and dismissal, would reduce safety benefits of the final rule even though there is general acceptance of this feature. Even temporary dismissal can reduce effectiveness by increasing the time before a change-of-status situation is addressed. Additionally, warnings lose effectiveness if drivers regularly dismiss the warning. Instead of deactivation or dismissal, this final rule contains multiple provisions and changes from the NPRM designed to maximize consumer acceptance while retaining the effectiveness of the belt warnings. The alerts required are now either short duration (for which driver annoyance is low) or are active in situations where belt use is critical. For instance, the start-of-trip audible warning system for the front seats and the change-of-status audible warning system for the rear seats now only have a 30 second minimum duration, which is short enough to have only a limited consumer annoyance impact. An indefinite duration audible warning is required only for front seats for speeds at or over 10 km/h (6.2 mph), at which point allowing deactivation or dismissal not only reduces effectiveness but defeats the purpose of an indefinite alert. There is also a variety of research, cited throughout this document and in the NPRM, regarding the high level of consumer acceptance for seat belt warning systems.

Additionally, a few commenters such as Consumer Reports brought up scenarios that may generate false warnings, such as passenger pick-up and drop-off, or rear seat occupants switching seats during a trip, for which they argued that driver deactivation (or dismissal) is the appropriate response. This comment does not convince the agency that deactivation or dismissal is needed because in this final rule we have addressed many of these scenarios through other means. Regarding passenger pick-up and drop-off, this final rule allows systems to treat a door opening as the start of a new trip, resetting the change-of-status warning for the rear seats. For the front seats, the finalized requirements require only a visual change-of-status warning

(assuming that, because the vehicle is stopped in a pick-up and drop-off scenario, the second phase warning would not activate), but the door reset provision would still apply to that visual change-of-status warning. For seat-switching in the rear, this final rule now contains a provision allowing a system to deactivate the warning if the system has determined that rear occupants have switched seats.

We also received comments regarding items placed on the rear seat, which is addressed elsewhere in this final rule. We note here that this rule does not preclude designs that do not activate a passenger seat belt warning if the seat belt is fastened and no one is in the seat. Thus, nuisance warnings due to cargo could be prevented by buckling the seat belt or placing the cargo somewhere else. NHTSA understands that these provisions may not account for all scenarios and warnings may still cause some unneeded annoyance. However, we believe that this rule properly balances effectiveness with consumer acceptance. Therefore, NHTSA is not going to allow deactivation or dismissal in this final rule.

We also note two items in response to some commenters' requests to harmonize with ECE R16 to allow deactivation and dismissal of front warnings. First, regarding the visual alert, this final rule is harmonized with ECE R16 in that it does not allow dismissal. This is in part because visual warnings cause little annoyance to the driver and have a low impact on consumer acceptance. Second, commenters such as NADA stated that their reasons for seeking harmonization on deactivation or dismissal centered on consumer acceptance grounds. As noted, these concerns have largely been addressed through other means. Additional harmonization may reduce this rule's effectiveness even if, as some commenters suggested and ECE R16 requires, the rule were to require a short-term deactivation to be more difficult than buckling the belt. Therefore, we have determined not to harmonize on deactivation or dismissal of the audible warnings.

We have also decided not to incorporate required hardening features or features to prevent circumvention of the system because, as some commenters pointed out, they increase the

cost and complexity of warning systems without providing corresponding benefits. Although these requirements could increase benefits for the hardcore belt non-users, these benefits are unclear because most rear seat belt non-users are not hardcore and are less likely to intentionally circumvent the warning system.<sup>197</sup> We note that manufacturers do have the discretion to incorporate such features if they choose to. This decision harmonizes with ECE R16 and Euro NCAP, which do not require such features.

Finally, we are not including a deactivation provision for the front seat belt warning specific to law enforcement vehicles. FMVSS No. 208 has required a warning system for the driver's seat in law enforcement vehicles for many years without issue. Commenters did not suggest that extending the requirement to the front outboard passenger seat would create a concern. NHTSA understands that there may be additional considerations for law enforcement vehicles given some of the changes to the audible alert itself in this rule. However, currently NHTSA does not believe these considerations are sufficient to change the requirements specific to such vehicles. Like emergency vehicles, these vehicles are often modified by the purchaser to accommodate specific concerns, and the FMVSS do not prohibit such purchaser modifications. As with emergency vehicles, NHTSA will also monitor the situation and can modify this approach in future rulemaking actions, if necessary.

## **7. Vehicles with automated driving systems**

In the NPRM, NHTSA proposed incorporating certain language to tailor aspects of this rule to vehicles with ADS, which may be designed differently, to maintain the same level of occupant protection in vehicles equipped with ADS as in conventional vehicles. For example, such vehicles may not have a driver's designated seating position or may have multiple front outboard passenger seating positions. Therefore, we proposed that the front passenger warning apply to "any" front outboard passenger. The addition of the term "any" makes it clear that, in

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<sup>197</sup> Highway Loss Data Inst., Ins. Inst. for Highway Safety, *Unbelted: Adults Admit They Often Skip Belts in Rear Seat*, 52 Status Rep. 1, 3 (Aug. 3, 2017).

some vehicles, there may be more than one front outboard passenger seating position. We also noted that in a dual-mode vehicle, the left front seat is still by definition a driver's seat, regardless of the operational status of the vehicle, so a provision to just have a warning for the driver and right outboard passenger would be sufficient to assure that all front seat outboard occupants receive a warning. Additionally, because some ADS-equipped vehicles have one or no front outboard passenger seats, we also proposed to align this final rule with the 2022 final rule updating occupant protection standards to incorporate considerations for vehicles with ADS and apply the same seat belt warnings for front inboard passenger seats as front outboard seats. Finally, we noted that NHTSA was not prepared to propose a solution for the visibility of rear seat belt warnings for ADS-equipped vehicles and that it was beyond the scope of the proposed rule.

#### Comments

AVIA commented that as NHTSA continues to promulgate safety standards to integrate emerging technologies into motor vehicles, AVIA encourages the agency to ensure that any new regulatory requirements include considerations for how autonomous vehicles can meet those standards.

Tesla supported the proposed warning on vehicle start up for front outboard passenger seats because it aligns with manually driven vehicles as well as partial and full automation, but asked how the change-of-status warning for front seats requirement will be applied to autonomous vehicles.

#### Agency Response

We have added language to tailor aspects of the rule for vehicles with automated driving systems in order to maintain the same level of occupant protection as this final rule requires for conventional vehicles. Some of these elements are discussed in other sections of this document specific to aspects of the rule. For example, in Section VI.B.4 we discuss an exception to the front seat visual warning visibility requirement that is necessary for dual-mode ADS and in

Section VI.B.5 we address occupant detection as it relates to dual-mode ADS. Here, we note a few additional items.

First, we are finalizing without change two items from the NPRM: one, to apply the front seat belt warning requirements to “any” front outboard designated seating position and two, to apply the same seat belt warnings for certain front inboard passenger seats as front outboard seat. We did not receive comment specific to these items intended to accommodate vehicles with ADS that may not have conventional seating configurations.

Second, to accommodate other changes in the final rule, we have included language regarding telltale visibility as applied to certain vehicles with ADS to maintain the same level of occupant protection as this rule requires for conventional vehicles. As noted in Section VI.B.4, this rule requires the front outboard passenger seat belt visual warning to be visible only to the driver. Additionally, this final rule requires that for telltales associated with multiple front outboard seats, the seat with which each telltale is associated must clearly identify the seating positions for which the warnings are intended. This requirement is discussed further in Section VI.C.3. As many commenters pointed out and we explained, in vehicles with a driver, the front outboard passenger can receive the audible signal and the driver can communicate the additional information provided by a visual signal to the front outboard passenger. However, in vehicles with ADS, there may not be a driver’s designated seating position with a human driver who can receive and communicate this information. Instead, as we noted in the NPRM, in a vehicle without manually operated driving controls, one of the front passengers may be performing the management role for the duration of a trip, such as in the case of a parent and children. In this circumstance, the most appropriate recipient of the visual warning is likely to be a front passenger.

For these reasons, we are finalizing two provisions. First, we are finalizing as proposed that for vehicles that do not have a driver’s designated seating position, the visual warning for each front outboard passenger designated seating position must be visible from each front

outboard passenger designated seating position. Second, we are now requiring that for vehicles without a driver's designated seating position, for telltales associated with multiple front outboard seats, the seats with which each telltale is associated must clearly identify the seating positions for which the warnings are intended. These requirements maintain the same level of occupant protection as is required for conventional vehicles and is also consistent with the logic of the NPRM.<sup>198</sup>

As we stated in the 2022 final rule on occupant protection for vehicles with ADS, these requirements are intended to apply only to ADS-equipped vehicles that have seating configurations similar to non-ADS vehicles, *i.e.*, forward-facing front seating positions (conventional seating). As we stated in the 2022 final rule, additional research is necessary (some of which is currently underway) to understand and address different safety risks posed by vehicles with unconventional seating arrangements (*e.g.*, rear-facing seats or campfire seating), including with regards to seat belt reminder systems.<sup>199</sup> Therefore, as we stated in Section VI.B.3 of this document in response to AVIA's comment about front seat occupants exiting through a door not adjacent to their seat, considerations for vehicles with unconventional seating (and other related considerations, such as bi-directional vehicles) are out of scope of this final rule. Additionally, as noted in the NPRM, the visibility of rear seat belt warnings for ADS-equipped vehicles is also out of scope of this final rule because further research is needed before the agency proposes a solution. Research on this topic is underway.

Finally, we believe the final rule has addressed in prior sections Tesla's concern about change-of-status warnings for front seats in vehicles operating in an automated state.

## **8. Test procedures**

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<sup>198</sup> As discussed in Section VI.B.4, many commenters expressed concerns with redesign costs associated with a requirement that the telltale be visible to the passenger. Although NHTSA sought comment on aspects of the NPRM regarding vehicles with ADS, commenters focused their concerns on conventional vehicles. Therefore, NHTSA does not believe that such concerns are present to the same degree with vehicles without a driver's designated seating position.

<sup>199</sup> 87 FR 18560.

In the NPRM, NHTSA proposed that NHTSA could test any system under any combination of seat occupancy or seat belt use status. The proposed test procedures also specified how the agency would test a seat belt warning system with a designated seating position that is occupied. The finalized occupancy criteria (the test dummies and the height and weight criteria for human beings, to be used instead of test dummies at the manufacturer's option, that will be used to determine occupancy) are discussed in Sections VI.A.2.a.iv (rear) and VI.B.5 (front passenger). The NPRM also proposed that to pass the test, the human beings or test dummies used would be seated, the seat belt use and ignition conditions would be applied, and the required signals must operate (that is, either activate or not activate) accordingly. The test could be conducted with the seat and adjustable belt anchorages in any position. The NPRM also noted that for rear designated seating positions with occupant detection, the agency would perform the test with the seat in any position, the seat back in the manufacturer's nominal design riding position, and any adjustable anchorages in any position.

#### Comments

Auto Innovators requested that NHTSA publish the proposed test procedures used to evaluate vehicle compliance before issuance of the final rule. Auto Innovators stated that this request is particularly relevant given the differences in the requirements in the NPRM when compared to the current requirements of ECE R16, and stakeholders' desire for the opportunity to address any technical concerns before the rule or test procedure is finalized. In particular, Auto Innovators sought additional information regarding how NHTSA will evaluate the performance of an indefinite alert.

Auto Innovators also commented that the agency should more closely align its requirements with ECE R16 and Annex 18 to reduce test burden costs, in particular regarding the process for evaluating the conditions for warning activation. Auto Innovators also commented that the proposal increases the complexity of evaluating vehicle compliance and may require

specialized equipment or similar measurement devices to verify the characteristics of the proposed audible warning.

Finally, Auto Innovators recommended that NHTSA ensure a technology neutral approach, both for performance requirements and test procedures, towards the means used to determine occupant detection.

#### Agency Response

The final rule incorporates several changes to the proposed regulatory text for the test procedures:

- *Definition of “seat centerline”* – Both the proposed and finalized test procedures specify the seating of the test dummy by reference to the “seat centerline.” The final regulatory text includes a definition of this term.
- *Occupancy criteria* – The proposed regulatory text specified these in the definitions section. In the final rule these have been moved to the test procedures section and edited for clarity.
- *Test procedures* – The final rule clarifies several aspects of how the test may be carried out. The final rule does not include the proposed specification that if a human occupant is used for testing, that they be dressed in a cotton T-shirt, full length cotton trousers, and sneakers, instead we are specifying that the dummy or human occupant may be clothed in any manner because clothing should not change the performance of the system. With respect to carrying out testing, the proposed regulatory text simply stated, “Place the ignition switch in the “on” or “start” position and verify that the seat belt warnings function as specified in S7.5(b) and S7.5(c), for any combination of seat belt use or seat occupancy at any designated seating position(s).” The final rule clarifies that NHTSA could test any of a number of test parameters: “Verify that the seat belt warnings function as specified in S7.5(b) and S7.5(c), for any combination of seat belt use (at any seating position), seat occupancy (at any seating position), removable seat electrical connection

status (connected or not connected, for any removable seat), vehicle speed, and door status (open or closed, for any door), except that the door shall not be opened when the vehicle is in motion.”

NHTSA is not publishing the compliance laboratory test procedures before publishing this final rule as requested by Auto Innovators. To investigate whether specific vehicles or products comply with the FMVSS, NHTSA’s Office of Vehicle Safety Compliance (OVSC) contracts with labs to conduct compliance testing. OVSC laboratory test procedures are prepared for the limited purpose of use by contracted independent laboratories conducting compliance tests for the OVSC. OVSC laboratory test procedures are distinct from regulatory test procedures that are included as part of most FMVSS. OVSC laboratory test procedures are generally based off of the regulatory test procedures in specific FMVSS but are prepared by the agency to give contracted labs specific instructions on how to conduct a specific test. The OVSC laboratory test procedures are simply agency guidance for contracted labs and do not constitute official agency action (e.g., a rule). In some cases, the OVSC laboratory test procedure, or the report produced as a result of the work performed by the contracted laboratory, does not include all of the various FMVSS minimum performance requirements. Because the OVSC laboratory test procedures are not part of the regulation, NHTSA is not required to publish them prior to or with this final rule. Typically, NHTSA will publish the OVSC laboratory test procedures on its website for transparency. NHTSA plans to publish the OVSC test procedures for this rule in the future.

NHTSA also declines to specify in the FMVSS the exact amount of time that it will test the indefinite front outboard seat belt warnings. NHTSA believes that specifying a finite testing duration would weaken the rule by enabling systems that are not indefinite to meet the test. Manufacturers must certify that their products comply with all applicable FMVSS, and they determine what steps are necessary to ensure that every product manufactured meets the

applicable requirements. The procedures in this rule are sufficiently detailed and objective for manufacturers to self-certify that their systems meet the indefinite warning requirement.

NHTSA agrees with Auto Innovators that this final rule should be technology neutral toward occupant detection, and this rule is technology neutral. As discussed in Section VI.B.5, this final rule does not require occupant detection capability for the driver's designated seating position. It provides manufacturers the flexibility to optionally choose to certify compliance to the same occupant detection criteria applied to the outboard passenger seats. Additionally, while the final rule requires occupant detection capability for the front outboard passenger designated seating position and specifies seat occupant criteria for testing front outboard passenger designated seating positions and rear designated seating positions, it does not specify the methods that must be used to detect occupancy. Manufacturers may choose occupant detection technologies at their discretion, so long as they can certify that the vehicle meets the requirements of this final rule and the test procedure it specifies. The same is true for the technology that OEMs may use to detect whether the seat belt is in use.

Throughout this final rule NHTSA has considered harmonization and has taken care, where possible, to incorporate performance requirements and test procedures that can enable systems to also meet ECE R16 requirements to minimize testing and compliance costs for manufacturers. Therefore, while this final rule does not fully align with the test procedures in ECE R16 Annex 18, they are largely compatible. As noted in the NPRM, ECE R16 operates in a type approval regime, while the FMVSS use self-certification and must be objective. For this reason, the final rule departs from Annex 18 when necessary to ensure that it is objective. Because of these necessary differences to meet statutory obligations, full alignment of the test procedures is not achievable.<sup>200</sup>

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<sup>200</sup> The Safety Act establishes a self-certification process in which vehicle and equipment manufacturers certify that their products comply with all applicable FMVSS, which establish minimum performance standards that the product must meet. It is up to manufacturers to determine what steps are necessary to ensure that every product manufactured meets or exceeds the applicable requirements before the products are imported, sold, offered for sale, or introduced into interstate commerce in the United States.

Finally, with respect to Auto Innovators' concern about specialized test equipment needed to verify compliance with the required audible warning characteristics, this final rule does not establish test procedures that necessitate specialty equipment that laboratory test facilities would not already have readily available (e.g., a stopwatch) to verify compliance of the audible warnings.

## **VII. Regulatory Alternatives**

In the proposal, NHTSA considered several major alternatives: harmonizing with the standards set in ECE R16 and Euro NCAP; requiring occupant detection and enhanced warning signals for the rear seat belt warning; requiring a warning for the front center seat; requiring an audio-visual seat belt warning for the front outboard seating positions with a duration not less than 90 seconds; and a few non-regulatory alternatives. For three of these alternatives (rear-seat occupant detection, front center seat warning, and 90-second front warning), NHTSA quantified the costs and benefits (see Section VIII.B). Although the proposal followed ECE R16 and Euro NCAP in a variety of ways, it also deviated from them in some important respects. The NPRM explained this deviation in detail. The NPRM also explained NHTSA's tentative reasoning for not selecting the other regulatory alternatives.

### Comments

NHTSA received many comments concerning the regulatory alternatives. Comments regarding alternatives for specific aspects of the proposal are discussed throughout the preceding sections of the preamble. Many of these comments concerned harmonization with the relevant provisions in ECE R16, Euro NCAP, and the IIHS protocol. Safety advocates in several instances favored final requirements that would be more stringent or demanding than those requirements or protocols. On the other hand, industry commenters generally – although not always – commented in support of greater alignment with them. In this section, NHTSA summarizes and addresses comments that concerned harmonization generally, as well as comments concerning non-regulatory alternatives.

In addition to the more specific comments already addressed in this document, several industry commenters commented more generally in favor of harmonization with ECE R16 and Euro NCAP. Auto Innovators, Hyundai, HATCI, IEE, NAMIC, and Nissan commented in support of harmonizing the requirements with ECE R16 and Euro NCAP. Auto Innovators commented that harmonization with ECE R16 provides the agency with the greatest opportunity to ensure an objective and practical approach that meets the need for safety, while also minimizing regulatory burden and corresponding delays associated with developing region-specific features for the U.S. market. Auto Innovators expressed concerns with several areas where the agency has proposed alternatives to the requirements of ECE R16, which have already been widely adopted and implemented in other global markets. Auto Innovators argued that several fundamental aspects of the proposal (such as the triggering conditions) differ from the systems that consumers may have experienced in both previous and current model year vehicles and would result in significant negative pushback from the public if the final rule is adopted without change.

Hyundai similarly commented that although it supported the proposal, its largest caveat to full support was the proposal's departure from ECE R16's requirements. Hyundai characterized these differences as minor in the sense that they do not represent any fundamental change to the core elements or safety benefits of NHTSA's proposal but stated that these "minor" differences could have significant adverse implications with respect to safety benefits, customer acceptance, unnecessary country-specific designs, costs, and required lead times. Hyundai commented that the benefits of international regulatory harmonization have been recognized and espoused by government and industry organizations, including NHTSA, for many years. Hyundai argued that these benefits include improved regulatory and NCAP provisions that reflect the international consensus of leading government and industry experts, more efficient development and timely enactment of state-of-the-art vehicle safety provisions, enabling international trade and cooperation by reducing nontariff barriers, more effective use of

finite government and industry resources, avoidance of country-specific requirements, and significantly reduced consumer costs.

HATCI also noted that the requirements that the agency has proposed would require significant interior redesign which would require longer design lead time. HATCI encouraged the agency to further harmonize with established international regulations and rating programs, allow for more flexible telltale design, and extend the effective dates.

GM, NSC, SRN, Hyundai, HATCI, and an individual commenter also supported the inclusion of seat belt reminder ratings in NCAP. Hyundai recommended that NHTSA coordinate its FMVSS and NCAP initiatives to pursue maximum safety benefits in the shortest feasible timeframes; by virtue of being voluntary, NCAP enables vehicle safety technology to be socialized in a non-compulsory way to enhance consumer acceptance. Hyundai suggested that a follow-on NCAP action might incentivize some form of a so-called “Seat Belt Assurance System” (e.g., limiting infotainment functionality or constraining vehicle speed when an occupant is unbuckled) to further motivate buckling up. Hyundai stated that this suggested NCAP update could also specify requirements regarding bypassing/disablement to obtain credit for the specified Seat Belt Assurance System. Hyundai argued that a timely progression of FMVSS and NCAP actions by NHTSA could appreciably improve seat belt use rates and consumer acceptance of these vehicle interventions. SRN commented that if NHTSA did not require the full-status rear seat warning system, it could reward vehicles with these more effective systems with NCAP points.

Consumer Reports agreed with NHTSA’s decision not to pursue either of the non-regulatory alternatives presented in the ANPRM.

#### Agency Response

Because NHTSA is amending FMVSS No. 208 to include these new requirements, it is not necessary to incorporate these requirements into NCAP. To help consumers make purchasing decisions, NHTSA currently indicates on a vehicle’s NCAP safety rating webpage if

the vehicle has a seat belt reminder system for the front and/or rear passengers. NHTSA may at a later date, as suggested by some commenters, consider using NCAP to incentivize enhanced rear seat belt reminder systems. NHTSA also concurs with Consumer Reports not to pursue either of the non-regulatory alternatives presented in the ANPRM.

In developing the requirements in this final rule, NHTSA considered the requirements in ECE R16, as well as materials published by Euro NCAP and IIHS. NHTSA agrees with the commenters that harmonization is an important goal and agrees that in some specific instances that the proposal should be modified to align more closely with ECE R16, Euro NCAP, and IIHS.

Executive Order 13609 provides that international regulatory cooperation can reduce, eliminate, or prevent unnecessary differences in regulatory requirements. Similarly, the Infrastructure, Investment, and Jobs Act directs that “[t]he Secretary [of Transportation] shall cooperate, to the maximum extent practicable, with foreign governments, nongovernmental stakeholder groups, the motor vehicle industry, and consumer groups with respect to global harmonization of vehicle regulations as a means for improving motor vehicle safety.”<sup>201</sup> (These directives are also discussed in the Regulatory Analyses section.) At the same time, the Safety Act authorizes NHTSA to establish motor vehicle safety standards that, among other things, meet the need for safety and are practicable.

Consistent with these directives, and after NHTSA has carefully considered the comments, the final rule more closely aligns with those regulatory alternatives where warranted but continues to deviate from them where necessary. The preceding sections of this document discuss in detail the ways in which the final rule follows and differs from these regulatory alternatives and explains why we believe the departures are justified. The major provisions in the final rule and the regulatory alternatives, including the differences between them, are summarized in table 10.

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<sup>201</sup> H.R. 3684 (117th Congress) (2021) section 24211.

**Table 10 – Comparison of Final Rule with Regulatory Alternatives**

Topic	Final Rule	UN ECE R16	Euro NCAP	IIHS
<b>Rear Seat Belt Warning Requirements</b>				
Applicability	Excludes small school buses, law enforcement vehicles, and ambulances	Excludes all small buses and more categories of special-purpose vehicles	Excludes commercial vehicles and most vehicles over 3,500 kg	N/A
Occupant detection	Not required	Not required	Awards points only for systems with occupant detection	Not required
Visual Warning on vehicle startup				
Type of information conveyed by visual signal	How many or which seat belts are in use and/or not in use	Indicates at least all rear seats to allow the driver to identify any seat where the belt is not in use	Indicates the rear seat belts in use and not in use	Whether the seat belt at each rear seating position is in use or not in use
Triggering Conditions	Ignition switch on/start or (for EVs) propulsion activation	Master control switch activated	Ignition switch is engaged (engine running or not)	Engine/motor on; allows 10-second delay
Seat Occupancy Criteria	6-year-old	5th percentile female	5th percentile female	Seated human or dummy in front passenger seat and human in rear seat (unspecified size)
Duration	60 seconds	60 seconds	60 seconds	60 seconds
Audio-Visual Change-of-status warning				
Duration	30 seconds	30 seconds	60 second visual warning; 30 second audible warning	30-seconds
Triggering Conditions	Fastened belt becomes unfastened, the vehicle is in forward or reverse, and all rear doors remain closed	Fastened belt becomes unfastened and certain distance, time and/or speed threshold(s) are exceeded	Fastened belt becomes unfastened, certain distance, time and/or speed threshold(s) are exceeded, and all rear doors remain closed	Fastened belt becomes unfastened, certain distance, time and speed threshold(s) are exceeded, and all rear doors remain closed
<b>Front Seat Belt Warning Requirements</b>				
Applicability	Excludes all heavy vehicles	Does not exclude heavy vehicles used for carrying goods	N/A	N/A
Front Seating Positions	Front outboard passenger and driver (not center seat)	All positions in the same row as the driver	All front row positions	Front outboard
Visual Warning – start-of-trip <sup>202</sup>				

<sup>202</sup> The final rule makes no distinction between start-of-trip and change-of-status visual warnings. It has been combined into one single visual warning requirement, so the triggering and duration characteristics summarized here are for the single visual warning requirement.

Topic	Final Rule	UN ECE R16	Euro NCAP	IIHS
Triggering Conditions	Seat occupied, belt unfastened, ignition on/start or (for EVs) propulsion activation	Belt unfastened, ignition or master control switch engaged	Belt unfastened, ignition switch engaged	Concurrent with audible
Duration	Until belt is fastened	30 seconds	Until belt is fastened	Concurrent with audible
Visual Warning – Change-of-Status				
Triggering Conditions	Seat occupied, belt unfastened, ignition on/start or (for EVs) propulsion activation	If belt remains unfastened and certain distance, time, and/or speed threshold (25 km/h (15.5 mph)) are exceeded	Belt unfastened, speed over 25 km/h (15.5 mph)	Concurrent with audible
Duration	Until belt is Fastened	At least 30 seconds not counting gaps over 3 seconds	Until belt is fastened	Concurrent with audible
Audible Warning – First Phase				
Triggering Conditions	Seat occupied, belt unfastened, ignition on/start or (for EVs) propulsion activation	If belt remains unfastened and certain distance, time, and/or speed threshold (25 km/h (15.5 mph)) are exceeded	Must be deployed before and certain distance, time, and/or speed threshold (25 km/h (15.5 mph)) are exceeded ("final" signal if other, higher thresholds are met)	Seat occupied, belt unfastened at ignition, continuous forward motion of at least 10 km/h (6.2 mph)
Duration	30 seconds	At least 30 seconds	May not exceed 30 seconds ("final" signal at least 90 seconds)	90 seconds
Audible Warning – Second Phase				
Triggering Conditions	Seat occupied, belt unfastened, and a speed $\geq 10$ km/h (6.2 mph)	Fastened belt becomes unfastened and certain distance, time and/or speed threshold(s) (25 km/h (15.5 mph)) are exceeded	Fastened belt becomes unfastened, vehicle speed over 25 km/h (15.5 mph) ("final audible signal" if over 40 km/h (24.9 mph))	Occupied seat, belt unfastened, continuous forward motion of at least 10 km/h (6.2 mph)
Duration	Until belt is fastened or speed $< 10$ km/h	At least 30 seconds	At least 90 seconds	90 seconds
Visual Warning Characteristics	Must provide telltale specified in FMVSS No. 101, Table 2, the seat to which the telltale is associated must be clearly identified	Specifies image identical to FMVSS No. 101, Table 2	N/A	Indicate an outboard front-row seating position with an unfastened belt
<b>Other Requirements</b>				
Audible Warning Characteristics				
Cycle, Chime Frequency, Signal Gaps	Front First Phase and Rear: Gap limitations  Front Second Phase: Specifies duty cycle, warning cycle, and	Gap limitations	Gap limitations	Gap limitations

Topic	Final Rule	UN ECE R16	Euro NCAP	IIHS
	chime frequency. No gap limitations.			
Volume	No volume requirement	“easily recognizable by the driver”	Final audible warning must be “loud and clear”	Must be between 20 and 20,000 Hz and must include at least one dominant frequency between 500 and 2,250 Hz.
Warning Deactivation, Acknowledgement, and Dismissal	Not permitted	Short and long-term deactivation of the audible warning with limitations, including that it must be more difficult to effectuate a short-term deactivation than to buckle the belt	Acknowledgement allowed for rear seats but not for the change-of-status warning	Rear visual signal may be cancelled by the driver

### VIII. Overview of Benefits and Costs

NHTSA has prepared a Final Regulatory Impact Analysis (FRIA) that assesses the benefits, costs, and other impacts of this final rule.<sup>203</sup> For a more detailed discussion, please refer to the FRIA. The following sections present the benefits and costs of the final rule requirements for the rear and front SBWSs and the three major regulatory alternatives considered. It is important to note that the incremental benefits presented in the section stem not from the SBWS’s function itself, but instead result from the increase in seat belt use brought about by the SBWS. Therefore, the incremental benefits associated with the final rule are comprised of the fatalities and non-fatal injuries prevented as a result of the increase in seat belt use from the SBWS.

#### A. Final Rule Requirements

NHTSA quantified the benefits and costs of the final rule requirements. This section presents a summary of the benefits and costs for the requirements on rear seat belt warning systems, front outboard seat belt warning systems, and the combined costs and benefits for both warning systems.

<sup>203</sup> The FRIA is available in the docket for this final rule and may be obtained by downloading it or by contacting Docket Management at the address or telephone number provided in the ADDRESSES section of this document.

## 1. Rear seat belt warning system

The September 2023 NPRM sought comment on the potential effectiveness, benefits, and costs of a rear seat belt warning.

### Comments

1. Safety benefits for rear SBWS are underestimated: Consumer Reports commented in support of the proposed rule stating that the preliminary regulatory impact analysis (PRIA) likely underestimates the safety benefits associated with the requirements for the rear seats. Consumer Reports commented that the analysis did not factor in the technological advancements of current vehicle fleets which will likely increase the rate of injury for unrestrained rear seat passengers. More specifically, Consumer Reports noted that crash avoidance systems that are associated with hard braking and pre-crash maneuvers may result in an increased rate of injury to unrestrained rear seat passengers.

### Agency Response

Regarding Consumer Reports' comment on underestimating the benefits associated with rear SBWS, NHTSA has updated the target population in the final rule using the most recently available data along with adjustments to account for safety impacts of new required safety technologies that have yet to be applied to the fleet. These updates in the final rule correctly reflect the benefits for rear SBWS. This analysis does not project changes in ridership between front and rear seat occupants as such projections would introduce uncertainty into the analysis. However, if ride sharing services increase rear seat occupancy, it is possible that benefits for rear seat occupants could be greater than those estimated in this FRIA.

2. Require occupant detection for rear seats: Commentors including Consumer Reports and NSC urged NHTSA to require SBWS with occupant detection for rear seats. These commentors also requested that the agency estimate benefits of the case that manufacturers would choose to implement negative-only or full-status warning system stating that the projected increases in seat belt use from the rule would likely be greater if NHTSA required the full-status

compliance option for all applicable vehicles. Consumer Reports, citing findings of an IIHS study,<sup>204</sup> noted that benefits for rear seat occupants may be underestimated as NHTSA did not account for increases in rear seat passengers resulting from consumers increasingly using ride sharing services in recent years.

### Agency Response

The final rule does not require occupant detection for the rear SBWS but permits it. Based on comments received, the final rule differs from the proposed rear SBWS requirements by permitting positive-only, negative-only, and full-status SBWS without the use of occupant detection. We believe that while the full-status system (with occupant detection) does provide the driver with the most information, as we explained in the NPRM, we continue to believe that the other allowable types of systems without occupant detection would provide the driver with sufficient information to easily determine whether and where there are any unbuckled occupants and request that they fasten their seat belts. Although some vehicle manufacturers may implement warning systems with occupant detection, NHTSA estimated benefits based on vehicle manufacturers meeting the minimum requirements. Therefore, NHTSA estimated the incremental benefits and costs associated with the least costly compliance option, which is a rear SBWS without occupant detection.

The study by Kidd and O'Malley, cited by Consumer Reports, compares the effectiveness of SBWS with different warning durations and system interlocks in increasing seat belt use. The study found that enhanced reminders, in particular more persistent reminders, are more effective in increasing seat belt use. Although system interlocks are effective in increasing seat belt use, they are found to be much less acceptable than audible reminders and more likely to be circumvented. The 2019 IIHS study by Kidd (used in the PRIA and in this final rule) found that

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<sup>204</sup> Kidd and O'Malley titled "Increasing seat belt use in the United States by promoting and requiring more effective seat belt reminder systems."  
<https://pubmed.ncbi.nlm.nih.gov/37267012/#:~:text=If%20every%20vehicle%20in%20the,85.9%25%20in%20the%20rear%20row.>

moving from a 7-second warning to either a 90-second or indefinite duration warning increased seat belt use for part-time users by 30 percent and 34 percent respectively. Overall, these studies provide evidence that the relative annoyance or duration of a warning increases the effectiveness of a SBWS. However, they do not provide any data that can be used to estimate the increase in seat belt use generated by adding occupant detection to the rear seat SBWS.

Due to a lack of data, NHTSA is unable to estimate the increase in seat belt use for a SBWS with occupant detection compared with a SBWS without occupant detection. Therefore, the agency is unable to estimate incremental benefits for the regulatory alternative with occupant detection. Instead, NHTSA considered how much more effective a SBWS with occupant detection would need to be to generate the same net benefits as the final rule, which allows for a SBWS without occupant detection in the rear seat. Overall, a SBWS with occupant detection would need to increase seat belt use by approximately two to three times that of a SBWS without occupant detection to generate the same level of net benefits. As it is not likely that a SBWS would be two or three times as effective as one without occupant detection, this regulatory alternative was not selected. However, while occupant detection was not included as a requirement in the final rule, the finalized requirements do allow systems that have occupant detection.

3. Cost burden for requiring SBWS on rear seats for high occupancy vehicles: Mercedes-Benz AG commented on the cost burden of implementing SBWS for rear seats in high occupancy vans. The commenter noted that for each removeable seat, an electronic control unit (ECU) would be required along with other hardware components and corresponding software. Additionally, one commenter indicated concern that the agency did not fully account for the potential burden on industry; in particular, in cases in which businesses will incur the cost of adding SBWS to vehicles with a large number of rear seats, such as vans and buses.

#### Agency Response

In estimating the costs associated with the final rule, the agency made use of end-user costs estimates from a teardown study. Those unit costs were then applied on a per-seat basis to the average number of seats per vehicle and average number of new light vehicles sold annually to estimate the total annual cost. NHTSA did not estimate costs on a per-manufacturer or per-business basis but instead provided the total annual cost to end users. This estimate reflects not only the cost of materials and labor incurred by manufacturers, but also non-production costs and profit reflected in the price passed down to consumers. Additionally, while the per-vehicle cost may vary based on the number of seats per vehicle, in vehicles with more rear seats, both costs and benefits will increase. While costs increase based on the number of seats in a vehicle, benefits increase not only based on both the number of restrained occupants that avoid injury due to their use of seat belts, but also due to the reduction in potential injuries from harmful interactions between unrestrained occupants.

4. Lack of harmonization with existing standards increases cost: Commenters, including Auto Innovators and Tesla, encouraged harmonizing with other regulatory and safety ratings requirements. More specifically, Auto Innovators stated that the agency should consider potential costs associated with redesign due to misalignment with ECE R16.

Agency Response: Throughout this final rule NHTSA has considered harmonization and has taken care to incorporate performance requirements and test procedures that can, in many cases, enable systems to also meet ECE R16 requirements to minimize testing and compliance costs for manufacturers. However, NHTSA declines to fully harmonize with the test procedures in ECE R16 Annex 18. Since NHTSA's regulations follow a self-certification approach, it is important to include certain information in the FMVSS test procedures to ensure that they are objective and properly test for compliance with this final rule, which may not be necessary for ECE R16 testing.

In general, the rear seat belt warning system requirements in this final rule are consistent with those in ECE R16 and Euro NCAP. One major difference is that ECE R16 evaluates

occupant detection using the 5th percentile female dummy while the final rule specifies using a 50th percentile 6-year-old child or equivalent. For the reasons explained in a previous section, this final rule addresses a MAP-21 mandate and requires, if an occupant detection system is provided, that the system be able to detect children in the rear seats. The weight of a 5th percentile female dummy is greater than that of many children aged 6 to 16 years old and so it is not an appropriate surrogate for evaluating child occupancy.

### Summary of Analysis and Results

Based on the Fatality Analysis Reporting System (FARS) and the Crash Investigation Sampling System (CISS) data from 2017 through 2021,<sup>205</sup> on average 930 unrestrained rear seat occupants were killed in crashes and 15,380 were injured annually.<sup>206</sup> After adjusting these to account for future decreases in fatalities and injuries projected to occur in the absence of the finalized requirements due to the introduction of other mandatory safety technologies (e.g., electronic stability control), the analysis estimates a baseline of, on average, 822 fatalities and 11,409 injuries to unrestrained rear seat occupants each year.<sup>207</sup> This is the overall target population for rear seat occupants—the annual deaths and injuries that the final rule requirements are aimed at reducing.

We estimated the benefits resulting from the final rule rear seat belt warning requirements. The benefits are the fatalities and injuries that we estimate would be prevented by the finalized requirements. The benefits depend, principally, on the effectiveness of seat belts in preventing deaths and injuries and the expected increase in seat belt use due to the finalized rear seat belt warning system requirements. Seat belt effectiveness in mitigating fatalities for rear seat occupants 11 years of age and older is 56 percent for passenger cars and 74 percent for light trucks and vans.<sup>208</sup>

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<sup>205</sup> The target population in the PRIA reflected the 2011-2015 FARS and 2011-2015 NASS/CDS data. The FRIA updated the target population to reflect more recent data. The NASS/CDS data previously used did not reflect injury data for vehicles older than ten years which may have underestimated injuries.

<sup>206</sup> See FRIA, appendix A.7.

<sup>207</sup> See FRIA, tables 25 and 26.

<sup>208</sup> See FRIA, table 33.

NHTSA believes that the minimum required warning signal characteristics would be effective at informing the driver of the use status of the rear seat belts and facilitating the driver to request that a rear passenger fasten an unfastened belt. A seat belt warning system can increase rear seat belt use in two ways: it can remind an occupant to fasten the occupant's belt, and it can inform the driver that a passenger is unbuckled, so that the driver can request the occupant fasten the occupant's belt.<sup>209</sup> Without a rear seat belt warning, the driver must turn around to ascertain whether a rear seat occupant is using a seat belt (or ask the occupant); in some vehicles, belt use may not be evident to the driver, even if he or she turns around, due to line-of-sight limitations. As noted above, in NHTSA's 2015 survey, 65 percent of drivers of vehicles equipped with rear seat belt reminders reported that the rear seat belt reminder made it easier to encourage the rear seat passengers to buckle up.<sup>210</sup> Also, as noted earlier, part-time seat belt users – the predominant non-user group – are amenable to seat belt warnings. In addition, children, who might be particularly compliant with driver requests, are proportionally much more likely to be rear seat passengers than are adults.<sup>211</sup>

We believe that any of the allowable rear seat belt reminder systems would be effective at accomplishing this goal. While some systems provide more information than others, and some would require the driver to fill in some informational gaps, even the most basic system (a RSBWS without occupant detection) would inform the driver about which belts are or are not fastened; the driver would readily be able to determine whether there were any unbelted occupants. We also believe that the 60-second visual warning would be effective. NHTSA could have proposed a more intrusive warning signal, such as an audible warning and/or a longer-duration visual warning. However, because such warnings necessitate occupant detection and we are not requiring occupant detection, we are also not requiring more aggressive warnings.

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<sup>209</sup> Motoyuki Akamatsu et al., Assessment Method of Effectiveness of Passenger Seat Belt Reminder. 2012-01-0050, SAE International (2012).

<sup>210</sup> Survey of Principal Drivers of Vehicles with a Rear Seat Belt Reminder System at 47.

<sup>211</sup> Matthew J. Trowbridge & Richard Kent, Rear-Seat Motor Vehicle Travel in the U.S.: Using National Data to Define a Population at Risk. *Am. J. Prev. Med.* 37(4), at 322 (2009).

NHTSA estimated the effectiveness of the rear seat belt warnings. Available research regarding seat belt use indicates that seat belt warning systems are effective at increasing seat belt use; however, estimates of the amount of increased belt usage that can be attributed to warning systems vary. In arriving at our estimates of increased seat belt usage from SBWS for rear seats, we examined current seat belt use rate in rear seats and the results of research conducted by NHTSA and others on percent increase in seat belt use for different types of warning systems for front seat occupants, as well as information submitted in response to the request for comments. For rear seat passengers 11 years old and older, we used a “low” estimate of 3.4 percent increase in seat belt use, and a “high” estimate of 5.1 percent increase in seat belt use. For rear seat passengers from six to ten years old, we used a low estimate of 0.27 percent and a high estimate of 0.41 percent. (The estimated increases for younger passengers are much lower because they already have high rates of seat belt use). For simplicity, we refer to these scenarios as “Low” and “High.”<sup>212</sup>

Based on these belt and warning system effectiveness estimates, we estimate that the rear seat belt warning requirements would prevent 26 fatalities and 148 injuries annually under the “Low” scenario. Under the “High” scenario, we estimate that 39 fatalities and 221 injuries would be prevented annually.<sup>213</sup> See table 11. Another way to measure benefits is by calculating equivalent lives saved. Equivalent lives saved are the number of prevented fatalities added to the number of prevented injuries, with the prevented injuries expressed in terms of equivalent fatalities (that is, with an injury expressed as a fraction of a fatality, so that the more serious the injury, the higher the fraction). The estimated equivalent lives saved are presented in table 12 at the 3 percent and 7 percent discount rate.<sup>214</sup>

**Table 11 – Estimated Annual Benefits –  
Lives Saved and Injuries Prevented For SBWS without Occupant Detection (Rear Seats),  
with Estimated Low and High Percentage Point Increase in Belt Use**

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<sup>212</sup> See FRIA section 4.2, “Effect of SBWS on Seat Belt Use Rates for Rear Seat Occupants.”

<sup>213</sup> See FRIA table 47.

<sup>214</sup> The 3 percent and 7 percent discount rates are in accordance with OMB Circular A-4.  
<https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-4.pdf>

<b>Injury Level</b>	<b>Low</b>	<b>High</b>
<b>MAIS 1</b>	36	54
<b>MAIS 2</b>	80	120
<b>MAIS 3</b>	26	38
<b>MAIS 4</b>	4	6
<b>MAIS 5</b>	1	2
<b>Total Injuries</b>	148	221
<b>Fatal</b>	26	39

**Table 12 – Estimated Annual Benefits –  
Equivalent Lives Saved – SBWS without Occupant Detection (Rear Seats)<sup>215</sup>**

<b>Belt Use Increase</b>	<b>Undiscounted</b>	<b>3 percent Discount Rate</b>	<b>7 percent Discount Rate</b>
<b>Low</b>	36.22	29.98	24.31
<b>High</b>	54.47	45.09	36.55

We also estimated the costs of the finalized requirements. To comply with the minimum requirements (a positive-only system or negative-only/full-status system without occupant detection), the system would need to have seat belt buckle sensors (to determine if the belt is fastened) and wiring and wire conduits to provide information on the belt buckle status from the rear seats to the computer processor controlling the warning system.<sup>216</sup> Based on the results of NHTSA’s teardown analysis, we estimate a cost of \$6.28 per seat. Given an average of 3.12 rear seats per vehicle, this yields a final cost of \$19.59 per vehicle. Based on this per-vehicle cost, the cost to the fleet to comply with the finalized minimum requirements is \$166.4 million.

Based on the forgoing, we performed benefit-cost and cost-effectiveness analyses. A benefit-cost analysis calculates net benefits, which is the difference between the benefits flowing from injury and fatality reductions and the cost of the rule. Our net benefit estimates are presented in table 13. The cost-effectiveness analysis derives the cost per equivalent life saved,

<sup>215</sup> See FRIA tables 68 and 70.

<sup>216</sup> The final rule is based on performance requirements, and as discussed previously, vehicle manufacturers are not restricted to using seat belt buckle sensors to determine belt usage. For example, spool-out sensors could be used instead of seat belt buckle sensors, but for the purposes of its compliance test NHTSA will consider a belt to be “not in use” when the belt latch is not fastened. We assume most manufacturers will likely use buckle sensors and that the cost is the same for seat belt buckle sensors as for spool-out sensors.

which is equal to the total cost of the rule divided by the total fatal equivalents that it prevents.

These estimates are presented in table 14.

**Table 13 – Annual Monetized Benefits, Costs, and Net Benefits – SBWS without Occupant Detection (Rear Seats)<sup>217</sup>  
(2020 Dollars, in Millions)**

Seat Belt Use Increase	3 percent Discount Rate			7 percent Discount Rate		
	Benefits	Cost	Net Benefits	Benefits	Cost	Net Benefits
<b>Low</b>	\$357.78	\$166.44	\$191.34	\$290.05	\$166.44	\$123.62
<b>High</b>	\$538.00	\$166.44	\$371.56	\$436.16	\$166.44	\$269.72

**Table 14 – Cost-Effectiveness Analysis (Cost per Equivalent Life Saved) – SBWS without Occupant Detection (Rear Seats)<sup>218</sup>  
(2020 Dollars, in Millions)  
3 percent Discount Rate**

Seat Position & Belt Use Increase	ELS	Cost	Cost/ELS
<b>Low</b>	29.98	\$166.4	\$5.55
<b>High</b>	45.09	\$166.4	\$3.69

**7 percent Discount Rate**

Seat Position & Belt Use Increase	ELS	Cost	Cost/ELS
<b>Low</b>	24.31	\$166.4	\$6.85
<b>High</b>	36.55	\$166.4	\$4.55

**2. Front seat belt warning system**

Based on FARS and CISS data from 2017 through 2021, on average 8,345 unrestrained drivers and 1,447 unrestrained front outboard passengers of passenger cars and light trucks were killed annually in traffic crashes. Additionally, 132,416 unrestrained drivers and 25,046 unrestrained front outboard passengers were, on average, injured annually. After adjusting these to account for future decreases in fatalities and injuries projected to occur in the absence of the finalized requirements due to the introduction of other mandatory safety technologies (e.g., electronic stability control), the analysis estimates a baseline of, on average, 8,383 fatalities and

<sup>217</sup> See FRIA table 82.

<sup>218</sup> See FRIA table 74.

150,739 injuries to unrestrained front seat occupants each year. This is the overall target population—the annual deaths and injuries that the final requirements are aimed at reducing.

According to the NOPUS, 90.6 percent of drivers used their seat belt in 2021, and 89.4 percent of passengers in the right-front seating position used their seat belt.<sup>219</sup> To estimate the percentage of drivers and front passengers who do not always use a seat belt, we used the results from a 2004 analysis using data from the Household Component of the 2002 Medical Expenditure Panel Survey (MEPS-HC)<sup>220</sup> that found that among persons 16-64 years of age, 87.7 percent reported always or nearly always using seat belts when driving or riding in a car. Another 6.9 percent reported sometimes using seat belts, while 5.4 percent reported seldom or never using seat belts when driving or riding in a car. These results are summarized in table 15. This means, when an observation is made about the percentage of drivers who use the seat belts, the observed belt use rate is higher than 87.7 percent since the other groups would contribute to the observed belt use rate although they are not always using the seat belts. NHTSA recognizes that driving habits may or may not have changed since 2002 as seat belt use rates have increased and as new generations of drivers and passengers are on the road. NHTSA considered, but tentatively decided not to use, the results of more recent studies, such as the (2016) Motor Vehicle Occupant Safety Survey (MVOSS)<sup>221</sup> to estimate the percentage of drivers and front passengers who do not always use a seat belt. While the 2016 MVOSS is more recent, we decided to use the 2004 study because we tentatively concluded that the data provided by the 2004 study best suited the needs of our analysis. Although most data on seat belt use is self-reported, including the data in the 2004 study, the 2004 study has a high sample size (approximately 25,000)<sup>222</sup> and provides robust categorizations of seat belt use that fit the needs

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<sup>219</sup> National Center for Statistics and Analysis. (2021, December). Seat belt use in 2021 – Overall results (Traffic Safety Facts Research Note. Report No. DOT HS 813 241). National Highway Traffic Safety Administration.

<sup>220</sup> May Chu, “Statistical brief #62: Characteristics of Persons Who Seldom or Never Wear Seat Belts 2002.” [https://meps.ahrq.gov/data\\_files/publications/st62/stat62.pdf](https://meps.ahrq.gov/data_files/publications/st62/stat62.pdf).

<sup>221</sup> Spado, D., Schaad, A., & Block, A. (2019, December). *2016 motor vehicle occupant safety survey; Volume 2: Seat belt report* (Report No. DOT HS 812 727). National Highway Traffic Safety Administration.

<sup>222</sup> Compared to the 2016 MVOSS, which had, depending on the question, sample sizes of approximately 5,000 to 10,000.

of our analysis. Furthermore, when comparing this data to the findings of the 2016 MVOSS, we did not find evidence that seat belt use trends have significantly changed over time.<sup>223</sup>

**Table 15 – Seat Belt Use Characteristics**

<b>Belt user and related items</b>	<b>Rate</b>
Reported “sometimes using seat belts”	6.9 percent
Reported “seldom or never using seat belts when driving or riding in a car”	5.4 percent
Reported always use seat belts	87.7 percent
Total	100.0 percent

As we did for the rear seats, NHTSA estimated the effectiveness and benefits associated with requiring a seat belt warning system that remains activated until the seat belts are buckled for the driver and front outboard passenger seats. In developing this estimate, NHTSA used the results of a 2019 study conducted by IIHS by Kidd et al.<sup>224</sup> In the Kidd et al. (2019) study, part-time belt users (who had a recent seat belt citation and reported not always using a seat belt) drove two vehicles for a certain period of time, a Chevrolet with three intermittent 7-second audible warnings followed by either a BMW with a 100-second audible warning (n=17) or a Subaru with an audible warning that continues until the seat belt is buckled (n=16). (All of the vehicles provided a visual warning that lasted until the seat belt was buckled.) Kidd et al. found that, relative to the intermittent reminder (i.e., 7-second audible reminder), the BMW warning with the 100-second audible reminder increased seat belt use by 30 percent and the Subaru warning with the indefinite audible warning increased belt use by 34 percent.<sup>225</sup> The Kidd Study also found that some participants circumvented the enhanced warning systems by misusing the seat belt (sitting on a buckled seat belt or routing the buckled seat belt behind their back). Hard

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<sup>223</sup> For example, the 2016 MVOSS found that about 6 percent of drivers reported using their belt most of the time or some of the time. See pg. 7 (Fig. 5) in the MVOSS.

<sup>224</sup> Kidd, D.G., and Singer, J. (2019, April) The effects of persistent audible seat belt reminders and a speed-limiting interlock on the seat belt use of drivers who do not always use a seat belt. Insurance Institute for Highway Safety, Westat, Inc.

<sup>225</sup> There were several limitations in this study, the main one being that the number of study participants was small, and, consequently, there was limited statistical power when comparing the change in rate of belt use between the different vehicle technology conditions. The study further discusses this and other limitations, such as how the demographics of the study sample differ from part-time belt users nationwide. See also the discussion *supra*, Section VI.B.3.

core "never users" of seat belts may similarly choose to circumvent the enhanced seat belt warning system. Therefore, NHTSA assumed that the "never and seldom users" of seat belts (5.4 percent from the Chu study) could potentially circumvent the enhanced SBWS, so the analysis conservatively assumes no increase in seat belt use with enhanced SBWS for "never and seldom users."

NHTSA also reviewed manufacturer data for MY 2020 vehicles to determine the market penetration of seat belt warning systems of various durations in the front outboard seats and obtained the estimates in table 16.

**Table 16 – Market Penetration of Different Duration Seat Belt Audible Warning Systems**

<b>SBWS system</b>	<b>Percentage of Sales</b>
<b>&lt;90 second warning</b>	7.6 percent
<b>90 second and 90+ but not indefinite</b>	85.2 percent
<b>Enhanced – Warning until seat belt is buckled</b>	7.2 percent

For drivers, seat belts reduce the risk of fatality by 48 percent (for passenger cars) and 61 percent (for light trucks and vans) and reduce the risk of moderate to greater severity injuries by up to 65 percent.<sup>226</sup> For front outboard passengers, seat belts reduce the risk of fatality by 37 percent (for passenger cars) and by 58 percent (for light trucks and vans) and reduce the risk of moderate to greater severity injuries by 65 percent.<sup>227</sup>

Based on the estimated seat belt warning system effectiveness in increasing seat belt use, the market penetration of different duration seat belt audible warning systems, and the effectiveness of seat belts in mitigating fatalities and injuries, NHTSA estimates that requiring an audio-visual seat belt warning<sup>228</sup> that remains activated until the seat belt is buckled (indefinite

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<sup>226</sup> See FRIA table 31.

<sup>227</sup> See FRIA table 32.

<sup>228</sup> The final rule differs from the proposed indefinite audio-visual warning on vehicle start-up, because while the visual warning will be indefinite it is no longer specific to the "start-of-trip" and the audible warning will only be required to activate for at least 30 seconds and after the 30 seconds it will be a speed-initiated indefinite audible warning. However, in the benefits and costs sections we will continue to refer to the front seat belt warning system as an indefinite warning because both the audible and visual warnings will be required to be active until the seat belt is fastened, if the respective trigger criteria are met.

duration) would prevent 20 driver fatalities, 2 front outboard passenger fatalities, and a total of 395 injuries annually, as shown in table 17. This rule results in 46.7 undiscounted equivalent lives saved, as shown in table 18. The estimated discounted annual benefits in terms of equivalent lives saved are also shown in table 18.

**Table 17 – Estimated Annual Benefits – Lives Saved and Injuries Prevented - Indefinite SBWS (Front Outboard Seats)<sup>229</sup>**

<b>Injury Level</b>	<b>Driver</b>	<b>Front Passenger</b>	<b>Total</b>
<b>MAIS 1</b>	129	14	143
<b>MAIS 2</b>	151	19	170
<b>MAIS 3</b>	62	8	69
<b>MAIS 4</b>	9	1	10
<b>MAIS 5</b>	3	0	3
<b>Total Injuries</b>	<b>354</b>	<b>42</b>	<b>395</b>
<b>Fatal</b>	<b>20</b>	<b>2</b>	<b>22</b>

Note: Values may not sum due to rounding.

**Table 18 – Estimated Annual Benefits – Equivalent Lives Saved – Indefinite SBWS (Front Outboard Seats)<sup>230</sup>**

	<b>Undiscounted</b>	<b>3 percent Discount Rate</b>	<b>7 percent Discount Rate</b>
<b>Driver</b>	42.26	34.98	28.36
<b>Front Passenger</b>	4.44	3.68	2.99
<b>Total</b>	46.70	38.66	31.35

We also estimated the costs of the finalized requirements. Since all driver seats are already required to have at least the basic warning system, the incremental cost of enhanced seat belt warning for the driver seat is zero. We assume there would be some labor costs associated with software updates needed to extend the warning. However, as this is a simple programming change, this cost would be amortized over each vehicle’s production and is therefore considered de minimis. Though there are no current requirements for a seat belt warning system for the front outboard passenger seat, NHTSA estimates that 96 percent of vehicles have seat belt

<sup>229</sup> See FRIA table 60.

<sup>230</sup> See FRIA table 73.

warning systems on the front outboard passenger seat. NHTSA estimated the cost of equipping a seat belt warning system in the front outboard passenger seat to be \$2.13 per seat. Therefore, the cost of equipping the remaining 4 percent of the 16 million new vehicle fleet is \$1.36 million (=16 million x 4 percent x \$2.13).

Based on the foregoing, we performed benefit-cost and cost-effectiveness analyses. The estimated net benefits, based on a 3 percent and 7 percent discount, are presented in table 19 and the cost-effectiveness estimates are presented in table 20.

**Table 19 – Annual Monetized Benefits, Costs and Net Benefits – Indefinite SBWS (Front Outboard Seats)<sup>231</sup>  
(2020 Dollars, in Millions)**

	Driver		Front Passenger		Driver and Front Passenger	
	3 percent	7 percent	3 percent	7 percent	3 percent	7 percent
Passenger car Benefits	\$188.89	\$154.12	\$22.86	\$18.65	\$211.75	\$172.77
Light Truck & Van Benefits	\$228.51	\$184.29	\$21.05	\$16.97	\$249.56	\$201.26
Total Benefits	\$417.41	\$338.41	\$43.90	\$35.62	\$461.31	\$374.03
Total Costs	\$0	\$0	\$1.36	\$1.36	\$1.36	\$1.36
Net Benefits	\$417.41	\$338.41	\$42.54	\$34.26	\$459.95	\$372.67

**Table 20 – Cost-Effectiveness Analysis (Cost per Equivalent Life Saved) – Indefinite SBWS (Front Outboard Seats)<sup>232</sup>  
(2020 Dollars, in Millions)**

Discount Rate	ELS	Cost	Cost/ELS
3 percent	38.66	\$1.36	\$0.04
7 percent	31.35	\$1.36	\$0.04

### 3. Overall benefits and costs of the final rule

In table 21, we combine the benefits and costs for the finalized rear and front seat belt warning requirements. We estimate positive net benefits under all discount rates and effectiveness estimates.

<sup>231</sup> See FRIA, tables 80, 81, and 82.

<sup>232</sup> See FRIA, table 74.

**Table 21 – Net Benefits from the Final Rule (SBWS for Rear Seating Positions and Indefinite SBWS for Front Outboard Seating Positions)  
(2020 Dollars, in Millions)<sup>233</sup>**

	<b>3 percent Discount Rate</b>	<b>7 percent Discount Rate</b>
<b>Front Outboard Seats</b>	\$459.95	\$372.67
<b>Rear Seats (low increase in rear seat belt use)</b>	\$191.34	\$123.62
<b>Rear Seats (high increase in rear seat belt use)</b>	\$371.56	\$269.72
<b>Total Net Benefits (low increase in rear belt use)</b>	<b>\$651.29</b>	<b>\$496.28</b>
<b>Total Net Benefits (high increase in rear belt use)</b>	<b>\$831.51</b>	<b>\$642.39</b>

In table 22, we combine the equivalent lives saved and cost for the finalized rear and front seat belt warning requirements to determine the cost per equivalent life saved.

**Table 22 – Cost per Equivalent Lives Saved from the Final Rule (SBWS for Rear Seating Positions and Indefinite SBWS for Front Outboard Seating Positions)<sup>234</sup>  
(2020 Dollars, in Millions)**

<b>Category</b>		<b>Discounted at 3 percent</b>			<b>Discounted at 7 percent</b>		
		<b>Equivalent Lives Saved</b>	<b>Cost</b>	<b>Cost per Equivalent Live Saved</b>	<b>Equivalent Lives Saved</b>	<b>Cost</b>	<b>Cost per Equivalent Live Saved</b>
Rear Seat	Low	29.98	\$166.44	\$5.55	24.31	\$166.44	\$6.85
	High	45.09		\$3.69	36.55		\$4.55
Front Seat		38.66	\$1.36	\$0.04	31.35	\$1.36	\$0.04
<b>Total</b>	Low	<b>68.65</b>	<b>\$167.8</b>	<b>\$2.44</b>	<b>55.66</b>	<b>\$167.8</b>	<b>\$3.01</b>
	High	<b>83.75</b>		<b>\$2.00</b>	<b>67.90</b>		<b>\$2.47</b>

## **B. Regulatory Alternatives**

In the preceding sections of this document, we discussed various alternatives for different aspects of the finalized requirements. We quantified the costs and benefits of three of these alternatives (rear-seat occupant detection, a 90-second front outboard seat belt warning, and front center seat belt warning). Below, we briefly summarize our results. For a more detailed discussion, the reader is referred to the Final Regulatory Impact Analysis in the docket for this rulemaking.

<sup>233</sup> See FRIA, table 82.

<sup>234</sup> See FRIA, table 74.

## 1. Occupant detection in rear seats

For the rear seat belt reminder, NHTSA is not requiring occupant detection in the rear seats but permits occupant detection in rear seats. As a regulatory alternative, NHTSA estimated the costs and benefits of requiring a SBWS with occupant detection in the rear seats.

NHTSA's teardown analysis indicates that occupant detection components cost \$39.75 per vehicle, which, added to the \$19.59 per vehicle cost of the buckle sensor, results in a combined warning system cost of \$59.33 per vehicle (2020 \$). NHTSA estimates that about 47 percent of new vehicles have a SBWS for the rear seating positions and 7 percent of new vehicles have occupant detection in rear seats. If NHTSA selected the regulatory alternative that required occupant detection, this rule would result in a total cost of \$802 million. As with the final rule, this cost estimate assumed that 53 percent of new vehicles would need to install a seat belt sensor in the rear seats. And as discussed, rear seat occupant detection systems would need to be installed in all new vehicles. Although seven percent of light vehicles already have rear seat occupant detection, those SBWSs may not meet the requirements specified in this regulatory alternative.<sup>235</sup> As a result, this analysis accounts for the cost of adding occupant detection in the rear seats in all new light vehicles to comply with this regulatory alternative. The total cost for this regulatory alternative is about \$802 million.<sup>236</sup>

Because there is uncertainty in how much more effective a SBWS with occupant detection would be in increasing seat belt use compared to the already estimated increase in seat belt use with SBWSs without occupant detection, NHTSA did not conduct a cost-effectiveness and net benefits analysis. Instead, NHTSA estimated the minimum increase in seat belt use for this regulatory alternative that would result in overall benefits equal to the overall costs (zero net benefits). Furthermore, for a direct comparison to the final rule requirements, NHTSA also

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<sup>235</sup> The rear seat occupant detection in current vehicles is likely only able to detect a 5<sup>th</sup> percentile female and heavier occupants, but not children who weigh less than the 5<sup>th</sup> percentile female as is required for rear seat occupant detection in this final rule.

<sup>236</sup> See FRIA, table 119.

considered how much greater the benefits from this regulatory alternative would have to be for the net benefits to be equal to those from the final rule, which does not require occupant detection.

The agency estimated that seat belt use for rear seat occupants 11 years and older would have to increase by approximately 5.4 percent when discounted at 3 percent and 6.7 percent when discounted at 7 percent for this regulatory alternative to result in zero net benefits. Moreover, for this regulatory alternative to match the net benefits (taking into account the Low and High estimates of increased seat belt usage) from the final rule, seat belt use for rear seat occupants 11 years and older would have to increase by 7.8 to 9.0 percent when discounted at 3 percent, and by 9.1 to 10.2 percent when discounted at 7 percent.

Under the final rule, which does not require occupant detection, seat belt use for rear seat occupants 11 years and older is estimated to increase from 75.12 percent to approximately 76.93 percent in the Low estimate and 77.84 percent in the High estimate. These increases reflect an approximately 2.4 percent and 3.6 percent increase in seat belt use under the final rule.

Therefore, in this regulatory alternative requiring occupant detection for the rear seats, SBWS for rear seat occupants would need to be approximately 2.5 to 3.8 times more effective than the final rule at increasing seat belt usage to generate the same level of net benefits as the final rule. The SBWSs considered under this regulatory alternative are capable of informing the driver either which occupants are not using their seat belts or how many of the rear seat occupants are not using their seat belts. While we would expect some possible increase in seat belt use from that specific functionality, it is doubtful that it would double to quadruple the increase in seat belt use estimated for SBWSs without occupant detection. Therefore, based on the available information, the agency did not choose this regulatory alternative.

## **2. 90-second front outboard seat belt warning**

NHTSA also estimated the costs and benefits if it were to require a 90-second audio-visual warning for the front outboard seats instead of the finalized requirement for a warning that

lasts until the belt and any occupied seat is buckled. NHTSA estimated the benefits in a similar manner as that for the finalized seat belt warning for front seat occupants where the warning remains on until the seat belt is buckled. The main difference is that this alternative only affects the 7.6 percent of the vehicle fleet with a front seat occupant seat belt warning with duration less than 90 seconds.

The benefits of this alternative are presented in table 23.<sup>237</sup>

**Table 23 – Injuries Prevented, Lives Saved, and Equivalent Lives Saved in Front Outboard Seats by a 90 Second Duration SBWS**

Injury Level	Injuries and Fatalities Prevented		Equivalent Lives Saved	
	Driver	Front Passenger	Driver	Front Passenger
<b>MAIS 1</b>	43	4.7	0.19	0.02
<b>MAIS 2</b>	44	5.7	1.82	0.23
<b>MAIS 3</b>	18	2.3	3.26	0.41
<b>MAIS 4</b>	3	0.3	0.83	0.08
<b>MAIS 5</b>	1	0.1	0.47	0.05
<b>Fatal</b>	6	0.6	6.07	0.57
<b>Total</b>			12.66	1.37

About 14 equivalent lives are saved by this alternative, which is significantly lower than the nearly 47 equivalent lives saved by a warning that remains on until the seat belt is buckled. The cost of this alternative is the same as that for the warning required by this final rule. The only cost is that for the 4 percent of vehicles without a seat belt warning system in the front outboard passenger seat (cost = \$1.36 million). The annual monetized benefits, costs, and net benefits of this alternative are shown in table 24.

**Table 24 – Annual Monetized Benefits, Costs and Net Benefits for a 90 Second Duration SBWS in Front Outboard Seats.<sup>238</sup>  
(2020 Dollars, in Millions)**

	Driver		Front Passenger		Driver and Front Passenger	
	3 percent	7 percent	3 percent	7 percent	3 percent	7 percent
Passenger car Benefits	\$58.69	\$47.89	\$7.25	\$5.92	\$65.94	\$53.81

<sup>237</sup> See FRIA, tables 134 and 138.

<sup>238</sup> See FRIA, tables 142 and 143.

Light Truck & Van Benefits	\$66.34	\$53.50	\$6.25	\$5.04	\$72.59	\$58.54
Total Benefits	\$125.03	\$101.39	\$13.50	\$10.96	\$138.54	\$112.35
Total Costs	\$0	\$0	\$1.36	\$1.36	\$1.36	\$1.36
Net Benefits	\$125.03	\$101.39	\$12.14	\$9.59	\$137.18	\$110.99

While this regulatory alternative has positive net benefits, the benefits and net benefits are significantly lower than the indefinite duration SBWS for front seat occupants in the final rule (net benefits of \$459.95 million and \$372.67 million when discounted to 3 and 7 percent, respectively).

### 3. Seat belt warning for front center seat

The agency also considered requiring a seat belt warning system for the front center seating position. To estimate incremental benefits, NHTSA used the 2017-2021 FARS data and CISS data, and the adjustment factors to account for safety impacts of new required safety technologies to establish the target population addressed by this regulatory alternative (Table 25).

**Table 25 – Annual Adjusted Fatalities and Non-Fatal Injuries to Front Center Seat Passengers<sup>239</sup>**

Injury Severity	Restrained	Unrestrained	Total
MAIS 1	190	100	290
MAIS 2	0	0	0
MAIS 3	0	0	0
MAIS 4	0	0	0
MAIS 5	0	0	0
<b>Total Injuries (MAIS 1-5)</b>	<b>190</b>	<b>100</b>	<b>290</b>
<b>Fatal</b>	<b>6</b>	<b>13</b>	<b>19</b>

Due to a lack of data, NHTSA is unable to establish the seat belt use rate for front center passengers under the baseline. As front center seat passengers are most similar to front outboard passengers, this analysis makes use of the established seat belt use rate for front outboard passengers to establish the baseline seat belt use rates for front center seat occupants. Based on

<sup>239</sup> See FRIA, table 122.

the 2021 NOPUS data, the baseline seat belt use rate is 89.40 percent and the corresponding seat belt use rate in potentially fatal crashes is 76.88 percent.

In order to estimate the change in seat belt use for front center seat passengers as a result of the SBWS, this analysis makes use of the linear regression model used to estimate the impact of the SBWS on the seat belt use rates of rear seat occupants. Under this regulatory alternative, the seat belt use rate for front center seat passengers using the high estimate is 91.58 percent and the corresponding seat belt use rate in potentially fatal crashes is 79.69 percent.

The cost for front center passenger seats would include the cost for a buckle sensor and occupant detection. Therefore, the cost per vehicle for this regulatory alternative is \$14.86 in 2020 dollars. This cost estimate reflects a cost of \$2.13 to add a buckle sensor and the cost to add occupant detection of \$12.73.

In assessing the number of vehicles that would be impacted by this regulatory alternative, we consider that the front center seat is not a common feature in new light vehicles. Based on our engineering judgement, we expect that approximately 800,000 vehicles or 5 percent of the new vehicle fleet include a center seating position. Table 26 presents the total cost to meet the requirements under this regulatory alternative for an indefinite duration SBWS for front center passenger seats.

**Table 26 – Total Cost of Indefinite Duration SBWS for Front Center Passenger Seats<sup>240</sup>**

<b>Number of Vehicles Impacted</b>	<b>Per Vehicle Cost</b>	<b>Total Cost</b>
800,000	\$14.86	\$11,888,000

Table 27 presents the of the cost-effectiveness analysis and table 28 presents the benefit-cost analysis for this regulatory alternative.<sup>241</sup> When discounted at three and seven percent, the cost per ELS is approximately \$40.9 million and \$50.6 million, respectively and the net benefits

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<sup>240</sup> See FRIA, table 128.

<sup>241</sup> See FRIA, tables 129 and 130.

are negative for this regulatory alternative. Because the cost per ELS is higher than the comprehensive cost of a fatality and the net benefits are negative, this regulatory alternative is not cost-effective.

**Table 27 – Cost-Effectiveness Analysis for SBWS Front Center Seat Passengers (Millions)**

Category	Discounted at 3 percent			Discounted at 7 percent		
	Equivalent Lives Saved	Cost	Cost per Equivalent Live Saved	Equivalent Lives Saved	Cost	Cost per Equivalent Live Saved
Front Center Seat	0.29	\$11.89	\$40.91	0.23	\$11.89	\$50.63

**Table 28 – Benefit-Cost Analysis for SBWS Front Center Seat Passengers (Millions)**

Category	Discounted at 3 percent			Discounted at 7 percent		
	Monetized Benefits	Cost	Net Benefits	Monetized Benefits	Cost	Net Benefits
Front Center Seat	\$3.47	\$11.89	-\$8.42	\$2.80	\$11.89	-\$9.09

### **IX. Compliance Dates**

NHTSA proposed that vehicles be required to comply with the requirements of this rule the first September 1 that is one year after the publication of the final rule for the front seat belt warning system requirements and the first September 1 that is two years after the publication of the final rule for the rear seat belt warning system requirements, with optional early compliance permitted. Consistent with 49 CFR 571.8(b), multi-stage manufacturers and alterers would have an additional year to comply.

We estimated it would take two years for manufacturers to equip their vehicles with the necessary technologies, redesign hardware and software components, and validate their systems to comply with the requirements for the rear seat belt reminder systems. Regarding front passenger outboard seat belt warning requirements, we noted that because of the market penetration of such systems (96 percent of new vehicles), the majority of vehicle manufacturers

would simply have to make software adjustments necessary to ensure they meet the proposed requirements.<sup>242</sup>

### Comments

The National Transportation Safety Board (NTSB) supported the proposed lead time and emphasized the timeline of this rulemaking activity related to seat belt warning systems.

Several commenters suggested shorter lead times. MADD and Advocates and Public Citizen supported a compliance deadline as soon as is feasible. MADD stated that given the state and availability of current technology, a one-year deadline for compliance is likely reasonable. Advocates and Public Citizen stated that one year should be sufficient for rear systems, noting that IIHS testing has demonstrated that this deadline is achievable and that delaying will cost lives.

SRN commented that, depending on the date on which the final rule is published, the rear seat compliance deadline could be closer to 3 years, and urged NHTSA to ensure that compliance is required within close to a 2-year window.

IIHS and NAMIC commented that the requirements should be implemented immediately. IIHS noted research suggesting that increasing seat belt use of unbuckled occupants throughout the vehicle by up to 34 percent would save about 1,600 lives each year (Kidd & O'Malley, 2023), and that delaying the implementation of the upgraded standard would unnecessarily delay its life-saving benefits. IIHS explained that according to its evaluations, since 2022 adoption of rear reminder systems has increased and manufacturers have responded quickly in the past to their requirements, suggesting that less lead time is needed.

Consumer Reports agreed with IIHS that manufacturers have demonstrated they can make improvements quickly and suggested that both rear and front reminders be required within 1 year. They also noted that in 2012, Congress mandated that NHTSA issue a final rule by 2015,

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<sup>242</sup> 88 FR 61674. This figure is based on data on total projected vehicle sales in the United States for MY 2022 from the agency's New Car Assessment Program *Purchasing with Safety in Mind: What to Look For When Buying a Vehicle* program.

and that the ANPRM for this rulemaking was published in 2019. They argued that given this timeline, compliance should be required sooner.

Other commenters requested that the compliance dates be extended. Auto Innovators contended that the proposed lead time is not reasonable or practical for implementing the proposed changes. In particular, they emphasized that the lack of harmonization with ECE R16 may result in design changes for vehicles that are in the final stages of preproduction and manufacturers may no longer be able to use hardware and software systems currently deployed in other markets. Honda provided a list of changes that it would undertake to meet the requirements proposed in the NPRM and suggested that the lead time proposed is inadequate to accomplish them.

Nissan also requested additional lead time, especially if it is necessary to relocate the front outboard passenger telltale. Auto Innovators and Honda noted that if NHTSA harmonized the rule further with ECE R16, less lead time would be needed to meet the requirements.

Auto Innovators, HATCI, Ford, and Honda requested a synchronized two-year phase-in for both the front and rear row seating position requirements that begins three years after publication of the final rule. In their proposal, a set percentage of vehicles would be required to meet the requirements of the rule beginning the first September 1<sup>st</sup> that is at least 3 years after publication of the final rule; a higher percentage by the first September 1<sup>st</sup> after 4 years; with full compliance by the first September 1<sup>st</sup> that is at least five years after publication of the final rule. HATCI specified that the first phase-in threshold should be no more than 50 percent of vehicles. Ford and Honda emphasized that this approach would allow manufacturers to account for differences in implementation across models with varied development cycles. Auto Innovators and Honda argued that this approach would unify the lead time for front and rear systems because there would not be a benefit to having different lead times for front and rear systems due to the limitations of production schedules. Auto Innovators commented that there is no benefit or regulatory relief provided by NHTSA's proposal for one year of lead time for the front and

two years for the rear because it is both highly impractical and unlikely that manufacturers will be able to adjust production schedules to account for changes to the front row and rear row seating positions independently of each other, and only one year apart. Additionally, some commenters, such as Auto Innovators and Nissan, commented that if the rule does not allow for the reminder to be overridden, it will likely result in the need for significant changes to the instrument cluster that will require additional time and resources to implement. Nissan commented that additional lead time becomes more critical if relocating the front outboard passenger telltale indicator beyond the vehicle's current meter display is required.

A few commenters, such as Auto Innovators and Consumer reports, requested that optional early compliance be allowed.

Auto Innovators urged the agency to announce whether the lead time will be changed through the docket, other such notice, or to publish a second NPRM within one year of its original filing, to ensure that manufacturers do not waste time, money, and effort to develop products that align with the proposal, but which need to be changed to meet the final rule.

#### Agency Response

NHTSA is finalizing the compliance dates as proposed in the NPRM. These dates properly balance the practical realities of bringing systems into compliance with maximizing the safety benefits of this rule. We are allowing optional early compliance.

NHTSA disagrees with commenters who argue that compliance can be required immediately or who seek to shorten the compliance timeline. NHTSA understands that any allowed time to bring systems into compliance risks reducing some of the benefits of the rule. However, we must balance maximizing effectiveness with considerations of feasibility and practicability. Although commenters correctly point out that the necessary technologies for both front and rear systems are available, they underestimate the time some manufacturers may need to integrate components into vehicles for the rear seat reminder as well as incorporate visual signals and validate system performance for both front and rear positions. Although some

manufacturers may have been able to rapidly adapt their systems to changes in IIHS ratings, this fact does not support the notion that doing so would be practicable for the entire industry. For example, a small number of vehicles do not yet have voluntary front passenger seat belt warnings, and these vehicles would need hardware integration. We also disagree with NAMIC and Consumer Reports that the duration of this rulemaking effort warrants shortening the date schedule. Our determination regarding the proper compliance dates is based on current information and when the rule is finalized. The option of early compliance may realize earlier safety benefits for vehicles with earlier development schedules.

NHTSA also disagrees with commenters seeking to extend the dates. In particular, a three-year compliance date with a two-year phase-in, suggested by Auto Innovators, HATCI, Honda, and Ford, dramatically exceeds the amount of time that manufacturers should need to implement the changes required by this rule. As noted, the technology for these systems already exists. For front systems in particular, the vast majority of vehicles already incorporate the necessary technology, and only software changes will be needed to bring systems into compliance.

Additionally, we have made changes from the NPRM which should significantly reduce the time needed to bring systems into compliance. For example, this final rule no longer dictates specific compliance options for the information conveyed by the rear seat belt warning visual warning; the finalized requirements for the visual warning allow all of the systems that would have been allowed under the proposed rule, as well as additional systems that would not have been allowed under the proposed rule, such as a negative-only system without occupant detection and a full-status system without occupant detection. It also does not require the front passenger seat belt visual warning to be visible to the front passenger (except for certain ADS-equipped vehicles), which was an element of the proposal about which certain commenters, such as Nissan, expressed significant cost and time concerns. Indeed, in the NPRM we sought comment, and received no detailed comments, regarding which types of vehicles might need additional lead

time to accommodate the proposed visibility requirement. Additionally, Auto Innovators noted that less time would be needed to implement requirements that harmonize with ECE R16. We have also incorporated changes from the NPRM which increase harmonization with ECE R16 significantly. Finally, we do not believe it is necessary to grant additional time to accommodate that warnings are not allowed to be overridden because this rule provides a large amount of flexibility for manufacturers to design and locate the visual alerts to resolve this issue.<sup>243</sup> Because these elements resolve many of the concerns raised by commenters about the compliance timeline, we are not extending the compliance dates.

We are also not implementing a unified lead time for front and rear systems. As we pointed out in the NPRM, 96 percent of vehicles already have a front outboard passenger seat belt warning system, while market penetration for rear systems is much lower. The acquisition and integration of additional hardware for rear seats, which is not needed for the vast majority of front passenger systems, warrants additional lead time for the rear systems.

Finally, because we are not changing the lead time from the proposal, we are not publishing the notice of changes regarding the lead time requested by Auto Innovators.

## **X. Regulatory Analyses**

### **Executive Order 12866, Executive Order 14094, Executive Order 13563, and DOT Regulatory Policies and Procedures**

NHTSA has considered the impact of this rule under Executive Order 12866, Executive Order 14094, Executive Order 13563, DOT Order 2100.6A, and the Department of Transportation's regulatory policies and procedures.<sup>244</sup> The Office of Management and Budget determined that this rule is a significant regulatory action and was reviewed under Section 3(f)(1) of E.O. 12866, as amended by E.O. 14094. Pursuant to E.O. 12866 and the Department's

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<sup>243</sup> While the final rule requires that the visual warning must not be overridden by other visual warnings, it does allow the audible warning to be paused during the activation of another audible safety warning that is designed to alert the driver to take immediate action; in this case, however, the seat belt audible warning must be resumed for the remainder of the required duration after the other audible warning deactivates.

<sup>244</sup> 49 CFR, Part 5, Subpart B; Department of Transportation Order 2100.6A, Rulemaking and Guidance Procedures, June 7, 2021.

policies, we have identified the problem this rule addresses, assessed the benefits and costs, and considered alternatives. These analyses have been summarized in Section VII, Regulatory Alternatives and Section VIII, Overview of Benefits and Costs and are discussed in more detail in the docketed final regulatory impact analysis.

### **Promoting International Regulatory Cooperation**

The policy statement in section 1 of Executive Order 13609 provides that the regulatory approaches taken by foreign governments may differ from those taken by the United States to address similar issues, and that in some cases the differences between them might not be necessary and might impair the ability of American businesses to export and compete internationally. It further recognizes that in meeting shared challenges involving health, safety, and other issues, international regulatory cooperation can identify approaches that are at least as protective as those that are or would be adopted in the absence of such cooperation and can reduce, eliminate, or prevent unnecessary differences in regulatory requirements.

In addition, section 24211 of the Infrastructure, Investment, and Jobs Act (IIJA; Pub. L. 117-58), Global Harmonization, provides that DOT “shall cooperate, to the maximum extent practicable, with foreign governments, nongovernmental stakeholder groups, the motor vehicle industry, and consumer groups with respect to global harmonization of vehicle regulations as a means for improving motor vehicle safety.”<sup>245</sup>

As discussed in Section VII and through this preamble, this rule harmonizes with ECE R16, Euro NCAP, and the IIHS protocol as much as possible, but deviates where we believed it was justified with respect to the Safety Act criteria (need for safety, objectivity, and practicability). The reasons for following or deviating in any of these respects are explained in detail in the relevant section of the preamble. In general, we believe that although this rule deviates from these requirements or protocols in some ways, it is not incompatible with them, so that it is possible to design a seat belt reminder system that complies with both this rule and

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<sup>245</sup> H.R. 3684 (117th Congress) (2021).

protocols such as R16. Further, almost all international NCAP programs, including those in Europe, Japan, China, Korea, Latin America, Southeast Asia, and Australia and New Zealand, award points to vehicles that are equipped with seat belt warning systems for passenger seating positions. Thus, the requirements in this rule are consistent with these international programs and complement those international efforts to increase seat belt use by all vehicle occupants.

### **Regulatory Flexibility Act**

Pursuant to the Regulatory Flexibility Act (5 U.S.C. 601 et seq., as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever an agency is required to publish an NPRM or final rule, it must prepare and make available for public comment a regulatory flexibility analysis (RFA) that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions). The Small Business Administration's regulations at 13 CFR part 121 define a small business, in part, as a business entity "which operates primarily within the United States." 13 CFR 121.105(a). No regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

I certify that this final rule would not have a significant economic impact on a substantial number of small entities. According to 13 CFR 121.201, the Small Business Administration's size standards regulations used to define small business concerns, manufacturers of the vehicles covered by this final rule would fall under North American Industry Classification System (NAICS) No. 336211, *Automobile Manufacturing*, which has a size standard of 1,000 employees or fewer.

NHTSA estimates that there are three small light vehicle manufacturers in the U.S. As noted in Section 11.1 of the docketed final regulatory impact analysis, the estimated annual

vehicle sales for these three manufacturers range from 25 to 100 vehicles with a sales price range \$24,000 to \$750,000 and estimated annual revenue between \$2 million and \$4 million. We estimate that there are several hundred second-stage or final-stage manufacturers and alterers that could be impacted by this final rule. The agency has analyzed the economic impact on these entities. For the reasons discussed below and detailed in the final regulatory impact analysis, we conclude that this rule would not have a significant economic impact on a substantial number of small entities.

The rule would directly affect motor vehicle manufacturers, including small light vehicle manufacturers. However, we believe that the rule will not have a significant economic impact on these entities. Small manufacturers are already certifying their vehicle's compliance, for the driver position, with FMVSS No. 208's seat belt warning system requirements. The means they use to certify to the current requirements would be similar to or the same as those they would use to certify to the rear seat belt warning requirements and front outboard passenger seat belt warning requirements under the final rule.

Further, the compliance test is a relatively simple test, involving a test technician positioning a person or test dummy in a seat and checking if the requisite signals activate. Checking to see if visual and audible warnings activate for the driver seat belt warning system has been a part of FMVSS No. 208 compliance testing for many years, and manufacturers are knowledgeable about conducting such tests.

Small manufacturers have options available to certify compliance, none of which will result in a significant economic impact on these entities. The manufacturers can and do obtain seating systems from seat suppliers and install the seats on the body following the instructions of the seat supplier. Seat and seat belt suppliers are large entities with resources available to assist small manufacturers in incorporating the seat belt warning systems, if manufacturers need technical assistance (which we do not think they will need, given the simplicity of the systems,

particularly those rear systems that do not involve occupant detection). We do not believe that current manufacturing practices will have to change significantly because of this rule.

In addition, we also believe that the rule will not have a significant impact on small and limited-line vehicle manufacturers because the market for the vehicles produced by these entities is highly inelastic. Purchasers of these vehicles are attracted by the desire to have an unusual vehicle. Further, all light vehicles would have to comply with the requirements. Since the price of complying with the rule will likely be passed on to the final consumer, the price of competitor's models would increase by similar amounts. Further, we do not believe that raising the price of a vehicle to account for the incremental costs estimated for this final rule (\$2.13 for the front outboard passenger seat and \$19.59 for the rear seats) would have much, if any, effect on vehicle sales.

There are a significant number (several hundred) of second-stage or final-stage manufacturers and alterers that would be impacted by a final rule. These manufacturers buy incomplete vehicles to finish as complete vehicles or modify previously certified vehicles. Many of these latter vehicles are van conversions; there are a variety of vehicles affected.

To produce a vehicle, a final-stage manufacturer can either stay within the incomplete vehicle document (IVD) furnished by the incomplete vehicle manufacturer (which are typically large vehicle manufacturers, such as GM or Ford), or the final-stage manufacturer can work with incomplete vehicle manufacturers to enable the final-stage manufacturer to certify to the new requirements.<sup>246</sup> The final-stage manufacturer can also certify to the standard using due care based on an assessment of the information available to the manufacturer.

While there are a substantial number of multi-stage manufacturers that could be impacted by the final rule, we believe that the impact on them would not be significant. We note that these

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<sup>246</sup> For a discussion of NHTSA's certification regulations for final stage manufacturers, see 71 FR 28168, May 15, 2006, Docket No. NHTSA-2006-24664, Response to petitions for reconsideration of a final rule implementing regulations pertaining to multi-stage vehicles and to altered vehicles. The Background section of that document provides concepts and terminology relating to the certification of multi-stage vehicles.

manufacturers are already certifying their vehicles to FMVSS No. 208's seat belt warning system requirements that apply to the driver seating position. They are already familiar with the equipment and manufacturing processes involved to certify their vehicles to seat belt warning system requirements. Further, we anticipate that final-stage manufacturers will base their vehicles on incomplete vehicles that already have the seat belt reminder system installed rather than install the systems themselves.

For final-stage manufacturers working with incomplete vehicles that do not have rear seats or seat belt reminder systems already installed, we believe that completing vehicles to meet the requirements would be practicable. The manufacturers can obtain seats and seat belt systems (with seat belt warning system) from suppliers. NHTSA recognizes that the suppliers might be supplying larger vehicle manufacturers during the development and lead time period, and do not have the capabilities to handle all of the smaller manufacturers, including final-stage manufacturers. The rulemaking accounts for this limitation by allowing final-stage manufacturers an additional year to comply with the requirements, to provide flexibility to these small entities and reduce the economic impact of the rule on them. (See also 49 CFR 571.8(b).)

For an alterer (a person who alters by addition, substitution or removal of components, other than readily attachable components, a certified vehicle before the first purchase of the vehicle other than for resale), the impacts of the rule will not be significant. The final rule allows alterers an additional year to comply with the requirements. For example, if an alterer is removing rear seats, the person making the alteration would simply have to be careful not to render non-compliant the seat belt warning system for the remaining seats. (See 49 CFR 571.8(b).)

An alterer that is adding rear seats could obtain seating systems with seat belt warning systems from seat suppliers and install the seats on the body following the instructions of the seat supplier. Changes may have to be made to the instrument panel area to add the requisite visual signal, but the final rule provides flexibility to manufacturers in providing the visual signal.

## **Executive Order 13132 (Federalism)**

NHTSA has examined this rule pursuant to Executive Order 13132 (64 FR 43255; Aug. 10, 1999) and concluded that no additional consultation with States, local governments, or their representatives is mandated beyond the rulemaking process. The agency has concluded that the rule does not have sufficient federalism implications to warrant consultation with State and local officials or the preparation of a federalism summary impact statement. The rule does not have “substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.”

NHTSA rules can have preemptive effect in two ways. First, the National Traffic and Motor Vehicle Safety Act contains an express preemption provision: When a motor vehicle safety standard is in effect under this chapter, a State or a political subdivision of a State may prescribe or continue in effect a standard applicable to the same aspect of performance of a motor vehicle or motor vehicle equipment only if the standard is identical to the standard prescribed under this chapter. 49 U.S.C. 30103(b)(1). It is this statutory command by Congress that preempts any non-identical State legislative and administrative law address the same aspect of performance.

The express preemption provision described above is subject to a savings clause under which “[c]ompliance with a motor vehicle safety standard prescribed under this chapter does not exempt a person from liability at common law.” 49 U.S.C. 30103(e). Pursuant to this provision, State common law tort causes of action against motor vehicle manufacturers that might otherwise be preempted by the express preemption provision are generally preserved.

NHTSA rules can also preempt State law if complying with the FMVSS would render the motor vehicle manufacturers liable under State tort law. Because most NHTSA standards established by an FMVSS are minimum standards, a State common law tort cause of action that seeks to impose a higher standard on motor vehicle manufacturers will generally not be

preempted. However, if and when such a conflict does exist - for example, when the standard at issue is both a minimum and a maximum standard - the State common law tort cause of action is impliedly preempted. See *Geier v. American Honda Motor Co.*, 529 U.S. 861 (2000).

Pursuant to Executive Order 13132, NHTSA has considered whether this rule could or should preempt State common law causes of action. The agency's ability to announce its conclusion regarding the preemptive effect of one of its rules reduces the likelihood that preemption will be an issue in any subsequent tort litigation.

To this end, the agency has examined the nature (e.g., the language and structure of the regulatory text) and objectives of this rule and finds that this rule, like many NHTSA rules, would prescribe only a minimum safety standard. NHTSA does not intend that this rule preempt state tort law that would effectively impose a higher standard on motor vehicle manufacturers than that established by this rule. Establishment of a higher standard by means of State tort law would not conflict with the standards in this final rule. Without any conflict, there could not be any implied preemption of a State common law tort cause of action.

### **National Environmental Policy Act**

NHTSA has analyzed this rule for the purposes of the National Environmental Policy Act. In accordance with 49 CFR 1.81, 42 U.S.C. 4336, and DOT NEPA Order 5610.1C, NHTSA has determined that this rule is categorically excluded pursuant to 23 CFR 771.118(c)(4) (planning and administrative activities, such as promulgation of rules, that do not involve or lead directly to construction). This rulemaking, which amends Federal Motor Vehicle Safety Standard (FMVSS) No. 208, "Occupant crash protection," to require a seat belt use warning system for rear seats, updates and enhances the current seat belt warning requirements for the driver's seat belt, and extends these requirements to the front outboard passenger seat, is not anticipated to result in any environmental impacts, and there are no extraordinary circumstances present in connection with this rulemaking.

### **Executive Order 12988 (Civil Justice Reform)**

With respect to the review of the promulgation of a new regulation, section 3(b) of Executive Order 12988, “Civil Justice Reform” (61 FR 4729, February 7, 1996) requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) Clearly specifies the preemptive effect; (2) clearly specifies the effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct, while promoting simplification and burden reduction; (4) clearly specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. This document is consistent with that requirement.

Pursuant to Executive Order 12988, NHTSA notes as follows. The issue of preemption is discussed above in connection with Executive Order 13132. NHTSA notes further that there is no requirement that individuals submit a petition for reconsideration or pursue other administrative proceeding before they may file suit in court.

### **Paperwork Reduction Act**

Under the procedures established by the Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3501, et. seq.), a Federal agency must request and receive approval from the Office of Management and Budget (OMB) before it collects certain information from the public and a person is not required to respond to a collection of information by a Federal agency unless the collection displays a valid OMB control number. In compliance with these requirements, NHTSA is submitting an information collection request (ICR) to OMB for approval for modifications to a currently approved information collection titled “Consolidated Vehicle Owner’s Manual Requirements for Motor Vehicles and Motor Vehicle Equipment” (OMB Control No. 2127-0541, Current Expiration Date: 03/31/2026).

This final rule amends 49 CFR 571.208 to, among other things, add new owner’s manual requirements. NHTSA submitted an ICR to OMB for review when the NPRM was published.<sup>247</sup>

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<sup>247</sup>[https://www.reginfo.gov/public/do/PRAViewICR?ref\\_nbr=202308-2127-002#](https://www.reginfo.gov/public/do/PRAViewICR?ref_nbr=202308-2127-002#).

OMB deferred review until after receiving NHTSA's summary and response to all comments related to the information collection requirements contained in this rulemaking. Accordingly, NHTSA is resubmitting the ICR for this final rule.

NHTSA's ICR describes the nature of the information collections and their expected burden. The ICR is for fifteen mandatory and voluntary disclosure requirements for manufacturers of motor vehicles and items of motor vehicle equipment. Pursuant to 49 U.S.C. 30117, the Secretary (NHTSA by delegation) is authorized to require manufacturers to provide information to first purchasers of motor vehicles or items of motor vehicle equipment related to performance and safety in printed materials that are attached to or accompany the motor vehicle or item of motor vehicle equipment. NHTSA has exercised this authority to require manufacturers to provide certain specified safety information to be readily available to consumers and purchasers of motor vehicles and items of motor vehicle equipment. This information is most often provided in vehicle owners' manuals and the requirements are found in 49 CFR parts 563, 571, and 575. Some of these requirements are contained in the Federal Motor Vehicle Safety Standards (FMVSS) that set performance requirements for motor vehicles and items of motor vehicle equipment. The other requirements are contained in separate regulations. Manufacturers must comply with these requirements whenever they manufacture a vehicle or equipment item that is subject to the requirements. The purpose of the required disclosures is to provide important safety information to vehicle owners.

This final rule makes changes to existing an information collection requiring that the owner's manual describe the vehicle's seat belt warning system features, including the location, format, and meaning of the visual warnings. It also requires that the owner's manual include instructions on how to make any manual electrical connections for readily removable seats. These changes are finalized without any substantive changes from those proposed in the NPRM.

We received comments on the proposed changes. ASC supported the proposed changes to the owner's manual requirements. NSC suggested standardizing generic nomenclature and

warning and icon symbols to reduce driver confusion. Regarding installation of child restraint systems, Auto Innovators emphasized that additional information about system design can be included at the discretion of the manufacturer, and SRN suggested that instructions regarding how to interpret certain warnings should be included in the child passenger section of the manual. These comments are discussed in Section VI.A.2.d.

As described in the NPRM, NHTSA estimates that the total burden of the ICR is approximately 10,172 hours and \$8,726,501 annually. This burden represents an increase in estimated burden hours of 1,544 hours (8,628 hours to 10,172 hours) and an increase in costs of \$755,040 (\$7,971,461 to \$8,726,501), compared with existing requirements. The change in burden reflects changes as a result of the rulemaking requiring the development and publication of new information for the owner's manual. Printing costs have increased due to accounting for the estimated number of vehicles that will be equipped with seat belt reminder systems and will therefore need to comply with the requirements to provide system information and operating instructions. We did not receive comments on these burden estimates or other aspects of the proposed revision to the information collection. These burden estimates did not change between the NPRM and final rule.

### **National Technology Transfer and Advancement Act**

Under the National Technology Transfer and Advancement Act of 1995 (NTTAA) (Public Law 104-113), "all Federal agencies and departments shall use technical standards that are developed or adopted by voluntary consensus standards bodies, using such technical standards as a means to carry out policy objectives or activities determined by the agencies and departments." Voluntary consensus standards are technical standards (e.g., materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary consensus standards bodies, such as SAE (formerly, the Society of Automotive Engineers). The NTTAA directs this agency to provide Congress, through OMB,

explanations when the agency decides not to use available and applicable voluntary consensus standards.

While the agency is not aware of any voluntary standards that exist regarding the seat belt warnings contemplated in this rule, the agency has examined relevant regulations in other countries, such as the European Union standard ECE R16. As discussed above, although we are not aware of any foreign regulations that require seat belt warnings for the front outboard passenger or rear seat belts or for the driver seat on small buses, we believe that requiring seat belt warnings for these seating positions and for the driver seats on small buses meets a safety need and is practicable.

### **Severability**

The issue of severability of FMVSS is addressed in 49 CFR 571.9. It provides that if any FMVSS or its application to any person or circumstance is held invalid, the remainder of the part and the application of that standard to other persons or circumstances is unaffected.

### **Unfunded Mandates Reform Act**

The Unfunded Mandates Reform Act of 1995 (Public Law 104-4) (UMRA) requires agencies to prepare a written assessment of the costs, benefits, and other effects of proposed or final rules that include a Federal mandate likely to result in the expenditures by States, local or tribal governments, in the aggregate, or by the private sector, of \$100 million or more (adjusted annually for inflation with base year of 1995) in any one year. Adjusting this amount by the implicit gross domestic product price deflator for 2022 results in \$177 million ( $111.416/75.324 = 1.48$ ). The assessment may be included in conjunction with other assessments, as it is here.

UMRA requires the agency to select the “least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule.” As discussed above, the agency considered alternatives to the final rule and has concluded that the requirements are the most cost-effective alternatives that achieve the objectives of the rule.

This rule on seat belt reminder systems is not likely to result in expenditures by State, local or tribal governments of more than \$177 million annually. However, it is estimated to result in the expenditure by automobile manufacturers and/or their suppliers by approximately \$168 million annually. The estimated costs are discussed in Section VIII, Overview of Benefits and Costs, and the docketed final regulatory impact analysis.

We have concluded that the requirements in this rule are the most cost-effective alternatives that achieve the objectives of the rule.

### **Plain Language**

Executive Order 12866 and E.O. 13563 require each agency to write all rules in plain language. Application of the principles of plain language includes consideration of the following questions:

- Have we organized the material to suit the public's needs?
- Are the requirements in the rule clearly stated?
- Does the rule contain technical language or jargon that isn't clear?
- Would a different format (grouping and order of sections, use of headings, paragraphing) make the rule easier to understand?
- Would more (but shorter) sections be better?
- Could we improve clarity by adding tables, lists, or diagrams?
- What else could we do to make the rule easier to understand?

NHTSA has considered these questions and attempted to use plain language in writing this rule. Please inform the agency if you can suggest how NHTSA can improve its use of plain language.

### **Regulation Identifier Number (RIN)**

The Department of Transportation assigns a regulation identifier number (RIN) to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year.

You may use the RIN contained in the heading at the beginning of this document to find this action in the Unified Agenda.

Note: The following appendix will not appear in the Code of Federal Regulations.

### **Appendix A. List of Comments Cited in Preamble**

<b>Commenter</b>	<b>Comment ID</b>
Advocates for Highway and Auto Safety and Public Citizen (Advocates and Public Citizen)	NHTSA-2023-0032-0040
Alliance for Automotive Innovation (Auto Innovators)	NHTSA-2023-0032-0048
Automotive Safety Council (ASC)	NHTSA-2023-0032-0015
Autonomous Vehicle Industry Association (AVIA)	NHTSA-2023-0032-0029
Braun Northwest, Inc. (BNW)	NHTSA-2023-0032-0050
Consumer Reports	NHTSA-2023-0032-0049
Cross, Karleigh	NHTSA-2023-0032-0013
Dorey, Rivers	NHTSA-2023-0032-0008
Ford Motor Company (Ford)	NHTSA-2023-0032-0045
Freedman Seating Company (Freedman)	NHTSA-2023-0032-0041
Freeman, Paige	NHTSA-2023-0032-0017
Gaal, Edward	NHTSA-2023-0032-0010
General Motors (GM)	NHTSA-2023-0032-0026
American Honda Motor Co. (Honda)	NHTSA-2023-0032-0039
Hyundai America Technical Center, Inc. (HATCI)	NHTSA-2023-0032-0053
Hyundai Motor Company (Hyundai)	NHTSA-2023-0032-0047
IEE	NHTSA-2023-0032-0032
Insurance Institute for Highway Safety (IIHS)	NHTSA-2023-0032-0020
InterMotive Vehicle Controls (InterMotive)	NHTSA-2023-0032-0016
Koo, John	NHTSA-2023-0032-0012
Mothers Against Drunk Driving (MADD)	NHTSA-2023-0032-0055
Mercedes-Benz and Mercedes-Benz Research and Development North America (Mercedes)	NHTSA-2023-0032-0025
National Association of Mutual Insurance Companies (NAMIC)	NHTSA-2023-0032-0034
National Automobile Dealers Association (NADA)	NHTSA-2023-0032-0042
National Safety Council (NSC)	NHTSA-2023-0032-0038
Nissan North America	NHTSA-2023-0032-0043
National Transportation Safety Board (NTSB)	NHTSA-2023-0032-0019
Paradise, John	NHTSA-2023-0032-0009
Recreational Vehicle Industry Association (RVIA)	NHTSA-2023-0032-0028
Rivian Automotive	NHTSA-2023-0032-0044
Safe Kids Worldwide (SKW)	NHTSA-2023-0032-0046

Safe Ride News (SRN)	NHTSA-2023-0032-0036
Stange, Trenton	NHTSA-2023-0032-0018
Tesla	NHTSA-2023-0032-0035
Tombrello, Stephanie	NHTSA-2023-0032-0030
Toyota Motor North America, Inc. and Toyota Motor Corporation (Toyota)	NHTSA-2023-0032-0054
Anonymous #5	NHTSA-2023-0032-0005
Anonymous #24	NHTSA-2023-0032-0024
Anonymous #33	NHTSA-2023-0032-0033

### List of Subjects in 49 CFR Part 571

Imports, Motor vehicle safety, Motor vehicles.

In consideration of the foregoing, NHTSA amends 49 CFR part 571 as set forth below.

### PART 571—FEDERAL MOTOR VEHICLE SAFETY STANDARDS

1. The authority citation for part 571 of title 49 continues to read as follows:

**Authority:** 49 U.S.C. 322, 30111, 30115, 30117, and 30166; delegation of authority at 49 CFR 1.95.

2. Amend § 571.101 by revising paragraph S5.5.6 and tables 1 and 2 to read as follows.

#### §571.101; Standard No. 101; Controls and displays.

\* \* \* \* \*

S5.5.6(a) Except as provided in S5.5.6(b) and (c), messages displayed in a common space may be cancelable automatically or by the driver.










(b) Telltales for high beams, turn signal, low tire pressure, and passenger air bag off, and telltales for which the color red is required in table 1 to this section must not be cancelable while the underlying condition for their activation exists.





(c) Telltales for the seat belts must not be cancelable by the driver before the minimum durations are satisfied but may be cancellable automatically as specified in FMVSS No. 208 (§ 571.208).









\* \* \* \* \*


### Table 1 to § 571.101 Controls, Telltales, and Indicators

**With Illumination or Color Requirements<sup>1</sup>**

<b>Column 1 ITEM</b>	<b>Column 2 SYMBOL</b>	<b>Column 3 WORDS OR ABBRE- VIATIONS</b>	<b>Column 4 FUNCTION</b>	<b>Column 5 ILLUMIN- ATION</b>	<b>Column 6 COLOR</b>
Highbeam <sup>2</sup>	 3, 5	-----	Telltale	-----	Blue or Green <sup>4</sup>
Turn signals <sup>2</sup>	 3, 6	-----	Control	-----	-----
			Telltale	-----	Green <sup>4</sup>
Hazard warning signal	 3	Hazard	Control	Yes	-----
			-----	Telltale <sup>7</sup>	-----
Position, side marker, end-outline marker, identification, or clearance lamps	 3,8	Marker Lamps or MK Lps <sup>8</sup>	Control	Yes	-----
Windshield wiping system		Wiper or Wipe	Control	Yes	-----
Windshield washing system		Washer or Wash	Control	Yes	-----
Windshield washing and wiping system combined		Washer-Wiper or Wash-Wipe	Control	Yes	-----
Windshield defrosting and defogging system		Defrost, Defog, or Def.	Control	Yes	-----
Rear window defrosting and defogging system		Rear Defrost, Rear Defog, Rear Def., or R-Def.	Control	Yes	-----
Brake system malfunction	-----	Brake	Telltale	-----	Red <sup>4</sup>
Antilock brake system malfunction for vehicles subject to FMVSS 105 or 135	-----	Antilock, Anti-lock, or ABS <sup>9</sup>	Telltale	-----	Yellow
Malfunction in Variable Brake Proportioning System	-----	Brake Proportioning <sup>9</sup>	Telltale	-----	Yellow

Column 1 ITEM	Column 2 SYMBOL	Column 3 WORDS OR ABBRE- VIATIONS	Column 4 FUNCTION	Column 5 ILLUMIN- ATION	Column 6 COLOR
Regenerative brake system malfunction	-----	RBS or ABS/RBS <sup>9</sup>	Telltale	-----	Yellow
Malfunction in antilock system for vehicles other than trailers subject to FMVSS 121	-----	ABS or Antilock <sup>9</sup>	Telltale	-----	Yellow
Antilock brake system trailer fault for vehicles subject to FMVSS 121		Trailer ABS or Trailer Antilock	Telltale	-----	Yellow
Brake pressure (for vehicles subject to FMVSS 105 or 135)	-----	Brake Pressure <sup>9</sup>	Telltale	-----	Red <sup>4</sup>
Low brake fluid condition (for vehicles subject to FMVSS 105 or 135)	-----	Brake Fluid <sup>9</sup>	Telltale	-----	Red <sup>4</sup>
Parking brake applied (for vehicles subject to FMVSS 105 or 135)	-----	Park or Parking Brake <sup>9</sup>	Telltale	-----	Red <sup>4</sup>
Brake lining wear-out condition (for vehicles subject to FMVSS 135)	-----	Brake Wear <sup>9</sup>	Telltale	-----	Red <sup>4</sup>
Electronic Stability Control System Malfunction (for vehicles subject to FMVSS 126) <sup>10, 11</sup>		ESC <sup>12</sup>	Telltale	-----	Yellow
Electronic Stability Control System "OFF" (for vehicles subject to FMVSS 126) <sup>10</sup>		ESC OFF	Control	Yes	-----
			Telltale	-----	Yellow
Electronic Stability Control System Malfunction (for vehicles subject to FMVSS 136) <sup>11</sup>		ESC	Telltale	-----	Yellow
Fuel Level		Fuel	Telltale	-----	-----

Column 1 ITEM	Column 2 SYMBOL	Column 3 WORDS OR ABBRE- VIATIONS	Column 4 FUNCTION	Column 5 ILLUMIN- ATION	Column 6 COLOR
	 or 		Indicator	Yes	-----
Engine oil pressure	 13	Oil	Telltale	-----	-----
			Indicator	Yes	-----
Engine coolant temperature	 13	Temp	Telltale	-----	-----
			Indicator	Yes	-----
Electrical charge		Volts or Charge or Amp	Telltale	-----	-----
			Indicator	Yes	-----
Engine stop	-----	Engine Stop 14	Control	Yes	-----
Automatic vehicle speed (cruise control)	-----	-----	Control	Yes	-----
Speedometer	-----	MPH, or MPH and km/h 15	Indicator	Yes	-----
Heating and Air conditioning system	-----	-----	Control	Yes	-----
Automatic transmission control position <i>(park)</i> <i>(reverse)</i> <i>(neutral)</i> <i>(drive)</i>	-----	<b>P R N D</b> 16	Indicator	Yes	-----
Heating and/or air conditioning fan	 or 	Fan	Control	Yes	-----
Low Tire Pressure (including malfunction) (See FMVSS 138)	 17	Low Tire 17	Telltale	-----	Yellow

Column 1 ITEM	Column 2 SYMBOL	Column 3 WORDS OR ABBRE- VIATIONS	Column 4 FUNCTION	Column 5 ILLUMIN- ATION	Column 6 COLOR
Low Tire Pressure (including malfunction that identifies involved tire) (See FMVSS 138)	 17	Low Tire 17	Telltale	-----	Yellow
Tire Pressure Monitoring System Malfunction (See FMVSS 138) 18	-----	TPMS 17, 19	Telltale	-----	Yellow
Rear Seat Belt Warning <sup>20</sup>	-----	-----	Telltale	-----	Green or Red <sup>21</sup>

Notes to table 1 to § 571.101:

<sup>1</sup>An identifier is shown in this table if it is required for a control for which an illumination requirement exists or if it is used for a telltale for which a color requirement exists. If a line appears in column 2 and column 3, the control, telltale, or indicator is required to be identified, however the form of the identification is the manufacturer's option. Telltales are not considered to have an illumination requirement, because by definition the telltale must light when the condition for its activation exists.

<sup>2</sup> Additional requirements in FMVSS 108.

<sup>3</sup> Framed areas of the symbol may be solid; solid areas may be framed.

<sup>4</sup> Blue may be blue-green. Red may be red-orange.

<sup>5</sup> Symbols employing four lines instead of five may also be used.

<sup>6</sup> The pair of arrows is a single symbol. When the controls or telltales for left and right turn operate independently, however, the two arrows may be considered separate symbols and be spaced accordingly.

<sup>7</sup> Not required when arrows of turn signal telltales that otherwise operate independently flash simultaneously as hazard warning telltale.

<sup>8</sup> Separate identification is not required if function is combined with master lighting switch.

<sup>9</sup> Refer to FMVSS 105 or FMVSS 135, as appropriate, for additional specific requirements for brake telltale labeling and color. If a single telltale is used to indicate more than one brake system condition, the brake system malfunction identifier must be used.

<sup>10</sup> Requirement effective September 1, 2011.

<sup>11</sup> A manufacturer may use this telltale in flashing mode to indicate ESC operation.

<sup>12</sup> This symbol may also be used to indicate the malfunction of related systems/functions, including traction control, trailer stability assist, corner brake control, and other similar functions that use throttle and/or individual wheel torque control to operate and share common components with ESC.

<sup>13</sup> Combination of the engine oil pressure symbol and the engine coolant temperature symbol in a single telltale is permitted.

<sup>14</sup> Use when engine control is separate from the key locking system.

<sup>15</sup> If the speedometer is graduated in both miles per hour and in kilometers per hour, the scales must be identified "MPH" and "km/h", respectively, in any combination of upper- and lowercase letters.

<sup>16</sup> The letters 'P', 'R', 'N', and 'D' are considered separate identifiers for the individual gear positions. Their locations within the vehicle, and with respect to each other, are governed by FMVSS 102. The letter 'D' may be replaced by another alphanumeric character or symbol chosen by the manufacturer.

<sup>17</sup> Required only for FMVSS 138 compliant vehicles.




<sup>18</sup> Alternatively, either low tire pressure telltale may be used to indicate a TPMS malfunction. See FMVSS 138.

<sup>19</sup> Required only for vehicles manufactured on or after September 1, 2007.

<sup>20</sup> Refer to FMVSS 208 for additional requirements.

<sup>21</sup> These are the colors if symbols or numbers are chosen. If a symbol or number is used to indicate to the driver how many or which rear seat belts are in use, the color of the illuminated symbol or number must be green. If a symbol or number is used to indicate to the driver how many or which rear seat belts are not in use, or how many or which rear seat belts have undergone a change of status from in use to not in use, the color of the illuminated symbol or number must be red. See FMVSS 208 S7.5(c)(3).

**Table 2 to § 571.101**  
**Identifiers for**  
**Controls, Telltales, and Indicators with**  
**No Color or Illumination Requirements**

<b>Column 1 ITEM</b>	<b>Column 2 SYMBOL</b>	<b>Column 3 WORD(S) OR ABBREVIATION</b>
Hand Throttle Control	-	Throttle
Engine Start Control	-	Engine Start <sub>1</sub>
Manual Choke Control	-	Choke
Odometer	-	Kilometers or km, if kilometers are shown. Otherwise, no identifier is required. <sub>2</sub>
Horn		Horn
Master Lighting Switch		Lights
Headlamps and Taillamps Control	-	<sub>3</sub> 4,5
Low Brake Air Pressure Telltale (for vehicles subject to FMVSS 121)	-	Brake Air
Front Seat Belt Unfastened Telltale		Fasten Belts or Fasten Seat Belts

Notes to table 2 to § 571.101:

1. Use when engine control is separate from the key locking system.
2. Any combination of upper- or lowercase letters may be used.
3. Framed areas may be filled.

4. If a line appears in Column 2 and Column 3, the Control, Telltale or Indicator is required to be identified, however the form of the identification is the manufacturer's option.

5. Separate identification not required if function is combined with Master Lighting Switch.

3. Amend § 571.208 by:

- a. Adding paragraphs S4.1.5.7, S4.1.5.7.1, S4.1.5.8, S4.1.5.8.1, S4.2.8, S4.2.8.1, S4.2.9, S4.2.9.1, S4.4.3.4, S4.4.3.4.1, S4.4.3.5, S4.4.3.5.1, and S4.5.1.(f)(3);
- b. Revising paragraph S4.5.3.3(b); and
- c. Adding paragraph S7.5.

The additions and revisions read as follows:

**§ 571.208 Standard No. 208; Occupant crash protection.**

\* \* \* \* \*

S4.1.5.7. *Front seat belt warnings for passenger cars manufactured on or after September 1, 2026.*

S4.1.5.7.1 Any front outboard designated seating position and any inboard designated seating position for which a seat belt warning is required in S4.1.5.6 shall comply with S7.5 of this standard.

S4.1.5.8. *Rear seat belt warnings for passenger cars manufactured on or after September 1, 2027.*

S4.1.5.8.1. All rear designated seating positions, except in law enforcement vehicles, shall comply with S7.5 of this standard.

\* \* \* \* \*

S4.2.8 *Front seat belt warnings for trucks and multipurpose passenger vehicles manufactured on or after September 1, 2026 with a GVWR of 4,536 kg (10,000 lb) or less.*

S4.2.8.1. Any front outboard designated seating position certified to a compliance option requiring a seat belt and any inboard designated seating position for which a seat belt warning is required by S4.2.6.4 shall comply with S7.5 of this standard.

S4.2.9 *Rear seat belt warnings for trucks and multipurpose passenger vehicles manufactured on or after September 1, 2027 with a GVWR of 4,536 kg (10,000 lb) or less.*

S4.2.9.1. All rear designated seating positions certified to a compliance option requiring a seat belt, except ambulances, as defined by FMVSS No. 201 (§ 571.201), and law enforcement vehicles, shall comply with S7.5 of this standard.

\* \* \* \* \*

S4.4.3.4 *Front seat belt warnings for buses manufactured on or after September 1, 2026 with a GVWR of 4,536 kg (10,000 lb) or less.*

S4.4.3.4.1 All front outboard designated seating positions and any inboard designated seating position for which a seat belt warning is required by S4.2.6.4 shall comply with S7.5 of this standard.

S4.4.3.5 *Rear seat belt warnings for buses manufactured on or after September 1, 2027 with a GVWR of 4,536 kg (10,000 lb) or less.*

S4.4.3.5.1 All rear designated seating positions certified to a compliance option requiring a seat belt, except for school buses and law enforcement vehicles, shall comply with S7.5 of this standard.

\* \* \* \* \*

S4.5.1 \* \* \*

(f) \* \* \*

(3) The owner's manual (which includes information provided by the vehicle manufacturer to the consumer, whether in digital or printed form) for any vehicle equipped with a seat belt warning system must include an accurate description of the system features and warning signals, including the location and format of the visual warnings, in an easily understandable format. The description shall include information on when the different features of the warning system will activate and how to interpret the visual warnings. For vehicles with any rear designated seating position that is a readily-removable seat (a seat designed to be easily

removed and replaced by means installed by the manufacturer for that purpose) equipped with manual electrical connections that are utilized by the rear seat belt warning system, the owner's manual must include a description of the purpose of the connection, instructions on how to achieve a proper connection, and a description of how not achieving a proper connection may affect the proper functioning of the system.

\* \* \* \* \*

S4.5.3.3 \* \* \*

(b) Conform to the seat belt warning system requirements of S7.3 or S7.5 of this standard, as applicable.

\* \* \* \* \*

*S7.5 Seat belt warning systems for front outboard seat belt assemblies in vehicles manufactured on or after September 1, 2026 provided in accordance with the requirements of S4.1.5.7, S4.2.8, S4.4.3.4, and S4.5.3.3 of this standard, and rear seat belt assemblies in vehicles manufactured on or after September 1, 2027 provided in accordance with the requirements of S4.1.5.8, S4.2.9, S4.4.3.5, and S4.5.3.3 of this standard.*

(a) *Definitions for S7.5.* (1) A manual seat belt is *not in use* when the seat belt latch mechanism is not fastened. A seat belt is *in use* when the seat belt latch mechanism is fastened. An automatic seat belt is *not in use* when the seat belt latch mechanism is not fastened or, if the automatic belt is non-detachable, the emergency release mechanism is in the released position. If the automatic seat belt is motorized, whether the seat belt is in use is determined when the seat belt webbing is in its locked protective mode at the anchorage point.

(2) A *warning cycle for an intermittent audible warning* consists of period(s) when the warning is active at the chime frequency or continuously, and of inactive period(s). A warning cycle begins with an active period and is 30 seconds in duration.

(3) *Chime frequency* means the repetition rate for an intermittent audible warning when the warning is active.

(4) *Duty cycle* means the total amount of time an intermittent audible warning is active during a warning cycle at the chime frequency or continuously, divided by the total warning cycle duration (30 seconds).

(5) A *readily-removable seat* means a seat designed to be easily removed and replaced by means installed by the manufacturer for that purpose.

(6) *Seat centerline* means the line formed by the intersection of the seating surface and the vertical plane that passes through the “seating reference point” (as defined at 49 CFR 571.3) and is parallel to the direction that the seat faces.

(b) *Front seat belt warning system.* A driver’s designated seating position and any front outboard passenger designating seating position must be equipped with an audio-visual seat belt warning meeting the requirements of S7.5(b)(1) through (4) when tested in accordance with S7.5(d).

(1) *Visual warning.* (i) A visual warning must activate and remain active whenever the ignition switch is in the “on” or “start” position (or the propulsion system is activated), the seat is occupied, and the seat belt is not in use.

(ii) *Vehicles with a driver’s designated seating position.* The visual warning for the driver’s seat belt and the visual warning for the front outboard passenger seat belt must be visible from the driver’s seat. If the vehicle has a mode of driverless operation, the visual warning for the front outboard passenger seat belt must also be visible from the front outboard passenger seat.

(iii) *Vehicles without a driver’s designated seating position.* The visual warning for each outboard passenger designated seating position must be visible from each outboard passenger designated seating position.

(iv) The visual warning may be continuous or intermittent and must display the identifying symbol or the words specified in table 2 of FMVSS No. 101 (§ 571.101).

(v) For a visual warning associated with multiple front outboard seats, the visual warning must clearly identify the seating positions for which the warnings are intended.

(vi) The visual warning must not be overridden by other warnings.

(2) *Audible warning – first phase.* (i) An audible warning must activate when the ignition switch is placed in the “on” or “start” position (or upon manual activation of the propulsion system, but prior to the vehicle being placed in “possible active driving mode” as defined by FMVSS No. 305 (§ 571.305)), the seat is occupied, and the seat belt is not in use.

(ii) The audible warning must continue for 30 seconds, until the seat belt that triggered the warning is in use, until the seat is no longer occupied, or until the second-phase warning activates, whichever comes first. The audible warning may be paused during the activation of another audible safety warning that is designed to alert the driver to take immediate action, but the seat belt audible warning must be resumed for the remainder of the required duration after the other audible warning deactivates.

(iii) The audible warning may be continuous or intermittent. If intermittent, inactive periods longer than 3 seconds will not be counted toward the total duration of the audible warning, and there must be no inactive periods greater than 10 seconds. The same audible warning may be used for all front and rear seats.

(3) *Audible warning – second phase.* (i) The audible warning must activate and remain active when the vehicle speed is equal to or greater than 10 km/h (6.2 mph), the seat is occupied, and the seat belt is not in use. The audible warning may be paused during the activation of another audible safety warning that is designed to alert the driver to take immediate action, but the seat belt audible warning must be resumed after the other audible warning deactivates.

(ii) The audible warning may be continuous or intermittent. If intermittent, the audible warning when active must be continuous or have a chime frequency of at least 0.5 Hz and a duty cycle of at least 0.2. The same audible warning may be used for all front and rear seats.

(4) *Cancellation.* The warning must not be able to be canceled or deactivated.

(c) *Rear passenger seat belt warning system.* All rear designated seating positions must be equipped with a warning system meeting the requirements of S7.5(c)(1) through (7) when tested in accordance with S7.5(d).

(1) *Start-of-trip warning.* A visual warning indicating how many or which rear seat belts are in use and/or not in use must activate when the ignition switch is placed in the “on” or “start” position (or upon manual activation of the propulsion system, but prior to the vehicle being placed in “possible active driving mode” as defined by FMVSS No. 305 (§ 571.305)) and continue for at least 60 seconds.

(i) No visual warning is required for:

(A) an unoccupied seat if the system is able to determine whether or not a seat is occupied;

(B) a seat belt that is in use in a system designed to indicate to the driver how many or which rear seat belts are not in use; and

(C) a seat belt that is not in use in a system designed to indicate to the driver how many or which rear seat belts are in use.

(2) *Change-of-status warning.* An audio-visual warning indicating how many or which rear seat belts have undergone a change of status from in use to not in use must activate when the status of any rear seat belt changes from in use to not in use and the vehicle is in forward or reverse drive mode, unless any rear door is open. The warning must continue for at least 30 seconds or until the seat belt that triggered the warning is in use. The warning may deactivate if the system is able to determine that the number of seat belts in use is restored and all the doors remained closed.

(3) *Additional visual warning requirements.* (i) The warning may be continuous or intermittent and may consist of text, symbols, and/or numbers.

(ii) The warning must be visible from the driver’s seat.

(iii) If the warning is designed to indicate how many or which rear seat belts are in use, the color of the symbols or numbers indicating seat belts in use must be green. If the warning is designed to indicate to the driver how many or which rear seat belts are not in use, the color of the symbols or numbers indicating seat belts not in use must be red.

(iv) The change-of-status visual warning may use the same telltale as the start of trip warning, provided that the color of an illuminated symbol or number used to indicate to the driver how many or which rear seat belts have undergone a change of status from in use to not in use is red.

(v) The warning must not be overridden by other visual warnings for the required duration.

(4) *Audible warning requirements.* (i) The audible warning may be continuous or intermittent. If intermittent, inactive periods longer than 3 seconds will not be counted toward the total duration of the warning, and there must be no inactive periods greater than 10 seconds.

(ii) The audible warning may be paused during the activation of another audible safety warning that is designed to alert the driver to take immediate action, but the seat belt audible warning must be resumed for the remainder of the required duration after the other audible warning deactivates.

(iii) The same audible warning may be used for all front and rear seats.

(5) *Cancellation.* The warning must not be able to be canceled or deactivated.

(6) *Seat electrical connection requirements.* Any rear designated seating position consisting of a readily-removable seat that is equipped with electrical connections utilized by the rear seat belt warning system must either--

(i) Automatically connect the electrical connections when the seat is put in place; or

(ii) If a manual electrical connection is required, the connectors must be readily accessible.

(7) *Electrical connection warning signal.* Vehicles that provide a visual warning designed to indicate to the driver how many or which rear seat belts are not in use and are equipped with any readily removable rear seats must, when the ignition switch is placed in the “on” or “start” position (or upon manual activation of the propulsion system, but prior to the vehicle being placed in “possible active driving mode” as defined by FMVSS No. 305 (§ 571.305)) provide a visual warning visible from the driver’s seat if a seat has been installed and a proper electrical connection has not been made. The visual warning may be intermittent but must remain active until all rear seat electrical connections are properly made.

(d) *Test procedures.* (1) *Occupied designated seating positions.* If testing with a designated seating position occupied, the following apply, at the option of the manufacturer:

(i) *Front outboard seating positions.* (A) Seat the 5th percentile female test dummy described in part 572, subpart O of this chapter, as well as any larger dummy described in part 572 of this chapter; or

(B) Seat any human occupant that weighs 46.7 kg (103 lb) or more and is 139.7 cm (55 inches) tall or taller.

(ii) *Driver’s seating position.* (A) Seat the 5th percentile female test dummy described in part 572, subpart O of this chapter, as well as any larger dummy described in part 572 of this chapter;

(B) Seat any human occupant that weighs 46.7 kg (103 lb) or more and is 139.7 cm (55 inches) tall or taller; or

(C) The seat may be considered occupied when the ignition switch is in the “on” or “start” position (or the propulsion system is activated).

(iii) *Rear seating positions.* (A) Seat the 6-year-old child dummy described in part 572, subpart N of this chapter, as well as any larger dummy described in part 572 of this chapter; or

(B) Seat any human occupant that weighs 21 kg (46.5 lb) or more and is 114 cm (45 inches) tall or taller.

(iv) *Compliance option selection.* The manufacturer shall select a compliance option by the time it certifies the vehicle and may not thereafter select a different option for the vehicle. Each manufacturer shall provide information to NHTSA regarding which of the compliance options it has selected for a particular vehicle or make/model upon request.

(2) *Seating procedures—(i) Seat adjustment.* If adjustable, the seat back shall be placed in the manufacturer's nominal design riding position, with any other seat adjustments in any position, and any adjustable seat belt anchorages in any position.

(ii) *Test dummy.* Seat the test dummy such that the midsagittal plane of the dummy is vertical and within  $\pm 10$  mm of the seat centerline, with the torso and pelvis in contact with the seat back. The dummy may be clothed in any manner.

(iii) *Human occupant.* The occupant shall assume, to the extent possible, the final physical position specified for the test dummy. The occupant may be clothed in any manner.

(3) Verify that the seat belt warnings function as specified in S7.5(b) and (c) for any combination of seat belt use (at any seating position), seat occupancy (at any seating position), removable seat electrical connection status (connected or not connected, for any removable seat), vehicle speed, and door status (open or closed, for any door), except that the door shall not be opened when the vehicle is in motion.

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**Adam Raviv,**  
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