DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 571

[Docket No. NHTSA–2024–0025]

RIN 2127–AL05

Federal Motor Vehicle Safety Standards: Seat Belt Assembly Anchorages; Incorporation by Reference

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

ACTION: Final rule.

SUMMARY: This document amends the procedures for testing the strength of seat belt anchorages in Federal Motor Vehicle Safety Standard No. 210, ''Seat Belt Assembly Anchorages.'' The amendments clarify the positioning of the test device currently specified in the standard and add an optional test device (and corresponding test procedures) as a certification alternative. These amendments respond to an earlier court decision which found that the regulatory test procedures do not provide manufacturers adequate notice of how NHTSA would conduct the test.

DATES:

Effective date: This rule is effective October 17, 2024.

Incorporation by reference date: The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register as of October 17, 2024.

Compliance date: The compliance date is September 1, 2027, with optional early compliance permitted. Multi-stage manufacturers and alterers would have an additional year to comply.

Petition for reconsideration: Petitions for reconsideration of this final rule must be received not later than November 1, 2024.

ADDRESSES: Petitions for reconsideration of this final rule must refer to the docket 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 *https://www.regulations.gov,* including any personal information provided.

Confidential Business Information: If you wish to submit any information under a claim of confidentiality, you should submit your complete submission, including the information you claim to be confidential business information, to the Chief Counsel, NHTSA, at the address given under **FOR FURTHER INFORMATION CONTACT.** In addition, you should submit a copy, from which you have deleted the claimed confidential business information, to Docket Management at the address given above. When you send a submission containing information claimed to be confidential business information, you should include a cover letter setting forth the information specified in our confidential business information regulation (49 CFR part 512). Please see further information in the Regulatory Notices and Analyses section of this preamble.

Privacy Act: The petition 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 (65 FR 19477–78) or you may visit *https://www.transportation.gov/individuals/privacy/privacy-act-system-records-notices.*

Docket: For access to the docket to read background documents or comments received, go to *www.regulations.gov,* or the street address listed above. Follow the online instructions for accessing the dockets.

FOR FURTHER INFORMATION CONTACT: For non-legal issues, you may contact Mr. Joshua McNeil, Office of Crashworthiness Standards, Telephone: (202) 366–7612; Email: *Joshua.McNeil@dot.gov;* Facsimile: (202) 493–2739. For legal issues, you may contact Mr. John Piazza, Office of Chief Counsel, Telephone: (202) 366–2992; Email: *John.Piazza@dot.gov;* Facsimile: (202) 366–3820. The address of these officials is: the National Highway Traffic Safety Administration, 1200 New Jersey Avenue SE, Washington, DC 20590.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Executive Summary

Federal Motor Vehicle Safety Standard (FMVSS) No. 210, ''Seat belt assembly anchorages,'' establishes requirements for seat belt anchorages, which are the part of the vehicle that transfers seat belt loads to the vehicle structure. The standard sets out a variety of requirements for seat belt anchorages, including performance requirements that ensure that the anchorages are strong enough to remain attached to the vehicle structure in a crash. The standard requires seat belt anchorages to withstand specified forces when tested according to the test procedures specified in the standard. The test forces are applied to the seat belts by test devices referred to as ''body blocks,'' which essentially take the place of an occupant. The body blocks are placed on the seat, secured with the seat belt, and attached to a force actuator that applies the specified test forces. The standard has included the anchorage strength requirements and body blocks since its inception in 1967. International regulations and industry consensus standards also contain seat belt anchorage strength requirements, which, although different from FMVSS No. 210 in various ways, generally mirror FMVSS No. 210 by specifying the use of body blocks similar to the FMVSS No. 210 body blocks.

This final rule amends the test procedures for the standard's seat belt anchorages strength requirements. The current standard specifies a variety of aspects of the test procedure, but does not specify precisely where on the vehicle seat NHTSA will position the body blocks at the start of the test before the test loads are applied. This lack of specificity has, in the past, resulted in manufacturers conducting compliance testing differently from NHTSA. As a result, in the late 1990s the U.S. Court of Appeals for the District of Columbia Circuit ruled that NHTSA had failed to provide adequate notice of where on the vehicle seat NHTSA would position the body block. As a result, NHTSA was not able to compel the recall of the vehicles at issue in that case, which had failed the anchorage strength test when tested by NHTSA.

To address the issues identified by the court, and to make the seat belt anchorage strength test easier to carry out, in 2012 NHTSA published a notice of proposed rulemaking (NPRM) (77 FR 19155, March 30, 2012) that proposed replacing the body blocks with a new test device referred to as the Force Application Device (FAD). The FAD consists of an upper torso portion and a pelvic portion hinged together to form a one-piece device that roughly resembles the human form. NHTSA developed two different size versions of the FAD, referred to as FAD1 and FAD2. The test procedure proposed for the FAD addressed the issues about the positioning of the test device that had been identified by the Court of Appeals. NHTSA also explained in the NPRM that it believed that the FAD would be easier to use than the body blocks. NHTSA developed the FAD independently and it has not yet been adopted outside of the United States.

The agency received a variety of comments in response to the NPRM. Vehicle manufacturers and seat suppliers stated several concerns with the FAD and the corresponding seating procedure, including the design and performance of the FAD, lack of knowledge or experience testing with the FAD, harmonization, and cost.

After considering these comments, NHTSA decided to evaluate the feasibility of retaining the body blocks and refining the regulatory test procedure to specify where on the seat NHTSA would position the body blocks. In 2015, NHTSA published a supplemental notice of proposed rulemaking (SNPRM) (80 FR 11148, March 2, 2015) in which it explained that it was considering specifying, either instead of or as an alternative to the FAD, a three-dimensional zone(s) with respect to the seat in which the body blocks would be positioned. The SNPRM explained that this contemplated procedure using zones was modelled after a similar procedure in FMVSS No. 222, School bus passenger seating and crash protection. By refining the current test procedure to include these zones, NHTSA stated that it intended the standard clarify how the agency will position the body blocks. The agency also stated that it had initiated research to develop the zones and that the research would evaluate the zone concept across different vehicle types and seat configurations and establish appropriate zone boundaries to ensure that the procedure is feasible and practicable for all vehicles. In 2018, NHTSA published a notice of availability (83 FR 16280, April 16, 2018) and docketed reports and data on the additional research it had completed on the development of the body block zones, as well as the FAD.

NHTSA received a variety of comments in response to the SNPRM. These included, among other things, concerns with whether the zones would work for all vehicles and vehicle types (especially for heavy-duty trucks and buses, which have different seats from passenger vehicles); the size of the zones and potential variability in the test results; and the need for existing vehicle platforms to be re-certified using the new zones. Several SNPRM commenters supported the continued use of the body blocks in addition to the option of using the FAD.

Summary of Final Rule

The final rule amends FMVSS No. 210 to specify zones for the placement of the body blocks and to include the FAD as an alternative compliance option (at the manufacturer's choice).

Placement Zones for the Body Blocks

The finalized zones are the zones specified in the research report NHTSA docketed in 2018. NHTSA's testing shows that the zones are valid for a wide range of vehicles, including medium- and heavy-duty vehicles. The zones are based on data from a range of different vehicles and were mathematically expanded to accommodate an even wider range of vehicles. To ensure that the zones would apply to a wide variety of vehicles and seats, the agency's research considered the factors identified by the SNPRM commenters, as well as other factors that may affect body block position.

While the zones are large enough to account for a variety of vehicles and seat types, they are still relatively modest in size, and there is no data or evidence that suggests that there will be large variability in force vectors or test results. For the same reasons, we have not seen any data or evidence to suggest that testing to the final zones will result in different compliance outcomes compared to the existing test procedure. The current test procedure has no constraints on the positioning of the body blocks. The refined test procedure in this final rule establishes allowable zones for the positioning of the body blocks, which have been used for testing anchorage strength since the standard's inception in 1967. Use of the body blocks within the allowable zones reduces the set of permissible test conditions, which also reduces the variability of the test.

Force Application Device

The final rule specifies the FAD as an optional alternative to the body blocks that manufacturers may choose to certify compliance. Manufacturers that prefer to certify using the body blocks may continue to do so. Design drawings of the FAD1 and FAD2 are incorporated by reference into the final rule and are sufficiently detailed to allow manufacturers to fabricate the devices. In addition to the two-dimensional engineering drawings incorporated by reference in the final rule, NHTSA is making three-dimensional design drawings available for reference purposes (*e.g.,* to facilitate fabrication). In response to comments, the final rule also clarifies some of the proposed regulatory text. NHTSA estimates the cost of each FAD to be approximately $8,000.

We are providing a two-year lead time for the use of the body blocks and the FAD as established by this final rule. Providing vehicle manufacturers the option to continue to use the current body blocks or the FAD for certification should alleviate the lead time concerns expressed by commenters to the NPRM.

This final rule is not significant and so was not reviewed by the Office of Management and Budget under E.O. 12866.

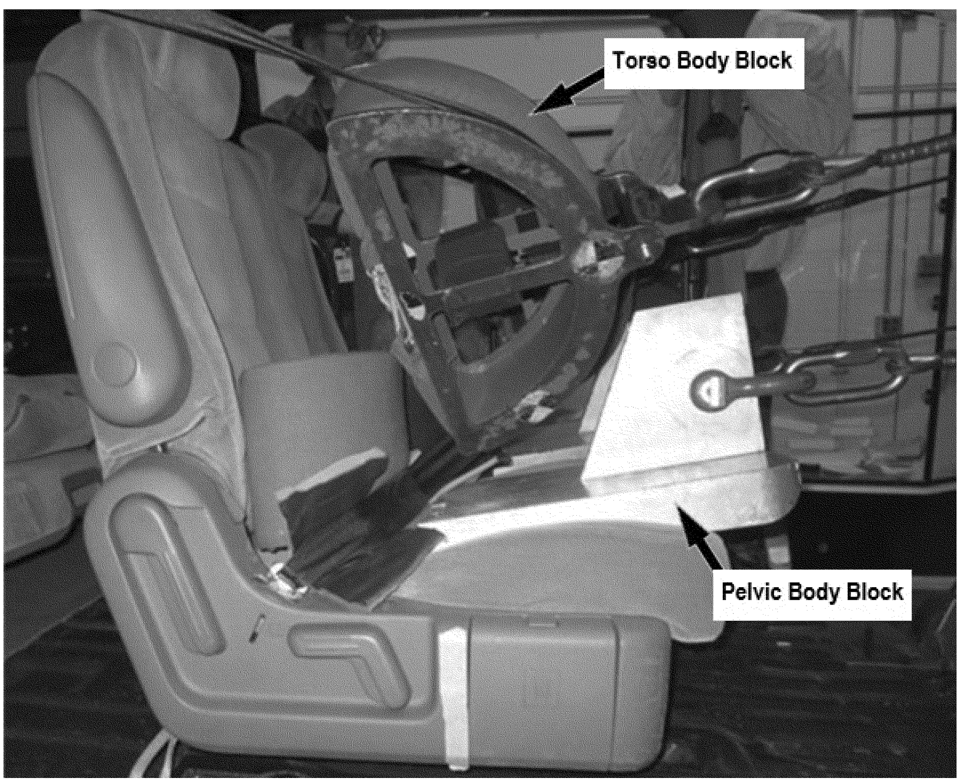
II. Background

A. FMVSS No. 210

FMVSS No. 210, ''Seat belt assembly anchorages,'' applies to passenger cars, multipurpose passenger vehicles (''MPVs''), trucks, and buses of all weights. The standard establishes requirements for seat belt assembly anchorages (''seat belt anchorages''). Seat belt anchorages are any component, other than the webbing or straps, involved in transferring seat belt loads to the vehicle structure, including, but not limited to, the attachment hardware, seat frames, seat pedestals, the vehicle structure itself, and any part of the vehicle whose failure causes separation of the belt from the vehicle structure. The standard's requirements ensure that the anchorages are properly located for effective occupant restraint and are sufficiently strong so that they remain attached to the vehicle structure in a crash. As to the latter, the standard requires seat belt anchorages to withstand specified forces when tested according to the procedures specified in the standard. This final rule amends the test procedures for the standard's seat belt anchorage strength requirements.

Since its inception in 1967, FMVSS No. 210 has included anchorage strength requirements, tested with body blocks.[1] Under the standard, seat belt anchorages for lap-belt only belts (referred to as ''Type 1'' belts[2]) must withstand a 22,241 Newton (N) (5,000 pound (lb)) force. Seat belt anchorages for combination lap/shoulder belts (''Type 2 belts''[3]) must withstand a 13,345 Newton (N) (3,000 lb) force applied to the lap belt portion of the seat belt assembly simultaneously with a 13,345 N force applied to the torso (*i.e.,* shoulder) belt portion of the seat belt assembly (''test force'' or ''test load''). Because Type 2 belts are generally required for most seating positions and vehicle types, for ease of explanation the preamble discussion will assume that testing is for a Type 2 belt unless otherwise noted. These forces are applied to the lap belt portion of the belt by a pelvic body block and the torso portion of the belt by a torso body block. The torso and pelvic body blocks are separate test devices that are positioned at each designated seating position tested. The standard specifies the shape, dimensions, and the covering (foam) of the body blocks, but otherwise, the construction of the body block may vary.[4] See Figure 1 for depictions of the torso and pelvic body blocks.

Figure 1 – Body Blocks



[1] *See* 32 FR 2408, 2415–2416 (February 3, 1967) (Initial Federal Motor Vehicle Safety Standards).

[2] *See* 49 CFR 571.210, S3 (definition of ''Type 1 seat belt assembly'').

[3] *See* 49 CFR 571.210, S3 (definition of ''Type 2 seat belt assembly'').

[4] *See* FMVSS No. 210, Fig. 2A (pelvic body block), Fig. 2B (optional pelvic body block for center seating positions), and Fig. 3 (torso body block). *See also* FMVSS No. 222, ''School bus passenger seating and crash protection,'' Figure 2 (pelvic body block). The FMVSS No. 222 pelvic body block is only used for school buses with a GVWR of 4,536 kilograms (kg) (10,000 pounds) or less.

The body blocks are placed on the seat, secured with the seat belt,[5] and attached (typically, with heavy-duty chains) to a force actuator that applies the specified test forces. Although not currently specified in the regulatory text of FMVSS No. 210, the laboratory test procedure for the standard specifies a preload in addition to the test force.[6] Specifically, after the body blocks are secured with the seat belt, the force actuator applies a preload equal to 10% of the test force. While at the preload level, photographs and measurements of the load application angles are taken. The load is then increased to the full test force. The test force must be attained within 30 seconds and held for 10 seconds. The anchorage, attachment hardware, and attachment bolts must withstand this loading; [7] permanent deformation or rupture of a seat belt anchorage or its surrounding area is not considered to be a failure if the required force is sustained for the specified time.[8] Typically, for compliance testing, all seats in the vehicle are tested, starting from the front of the vehicle. After the front seats have been tested, they may be removed to facilitate access to the rear seats.

Neither the standard nor the laboratory test procedure specifies precisely where on the vehicle seat NHTSA will position the body blocks. This lack of specificity has, in the past, resulted in manufacturers conducting compliance testing differently from NHTSA, as illustrated in an enforcement action brought against Chrysler in the 1990s for apparent noncompliance with FMVSS No. 210.[9] In the compliance test at issue there, NHTSA positioned the pelvic body block away from the seat back. Chrysler argued that its vehicle met the anchorage strength requirements when tested with the body block placed against the seat back, and that NHTSA's placement of the pelvic body block forward of the seat back was not required by FMVSS No. 210. Ultimately, the U.S. Court of Appeals for the District of Columbia Circuit determined that NHTSA had failed to provide adequate notice about the correct placement of the pelvic body block and ruled that NHTSA could not compel Chrysler to recall the vehicles.

In addition, setting up the body blocks for testing can be cumbersome because the torso body block does not sit on the seat and must be supported by someone or something as the preload is applied to the shoulder portion of the seat belt. Doing so can be challenging when testing multiple adjacent seating positions simultaneously because the preload must be maintained on body blocks that are already set up until all the body blocks are set up in a manner that minimizes the chance of load interference, and all seating positions are ready for the full test force. This setup typically necessitates two technicians and, potentially, multiple attempts to run the test, because the torso body block tends to come out of position.

B. 2012 Notice of Proposed Rulemaking

To address the issues identified by the *Chrysler* decision and the challenges associated with the use of the body blocks, on March 30, 2012, the agency published an NPRM.[10] In that NPRM, NHTSA proposed to amend FMVSS No. 210 to replace the pelvic and torso body blocks with a new Force Application Device (FAD).

The FAD consists of an upper torso portion and a pelvic portion hinged together to form a one-piece device that roughly resembles the human form. NHTSA developed two different size versions of the FAD, referred to as FAD1 and FAD2. The external dimensions of the FAD1 are based on digital data developed by the University of Michigan Transportation Research Institute (UMTRI) as a representation of the 50th percentile adult male.[11] The FAD1, which weighs 55.8 kg (123 lb), replicates the torso and lap portions of what UMTRI calls the ''Golden Shell'' and reproduces the seat belt angles produced when a seat belt is fastened around a 50th percentile adult male. NHTSA developed the specifications for the smaller FAD2 to use at designated seating positions (DSPs) that are too narrow in width to accommodate the FAD1, such as some rear center seats in passenger cars and MPVs. The FAD1 and the FAD2 are specified in approximately 32 drawings that were docketed with the NPRM. As requested by Faurecia S.A. Automotive Seating, NHTSA provided the Initial Graphics Exchange Specification files of the 3–D contours for the torso and pelvis portions of the FAD1 and FAD2, and in a docketed memo informed the public that the files were available upon request.[12] NHTSA estimated the cost of each FAD to be approximately $8,000.

The proposed regulatory text specified how the FADs would be seated at the outset of the strength test (*i.e.,* before any load was applied to the belt). Like the existing body blocks, the FADs are secured with the seat belt(s) and are attached to a force actuator that applies the specified test forces. For combination lap/shoulder belts (Type 2 seat belts), the force actuator is connected to separate connection points on the torso and lap portions of the FAD to apply the required forces to the lap and shoulder portions of the belt simultaneously; for lap belt-only anchorages, a bridged pull yoke is used to connect the connection points of the torso and lap portions of the FAD, so that they are jointly pulled.

As to which FAD the agency would use for a particular designated seating position, NHTSA proposed that if it was not testing in accordance with S4.2.4,[13] it would use the FAD1. For tests conducted in accordance with S4.2.4, NHTSA proposed that, if after the FAD1 devices are installed, but prior to conducting the test, there is contact between the FAD1s (or if there is contact between the FAD1s that prevent them from fitting side-by-side), an inboard FAD1 would be replaced with a FAD2. (As discussed later in this document (in section V.C.2.b), the proposal was not clear whether this contact was prior to the preload force or prior to when the test force was applied to the FADs.) If there is still contact between the FADs, and if there is another inboard DSP, an additional inboard FAD1 would be replaced with a FAD2, and so on. If the contact continues with all inboard DSPs with FAD2s, the FAD1 in the right outboard

[5] The seat belt may be replaced with material whose breaking strength is greater than or equal to the breaking strength of the webbing for the seat belt assembly installed as original equipment at that seating position. S5.

[6] Laboratory Test Procedure for FMVSS 210 Seat Belt Assembly Anchorages. U.S. Department of Transportation, National Highway Traffic Safety Administration (TP–210–09) (Feb. 7, 1994), *available at https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-06/tp-210-09-tag.pdf.* The Office of Vehicle Safety Compliance (OVSC) publishes, for each standard, a laboratory test procedures manual containing more detailed test procedures and laboratory practices for NHTSA-contracted test laboratories. This is distinguished from the test procedures set out in the regulatory text of the FMVSS.

[7] S4.2.1, S4.2.2.

[8] S4.2.3.

[9] *See United States* v. *Chrysler Corp.,* 158 F.3d 1350 (D.C. Cir. 1998).

[10] 77 FR 19155 (March 30, 2012).

[11] Robbins, D. 1985. ''Anthropometric Specifications for Mid-Size Male Dummy,'' Volume 2, UMTRI, DOT HS 806 716.

[12] NHTSA–2012–0036–0020. These reference materials would not be incorporated into FMVSS No. 210. Instead, they are intended only for reference purposes (*e.g.,* to facilitate fabrication and inspection of parts).

[13] Briefly stated, S4.2.4 specifies that anchorages, attachment hardware, and attachment bolts shall be tested by simultaneously loading them if: (a) the DSPs are common to the same occupant seat and face the same direction, or (b) the DSPs are not common to the same occupant seat, but a DSP has an anchorage that is within 305 mm of an anchorage for one of the adjacent DSPs, provided that the adjacent seats face in the same direction.

DSP would be replaced with a FAD2. If there is still contact between the FADs, the FAD1 in the left outboard DSP would be replaced with a FAD2.

The agency received 14 comments in response to the NPRM from 13 organizations and an individual. (One entity submitted two comments.) Commenters included five vehicle manufacturer associations, three medium and/or heavy-duty truck manufacturers, two light vehicle manufacturers, two seat suppliers, one bus manufacturer, and one test facility. The commenters stated several concerns with the FAD and the corresponding seating procedure. These concerns included issues such as the design and performance of the FAD, harmonization, the proposed test procedure, and cost. (The comments are discussed in detail later in this document.)

C. 2015 Supplemental Notice of Proposed Rulemaking

After considering the comments on the NPRM, the agency decided to evaluate the feasibility of maintaining the current body blocks and refining the regulatory test procedure to specify where on the seat NHTSA would position the body blocks. On March 2, 2015, NHTSA published an SNPRM.[14]

The agency explained that it was considering specifying, either instead of or as an alternative to the FAD, zones within which the current body blocks would be placed. The procedure would establish a three-dimensional region with respect to the seat in which the body blocks would be positioned; there would be two zones, one for the torso body block, and one for the pelvic body block. The pelvic body block would be positioned within the pelvic body block zone and the torso body block would be positioned within the torso body block zone. This positioning would be accomplished by first applying a preload force (of 1,335 N) to each body block. While this preload force is being applied, the torso and pelvic body blocks would be positioned so that a specified ''target'' on each block is within each of the applicable zones.

As explained in the SNPRM, this positioning is based on the similar procedure specified in FMVSS No. 222, School bus passenger seating and crash protection.[15] FMVSS No. 222 includes a ''quasi-static'' test requirement to help ensure that school bus seat backs incorporating lap/shoulder belts are strong enough to withstand both the forward pull of the torso belts and the forces imposed on the seat from unbelted passengers to the rear of the belted occupants in a crash. That procedure, which uses the FMVSS No. 210 torso body block (but not the pelvic body block), establishes a zone in which the torso body block must be located. Specifically, FMVSS No. 222 specifies that the torso body block is placed in the seat, secured behind the seat belt, and a preload of 600 N is applied. This preload force is, depending on the weight of the vehicle being tested (because the test forces specified in FMVSS No. 222 depend on vehicle weight), approximately 8 percent to 18 percent of the full test load. After the preload application is complete, the origin of the torso body block radius at any point across the torso body block thickness must lie within a zone defined by specified boundaries. The forward boundary of this zone is established by a transverse vertical plane of the vehicle located 100 mm longitudinally forward of the seating reference point (SgRP).[16] The upper and lower boundaries of the zone are 75 mm above and below the horizontal plane located midway between the horizontal plane passing through the school bus torso belt adjusted height (specified in S3 of FMVSS No. 210), and the horizontal plane 100 mm below the SgRP. After the 600 N preload is applied and the torso body block is verified as being within the specified zone, the required test forces are applied.[17]

NHTSA explained in the SNPRM that it was planning to develop separate zones for the placement of the torso and pelvic body blocks to be specified in FMVSS No. 210. By refining the current test procedure to include these zones, NHTSA stated that it intended the standard to be clearer as to how the agency will position the body blocks. The agency explained that it did not intend to increase the stringency of the standard. The agency also stated that it had initiated research to develop the zones and stated that the research would evaluate the zone concept across different vehicle types and seat configurations and establish appropriate zone boundaries to ensure that the procedure is feasible and practicable for all vehicles.

NHTSA received nine comments in response to the SNPRM: three vehicle manufacturer associations, one vehicle manufacturer, three suppliers, one foreign government, and one individual. The commenters raised several concerns and issues with the SNPRM. These concerns included, among other things, concerns with the appropriateness of the zone concept, the size of the zones and potential variability in the test results, and specific concerns with the test procedures. There were also several additional comments about the FADs. Several SNPRM commenters supported the continued use of the body blocks in addition to the option of using the FAD. Many of the compliance concerns raised in response to the NPRM were also present in response to the SNPRM, since the agency proposed refining the test procedure for the continued use of the body blocks. For instance, commenters raised concerns regarding recertification, lead time, harmonization, and costs associated with recertification and potential redesign. These comments are discussed in detail later in this document.

D. 2018 Notice of Availability

In 2018, NHTSA published a notice of availability[18] and docketed reports and data on the additional research it had completed on the FAD and the development of the body block zones. NHTSA also docketed test reports describing additional testing conducted with the FAD. This research is discussed in more detail in section IV, NHTSA Research and Testing, and elsewhere in the preamble where relevant. NHTSA received two comments from trade groups in response to the 2018 notice of availability (a list of the comments received in response to the NPRM, SNPRM, and notice of availability is provided in appendix A of this document). The comments recommended, among other things, that NHTSA issue and provide opportunity to comment on a pre-final rule draft test procedure and schedule a compliance workshop. These comments are discussed in detail later in this document.

E. International and Industry Consensus Anchorage Strength Requirements and Test Procedures

International regulations and industry consensus standards also establish seat belt anchorage strength requirements. These include United Nations Regulation No. 14 (ECE R14), Transport Canada's Technical Standards Document No. 210, Australian ADR 05, and SAE Standard J384 (2014). As explained below, all these standards specify pelvic and torso body blocks similar to the FMVSS No. 210 body

[14] 80 FR 11148 (March 2, 2015).

[15] *See* 73 FR 62744 (October 21, 2008) (final rule upgrading FMVSS No. 222).

[16] The seating reference point (SgRP) is defined in 49 CFR 571.3.

[17] The required test forces for FMVSS No. 222 vary from 3,300 N to 7,500 N, depending on the weight of the bus and the type of seat.

[18] 83 FR 16280 (April 16, 2018).

blocks but do differ somewhat from the FMVSS No. 210 test procedures.[19]

United Nations Regulation No. 14 (ECE R14) and Australian ADR 5, Anchorages for Seatbelts

ECE R14 provides the uniform provisions concerning the approval of vehicles regarding seat belt anchorages, including the general test requirements for seat belt anchorages. The load requirements differ somewhat from FMVSS No. 210 (*e.g.,* FMVSS No. 210 requires 13,345 N and ECE R14 requires 13,500 N ± 200 N) and there are different load requirements for different vehicle types. For example, category M1 and N1 vehicles (passenger cars, multipurpose passenger vehicles, vans, pick-ups, and light trucks) have similar requirements as FMVSS No. 210 but M3, N3, and other vehicle types have lower load requirements. R14 also specifies different load requirements for rear-facing and side-facing designated seating positions (same as the requirements for M3 vehicles). As far as achieving the required load and the holding requirement, ECE R14 allows achieving the load in 60 seconds (versus FMVSS No. 210 requirement of 30 seconds) and the hold requirement is 0.2 seconds (versus FMVSS No. 210 requirement of 10 seconds). Australian ADR 5, Anchorages for Seatbelts, follows the ECE R14 requirements.

ECE R14 and FMVSS No. 210 specify similar body blocks for testing the seat belt anchorages.[20] R14 also specifies some aspects of the test procedure not currently specified in FMVSS No. 210. R14 specifies the placement of the body blocks at preload; it specifies that the belt be pulled tight against the pelvic block and that the torso block be pushed back into the seat back while the belt is pulled tight around it. R14 also specifies the location of the pivot point on the torso body block. R14 specifies a preload of 10 percent of the full load, with a tolerance of ±30 percent. Another distinction between FMVSS No. 210 and ECE R14 is that ECE R14 also has a distinct pelvic block for testing side-facing seats and specifies that the direction of the test load be forward in relation to the vehicle.

[19] The NPRM made mention of an ISO standard (TR 1417–1974) but that has since been withdrawn.

[20] For example, the regular size pelvic block and the torso block dimensions have slight variations (*e.g.,* for torso block R200 vs R203; for pelvic block the width is 406 mm vs 356 mm and R520 vs R495, etc.).

Transport Canada's Technical Standards Document No. 210

Transport Canada's Technical Standards Document No. 210, Seat Belt Anchorages, is based on FMVSS No. 210,[21] and the two standards are nearly identical. The same pelvic and torso body blocks are used to test the strength of the seat belt anchorages at the same test loads for Type 1 and Type 2 seat belts and with the same hold time of 10 seconds once the test load is achieved. Like FMVSS No. 210, the Canadian standard lacks a specification for the placement of the body blocks at preload. The standard specifies a procedure for adjustments in the event of interference between the pelvic body block and belt buckle. A 50th percentile anthropomorphic test dummy (ATD) is placed at each seating position with the seat belt fastened around it and all slack is removed from the webbing. At this position, the belt webbing is marked and the ATDs are removed. The body blocks are placed ''against the back of the seat'' and the belts are fastened around the blocks. The blocks are moved forward if the belt buckle seems to be susceptible to damage upon inspection, but the blocks are not to be moved further forward than the mark made with the ATD placed in the seat. The approach of using an ATD to address interference between the block and the belt buckle differs from NHTSA's test procedure for FMVSS No. 210.

SAE J384 (Rev. 2014) and J383 (Rev. 2014)

SAE J384 (Rev. 2014) specifies test procedures for seat belt anchorages and SAE J383 (Rev. 2014) provides design recommendations for seat belt anchorage locations. SAE J384 is nearly identical to FMVSS No. 210, with similar body block specifications (the torso body block has the same dimensions, but also includes a pull arm), test loads, and the option to replace the seat belt webbing with other material. The standard specifies a preload of 10%. The body blocks are positioned at each DSP and the seat belts are positioned around the blocks ''to represent design intent routing.''

III. NHTSA's Statutory Authority

NHTSA is adopting this rule pursuant to its authority under the National Traffic and Motor Vehicle Safety Act, 49 U.S.C. 30101 *et seq.* (''Safety Act''). Under the Safety Act, NHTSA (under authority delegated by the Secretary of Transportation [22]) is responsible for prescribing motor vehicle safety standards that are practicable, meet the need for motor vehicle safety, and are stated in objective terms.[23] ''Motor vehicle safety'' is defined in the Motor Vehicle Safety Act 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.'' [24] ''Motor vehicle safety standard'' means a minimum performance standard for motor vehicles or motor vehicle equipment.[25] When prescribing such standards, NHTSA must consider all relevant, available motor vehicle safety information.[26] NHTSA 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.[27] In promulgating this rule, NHTSA carefully considered all the aforementioned statutory requirements. NHTSA evaluates this rule with respect to these requirements in section V of the preamble where relevant.

[21] *https://tc.canada.ca/sites/default/files/migrated/tsd_210_en.PDF* (*last accessed* June 14, 2024).

IV. NHTSA Research and Testing

This final rule is supported by a variety of research. Some of this research was docketed with the NPRM. Research was also conducted and docketed after the NPRM but before issuance of this final rule. NHTSA briefly summarizes the agency's research below. More specific discussion of various aspects of this research is available in the cited test reports, the NPRM, and in subsequent sections of this document. This research is summarized in Table 1.

[22] 49 CFR 1.95.

[23] 49 U.S.C. 30111(a).

[24] 49 U.S.C. 30102(a)(9).

[25] Section 30102(a)(10).

[26] Section 30111(b)(1).

[27] Section 30111(b)(3)–(4).

TABLE 1—SUMMARY OF RESEARCH SUPPORTING FINAL RULE

Research	Summary	Docket ID
Research Docketed with NPRM		
Final Report: Development of a Combination Upper Torso and Pelvic Body Block for FMVSS 210 Test.	Description of design, materials, and positioning procedures. Analysis of FAD positioning consistency based on testing of nine light vehicles from two-seat sports cars to light-duty trucks. Analysis of FAD anchorage force repeatability based on testing of three seat configurations.	NHTSA–2012–0036–0002.
Indicant Test Reports	Full-scale FMVSS No. 210 anchorage strength tests using the FAD on nine vehicles: six passenger cars, an 11-passenger van, a minivan with stow-and-go seating, and an F–150 SuperCab pickup truck.	NHTSA–2012–0036–0002.
Repeatability Analysis of the Forces Applied to Seat Belt Anchors Using the Force Application Device.	Additional analysis of FAD anchorage force repeatability using the FMVSS No. 214 test procedure and comparing channel measurements differences.	NHTSA–2012–0036–0002.
FAD inspection report	Report of drawings and parts lists, drawing revisions, and measurements of multiple FAD devices used in . . .	NHTSA–2012–0036–0002.
FAD drawing packages	Drawing packages for the FAD1 and FAD2	NHTSA–2012–0036–0002.
Research Docketed with Notice of Availability		
Body Block Zone Development Report.	Report detailing development of body block zones	NHTSA–2012–0036–0041.
Indicant testing of FAD on buses with gross vehicle weight rating (GVWR) >10,000 lb.	Full-scale FMVSS No. 210 tests with the FAD in the driver's seat on two school buses and a motorcoach.	NHTSA–2012–0036–0042 (school bus), NHTSA–2012–0036–0043 (school bus), NHTSA–2012–0036–0044 (Motorcoach).
Indicant testing on passenger vehicles.	Full-scale FMVSS No. 210 tests on passenger vehicles to test body block zone concept and equivalence with the FAD.	
Honda Fit (sedan)	Simultaneous testing with body blocks and FAD	NHTSA–2012–0036–0036.
Mitsubishi I-Miev (subcompact)	Simultaneous testing with body blocks and FA	NHTSA–2012–0036–0046.
Chevy Suburban (MPV/sports utility vehicle (SUV)).	Simultaneous testing with body blocks and FAD	NHTSA–2012–0036–0040.
Ford Fusion (sedan)	Matched pair testing with body blocks and FAD	NHTSA–2012–0036–0034,
Ford Fusion (sedan)		NHTSA–2012–0036–0035.
Ford C-Max (sedan)	Matched pair testing with body blocks and FAD	NHTSA–2012–0036–0033,
Ford C-Max (sedan)		NHTSA–2012–0036–0045.
Subaru Impreza (compact)	Matched pair testing with body blocks and FAD	NHTSA–2012–0036–0037,
Subaru Impreza (compact)		NHTSA–2012–0036–0039.

A. Research Docketed With the NPRM

The research docketed with the NPRM consisted of materials and reports relating to the development and evaluation of the FAD, including extensive full-scale FMVSS No. 210 tests to determine whether the FAD performs equivalently to the existing body blocks.

NHTSA contracted with the engineering consulting firm KARCO Engineering (Karco) to design, manufacturer, and test a new FMVSS No. 210 test device.[28] Karco also developed the procedure for positioning the FAD in the vehicle seat and assessed the repeatability of the positioning procedure. As explained in the NPRM, three different laboratory technicians were able to place a FAD in a specific test vehicle so that the predetermined measuring points were within ¼ inches (6.35 mm) of the same point of the same FAD in the same test vehicle placed by the other technicians. FMVSS No. 208, S10.4.2.1, specifies a ½ in. (12.7 mm) tolerance for the H-point, so a ¼ in. (6.35 mm) variability for seating the FAD can be considered reasonable.

NHTSA also assessed the repeatability of the forces applied to the seat belt anchorages in the FMVSS No. 210 anchorage strength test using the FAD.[29] Anchorage load cells were mounted to a rigid test rig, the vehicle seat was replaced with a rigid seat, and the seat belt webbing was replaced with high strength webbing. The test configuration was set up in a generic configuration to minimize variability. A FAD1 was positioned, belted, and pulled per the proposed FMVSS No. 210 test procedure. This test was repeated four times, and a statistical analysis was performed on both the peak force values as well as time-based metrics. The coefficient of variance (CV) was used to assess the variability of the peak values for each data channel to assess the repeatability of the test results and to rate the channels based on established CV acceptance criteria. The data and analysis presented in the repeatability analysis demonstrate that the forces applied to the seat belt anchor points by the FAD using the FMVSS No. 210 procedure are repeatable.

NHTSA then conducted full-scale FMVSS No. 210 anchorage strength tests (''indicant tests'' [30]) on nine vehicles: six passenger cars, an 11-passenger van, a

[28] NHTSA–2012–0036–0002 (''Final Report: Development of a Combination Upper Torso and Pelvic Body Block for FMVSS 210 Test, Revision A,'' May 22, 2003, KARCO Engineering, LLC).

[29] NHTSA–2012–0036–0002 (''Repeatability Analysis of the Force Applied to Safety Belt Anchors Using the Force Application Device (May 2009)''). KARCO also assessed the repeatability of the forces recorded at the seat belt anchorages and compared these to the forces recorded with the current body blocks. *See supra* note 15, KARCO Final Report. However, this force repeatability study did not adhere strictly to the proposed test procedure, so NHTSA conducted a new analysis (discussed in the next paragraph) that did strictly adhere to the proposed test procedure. *See* NPRM at 19157.

[30] We use the term ''indicant'' test, as opposed to ''compliance'' test, because NHTSA was not testing these vehicles to determine whether they comply with the standard.

minivan with stow-and-go seating, and an F–150 SuperCab pickup truck.[31] The purpose of the tests was to determine whether the FAD performed equivalently to the existing body blocks, and to evaluate the overall performance and usability of the FADs. Every seat in each vehicle was tested; seats in the same row were tested simultaneously. The FAD1, FAD2, and the body blocks (pelvic and torso) were positioned in adjacent seating positions, with the FAD1 in the left seat, the current upper torso and pelvic body blocks in the right seat, and the FAD2 in the center seat (if present). The FADs were positioned using the proposed seating procedure.[32] There were no test failures. The testing also showed some advantages of the FAD compared to the current body blocks: the FADs were easier to position, and the hydraulic test load application cylinders were less likely to bottom out when testing seating positions with load limiters.

B. Research Docketed in 2018

After the SNPRM was published in 2015, the agency conducted research to develop the body block zones and to further evaluate the FAD. There were three phases of this research and NHTSA docketed the research in 2018.

The first phase of research involved indicant anchorage strength tests on nine vehicles (described below) with the FAD and/or the body blocks.[33] This testing had two purposes. One was to validate a preliminary zone concept for the initial positioning (at preload) of the existing pelvic and torso body blocks. The other purpose was to respond to concerns voiced by commenters to the NPRM. The nine indicant tests previously performed to develop the NPRM involved testing the FAD and body blocks simultaneously in the same vehicle. Commenters to the NPRM stated that this testing might not accurately represent the performance of the seat belt assembly anchorages in an actual compliance test, which would use (if the FAD were adopted as proposed) only the FAD. To address this concern, in this phase of research NHTSA performed some of the indicant tests with only the FAD or only the body blocks.

For all vehicles, only the rear seating positions were tested, because the vehicles NHTSA had that were readily available for testing only had rear seating positions that were viable for testing. The FADs were positioned using the seating procedure proposed in the NPRM. The body blocks were positioned using a preliminary zone concept based on the positioning procedure for the torso body block used in the quasi-static test for lap/shoulder seat belts on school buses in FMVSS No. 222.[34] The body blocks were subjected to a preload of 1,335 N. This mirrors the current FMVSS No. 210 laboratory test procedure for the body blocks, which specifies a preload of 10% of the target load (1,335 N is ten percent of the full test load specified in FMVSS No. 210 for the lap and shoulder portions of a Type 2 seat belt assembly).[35] The position of the torso body block was then adjusted, if necessary, so that the origin of the body block radius at any point across the body block thickness was within the zone. To investigate the commenters' concerns about testing the FAD and body blocks simultaneously in the same vehicle, we tested three matched pairs of vehicles (Fusion, C-Max, and Impreza). One vehicle in each pair was tested with only the body blocks, and the other vehicle in the pair was tested with only the FAD. In the other three vehicles, NHTSA tested the body blocks and FAD simultaneously in the rear outboard seats (with the FAD in one seat and the body blocks in the other seat). There were no failures in any of these tests. This testing showed that the zones were viable and that they would not have to be unreasonably large.

The second phase of research involved development, testing, and validation to establish practicable and repeatable zones for the preload positioning of the pelvic and torso body blocks.[36] The first phase of testing referred to immediately above served as a proof of concept for the zones. In this second phase of research, the agency developed zones that would be valid for a wide range of vehicles and vehicle types. The agency first determined the factors affecting the position of the body blocks at preload, using a generic test fixture, and used this information to refine the procedure for positioning the body blocks at preload. This refined procedure was used to apply a preload force to the body blocks in five different passenger vehicles (ranging in size from a subcompact to SUVs) with a variety of seat and belt configurations as well as the generic test fixture. Several different parameters (*e.g.,* with and without a wooden positioning fixture for the torso block, preload force [37]) were systematically varied to reflect the full range of conditions that might affect the position of the blocks at preload. The tests were conducted in the left outboard and center seats (all tested DSPs had Type 2 belts). This resulted in a total of 125 tests. The agency recorded the position of the torso and pelvic body blocks at preload for each test.

This data set was then mathematically expanded in two ways. First, because the outboard seat tests were conducted only in the left seating position, and because center seating positions can have the shoulder belt on either the left or right side, this data did not represent the full range of target positions for all seating locations. Therefore, additional data points were calculated for right outboard seating positions and center seating positions with the shoulder belt over the occupant's right shoulder by ''mirroring'' the Y-coordinate values. These ''mirrored'' locations represent the right outboard seating positions and center seating positions with the shoulder belt over the occupant's right shoulder. Second, the zones (including the mirrored data points) were expanded to four standard deviations in the X, Y, and Z directions. This expansion of the zones was intended to allow for vehicle configurations not evaluated in the study and future vehicle designs. The result (with the

[31] NHTSA–2012–0036–0002 (test reports for each indicant test).

[32] With respect to the body blocks, neither the standard nor the laboratory test procedure currently specifies precisely where on the vehicle seat the body blocks should be positioned, so the laboratory technicians had no procedure to follow for this.

[33] NHTSA–2012–0036–0035 (Ford Fusion), NHTSA–2012–0036–0034 (Ford Fusion), NHTSA–2012–0036–0037 (Subaru Impreza), NHTSA–2012–0036–0039 (Subaru Impreza), NHTSA–2012–0036–0033 (Ford C-Max), NHTSA–2012–0036–0040 (Chevrolet Suburban), NHTSA–2012–0036–0036 (Ford Fusion), NHTSA–2012–0036–0045 (Ford C-Max), NHTSA–2012–0036–0046 (Mitsubishi I-Miev).

[34] *See* SNPRM at pg. 11151. The procedure generally followed the FMVSS No. 222 procedure except that the D-ring is used as the reference point instead of the TBAH. For more information, see the docketed test reports. As noted earlier, neither the standard nor the laboratory test procedure currently specifies precisely where on the vehicle seat the body blocks should be positioned. For this testing, the pelvic body block was typically positioned (prior to application of the preload force) such that the centerline of the block and the centerline of the seat were aligned with the back of the block in contact with the seat back.

[35] Laboratory Test Procedure for FMVSS 210 Seat Belt Assembly Anchorages. U.S. Department of Transportation, National Highway Traffic Safety Administration (TP–210–09) (Feb. 7, 1994), pg. 21.

[36] The research summarized here is explained in more detail in the docketed report ''Development of Positioning Zones for FMVSS No. 210 Body Blocks'' (NHTSA–2012–0036–0041).

[37] One of the test parameters the study systematically varied was the preload force. The study measured the body block target locations with preload forces of 1,335 N and 2,224 N. The laboratory test procedure has long specified that the preload be ten percent of the target (test) load. The former preload is ten percent of the test load for the lap and shoulder portions of a Type 2 seat belt assembly, and the latter preload is ten percent of the test load for Type 1 seat belt assemblies.

coordinates of the vertices rounded up to the nearest 5 mm for ease of use) is the zones specified in this final rule. The precise locations of the zones are specified in relation to the SgRP. The dimensions of the zones are summarized in Table 2 (Table 1 of the regulatory text) and Figure 6 in the regulatory text provides a depiction of the body block zones.

TABLE 2—BODY BLOCK ZONE DIMENSIONS

Zone	Depth (mm)	Width (mm)	Height (mm)
Pelvic Body Block	205	340	145
Torso Body Block	240	530	245

Two additional steps were taken to further validate the zones. First, an indicant test was carried out on two DSPs in the second row of a Ford Freestar minivan with the body blocks at the longitudinal extremes of the positions recorded in the fleet study.[38] This test was used to examine if the location of the body block at these extremes had an effect on the seat belt anchorages meeting the load requirements of FMVSS No. 210. The blocks were positioned in the zones and the test was successfully run, with no failures. Second, the zones were validated in heavy-duty vehicles.[39] The fleet study used to develop the zones involved only light-duty vehicles, the largest of which was a Ford Freestar. The agency verified the zones in two school bus seats and one motorcoach seat. The tested seats are commonly used on large (GVWRs greater than 10,000 pounds) buses and motorcoaches. Each seat had three DSPs. NHTSA applied the preload force and verified that the body blocks could be positioned in the zones at each of these DSPs.

The third phase of research involved indicant tests with the FAD on buses with a GVWR of more than 4,536 kilograms (10,000 pounds). The indicant tests using the FAD docketed with and discussed in the NPRM were on passenger vehicles with GVWRs of less than 10,000 lb. Commenters to the NPRM noted that, at the time the NPRM was published, NHTSA had not tested any heavy-duty vehicles using the FAD and expressed concerns about whether the FAD would perform equivalently to the body blocks in heavy-duty applications (see section V.A.4 below). The objective of the additional indicant testing with the FAD on these buses was to determine whether the FAD affects the stringency of the anchorage strength test on heavy duty vehicle seats and to assess how the FAD performs in these tests. The agency performed three indicant tests with the FAD in the driver's seat of three different buses: A school bus with a pedestal-type seat;[40] a school bus with an air suspension seat;[41] and a motorcoach with an air suspension seat.[42] The tests were conducted with the driver's seats installed in the buses, using the proposed FAD positioning procedures. All the seat belt anchorages tested met the FMVSS No. 210 performance requirements.

V. Final Rule and Response to Comments

A. Force Application Device[43]

1. FAD Design

i. Durability and Strength of FADs

The NPRM anticipated that the FAD would have a long service life because it consists of components (a polyurethane shell, aluminum structural components, and aluminum and steel peripheral attachments) that should not experience appreciable wear.

Comments

Daimler Trucks North America LLC (DTNA), the Truck and Engine Manufacturers Association (EMA), and the Alliance of Automobile Manufacturers (Alliance)[44] brought up concerns about the how durable the FAD would be if tested to failure. FMVSS No. 210 does not require testing the seat belt assembly anchorages to failure nor does the agency conduct tests to failure. However, these commenters noted that after ensuring compliance with the FMVSS No. 210 requirements manufacturers normally continue to load the anchorages to failure. EMA stated that testing to failure provides crucial data regarding the compliance margin and ultimate strength of the seat belt assembly anchorages. EMA's concern is that it is unknown whether the FADs are strong enough to withstand this testing and that if test engineers must, after proving compliance, replace the FAD with body blocks to test to failure, it would increase the cost and accuracy of testing. DTNA similarly stated that due to the lack of experience with the construction and durability of the FAD it is unknown whether it will withstand the destructive testing that manufacturers perform to evaluate the ultimate strength of the seat belt anchorages. The Alliance also stated it was concerned with the long-term durability of the polyurethane shell, especially given the lack of any data or analysis regarding the durability of this test device at the elevated loading conditions typical of original equipment manufacturer (OEM) compliance testing.

Agency Response

The agency does not perform or require tests to failure for the seat belt assembly anchorages. While we understand manufacturer concerns, the agency is not willing to research the FAD's material strength for testing that goes beyond our performance requirements. While we have not found any evidence of wear on the FADs used for our research, we cannot predict if testing to failure with the FADs will result in a shorter service life than we predicted for our compliance test requirements, particularly since the failure level would vary for every anchorage design.

If the vehicle manufacturer is concerned about the durability of the FAD when testing anchorages to failure, the manufacturer has the option to certify compliance using the current body blocks.

ii. FAD Material and Potential Seat Belt Slippage

The FADs consist of an upper torso portion and a pelvic portion hinged together to form a single device. The

[38] "Development of Positioning Zones for FMVSS No. 210 Body Blocks," pp. 39–46.

[39] *Id.* at pgs. 47–51.

[40] NHTSA–2012–0036–0043 (FAD Testing on IC School Bus).

[41] NHTSA–2012–0036–0042 (FAD Testing on Blue Bird School Bus).

[42] NHTSA–2012–0036–0044 (FAD Testing on MCI Motorcoach).

[43] The comments summarized in this section were to the NPRM unless otherwise noted.

[44] After NHTSA received comments from the Association of Global Automakers and the Alliance of Automobile Manufacturers, they merged to form the Alliance for Automotive Innovation.

torso and pelvic portion are manufactured from a smooth polyurethane material. The lap belt would be positioned over the pelvic portion of the FAD, and if applicable, the shoulder belt would be positioned across the FAD's torso portion.

Comments

EMA, DTNA, the Alliance, Navistar, Inc. (Navistar), and the People's Republic of China were concerned about the potential for the FAD to allow the seat belt (or the material that is used to replace the seat belt) to slip during testing, resulting in an invalid test. EMA commented that while the current body blocks are covered with foam that secures the seat belt in place, the FADs are made of smooth polyurethane that may allow the belt to slip. The Alliance similarly stated that the FADs do not guide the webbing like the current body blocks. DTNA commented that the belt might slip in heavy truck testing due to the unique seating and seat belt systems (*e.g.,* air suspension seats have a more upright seating configuration and tethers to anchor the seat belts to the cab structure). Navistar was also concerned about the validity of the test if the torso belt slipped off the FAD.

Agency Response

The agency did not encounter any problems with the seat belts slipping off the FADs in any of the testing conducted, including indicant tests on fifteen light vehicles and three heavy vehicle driver seats. In fact, NHTSA did not observe any significant movement of the seat belt on the FAD during any tests, so we do not see this slippage as a potential source for seat belt webbing damage. If the seat belt slid off or over the FAD during a compliance test it would be considered an invalid test, not a non-compliance. The commenters provided no data to support their concerns for seat belt slippage when the FAD is used. Therefore, the agency does not anticipate that this slippage will be a problem in future compliance tests or testing manufacturers may conduct for self-certification.

iii. Weight of the FADs

The NPRM stated that the FAD1 weighs 55.79 kg (123 lb) and the FAD2 weighs 27.55 kg (47.5 lb). For comparison, the weight of the current body blocks varies depending on the material with which they are fabricated and the design of the torso body block. As noted earlier, the standard does not specify the type of material. NHTSA's understanding, based on its test experience, is that the torso body blocks can weigh approximately 7.7 kg (17 lb) to 13.6 kg (30 lb) depending on the design type (see discussion in section V.B.7.a) and material (aluminum and/or steel). The standard pelvic body block weighs approximately 37.9 kg (83.5 lb), and the optional pelvic body block for inboard seating positions weighs approximately 19.5 kg (43 lb), when made from aluminum.

Comments

Navistar, the Association of Global Automakers (Global), and Freedman Seating Company (FSC) commented that the increased weight of the FADs compared to the current body blocks could make it difficult to use. For example, Navistar commented that the FADs are significantly heavier than the current body blocks, so installing, positioning, and removing the FADs could cause some issues. FSC stated that it requires one person for every 50 lb to lift items, so three people would be required to lift the FAD1 in and out of the vehicle. FSC also stated that it is nearly impossible for a mechanical assistant to help position the FADs in a vehicle and that tight-quartered vehicles with four rear rows would probably be the most difficult platform to position the FADs. FSC also stated it was concerned about possible injuries (back injuries and strains from lifting) to lab technicians from positioning the FADs.

Agency Response

In its testing, NHTSA found that that the FAD was easier to use than the body blocks. For example, NHTSA found that the FADs generally require one installation attempt while the current body blocks may require multiple attempts, possibly with a technician holding the block as the preload is applied, because the torso block must maintain its position in the specified zone during preload. While we acknowledge that the FAD1 is heavier than the combined weight of the current body blocks, during NHTSA's testing it rarely took more than one technician to place the FAD1 in and out of the vehicle. NHTSA also did not encounter any problem with placing the FADs in tight-quartered vehicles, such as the third row of the Chevrolet Suburban and Chevy Express small bus. We acknowledge that test laboratories may have specific policies that prohibit one person from lifting a certain amount of weight, and that whether one technician could place the FAD in a seat would depend on the individual's strength, but we suspect that test laboratories encounter the same issue with anthropomorphic test device dummies, which are, in some cases, significantly heavier than the FAD1; for example, the Hybrid III (HIII) 50th male ATD weighs approximately 170 pounds.

iv. Dimensions of the FADs

The NPRM included a table that summarized the dimensions of the FAD1 and FAD2, and, for comparison, the dimensions of the HIII test dummies representing the 50th percentile adult male, 10-year-old child, and the 5th percentile adult female.[45] The FAD1's dimensions most closely resembled that of the 50th percentile adult male and the FAD2's dimensions were less than that of the 10-year-old child test dummy.

Comments

In response to the NPRM, Johnson Controls, Inc. (JCI) acknowledged the need to use the FAD2 for designated seating positions too narrow to accommodate the FAD1 but commented that the shoulder height for the FAD2 is exceptionally low, creating unrealistic load vectors that will negatively impact seating designs and configurations. JCI suggested that if the FAD2 is intended to replicate a small child, it should be seated in a child or booster seat to create real-world load vectors, and if it is intended to replicate a small adult that the agency should reference databases such as UMTRI to aid in the development of the test device.

In response to the SNPRM, an individual (Jung HoYoo) commented that t the safety of average female drivers and passengers would be better addressed by using another FAD that represents the 50th percentile adult female, because the FAD2 represents the weight/size of approximately half of a 50th percentile male.

Agency Response

NHTSA acknowledges that the placement of the seat belt may not be ideal for some seat belt configurations with the FAD2, but our research has not indicated that the use of the FAD2 is problematic or that it impacts the test results negatively. None of the research tests conducted with the FAD2 resulted in a test failure. For further discussion of the load vectors, see section V.A.4.

The FAD2 was developed to be used at designated seating positions that are too narrow to accommodate the FAD1, when multiple seating positions must be tested simultaneously, such as some inboard seats in the rear rows of passenger cars and MPVs. The FAD2 was not modeled after a particular Hybrid III ATD or occupant category (*e.g.,* 50th percentile adult female) but rather a scaled-down FAD1 to fit narrow

[45] 77 FR 19155, 19156 (March 30, 2012).

designated seating positions. The NPRM explained that the FAD2's shoulder pivot height, shoulder breadth, and hip breadth is 60%, 71%, and 66% of the 50th percentile male's, respectively. Therefore, the individual commenter's concern that the FAD2 represents an occupant half the size of a 50th percentile male is inaccurate. The weight of the FADs cannot be used to infer representation of a particular Hybrid III ATD or occupant category because the FADs do not have lower legs, arms, or heads. The intent of FMVSS No. 210 is to assess the performance of the seat belt assembly anchorages, not to measure the forces imparted to a vehicle occupant in a crash, so test devices that represent a range of occupant sizes are not necessary.

If the vehicle manufacturer is concerned about the performance of the seat or seat belt assembly anchorages when tested with the FAD2, the manufacturer has the option to certify compliance using the current body blocks.

v. FAD Abdomen Area

The FAD developed by Karco was designed with a pelvic area consisting of a molded protrusion to facilitate placement of the lap belt; the protrusion is the polyurethane part between the aluminum structural pieces that connect the upper and lower portions of the FAD. NHTSA observed in early indicant testing during development of the FAD that the aluminum connecting pieces were causing damage to the belt webbing.

To prevent webbing damage, NHTSA developed hip clips. The hip clips evolved over several design iterations. The initial design version of the hip clips consisted of a metal piece that prevented the aluminum connecting pieces from damaging the seat belt webbing. However, in one of the agency's first indicant tests, the initial version of the hip clips damaged the belt, resulting in the belt breaking.[46] Accordingly, the agency redesigned the hip clips to have smoother edges to prevent belt breakage. A prototype version of the redesigned hip clips was installed in the FADs for the remainder of the agency's research tests; no belt damage was observed with the redesigned hip clips. The hip clip specifications docketed with the NPRM[47] differ slightly from the prototype version of the redesigned hip clips; the hip clips in the proposed drawing are angled to further prevent the seat belt from riding up and they specify stronger and bigger hardware for attachment.

Comments

The Alliance and JCI referenced an indicant test on the 2006 Chevrolet Express Bus in which the initial design version of the hip clips damaged the seat belt webbing. The Alliance commented that it was concerned that even with the redesigned hip clips the FAD's pelvic/torso intersection is not biofidelic and there is a risk of cutting the webbing which is non-representative of field performance. It also questioned whether the pivot point between the torso and pelvis is required. JCI similarly recommended redesigning the hip clip.[48] The People's Republic of China also commented on the potential for the FAD to damage the seat belt webbing.

Agency Response

The redesigned hip clips are intended to prevent damage to the seat belt by improving the biofidelity of the pelvic/torso intersection to the extent possible. While it is not perfectly biofidelic, the nine research tests with the redesigned hip clips, docketed with the NPRM, and nine research tests conducted by the agency since the NPRM, have not shown damage to the webbing of the seat belt. However, we believe that the design of the prototype hip clip needed improvement, and accordingly modified the design presented in the proposal. We believe the redesigned hip clips function as intended. Regarding whether the existing pivot point between the torso and pelvis portions is necessary, the agency believes a pivot point is necessary to properly position the FAD in the seat. Different seat designs and seat contours will require the ability to pivot the torso and pelvis to properly position the FAD.

vi. Bridged Pull Yoke

The FAD consists of an upper torso portion and a pelvic portion hinged together to form a one-piece device. Where the force actuator attaches to the FAD depends on the seat belt type. For Type 2 seat belts, the force actuator is connected to separate connection points on the torso and pelvis portions of the FAD. For Type 1 seat belts, a bridged pull yoke is used to connect the connection points of the torso and lap portions of the FAD (so that they are jointly pulled) and the force actuator is connected to this pull yoke. The proposed regulatory text defined the ''bridged pull yoke'' as the yoke that bridges the torso and pelvis on the FAD1 or FAD2 to apply the required force to a Type 1 seat belt assembly.

Comments

The Alliance suggested the bridged pull yoke be redesigned to prevent it from digging into the seat cushion, which introduces an unintended load path into the system. It cited the indicant test with the 2005 Chrysler Town and Country Minivan as evidence.[49]

Agency Response

The agency conducted four indicant tests (totaling six seating positions) with a FAD1 or FAD2 fitted with the bridged pull yoke on a Type 1 belt. To investigate the Alliance's concern, NHTSA re-examined these indicant tests. One was the indicant test cited by the Alliance with the 2005 Chrysler Town and Country Minivan, in which a third-row center seat with a Type 1 belt was tested with a FAD2 fitted with the bridged pull yoke.[50] The test photos do not clearly depict the interaction of the FAD2 and the seat cushion. (A video was not recorded for this test.) Therefore, NHTSA is unable to conclude whether the bridged pull yoke dug into the seat. A second test was the indicant test with the 2005 Ford F–150, in which a front inboard seat was tested with a FAD2 with a bridged pull yoke.[51] The pull yoke did not appear to dig into the seat in a way that would interfere with the test because it was near the edge of the seat cushion. To the extent that this circumstance did present an issue during a test, the pull angle or chain could potentially be adjusted to alleviate it. The third indicant test was on a 2000 MCI 102–EL3 Series Motorcoach in which a driver's seat was tested with a FAD1 with a bridged pull yoke.[52] The pull yoke did not appear to

[46] FMVSS No. 207 Indicant Test, General Motors Corp., 2006 Chevrolet Express Bus, NHTSA No. C60100, pp 40–72. General Testing Laboratories, Inc. May 2, 2006 (Report No. 207–GTL–05–009).

[47] NHTSA–2012–0036–0002; Drawings NVS221–210–16B (pg. 1016), NVS221–210–18–B (pg. 1017), NVS221–210–16J–B (pg. 1042), and NVS221–210–18J–B (pg. 1043).

[48] JCI referred to the ''contour abdomen plate,'' which we construe as referring to the hip clips because JCI referenced a picture of the webbing damage caused by the hip clips in the 2006 Chevrolet Express Bus indicant test.

[49] FMVSS No. 207 Indicant Test, Daimler Chrysler Corporation, 2005 Chrysler Town and Country Minivan MPV, NHTSA No. C50310, p. 28. General Testing Laboratories, Inc. May 2, 2006 (Report No. 207–GTL–05–006), Figure 5.20, pg. 28.

[50] FMVSS No. 207 Indicant Test, Daimler Chrysler Corporation, 2005 Chrysler Town and Country Minivan MPV, NHTSA No. C50310, pg. 28. General Testing Laboratories, Inc. May 2, 2006 (Report No. 207–GTL–05–006).

[51] FMVSS No. 207 Indicant Test, Ford Motor Co. 2005 Ford F–150 Pickup Truck, NHTSA No. C50210, pgs. 18–28.

[52] Using New Force Application Device on Heavy Duty Vehicle Seats, Research Supporting FMVSS

dig into the seat. The fourth indicant test involved a 2006 Chevrolet Express Bus in which we tested an inboard seat in the third, fourth, and fifth rows with the bridged pull yoke on a FAD2.[53] The pull yoke did not appear to dig into the seat.

After considering the Alliance's concern, NHTSA has decided not to redesign the bridged pull yoke. With respect to the FAD2, we acknowledge that while the pelvic portion of the FAD1 usually extends to the front edge of the seat, the pelvis of the FAD2 is not as long as the pelvis of the FAD1. Therefore, the bridged pull yoke could possibly dig into the seat if the seat cushion is soft. However, the test report cited by the Alliance does not clearly show that this is the case. Moreover, none of the test reports noted this as an issue. We also note that even if it were to be an issue, it would not arise frequently because all rear DSPs under 10,000 pounds (except side-facing seats) are required to have Type 2 belts. In any case, if this is a concern for a manufacturer, it can certify to the body block compliance option. Therefore, the agency declines to implement a redesign of the bridged pull yoke.

vii. Clarifying Attachment to Force Actuator

The type of seat belt dictates where the force actuator attaches to the FAD. For Type 2 seat belts, the force actuator is connected to separate connection points on the torso and lap portions of the FAD. The actuator is connected to the torso via a torso pull yoke; specifically, the actuator is connected to the eye bolt attached to the pull bracket.[54] The actuator is connected to the pelvis via a through hole on the pelvis.[55] For Type 1 seat belts, the force actuator is connected to a bridged pull-yoke that is used to connect the attachment points of the torso and lap portions of the FAD (so that they are jointly pulled). The drawing package docketed with the NPRM included a single drawing labeled ''FAD 2—Bridged Pull Yoke.'' The bridged pull yoke is attached to the eye bolt and through hole of the FAD and the test load is applied to the second through hole on the bridged pull yoke.

The proposed regulatory text did not clearly identify where the actuator would be connected to the FAD. For Type 2 seat belts, the regulatory text specified that the test forces should be applied ''to the yoke attached to the torso of the FAD1 or FAD2 and to the eyelet attached to the pelvis of the FAD1 or FAD2.'' For Type 1 seat belts, the regulatory text stated that the forces should be applied ''to the bridged pull yoke.''

Comments

EvoBus GmbH (EvoBus)[56] commented that either the regulatory text or the drawings should be revised to clearly identify where the forces are to be applied, and that the bridged pull yoke should be explicitly marked to ease the understanding and preparation of the test.

Agency Response

NHTSA has modified the proposed regulatory text and drawings to make them clearer. The regulatory text has been modified to use the same part names used in the design drawings (*e.g.,* eye bolt). We also modified the bridged pull yoke drawing to clarify the attachment points for the torso, pelvis, and actuator. Because the same bridged pull yoke is used for the FAD 1 as is used for the FAD 2, we have added a drawing for the bridge pull yoke (NHTSA221–210–27) to the finalized drawing package for the FAD 1. There is a drawing (NHTSA221–210–27J) depicting the bridged pull yoke in the drawing package for the FAD2.

However, we are not specifying exactly how the actuator will be attached to these parts of the FAD because this piece of laboratory equipment could vary (*e.g.,* different chains or other material could be used to transfer the required load) depending, for example, on whether seat belt anchorage strength testing is performed to failure (as some commenters indicated they do) or testing just to FMVSS No. 210 performance requirements. This is consistent with the current specification of the body blocks in the standard, which also do not specify how the actuator is attached to the body blocks.

viii. Human Form Design

The NPRM stated that one of the advantages of the FAD is that it is more representative of the human form than the upper torso and pelvic body blocks. We also identified other advantages of the FAD over the body blocks. We noted that the FAD geometry does not put an unrealistic bending force on the belt buckle, and that the FAD does not have sharp edges, reducing the likelihood that the seat belt will break during testing. We also noted that the FAD does not result in as much seat belt spool-out as seen with the body blocks, thereby eliminating the problem of bottoming-out the hydraulic cylinders during the test, and that the FAD should be easier and quicker to position than the body block, potentially decreasing test costs.

Comments

EMA, DTNA, and an individual commenter to the SNPRM (Jung Ho Yoo) commented that the NPRM did not justify why the human form design would be an advantage for compliance testing. EMA stated that the scope of FMVSS No. 210 only includes seat belt anchorages and that the seat belts that contact vehicle occupants are regulated by FMVSS No. 209, ''Seat belt assemblies,''[57] and that because the anchorage strength test does not require use of the seat belt, any potential advantages related to belt breakage may not be relevant. EMA also stated that NHTSA failed to explain why the FAD transfers test loads any more effectively than the body blocks. DTNA similarly commented that resemblance to the human form may not be relevant when testing strength of seat belt anchorages which do not come into contact with occupants.

Agency Response

NHTSA agrees that the NPRM was not clear on this point. We clarify that we believe that the human form design is advantageous in that its more realistic features decrease the risk of problematic interactions between the test device and the belt/vehicle. We also note that the human form of the FADs could allow for testing of future seat belt designs with unconventional seat belt geometries (such as four-point and five-point seat belts) that cannot be accommodated by the current body blocks. Primarily, however, we believe that the advantages of the FAD will be related to ease and repeatability of testing. The agency believes that the FAD resolves many existing test-related issues with the body blocks. The docketed test reports note several advantages of the FAD. It does not put an unrealistic bending force on the belt buckle, unlike the pelvic body block. The FAD lacks the sharp edges of the pelvic body block,

No. 210 Rulemaking, pgs. 13–15. MGA Research Corp., Sept. 11, 2013 (Report No. .207/210–MGA–2013–001).

[53] FMVSS No. 207 Indicant Test, General Motors Corp., 2006 Chevrolet Express Bus, NHTSA No. C60100, pgs. 40–72. General Testing Laboratories, Inc. May 2, 2006 (Report No. 207–GTL–05–009).

[54] Drawings NHTSA221–210–04 (FAD 1—TORSO PULL YOKE) and NHTSA221–210–04J (FAD 2—TORSO PULL YOKE).

[55] Drawings NHTSA221–210–02 (FAD 1—BODY—PELVIS) and NHTSA221–210–02J (FAD 2—BODY—PELVIS).

[56] After receiving comments from EvoBus they became Daimler Buses GmbH.

[57] EMA referenced FMVSS No. 208, but we understand it to have meant FMVSS No. 209.

which reduces the likelihood of the seat belt buckle or webbing material (or the material used to replace the seat belt webbing during testing) breaking during testing. In addition, the current body blocks move independently of each other, and the agency's test laboratories have indicated that sometimes the increased range of motion associated with the torso body block can be problematic (*e.g.,* the hydraulic cylinders used to pull the belts can reach the end of their stroke). As EMA noted, FMVSS No. 210 does not require testing with the vehicle's seat belt. Therefore, a shorter substitute belt or cable could be used to solve the problem of reaching the end of the stroke of the loading devices. Using a shorter substitute belt or cable also alleviates the problem with seat belt buckle breakage. However, for simplicity, the agency prefers conducting the compliance testing, if possible, with the vehicle's original seat belt assembly. Other benefits of the FADs are discussed elsewhere in this document.

ix. Effect on Seat Back Deformation

The NPRM did not specifically address whether there was the potential for the FAD to interact with the seat structure in a way that could affect test outcomes.

Comments

TÜV Rheinland Kraftfahrt GmbH (TUEV) and JCI had concerns related to seat structure deformation. TUEV commented that the FAD could reinforce the seat structure during tests of integrated seats (seats with seat belts that attach to the seat), which is not representative of the deformation that would occur in a real accident and could potentially lead to different results than testing with the body blocks (*i.e.,* where the anchorages would fail when tested with the body blocks, but pass when tested with the FAD). JCI stated that the FAD structure could interfere with the manufacturer's testing protocols that are intended to gauge backrest deformation.

Agency Response

The agency's research tests demonstrate that the FAD pulls away from the seat back during testing and does not reinforce the seat structure. In fact, the FAD would more accurately represent the dynamics of an occupant in a real crash event because of its geometry: it hinges at the H-point and it is not two independent blocks. TUEV and JCI did not provide any supporting information on the protocols they used for gauging backrest (seat back) deformation with the FAD versus the body blocks, which limits our ability to respond in more detail to this concern.

x. Missing Tolerance Values

The drawing packages for the FAD1 and the FAD2 were docketed in conjunction with the NPRM. In the NPRM, we stated that the drawing packages were sufficiently detailed to allow manufacturers to fabricate the FAD1 and FAD2.

Comments

JCI commented that the drawing packages are incomplete due to the lack of tolerance designations in numerous places. They suggest that this incomplete information be remedied before finalizing the FAD.

Agency Response

NHTSA has added tolerances to all dimensions specified in the finalized drawing package. If a tolerance is not indicated next to a specified dimension, an overall tolerance summary is specified at the bottom of the drawing page.

xi. Design Drawings and Supplemental 3–D Data

NHTSA docketed the FAD design drawings with the NPRM. The proposed regulatory text incorporated these design drawings by reference. The agency was unable to docket the computer-aided design (CAD) files of the FAD drawings or three-dimensional data because the docket does not accept CAD files. In the past NHTSA has generally not incorporated by reference 3–D CAD data for FMVSS documentation or Part 572 anthropomorphic test devices, although it has not infrequently made 3–D geometric rendering solid models available to the public for reference purposes.[58]

Comments

Both American Honda Motor Co., Inc. (Honda) and the Alliance suggested in their comments that the 3–D drawing data for the FAD1 and FAD2 be made readily available. Honda stated that the 3–D drawings were necessary to allow manufacturers to fully assess the proposed test procedures and detect potential issues that would need to be addressed before it is finalized. The Alliance commented that provision of the 3–D CAD data could reduce the cost and lead-time associated with the procurement of the FADs.

Agency Response

During the NPRM comment period the agency provided 3–D solid models of the torso and pelvis portions of the FADs to entities that requested them in response to the NPRM. A memo was filed in the docket documenting the requests and agency response.[59] In the memos, the agency additionally stated that it would provide the files to others upon request. We received requests from, and provided the files to, MGA Research Corp., Faurecia, General Motors, RCO Technologies, Jasti-Utama, Inc., and SCHAP Specialty Machine.

We believe that the drawing package is sufficiently detailed to allow manufacturers to fabricate the FAD1 and FAD2. During development of the NPRM, NHTSA compared a FAD1 and FAD2 manufactured by Denton ATD using the drawing package to a FAD1 and a FAD2 that pre-existed the drawing package.[60] Based upon this inspection, the agency determined that the devices were sufficiently equivalent.

In addition to the two-dimensional engineering drawings being incorporated by reference in the final rule, NHTSA is providing, as supplemental documentation, 3–D solid models. NHTSA has regenerated these 3–D geometric renderings by scanning our physical FADs. These supplemental reference materials are summarized in Table 3. These files are not being incorporated by reference into 49 CFR 571.5 and are therefore will not be part of the FAD specification. Instead, they are intended only for reference purposes (*e.g.,* to facilitate fabrication). The files are available via NHTSA's FTP site.[61] A memo to this effect is also being placed in the docket for this final rule.

We note that some minor changes have been made to the proposed drawings. Some dimensions on NHTSA221–210–02 and 03 (FAD 1 Body Torso and FAD 1 Body Pelvis) and NHTSA221–210–02J and 03J (FAD 2 Body Torso and FAD 2 Body Pelvis) have been modified slightly to match the dimensions of the scanned 3–D solid models. The revised dimensions are related to the molded portions of the FADs. The hip clip drawings were also modified to match the redesigned hip clips that are installed on the FADs at

[58] *See, e.g.,* 77 FR 11651 (Feb. 27, 2012) (final rule for Hybrid III 10-year-old child test dummy) (''[T]hree-dimensional engineering aids are available from the NHTSA website for complex dummy part dimensions. While these aids are not part of this specification, they can be used by the public for reference purposes.'').

[59] NHTSA–2012–0036–0003, NHTSA–2012–0036–0020.

[60] A document describing the inspection criteria used to make this determination has been placed in the docket for the NPRM.

[61] *https://www.nhtsa.gov/file-downloads?p=nhtsa/downloads/.*

NHTSA's Vehicle Research Test Center (VRTC).

TABLE 3—DESIGN REFERENCE DOCUMENTATION

Title	Link
FAD Drawing Package	*https://www.nhtsa.gov/file-downloads?p=nhtsa/downloads/Seat-Belt-Assembly-Anchorages/FAD-Drawing-Package-April-2024.zip.*
FAD Drawing Package—2D AutoCAD	*https://www.nhtsa.gov/file-downloads?p=nhtsa/downloads/Seat-Belt-Assembly-Anchorages/FAD-AutoCAD-DWG-Files.zip.*
FAD Drawing Package—3D Inventor Format.	*https://www.nhtsa.gov/file-downloadsp=nhtsa/downloads/Seat-Belt-Assembly-Anchorages/FAD-Inventor-Files.zip.*
FAD Drawing Package—3D STEP Format.	*https://www.nhtsa.gov/file-downloadsp=nhtsa/downloads/Seat-Belt-Assembly-Anchorages/FAD-3D-STEP-Files.zip.*

2. FAD Test Procedure

i. Positioning Procedure

The proposed regulatory text specified how to adjust the seat and position the FAD at the outset of the strength test. The proposed regulatory text specified that the seat back would be placed at the manufacturer's design seat back angle (as measured by SAE J826 (July 1995) with the seat in its rearmost and lowest position). The NPRM essentially proposed that the FAD be placed so that its midsagittal plane is vertical and aligned with the center of the seat. Although the term ''Midsagittal plane'' was not defined in the proposed regulatory text, it is defined in FMVSS No. 208 S16.3.1.3 as ''the vertical plane that separates the dummy into equal left and right halves.'' The proposed regulatory text defined and used two different terms to refer to the center of the seat: ''longitudinal centerline of a forward and rear-facing seat'' and ''seat centerline.'' Both were defined with reference to the SgRP, and both essentially referred to the center of the seat.

Comments

The Alliance questioned how the FADs should be placed in the seat if the seat centerline does not align with the SgRP. It also asked how the FAD should be placed in a seat with multiple designated seating positions when the lateral seat width is not equally designated by design.

Agency Response

We first note that the NPRM inadvertently used two different terms, ''longitudinal centerline'' and ''seat centerline,'' to refer to the same concept. The final rule clarifies this discrepancy by using a new term, ''seat reference plane,'' which is defined as ''the vertical plane that passes through the SgRP (as defined at 49 CFR 571.3) and is parallel to the direction that the seat faces.'' This is essentially the same procedure NHTSA intended to specify in the NPRM—namely, positioning the FAD so that the midsagittal plane is aligned with the vertical plane passing through the SgRP in the same direction the seat faces. We decided to use the SgRP and not the H-point for consistency with the proposed body block test procedure. Both Alliance's concerns are addressed by this definition because the SgRP does not depend on either the seat centerline or width. The final rule also adds a definition of ''midsagittal plane'' specific to the FAD because the definition of it in FMVSS No. 208 refers to a test ''dummy.''

We also note that the final rule modifies the proposed seat adjustment. In the NPRM, the agency proposed a seating procedure for the FAD that specified, in addition to placing the seat at the rearmost position, the seat back would be adjusted to the manufacturer's design angle and the seat to its lowest position. Now that the agency is reinstating the option to test with the body blocks (with a refined test procedure), we are making the seat adjustment provisions consistent with the manufacturer's SgRP, since the body block zones use the SgRP as the reference point. Specifically, we are adding regulatory text to clarify that the seat is to be adjusted to the rearmost normal riding or driving position, to make the H-point position consistent with the SgRP. The rearmost normal riding or driving position is specified by the manufacturer and includes all modes of seat adjustment, including horizontal, vertical, seat back angle, and seat cushion angle.

To this end, we have added a specific regulatory text section on seat adjustment that applies to both the FAD and body blocks. We note that in the NPRM, the seat was proposed to be placed in its rearmost and lowest position when using the FAD, but no details were provided as to how such a position would be achieved. By specifying a seat position consistent with the SgRP, the agency is fully articulating a well-defined seat position with which all manufacturers should be familiar. This information is typically already requested prior to testing by OVSC.

ii. Selections of FAD1 or FAD2 and Contact Between Adjacent FADs and Vehicle Interior

The NPRM proposed an iterative procedure for determining which FAD NHTSA would use when simultaneously testing the seat belt assembly anchorages of adjacent seats. Specifically, the NPRM specified positioning FAD1s on each seat, and if, ''prior to conducting the test, there is contact between the FAD1s, or if FAD1s cannot be positioned side-by-side due to contact, replace an inboard FAD1 with a FAD2.'' [62] This would not have disallowed contact once the test had started (*i.e.,* once the test force had begun to be applied). However, because the proposal simply specified that contact was not allowed ''prior to conducting the test,'' it was not clear whether this applied before and/or after the preload force was applied to the FADs. The proposal also did not disallow (or specify any procedures with respect to) contact between FADs and the vehicle interior. Finally, the proposal did not contemplate novel seating configuration or vehicles without a driver's designated seating position.

Comments

Honda requested clarification on whether contact between FADs during testing is allowed. Honda also requested clarification on whether contact between the FAD and the vehicle interior would affect the selection, replacement, or seating procedure of the FAD. FSC similarly questioned what constituted ''contact,'' and whether this term referred to any part of any FAD touching another FAD, or whether

[62] S5.3(a) (proposed).

contact between the FADs is permitted so long as it did not interfere with their functionality or independent operation. FSC also inquired about the possibility of changing the size of the FAD1.

Agency Response

The agency would not allow adjacent FADs to contact each other at all at the onset of testing, *i.e.,* when the FADs have been positioned, but prior to the preload being applied. The hierarchical procedure used to determine which FAD to place in each seat if contact occurs during placement should provide ample room to eliminate contact during testing of the anchorages. However, although not expressly addressed in the regulatory text, contact between adjacent FADs once test preloads have begun is not prohibited. Although we believe incidental contact of the FADs during preload and loading is unlikely, we believe if it does occur the contact will not unduly influence the results and will not invalidate the test. Additionally, if a manufacturer is concerned about such incidental contact, it can choose to test with the body blocks.

As far as contact with the vehicle interior, the agency normally conducts the FMVSS No. 210 compliance tests with the vehicle doors removed so we do not encounter contact with the vehicle interior in our tests of outboard seats next to a door. For outboard seats that are not positioned next to a door, contact may also be found permissible if it does not interfere with the loading of the anchorages and attaining the required load value. Since this determination should be made on a case-by-case basis, and to avoid limiting the agency's testing options due to inconsequential contact of the FAD with the vehicle interior, the regulatory text will not address this determination of permissible contact with the vehicle interior. This aspect of the test procedure may be addressed in the laboratory test procedure for FMVSS No. 210.

The agency declines to change the size of the FAD1. The size of the FAD1 did not present any problems in the testing the agency conducted in support of this rulemaking. In any case, if a DSP is too narrow to accommodate the FAD1, the smaller FAD2 may be used. If, on a seat with multiple DSPs, each DSP is occupied by a FAD2, we believe there is minimal potential for contact at preload because the width of the FAD2 at its widest point (the shoulder width) is 11.78 ± .05 in (299.2 mm ± 1.27 mm); based on NHTSA's experience with testing and knowledge of the vehicle market, this is less than the width of many or most DSPs. A DSP less than a foot in width would be exceedingly small, and smaller than the minimum required width for a DSP.[63]

Finally, with respect to the iterative procedure proposed to determine if the FAD1 or FAD2 would be used in a particular seat, consideration was not given at the time of the NPRM to the potential for novel seating configurations and vehicles without a driver's designated seating position. For forward and rearward facing seats, the final rule maintains the same overall hierarchy of prioritizing inboard seats for the use of the FAD2, to eliminate contact between FADs in adjacent seats. However, the reference to driver's side versus passenger side has been replaced by right-hand side versus left-hand side, as viewed from the direction of the seat. Additional regulatory text has been added to address non-forward and non-rearward facing seats.

iii. Use of FAD2 on Buses and Heavy-Duty Trucks

As previously discussed, NHTSA developed the FAD2 for use at DSPs too narrow to accommodate the FAD1, although in the proposed seating procedure NHTSA would first attempt to position FAD1s in all seats.

Comments

EvoBus commented that when testing buses, it would be preferable to specify use of the FAD2 for double seats because in coaches the situation regarding shoulder width is similar to the shoulder width in the rear seats of passenger cars.

FSC noted that its standard passenger bus seat width is 17.75 inches (45.085 cm), which is the same width as the FAD1. Based on the proposed seating procedure, FSC commented that most of its DSPs would require a FAD1 to be replaced by the FAD2 in the outboard DSP to avoid contact. Based on this concern, FSC questioned if it was possible to change the size of the FAD1.

Navistar expressed concern regarding the potential effect on the test results if a FAD1 is replaced with a FAD2, because it could differ from what was used when testing with the current body blocks (larger pelvic block vs. smaller pelvic block) for a given seat. Navistar believes if this were the case, it would result in the need to identify these testing differences for each seating position and revalidation of these vehicles, and potentially some redesign or reengineering if this testing difference changes the test results.

[63] The minimum DSP width (for most vehicles with a GVWR less than or equal to 10,000 lb) is 330 mm (13 inches). *See* 571.3 and 571.10.

Agency Response

The agency declines to accept the recommended changes. NHTSA does not agree with the need to limit the testing of bus seats with multiple DSPs to testing solely with the FAD2, as suggested by EvoBus. There is no regulatory limit on bus seat width, so certain bus seat designs may allow for simultaneous testing with the FAD1 and FAD2 seated adjacent to each other. Therefore, rather than limit these bus seats to testing solely with the FAD2, the agency prefers an objective protocol for determining when to replace a FAD1 with a FAD2. We also decline to change the size of the FAD1 because the need for a smaller test device is met by the specification and use of the FAD2. In response to Navistar's comment, there is no indication that testing results differ depending on which FAD is used; NHTSA tested both sizes of the FAD in various light vehicles, and there were no test failures with either. With respect to heavy duty vehicles, NHTSA only tested with the FAD1, although the FAD2 was tested in a Chevrolet Express Bus, which, with a GVWR of 9,600 lb, is nearly into the heavy vehicle category. None of these tests resulted in failures. In addition, design margins should be sufficient to accommodate slight differences in force vectors between the FAD1 and FAD2. Nonetheless, if heavy duty manufacturers have vehicles for which the FAD1 does not fit under our test procedure, and they do not feel comfortable certifying with the FAD2, they may continue to use the body blocks.

iv. Bottoming Out of Hydraulic Cylinders

Test laboratories typically use hydraulic cylinders to achieve the required pull force. The NPRM stated that the FAD would eliminate the problem of bottoming out of the hydraulic cylinders that sometimes occurs when performing the anchorage strength test using the current body blocks.

Comments

EMA commented that the FAD may make hydraulic cylinders more likely to bottom out during testing of medium- and heavy-duty vehicles because the FAD may cause more hydraulic cylinder travel to take up the slack necessary to apply loads to the anchorages for suspension seats and seat belt assemblies using tethers.

Agency Response

When the NPRM was published, NHTSA had not conducted any indicant tests with the FAD on heavy vehicles. The agency has since conducted FAD testing on two air suspension seats (one school bus driver's seat with a Type 2 seat belt and one motorcoach bus driver's seat with a Type 1 seat belt). In those tests, there was no indication that the FAD introduces more slack than the current body blocks. Based on observations during testing, the cylinders did not undergo additional travel and bottoming out of the hydraulic cylinders did not occur. The agency believes that the increased range of motion of the current body blocks is greater than the FAD and would more likely result in the hydraulic cylinders reaching the end of their stroke than with the FAD.

3. Repeatability

NHTSA assessed the repeatability of the FAD in two different ways. First, Karco assessed the consistency of the FAD seating procedure. Different test technicians positioned the FAD1 multiple times in nine different vehicles (ranging from two-seat sports cars to light duty trucks).[64] The technicians were provided a written copy of the seating procedure and no additional instructions. Once each technician had seated a FAD in a test vehicle, a Faro Arm (an articulated measuring arm with six degrees of freedom) was used to record the precise location of seven points on the FAD. Second, NHTSA evaluated the repeatability of the forces applied to the anchors using the FAD1.[65] We conducted four anchorage strength tests, using a rigid test seat in a test rig, with load cells located at the seat belt anchorages and a few other locations (*e.g.,* to measure the tensile load for the shoulder belt webbing). In each test, the FAD1 was positioned, belted, and pulled per the proposed test procedure. (NHTSA used the FAD1 for these repeatability evaluations; it has no reason to believe that similar results would not be achieved with the FAD2.)

Comments

The Alliance commented that the repeatability analysis using a rigid test seat looks reasonably acceptable.[66] JCI commented that the FAD improves repeatability and reduces the potential for interference between the lap and torso blocks.

Agency Response

NHTSA concludes that use of the FADs leads to sufficiently repeatable results. Below we briefly summarize the results of NHTSA's testing. More information, including details on the methodology and results, is available in the cited reports in the rulemaking docket.

With respect to the consistency of the seating procedure, of the twenty-seven positionings of the FAD (three technicians × 9 vehicles), the average variance for positioning the FAD was less than ¼ inch. We believe that this variability in seating the FAD is acceptable. In comparison, FMVSS No. 208, ''Occupant crash protection,'' at S10.4.2.1, specifies a 12.7 mm (½ inch) tolerance for the H-point.[67] Accordingly, variability of less than ¼ inch in seating the FAD is well within the same range of tolerance as specified in FMVSS No. 208 for positioning the H-point. This result is even more compelling considering that the technicians performing the FAD test were unaccustomed to the seating procedure, and that the results were based on a comparison of three points of the FAD surface, not just one point.

NHTSA also concludes that the forces applied to the seat belt anchorages using the FAD are repeatable (over repeated trials on the same seat and vehicle body design). To evaluate the repeatability of the forces applied to the anchorages, NHTSA used three different methodologies: the coefficient of variation, a general linear model, and a mixed model. Each of these analyses indicated that the test device applied loads to the anchorages in a repeatable manner. For example, the coefficient of variation analysis showed that the test procedure was repeatable, with all data channels except two rated ''excellent.'' Of the remaining two, one data channel was rated ''good'', and another was rated ''acceptable.'' The ''acceptable'' data channel (retractor Y-axis) had a large measurement error relative to the other channels as seen by the ''acceptable'' coefficient of variation. However, the scale of the mean value, around 890 N (200 lb), is relatively small compared to the 13,345 N (3,000 lb) belt load, so the relatively larger measurement error has a minor effect on the overall test results. The general linear model and the mixed model similarly indicated that the forces measured from the 16 channels tend to be consistent and repeatable over time, and there are no statistically significant differences across tests.

4. Equivalence With the Body Blocks

In the NPRM, NHTSA stated that it believed use of the FADs would not affect the stringency of the strength test and would not affect the likelihood of a vehicle meeting or not meeting the standard's strength requirements. NHTSA reported the results of its indicant testing showing vehicles that met the anchorage strength requirements using the body blocks also met those strength requirements using the FAD.[68]

Comments

Commenters expressed concerns regarding whether the proposed FAD would perform equivalently to the existing body blocks. Comments from manufacturers and suppliers of heavy-duty vehicles focused on whether the FAD would perform equivalently in heavy-duty applications.

Several medium- to heavy-duty vehicle manufacturers, associations, and their suppliers commented in response to the NPRM on the lack of testing in these vehicles. They pointed out differences between heavy and light-duty vehicles and questioned whether heavy-duty vehicles would remain compliant if tested with the FAD.

DTNA, Navistar, and EMA commented on the unique characteristics of heavy-duty vehicles and seating systems and noted that NHTSA's testing did not include heavy-duty vehicles. For example, EMA stated there was no data indicating that existing seat belt assembly anchorages in heavy trucks would remain compliant if the FAD is used, and pointed out that heavy-duty vehicles have different seating and seat belt assembly systems than light-duty vehicles, citing the use of larger cabs, upright seating configurations, unique seat belt systems and anchorages, and air suspension seats (which utilize tethers to connect the seat belt assembly to the anchorages). EMA further commented (on the 2018 notice of availability) that the additional technical reports NHTSA docketed did not alleviate its concerns because they

[64] ''Final Report: Development of a Combination Upper Torso and Pelvic Body Block for FMVSS 210 Test, Revision A,'' May 22, 2003, KARCO Engineering, LLC, pgs. 10, 13, 29 (NHTSA–2012–0036–0002).

[65] ''Repeatability Analysis of the Forces Applied to Safety Belt Anchors Using the Force Application Device'' (DOT HS 811 139) (NHTSA–2012–0036–0002, pp. 977–995).

[66] NHTSA understands this comment to refer to NHTSA's repeatability analysis *supra,* n. 66. The KARCO report also contains a repeatability analysis of the forces applied to the anchorages (NHTSA–2012–0036–0002, pp. 12–33). *See supra* note 30.

[67] H-point means the mechanically hinged hip point of a manikin which simulates the actual pivot center of the human torso and thigh.

[68] *See* NPRM at pgs. 19157–58 and section IV.

did not contain any data with respect to the feasibility of the FAD on the medium- and heavy-duty trucks built by its member companies, and suggested that they did not address the unique aspects of the broad range of heavy-duty vehicles such as regional or line-haul tractors, refuse trucks, construction trucks, parcel delivery step vans, or many other applications that would be affected. EMA stated that if NHTSA proceeds with amending FMVSS No. 210 based only on the existing rulemaking record, it must exempt vehicles with a GVWR greater than 10,000 pounds from the new requirements. Navistar similarly stated that NHTSA's testing did not apply to its highly customized vehicles (*e.g.,* a wide variety of seating types and locations).

EMA, Navistar, and Hino Motors, Ltd. (Hino) commented that replacing the current body blocks with the FAD would impact the levels and/or directions of the forces that are applied to heavy truck seat belt assembly anchorages during compliance testing. For example, DTNA stated that it was unclear whether the FAD would introduce unique seat loads and seat belt loads not observed in testing with the body blocks in heavy-duty applications.

Commenters also questioned the equivalence of the FAD that were not limited to a specific vehicle type. The Association of Global Automakers (Global) commented that the results of the nine indicant tests reported in the NPRM do not provide a sufficient basis for using the current and proposed test devices interchangeably. JCI commented that more robust comparison testing should be conducted because the testing conducted on bench seats using the FAD and the current body blocks simultaneously on the outboard seats may not accurately represent the performance of the seat belt assembly anchorages when the adjacent designated seating positions are tested simultaneously with the same test device. Global noted that the NPRM identifies several aspects (*e.g.,* seat belt angle, spool-out, and placement) in which testing with the FAD differs from testing with the body blocks and stated that it is possible that such differences could affect test results. JCI commented that the testing NHTSA conducted does not cover the full range of seating structures and test conditions in use, and the FAD may interact with the seating configurations in a way that impacts seating and/or seat belt assemblies. JCI also stated that the FAD allows for more movement in the upper torso than the current body blocks resulting in a different vector of force on the seat structure and potentially also on the anchorages. The Alliance commented that there can be significant differences in the anchorage loads between the FAD and the current body blocks and that vehicle seats showed significant variability in the anchorage loads for some tests. The Alliance pointed to the agency's comparison tests of the 1996 Ford Taurus outboard lap anchorage in which the loads obtained using the FAD averaged 31% lower than the average of the loads obtained using the existing body blocks. Likewise, the comparison tests on the 2003 Honda Pilot, indicated a similar variability of 37%. The Alliance stated that even though the loads recorded in these cases were lower for the FAD, the level of variation[69] was troubling and needs to be examined further.

Agency Response

The agency recognizes that at the time the NPRM was published, it had not conducted any indicant tests with the FAD on heavy vehicles. However, in response to comments on the NPRM, NHTSA subsequently performed three indicant tests with the FAD on the driver's seats in three different heavy-duty buses. The anchorages of all three seats met the FMVSS No. 210 anchorage strength requirements.

We believe that we have conducted sufficient testing of the FAD in heavy-duty vehicles to conclude, with a reasonable degree of confidence, that the FAD is equivalently stringent to the existing body blocks in these vehicles. Three FAD tests were performed on seats in buses with a GVWR >10,000 lb (two school bus driver's seats, a pedestal-type seat and air suspension seat, and a motorcoach driver's air suspension seat). The school bus seats were both equipped with Type 2 seat belts and the motorcoach seat was equipped with a Type 1 seat belt. The anchorages of all three seat belts met the FMVSS No. 210 performance requirements when tested with the FAD. Some of the tested seat types are similar to those found in heavy-duty trucks (*e.g.,* air suspension, pedestal type seats), and the use of the FAD test device did not affect the compliance of the seat belt assembly anchorages. These results are also summarized in section IV.B and in Table 4. The evidence from the agency's testing program shows that heavy vehicles certified to FMVSS No. 210 strength requirements with the body blocks are still compliant when tested with the FAD. We have no data to support that the use of the FAD would affect the compliance of a vehicle.

TABLE 4—INDICANT ANCHORAGE STRENGTH TESTS TO EVALUATE FAD EQUIVALENCE

Vehicle	Vehicle type	Test device(s)[70]	Result
Research Docketed with the NPRM			
2005 VW Passat	Light	Body Blocks (2) FAD 1 (2) FAD 2 (1)	Pass.
2005 Acura RL	Light	Body Blocks (2) FAD 1 (2) FAD 2 (1)	Pass.
2005 Toyota Avalon	Light	Body Blocks (2) FAD 1 (2) FAD 2 (1)	Pass.
2005 Buick Lacrosse	Light	Body Blocks (2) FAD 1 (2) FAD 2 (1)	Pass.

[69] The agency understands this variation to refer not to variability among the measured loads from the FAD (discussed below in section V.A.3, Repeatability), but instead to refer to a comparison of the anchorage loads observed with the FAD and the anchorage loads observed with the body blocks.

[70] The number in parentheses indicates the number of DSPs tested with that test device.

TABLE 4—INDICANT ANCHORAGE STRENGTH TESTS TO EVALUATE FAD EQUIVALENCE—Continued

Vehicle	Vehicle type	Test device(s) [70]	Result
2005 Chrysler 300	Light	Body Blocks (2) FAD 1 (2) FAD 2 (1)	Pass.
2005 Chevy Express Small Bus	Light	Body Blocks (6) FAD 1 (5) FAD 2 (4)	Pass.
2005 Chrysler Town and Country Minivan	Light	Body Blocks (3) FAD 1 (3) FAD 2 (1)	Pass.
2005 Ford F–150 Super Crew Cab Pick-up	Light	Body Blocks (2) FAD 1 (2) FAD 2 (2)	Pass.
2005 Chevy Aveo	Light	Body Blocks (2) FAD 1 (2) FAD 2 (1)	Pass.
Research Docketed After the NPRM			
2000 MCI 102–EL3 Series Motorcoach	Heavy	FAD 1 (1)	Pass.
2012 Blue Bird All American D3 RE School Bus	Heavy	FAD 1 (1)	Pass.
2012 IC CE School Bus	Heavy	FAD 1 (1)	No test.
2012 Honda Fit	Light	Body Blocks (1) FAD 1 (1)	Pass.
2012 Mitsubishi I-Miev	Light	Body Blocks (1) FAD 1 (1)	Pass.
2012 Chevrolet Suburban	Light	Body Blocks (2) FAD 1 (2)	Pass.
2013 Ford Fusion	Light	Body Blocks (3)	Pass.
2013 Ford Fusion	Light	FAD 1 (2) FAD 2 (1)	Pass.
2013 Ford C-Max	Light	Body Blocks (3)	Pass.
2013 Ford C-Max	Light	FAD 1 (2) FAD 2 (1)	Pass.
2012 Subaru Impreza	Light	Body Blocks (3)	Pass.
2012 Subaru Impreza	Light	FAD 1 (2) FAD 2 (1)	Pass.

In response to commenters who expressed concerns that the FADs would introduce different load vectors or that the test load would be distributed differently among the anchors compared to the body blocks in heavy and/or light-duty applications, we acknowledge that given the geometry and construction of the FAD it will not apply the test forces to the seat belt assembly anchorages in exactly the same way as the current body blocks. The load data in the KARCO report does show that the FAD distributes the test loads somewhat differently than the body blocks. On average, the FAD produced lower forces at the outboard shoulder and d-ring and higher forces at the outboard lap belt anchorage. These differences can be attributed to the differences in geometry and range of motion of the two test devices. Because the FAD has two pieces connected in a manner that restricts their relative articulation and the current body blocks move independently of each other, the range of motion of the devices is inherently different. In addition, the torso body block is supported in air by the torso portion of the seat belt; thus, the force vectors and load distributions on the shoulder belt portion will differ from those with the FAD. (For these reasons we also disagree with JCI's comment that the FAD allows for more movement in the upper torso.) However, while the force vectors or load distribution between the two test devices may not be the same, the total load on the seat belt assembly anchorages is the same for both the FAD and the body blocks. Moreover, as discussed in more detail below, the indicant test data shows that the FAD performs equivalently to the body block.

To respond to Global's comment that the 9 indicant tests docketed with and discussed in the NPRM are not sufficient to establish the equivalency of the FAD, and JCI's comment that this testing did not cover a full range of seating structures, NHTSA conducted additional testing with the FAD on passenger vehicles (as well as the additional heavy-duty testing discussed above) to allow for a more robust evaluation of the FAD1 and FAD2 with different seat belt assembly configurations. This additional testing included five passenger cars and a large SUV. In total ten different vehicle makes were represented in these tests and the earlier nine indicant tests. Therefore, we believe our testing with the FAD has been reasonably representative of the population of seats in light vehicles. To address JCI's comment that the original indicant tests were not conducted as an actual compliance test would be (because they mixed both the FAD and the body blocks), in this additional testing we tested three matched pairs of vehicles. One vehicle in each pair was tested with only the body blocks, and the other vehicle in the pair was tested with only the FAD.[71] There were no test failures in any of these additional indicant tests. All the indicant tests involving the FAD are summarized in section IV.B and in Table 4.

NHTSA performed testing in a variety of vehicles—both light- and heavy-duty—to evaluate equivalence. We did not record failures in any of these tests. These results suggest to us that any

[71] The testing was conducted on rear seats and the comparison vehicles were the same vehicle model and model year but with different battery options (*e.g.,* Ford Fusion Hybrid and Ford Fusion Energi).

differences in test performance related to use of the FAD—such as differences in load vectors, seat belt angle, spool out, or interaction with the seating configuration—do not meaningfully affect the test results, and, most importantly, do not affect the ultimate test outcome. In addition, in real life, the seat belts and anchorages must accommodate occupants of varying sizes, sitting in a variety of sitting and seat positions; design margins for existing seating and restraint systems should be sufficient to accommodate this variation, which should also be sufficient to compensate for any effects due to differences in test performance related to the FAD.

The adequacy of existing design margins is supported by the history of NHTSA's anchorage strength compliance testing program. In the agency's forty-plus year history of testing for compliance with the anchorage strength requirements, test failures have been uncommon. According to the agency's records, for testing from 1972 to the present there were 327 compliance tests for FMVSS No. 210 and only 23 test failures.[72] The agency concludes that this testing is sufficient to establish, to a reasonable degree of confidence, that the FAD performs equivalently to the body blocks. Moreover, we are also retaining the existing body blocks and providing manufacturers the ability to choose the device to which they will certify compliance.[73]

5. Stakeholder Familiarity With the FAD

At the time of the NPRM, manufacturers and other stakeholders did not have access to the FAD for evaluation because the agency had possession of the only FADs in existence. The agency docketed the FAD design drawings with the NPRM.[74]

Comments

The Alliance, Navistar, DTNA, EMA, Hino and Honda all noted or alluded to the lack of knowledge or experience testing with the FAD. DTNA commented that the suppliers and availability of the FADs are unknown. FSC asked if there would be ''approved manufacturers'' of the FAD. The Alliance suggested reopening the comment period to allow manufacturers time to procure and test with the FAD and stated that initial quotes from Humanetics indicated a 26-week lead-time before the first products can be delivered. The Alliance suggested that the FADs be made available for round-robin testing. Both Honda and the Alliance suggested conducting a technical workshop to demonstrate the use of the FAD and go over any technical questions and concerns associated with it.

In response to the SNPRM, JCI noted that it had conducted preliminary testing with the FAD and had not experienced any of the technical concerns raised in its NPRM comments. It stated that the FAD may develop into a feasible test device which helps to reduce variability, set-up time, and testing costs.

Agency Response

NHTSA understands the commenters' concerns that at the time the NPRM was published the FAD was not available. However, the FAD design information has been publicly available since the NPRM. After the NPRM was published, two commenters asked for the 3D design drawings, and we made these available upon request (and placed in the docket a memo stating so).[75] To date, the agency has received only a limited number of requests for the 3D drawings. Manufacturers have had ample time to fabricate and test with FADs; the NPRM was published in 2012 and the 2015 SNPRM (published in 2015) explicitly stated that NHTSA was still considering replacing the body blocks with the FAD or incorporating the FAD as an optional testing tool. Moreover, the concerns with respect to a lack of familiarity with the FAD are also addressed by the decision to give manufacturers the option to continue to certify to the requirements with the body blocks.

Any supplier or manufacturer is free to manufacture the FAD, and the design information that we have made publicly available is sufficient to fabricate the FAD. With respect to the comment regarding a compliance workshop, we received no further inquiries about this possibility. With respect to the comment about round-robin testing, NHTSA will make its FADs available to manufacturers or test laboratories upon request.

6. Testing Costs

i. Costs of Testing With the FAD

In the NPRM we estimated the cost of each FAD (FAD1 or FAD2) to be approximately $8,000. The agency assumed that a vehicle manufacturer or test facility would purchase a set of two FAD1s and three FAD2s, and that the principal cost associated with the NPRM is the one-time purchase cost of $40,000.

The NPRM stated that we believe there would be cost savings associated with using the FADs because they require less effort, time, and personnel to install in the test vehicle, and that over time these efficiencies would offset the one-time purchase cost of the FADs. In the NPRM, we estimated that the use of the FADs would result in a labor cost savings of $18.75 per vehicle test and on average a time savings of 5 minutes per seat installation.

Comments

FSC, which has a small test lab, stated that it would acquire five or more FADs, which would cost at least $40,000. Navistar commented that it has numerous test facilities and would require a dozen FADs (an initial investment of $96,000).

The Recreation Vehicle Industry Association (RVIA) commented that most motorhome manufacturers are small-volume manufacturers, and that motorhome manufacturers faced with expanded testing using new FAD equipment would confront massively (and potentially crippling) testing costs, with minimal ability to recapture test costs by spreading them across the units sold. RVIA argued that these costs would contrast markedly with large volume automobile manufacturers, which can test one unit of a model that represents tens or hundreds of thousands of similar units produced. Both EMA and DTNA commented that it is unknown whether the test set-up with the FAD results in less effort and time in a heavy-duty truck since no testing was done on these vehicles.[76]

Agency Response

Although vehicle manufacturers or test laboratories might purchase larger quantities of FADs than assumed in the NPRM to meet their testing needs, additional FADs are not necessary for

[72] Based on a search of NHTSA's electronic records. This tally includes failures relating to any of the FMVSS No. 210 requirements, as well as what the agency would typically consider ''non-tests'' (*i.e.,* tests that could not be completed due to equipment or testing issues), so the number of actual test failures for the anchorage strength requirements is likely lower than this.

[73] Furthermore, any concern about testing with the FAD resulting in different test outcomes than testing with the body blocks is obviated by the fact that the final rule provides manufacturers the choice of compliance options. In any case, as we explain here, after much testing, we have no evidence that the FAD results in different test outcomes.

[74] *See* NHTSA–2012–0036–0002, ''Final Report: Development of a Combination Upper Torso and Pelvic Body Block for FMVSS 210 Test,'' Appendix E.

[75] NHTSA–2012–0036–0002.

[76] Global, the Alliance, and DTNA also commented that there would be additional certification costs, not considered in the NPRM, resulting from disharmonization. This subject is discussed in section V.C.10, Regulatory Alternatives.

testing based on the FMVSS No. 210 performance requirements. Test labs typically test one vehicle at a time, and vehicles typically do not have more than five adjacent seating positions (that would be tested simultaneously). In addition, we believe that the useful life of the FADs can be measured in decades because of the materials with which it is constructed, and any cost can be amortized over this long life. For vehicle designs with long production lives, such as heavy vehicles, the testing cost would be spread over many years. We recognize that smaller-volume manufacturers would find it more difficult to recover these costs. However, it is likely that small-volume manufacturers would contract out testing services, thus the cost of the of purchasing the FADs would not be incurred by them directly. Another potential solution to defray cost might be for the RVIA to purchase FADs for the use of their members.

The test cost savings expected from the FAD's ease of use should apply equally as well to heavy-duty vehicles as well as light vehicles. The handling and positioning of the body blocks (mainly the torso body block) require more time and effort than seating the FAD regardless of vehicle type. The Karco final report included a section on the FAD's ease of use that discussed the installation time savings (6.75 minutes per seating position) and noted that, unlike the body blocks, it does not require multiple installation attempts. The research test reports docketed with the NPRM noted that the FADs were much easier to position than the current body blocks.

ii. Potential Re-Certification Costs

The NPRM stated that the use of the FAD would not affect the stringency of the seat belt assembly anchorage strength test.

Comments

Several vehicle manufacturers and vehicle manufacturer associations expressed concerns regarding the potential need for additional testing to ensure that the seat belt assembly anchorages certified with the current body blocks remain compliant when the FAD is used for testing.

The Alliance, EMA, Hino, Navistar, DTNA, and RVIA commented that vehicle manufacturers would have to perform expensive additional certification testing to ensure that their vehicles continued to be compliant when tested with the FAD. For example, the Alliance stated that even if a vehicle modification is not necessary, the new test hardware and procedures could require additional certification testing, which would require significant additional cost because many vehicles have numerous body styles and seating arrangements, and testing costs include bucks, seats, seat belts, body preparation time, test set up and tear down and disposal of scrap materials. Similarly, EMA commented on the need for additional validation testing with the FAD and stated that to ensure that existing heavy-duty truck models remain compliant to FMVSS No. 210 when tested using FADs, manufacturers would have to either prove that testing with the new FAD is equivalent to testing with the current body blocks, or re-test to ensure compliance of vehicles produced after the effective date of the rule. EMA commented that, at a minimum, one test would be required to establish equivalency of the FAD and the body blocks, and that test (which destroys a cab shell) is estimated to cost between $20,000 and $30,000. More likely, a manufacturer would have to conduct many tests to ensure equivalency for all seat, seat belt, and seat belt anchorage configurations in all its models. For example, Navistar estimated that such an equivalency evaluation could cost $670,000, and that the only alternative to establishing equivalency of FADs would be to re-test every product that a manufacturer plans to continue selling after the new rule is effective, which would be prohibitively expensive. Additionally, if testing disclosed a discrepancy between the FAD and the body blocks, the manufacturer would incur the costs of implementing a solution and would also need to address its potential liabilities from sold vehicles.

RVIA commented that if NHTSA finalized the FAD, the final rule should permit manufacturers to continue certifying to the anchorage strength requirements with the current body blocks until such time (regardless of how long) as new testing is made necessary by applicable changes in seating or vehicle structure, to allow motorhome manufacturers to gradually implement the new requirements and at least partially mitigate implementation costs.

Agency Response

As we explained above, the agency's indicant tests on passenger vehicle and bus seats do not indicate that using the FAD affected the compliance of the tested seat belt assembly anchorages; there were no test failures (see section V.A.4). However, considering the comments to the NPRM suggesting that manufacturers might conclude that to certify to the anchorage strength requirements using the FAD they would have to conduct additional certification testing, NHTSA has decided to retain and modify the test procedure using the longstanding body blocks (which is discussed in detail in section V.B). Accordingly, if a manufacturer has a concern with the FAD—for example, if it believes the FAD would not be practicable for a particular vehicle, or that it would have to conduct costly testing or design to re-certify a vehicle platform—it may certify to the body block compliance option instead.

7. Incorporation by Reference

Under regulations issued by the Office of the Federal Register (1 CFR 51.5(b)), an agency, as part of a final rule that includes material incorporated by reference, must summarize in the preamble of the final rule the material it incorporates by reference and discuss the ways the material is reasonably available to interested parties or how the agency worked to make materials available to interested parties.

In this final rule, NHTSA incorporates by reference material entitled ''Drawing Package for the Force Application Device 1 (FAD1), April 9, 2024'' and ''Drawing Package for the Force Application Device 2, April 9, 2024,'' consisting of engineering drawings and specifications for the force application device that NHTSA will use to assess the compliance of seat belt assembly anchorages with FMVSS No. 210 if the manufacturer selects that compliance option. The FAD consists of an upper torso portion and a pelvic portion hinged together to form a one-piece device and is available in two sizes.

NHTSA has placed a copy of the material in the docket for this final rule. Interested persons can download a copy of the material or view the material online by accessing *www.Regulations.gov,* telephone 1–877–378–5457, or by contacting NHTSA's Chief Counsel's Office at the phone number and address set forth in the **FOR FURTHER INFORMATION CONTACT** section of this document. The material is also available for inspection at the Department of Transportation, Docket Operations, Room W12–140, 1200 New Jersey Avenue SE, Washington, DC, Telephone: (202) 366–9826.

B. Body Blocks

The SNPRM announced that the agency was considering maintaining the current body blocks and refining the test procedure to specify the positioning of the body blocks more clearly so that manufacturers are informed of the range of positions that may be tested to determine compliance. After the

SNPRM was published, the agency docketed the additional research it had conducted to develop and validate the zones (as well as additional testing with the FAD). The agency received comments on the proposed zone concept in response to both the SNPRM and the subsequently docketed research. In this section we address those comments and explain NHTSA's decision to retain the current body blocks while refining the test procedure to respond to the *Chrysler* decision and clarify the test procedure.[77]

1. Retention of Body Blocks and Appropriateness of Specifying Zones for Body Block Placement

The SNPRM announced that the agency was considering maintaining the current body blocks and proposed a preliminary concept that consisted of specifying zones within which the body blocks would be placed for testing purposes, as it has done in FMVSS No. 222, ''School bus passenger seating and crash protection.''[78]

Comments

The Alliance, FSC, Global, Honda, IMMI, and JCI all supported the continued use of the body blocks, and JCI, the Alliance, and IMMI specifically supported refining the test procedure to make it more objective and repeatable. For example, JCI commented that the current test procedure is unclear and potentially inconsistent. Several commenters suggested alternative approaches to specify the position of the body blocks instead of the zone approach. These suggestions are discussed in section V.B.7, Alternative Solutions.

However, some commenters appeared to question the appropriateness of specifying zones for the FMVSS No. 210 anchorage strength test. Global commented that the test setup is overly complex, making it difficult to obtain repeatable test results and increasing the time needed for test setup. FSC shared Global's stated concern about the complexity of the procedure and space limitations when conducting in-vehicle testing. Vans and minivans with a GVWR under 10,000 lb, have space constraints, especially when there are no rear windows and in rear-rows with four DSPs. Alliance, Global, and IMMI stated they were concerned that zones that would be valid for a wide range of vehicles would be too large, resulting in excessive variability (this is discussed further in section V.B.4). The Alliance recommended harmonizing with ECE R14 requirements for positioning the pelvic and torso block during the initial test set-up, including against the seat back. Global and FSC similarly suggested that the body blocks be placed against the seat back. Honda did not agree with the zone concept because it would result in disharmonization. (Harmonization is further discussed in section V.C.10.)

Agency Response

The final rule will retain the body blocks along with a refined test procedure that more clearly specifies the positioning of the blocks and will adopt the FAD as an optional test device. If manufacturers are not comfortable with the FAD, they may continue to use the body blocks. As explained in more detail below, NHTSA is, consistent with the decision in *Chrysler,* amending the body block test procedure to clearly specify the placement of the body blocks at preload.

NHTSA acknowledges that the finalized test procedure does add complexity to the current test procedure, which places no restrictions on the starting location of the body blocks. However, this change is both necessary and practicable. It is necessary because in *Chrysler* the D.C. Circuit determined that the existing test procedure did not provide manufacturers with adequate notice of where NHTSA would position the body blocks. However, NTHSA's testing showed that testing using the finalized zones is practicable. For example, there are methods for assisting the positioning of the body blocks in the allowable zones (*e.g.,* positioning aids, using lasers and a Faro Arm to ensure proper positioning, etc.)[79] that can be readily implemented by test laboratories. For vehicles with extreme space or accessibility constraints, sections of the vehicle can be removed to improve access and visibility. The zones also improve test repeatability by limiting the positioning of the body blocks. Comments regarding the size of the zones are discussed in detail in section V.B.4 and the alternatives suggested by commenters are discussed in section V.B.7.

2. Reference Point for Determining Zone Locations

The zone used in FMVSS No. 222 is defined with reference to the school bus torso belt adjusted height (TBAH)[80] and the SgRP. The SNPRM announced the possibility of using similar zones for the FMVSS No. 210 testing, but did not discuss how the proposed zone boundaries would be determined. That determination was discussed in the research report NHTSA docketed in 2018.[81] Specifically, that report set out the zones specified in this final rule and explained how they were developed. The zones are specified in relation to the SgRP, which is a design point determined by the vehicle manufacturer that represents a specific landmark near the hip of a 50th percentile adult male seated in the driver's seat. The SgRP is similar to, but different from, the H-point, which is the hip point as determined by placing a two-dimensional manikin in the seat.[82]

Comments

Honda recommended that the zones be based on the SgRP instead of the TBAH. Honda stated that while the TBAH of school bus seats is not variable (because the seat belts are contained in the seats), the TBAH in other types of passenger vehicles is variable, leading to instances in which the zone is higher than the passenger's torso.

IMMI shared Honda's stated concern about the variability of the TBAH in vehicles other than school buses, and stated that this variability would lead to large zones or setup problems. IMMI recommended that NHTSA instead use the H-point. However, IMMI identified what it viewed as potential issues with using the H-point. It stated that if not provided by a seat or vehicle manufacturer for the seat to be tested prior to the actual test, the testing

[77] Unless otherwise noted, the comments summarized below were in response to the 2015 SNPRM.

[78] The procedure in FMVSS No. 222 establishes a zone in which the body block must be located when testing school bus passenger seating and restraining barriers. Specifically, after the preload application is complete, the origin of the torso body block radius, at any point across the torso body block thickness, must lie within a zone defined by specified boundaries.

[79] ''Development of Positioning Zones for FMVSS No. 210 Body Blocks,'' pgs. 39–46.

[80] The school bus torso belt adjusted height is defined in S3 of Standard No. 210 as the vertical height above the seating reference point (SgRP) of the horizontal plane containing a segment of the torso belt centerline located 25 mm to 75 mm forward of the torso belt height adjuster device, when the torso belt retractor is locked and the torso belt is pulled away from the seat back by applying a 20 N horizontal force in the forward direction through the webbing at a location 100 mm or more forward of the adjustment device as shown in Figure 5 (of FMVSS No. 210).

[81] ''Development of Positioning Zones for FMVSS No. 210 Body Blocks.''

[82] SAE J826 JUL95 defines and specifies a procedure, including a manikin, for determining the location of the H-point. NHTSA's regulations define the H-point as the pivot center of the torso and thigh on the three-dimensional device used in defining and measuring vehicle seating accommodation, as defined in Society of Automotive Engineers (SAE) Recommended Practice J1100: Motor Vehicle Dimensions, revised in February 2001. 49 CFR 571.3.

agency will become responsible for determining the location of the H-point. It also stated that the SAE J826 machine does not always position well in the seat due to the bolsters and cushion contours, leading to variations in H-point determinations. To accommodate this variation, according to IMMI, there may be a need for an increase to the alignment zone, which could lead to variation in FMVSS No. 210 performance test results. The Alliance recommended using either the SgRP or H-point instead of the TBAH, because using the TBAH would introduce too much variability in body block positioning, which could lead to infeasible zones.

FSC developed a positioning procedure that defined the positioning of the body blocks relative to one another, and submitted data relating to this procedure. However, FSC reported that this procedure did not work well since the reference plane was attached to the pelvic body block and therefore moved when a preload was applied. FSC stated that it was providing the data for informational purposes and was not suggesting it be adopted.

Agency Response

NHTSA agrees with the commenters' concerns about using the TBAH. The final zones do not use the TBAH and instead are specified with reference to the SgRP. We decided to use the SgRP and not the H-point because the seat positioning provided for a more adequate torso location.

NHTSA appreciates FSC's comment and agrees that its concept would be difficult to implement, given that the body blocks are independent of each other, and their positioning depends on a variety of other factors, such as the design and weight of the body blocks (see section V.B.3). We believe the body block zone concept adequately addresses these factors because they were considered during the development of the zones.

3. Applicability of Zones to a Range of Vehicle and Seat Designs and Factors Affecting Position of Body Blocks at Preload

In the SNPRM, NHTSA stated that it had initiated research to aid in the development of the zones bounding the initial placement for the current body blocks. NHTSA explained that the research would evaluate the zone concept across different vehicle types (including heavy vehicles) and seat configurations and develop zone boundaries that would be feasible and practicable for all or most vehicles.

Comments

NHTSA received a variety of comments to the SNPRM regarding factors that affect the preload positioning of the body blocks.

IMMI, JCI, EMA, the Alliance, and Global commented that body block position would depend on seat and seat belt designs. IMMI further commented that the body blocks would not necessarily fit well in all seats due to variations in seat cushion contours, seat back size and bolster shape. EMA similarly commented that changes to the FMVSS No. 210 certification test procedures designed to work for passenger cars may not work for heavy trucks. It noted that while FMVSS No. 222 applies only to rigid school bus bench seats (which are different than seats used in heavy trucks (*e.g.,* air suspension seats)), FMVSS No. 210 specifies seat belt anchorage requirements for a broad range of motor vehicles, including medium and heavy-duty trucks. It stated that without testing of a broad range of heavy-duty trucks, NHTSA cannot know for certain whether it is feasible to establish appropriate body blocks zones for heavy-duty trucks. EMA further stated (in its comments on the 2018 notice of availability) that the additional technical reports NHTSA docketed did not alleviate its concerns because they do not contain any data with respect to the feasibility of the body blocks on the medium- and heavy-duty trucks built by its member companies, and suggested that the reports do not properly address the unique aspects of the broad range of medium and heavy-duty vehicles (*e.g.,* tractors, refuse trucks, parcel delivery vans, etc.). Accordingly, EMA argued that NHTSA should exempt vehicles with a GVWR greater than 10,000 pounds from the new requirements. IMMI commented that the body block position at the start of the test (*i.e.,* when the test load is applied) is affected by how tight the seat belt is pre-tensioned during setup, which affects the movement of the blocks during the preload or initial loading phase of the pull tests.

IMMI also stated that achieving consistent positioning of the torso block is made challenging by the mass of the torso body block and the mass of the load chain, so that unless supported prior to application of sufficient pull load, the block will drop from initial set-up position. IMMI stated that additional setup is required to hold the torso blocks in place prior to actual testing; IMMI uses a temporary hoist chain to support the torso block until sufficient preload is achieved to securely position the block for full test loads. IMMI commented that this method is not always acceptable when dealing with enclosed seating or multiple position tests and additional alternative means for vertical support must be devised. Ultimately, tests results may possibly be impacted depending on support type. IMMI accordingly suggested revising the design of the torso block to simplify and reduce mass.

FSC conducted an analysis on the movement of the body blocks up to and during preload with different seat belt and seat types and provided its findings.[83]

Agency Response

After reviewing the comments on the SNPRM, NHTSA carried out research to develop zones for the body blocks that would be appropriate for the anchorage strength test. To ensure that the zones would apply to a wide variety of types of vehicles and seats, the agency's research considered the factors identified by the SNPRM commenters, as well as other factors that could affect body block position at preload. These factors included vehicle-specific parameters (such as the seat design and the overall seat belt system geometry) and test-specific parameters (such as the force application angle). The zones in the final rule are based on data from body blocks positioned in a variety of vehicles, seats, and seat-belt configurations. The zones are based on data from a range of different passenger vehicles, and were mathematically expanded to accommodate an even wider range of vehicles. The zones were validated on three heavy vehicles—specifically, two school bus seats (an IMMI school bus seat and a C.E. White school bus seat) and one motorcoach (an Amaya motorcoach) seat. Although the agency did not test the zones in every single possible type of medium- and heavy-duty vehicle, we believe NHTSA's testing shows that the zones are valid for a wide range of vehicles, including medium- and heavy-duty vehicles. Given the extensive use of the body blocks over the years, we believe IMMI's concerns about the body blocks not being an adequate test device for testing a wide variety of seat designs has not been borne out in practice. Because the agency's research included a variety

[83] It measured the displacement with (1) no connections to the hydraulic cylinders (rest), (2) with chains connected to hydraulic cylinders, and finally (3) at the FMVSS No. 210 recommended preload[s] of 136 kg and 227 kg (300 lb and 500 lb) for Type I & Type II seats respectively. *See* Attachment 2 of FSC's comment for details (NHTSA–2012–0036–0027).

of seat and seat belt designs, the zones in the final rule are large enough to account for this variety.

With respect to IMMI's comment regarding seat belt tension and routing, NHTSA's fleet study did find that the amount of seat belt webbing pulled out from the retractor had an effect on body block placement in the fore/aft direction (x-plane). The study attempted to address the pre-tension of the seat belt by marking the belt at the D-ring at the desired length and locking it at this position for the remaining positioning attempts on that seat. Testing laboratories can put these actions into practice to facilitate positioning of the body blocks in a vehicle; testing laboratories can adjust the seat belt to the length necessary so that the body block is within the zone at preload. Similarly, if testing is performed with replacement webbing or cable, the length of the replacement material can be chosen to determine a fore/aft position in the required zone. In addition, the routing of the belt on the torso block can be used for small adjustment to increase the distance between the torso and pelvic block to avoid interference. This technique was not required in NHTSA's fleet study because contact (interference) between the blocks was not observed before or during application of the preload.[84]

NHTSA has decided not to specify the weight or revise (simplify) the torso or pelvic body block designs. NHTSA's fleet study examined the effect of the mass of the torso body block and found that the positioning of the torso block was not sensitive to torso block mass. The weight of IMMI's torso body block seems to be greater than the blocks tested by NHTSA, so IMMI's torso block design and construction may be unnecessarily heavy. Both the torso and pelvic body blocks have been in use for decades and similar designs are used internationally. The agency has conducted numerous FMVSS No. 210 compliance tests through multiple test laboratories. Laboratory technicians use various techniques to facilitate the set-up of the torso body block, such as positioning devices. The agency's study identified several such techniques,[85] and the fleet study that was used to develop the zones used one of these techniques—a positioning aid placed on top of the pelvic body block—as well as having a laboratory technician position it by hand. Based on our testing, we believe that the final zones will accommodate different placement techniques.

One parameter NHTSA did not evaluate in the fleet study is the effect of the hardware used to connect the body blocks to the force actuators (*e.g.,* chains). While FSC's analysis does suggest that the seat type and connection to the force actuators have some effect on the position of the body blocks at preload, NHTSA's testing showed that the connection method does not have a meaningful effect on the position of the body blocks and the finalized zones will accommodate the effects of this test parameter.

4. Size of Zones, Variability of Test Results, and Effect on Compliance

The SNPRM explained that NHTSA was considering specifying zones like those specified in FMVSS No. 222, but did not otherwise discuss the size of the zones, or the variability of test results and whether currently produced vehicles certified before the establishment of the zones would continue to comply with the standard. The reports docketed with the notice of availability in 2018 did provide this information (see section IV.B).

Comments

The Alliance, Global, and IMMI stated they were concerned that zones that would be valid for a wide range of vehicles would be too large, resulting in excessive variability. The Alliance stated that the FMVSS No. 222 zone would be too large, resulting in significant variability in belt force vectors and system performance with the torso blocks placed at the extreme ends of the zone. The Alliance also stated that the zones would permit interactions between the torso and pelvic blocks that could result in load transfer between the blocks, which could result in non-representative loading onto the seat belt assembly anchorages, and such variability would require manufacturers to run additional compliance testing, and could also drive additional cost and weight into vehicles. Global and IMMI similarly argued that factors such as the give of the seat belt system, deflection of the seat cushion, variation in seat cushion contour, seat back size, torso belt anchor location, and bolster shape would affect the position of the body blocks and make consistent positioning a challenge; these factors may necessitate a large zone, which could lead to variation in test results. Global also commented that the FMVSS No. 222 test procedure is not suitable for use in FMVSS No. 210 because the test setup is overly complex, and it is difficult to ensure consistent test repeatability when positioning the body blocks.

EMA stated that even if it were possible to establish appropriate body block zones that would accommodate all seat and seat belt assembly configurations in all heavy-duty vehicles, it would be prohibitively expensive to re-certify all existing vehicles to comply with the new requirements.

Agency Response

As an initial matter, we note that even if there is variability in test results in the sense that a vehicle model may pass the anchorage strength test with the body blocks at one location in the zone, but fail the test when the body block is placed at another location in the zone, this variability is attributable to the vehicle's performance, not the test. The final zones give manufacturers clear notice of where NHTSA may position the body blocks for testing. Manufacturers are responsible for ensuring compliance at all points in the zones.

In any case, while we believe the final rule's zones are large enough to account for a variety of vehicles and seat types, they are still relatively modest in size, particularly from the side-profile. (See section IV.B for the zone dimensions.) The zone for the torso body block target point measures 530 mm in length by 240 mm in width by 245 mm in height (20.9 in. by 9.4 in. by 9.6 in.) and the zone for the pelvic body block target point measures 340 mm in length by 205 mm in width by 145 mm in height (13.4 in. by 8.1 in. by 5.7 in.). We also have seen no data or evidence to suggest that there will be large variability in force vectors or test results. To address the Alliance's concern about testing at the zone extremes, we ran an indicant test on a minivan with the body blocks at the longitudinal extremes of the zones recorded in the field study. There was no effect on the seat belt anchors meeting the load requirements of FMVSS No. 210. In addition, as noted earlier, NHTSA performed several indicant tests with preliminary versions of the zones on a variety of light vehicles, and did not record any test failures. Moreover, in the agency's forty-plus year history of testing for compliance with the anchorage strength requirements, test failures have been uncommon. According to the agency's records, for testing from 1972 to the present, there were 327 compliance tests

[84] Removal of slack is not the same concept with the FAD as it is for the body blocks. A FAD sits on the seat and so slack can be easily removed whereas the body blocks potentially must be adjusted to be positioned in the zones and in some cases are held in place by the belt, particularly for the torso block. If there was slack in the belt the body block would not be held in place.

[85] ''Development of Positioning Zones for FMVSS No. 210 Body Blocks,'' pgs. 13–16 (NHTSA–2012–0036–0041).

for FMVSS No. 210 and only 23 test failures.[86] (For a response to the Alliance's comment regarding interactions between the body blocks see section V.B.7.)

For the same reasons, we also have not seen any data or evidence to suggest that testing to the final zones will result in different test outcomes compared to the existing test procedure. The current test procedure has no constraints on the positioning of the body blocks. The refined test procedure in this final rule establishes allowable zones for the positioning of the body blocks. It therefore reduces the set of permissible test conditions. Because the universe of test conditions is smaller, the variability of possible test outcomes is also smaller. Thus, we do not foresee issues with compliance.[87]

5. Laboratory Safety Concerns

FMVSS No. 210, S4.2.4 requires simultaneous testing of certain types of designated seating positions (those that are common to the same occupant seat and that face in the same direction or laterally adjacent designated seating positions that are not common to the same occupant seat, but that face in the same direction if their anchorages are within a certain distance from each other). Testing of adjacent designated seating positions with the body blocks can lead to an intricate test set-up with multiple body blocks and chains in a relatively confined space, and with a load being applied to the chains. With the refined test procedure, verifying the positioning of the body blocks in the allowable zones and maintaining the position for each designated seating position until all adjacent designated seating positions are ready for testing will inherently require some additional effort and diligence.

Comments

Honda and Global stated they were concerned that positioning the body blocks while a preload force is being applied could be dangerous for the laboratory technicians, especially for the middle seating position in a three-seat row.

Agency Response

Testing inboard seats is not a new requirement. The new requirements only require the additional process of ensuring the body blocks are in the zones, and we believe the zones are sized in a manner that would limit the need for repositioning of the body blocks. As discussed in the docketed test report,[88] the involvement of technicians can be minimized by using different test set-up methods. For example, positioning aids can be used to minimize the involvement of the technicians when applying the preload to the body blocks, and the use of lasers and/or a Faro Arm to ensure proper positioning of the body blocks in the zones would help minimize the exposure to the body blocks at preload. Therefore, we do not believe that the refined test procedure would necessarily result in an increased safety risk for technicians. The implementation of the zones will mainly require additional test set up effort, not installation effort.

6. Lack of Regulatory Test Procedure Language and Requested Public Workshop

The notice of availability did not set out specific test procedures for positioning the body blocks in the zones, although the docketed test report did provide the zone specifications, as well as discussion and data related to positioning the body blocks in a variety of vehicles using a variety of different positioning methods.

Comments

The Alliance and EMA, in their comments on the notice of availability, recommended that NHTSA issue a pre-final rule draft test procedure and that NHTSA should provide them with the opportunity to comment on this. EMA also stated that if it is not provided an opportunity to comment, NHTSA should exempt Class 3 through 8 commercial vehicles from the new requirements, and suggested that the proposed regulatory language should have specific testing requirements applicable to the driver's seats of medium- and heavy-duty trucks.

The Alliance also recommended that NHTSA schedule a public compliance workshop to inform the public about how the procedures would be applied as well as provide an opportunity to identify any remaining issues. The Alliance also stated that it was still evaluating the research and intended to provide detailed comments, and requested that the agency not issue a final rule until at least 90 days after publication of the notice of availability.

Agency Response

NHTSA has decided to issue the final rule without providing additional opportunity to comment on the exact language contained in the finalized test procedures. NHTSA believes that doing so is not necessary in this instance. While NHTSA typically provides proposed regulatory text, it is not required under the Administrative Procedure Act. However, although NHTSA did not provide exact regulatory language regarding this issue, the research report NHTSA docketed and upon which the Alliance and EMA commented contained the exact zone specifications that are in the final rule.[89] The research report also contained extensive information about the test procedures, both the procedures contained in the final regulatory text, as well as more informal laboratory procedures that may be part of the laboratory test procedures manual or laboratory practice. Also, body blocks have been used for anchorage strength testing since the inception of FMVSS No. 210 in 1967. The final rule does not alter the characteristics or specifications of the body blocks. It also does not alter the longstanding test procedures, other than limiting the locations in which NHTSA may place the body blocks at preload. For these same reasons, NHTSA has also decided not to hold a public workshop before issuing the final rule.

7. Alternative Solutions Suggested by NPRM Commenters

The SNPRM invited comments on the proposed zone concept as well as other possible solutions. The SNPRM requested comments on how the zones should be established in the vehicle environment, how to verify that the body blocks are within the specified zones under preload, and any make/model-specific issues that could impact the implementation of the proposed body block zone concept. It requested that commenters' recommendations be consistent with the existing standard requirements and test procedure (*e.g.,* force requirements, hold time, etc.).

[86] This tally includes failures related to any of the FMVSS No. 210 requirements as well as what the agency would typically consider ''non-tests'' (*i.e.,* tests that could not be completed due to equipment or testing issues), so the number of actual test failures for the anchorage strength requirements is likely lower than this. The agency was unable to locate all the past test reports to determine the number of failures more accurately. The agency believes, however, that the overall magnitude of the number of test failures reflected in the available records accurately reflects the magnitude of actual test failures.

[87] Moreover, if a vehicle fails the test with the body blocks positioned in the final rule zones, whereas it passes the test with the blocks positioned outside the zones, failure would be the proper outcome. These results would indicate that the vehicle can only pass the test with an unusual placement of the blocks that is unlikely to be equivalent to a real occupant's seating position.

[88] ''Development of Positioning Zones for FMVSS No. 210 Body Blocks'' (NHTSA–2012–0036–0041).

[89] ''Development of Positioning Zones for FMVSS No. 210 Body Blocks'' (NHTSA–2012–0036–0041).

i. ECE R14 6.3.4 and Similar Procedures

Comments

The Alliance identified several related modifications based on S6.3.4 of Economic Commission for Europe (ECE) Regulation No. 14 (R14), ''Safety belt anchorages'', that it recommended NHTSA adopt to address the Alliance's concerns about test variability and load transfer between the torso and pelvic body blocks. JCI also encouraged the agency to consider an alternative body block positioning procedure that would eliminate body block interference during testing, and provide specific guidance on how to position the blocks in relation to each other and to the seat.

• *Place body blocks against the seatback with belt pulled tight.* The Alliance noted that R14 requires that the pelvic block be ''pushed back into the seat back while the belt strap is pulled tight around it,'' and the torso block must be ''placed in position, [while] the belt strap is fitted over the device and pulled tight.''[90] FSC and Global had similar comments. FSC suggested the body blocks be set up on the seats and the occupant restraints cinched down so that the body blocks are in contact with the seating surface (seat back and seat cushion) prior to test preload. This setup would be similar to FMVSS No. 225 S11(a), which calls for a rearward force to be applied to the test device to press the device against the seat back and remove any slack or tension in the seat belt. Global stated that placing the body blocks against the seat back is representative of real-world use conditions, and several test laboratories have evaluated testing with the positioning of the body blocks near the seat back and identified no issues.

• *Position torso block rearward of pelvic block.* The Alliance recommended that NHTSA modify the current test procedure for positioning the body blocks such that under application of a preload that is 10% of the target load, the lowest point on the torso block must be positioned rearward of the forwardmost plane on the horizontal surface of the lap belt block.

• *Specify that interference be avoided.* The Alliance also recommended adopting the R14 requirement that the positioning of the body blocks ''shall avoid any mutual influences during the pull test which adversely affects the load and load distribution.''[91]

• *Specify torso body block pivot point.* The Alliance also noted that the torso pivot point is not specified in the regulation or the laboratory test procedure and, as a result, various torso blocks exist, unnecessarily introducing test setup variability. It recommended that NHTSA revise the standard so that the pivot point is as specified in ECE R14, which specifies the exact location of the pivot point on the torso body block.

Agency Response

We agree that the test procedure should specify that there be no contact between the pelvic and torso body blocks at the end of preload. The SNPRM did not discuss how the refined body block test procedure would address potential interaction between the body blocks. Currently neither the standard nor the compliance test procedure address body block interaction prior to or during testing. Although we would not expect contact to result in undesirable load transfer between the two blocks, contact between the pelvic and torso body blocks could affect how the loads are distributed onto the seat belt if one block became hooked on the other. However, the agency is not aware of this having been a problem during its own compliance testing nor is it aware of any manufacturer concerns about body block interaction during the long history of compliance testing for FMVSS No. 210. Nonetheless, the best practice would be to avoid any contact. The final regulatory text specifies that the body blocks must not be in contact at the end of the preload force application (*i.e.,* before the test force is applied). Our research has identified different methods to prevent preload contact between the body blocks, which includes adjusting the alignment of the seat belt on the torso block or using a positioning aid to achieve clearance between the body blocks.[92] After preload (that is, once the test loads (*i.e.,* loads greater than 1,335 N) begin to be applied and held for the required 10 seconds) the test procedure does not prohibit the body blocks from touching. We recognize that it might not be safe for laboratory technicians to adjust the position of the body blocks when the much greater test load is applied.

NHTSA has decided not to adopt the suggested method of pushing the body blocks against the seat and cinching the seat belt tightly, because doing so could potentially impact the seat structure and anchorage performance.[93] This method could especially be a problem for seats with integrated seat belts because there may be a tendency for increased seat deformation if cinching the blocks against an integrated seat. We also believe this deviation from R14 is necessary to ensure objectivity and ensure that the standard is enforceable in the U.S. The U.S. self-certification and compliance testing process in the FMVSSs requires a high level of objectivity. In the decision in *Chrysler,* the Court of Appeals found that too much ambiguity exists in the current FMVSS No. 210 test procedure. Consequently, the agency is working toward a more enforceable standard. The instruction to ''pull'' the belt ''tight'' is vague, especially if the belts are switched out for straps. In addition, the initial positioning in R14 seems to be without any load placed on the body block, so there is no control on the position of the blocks once the loading starts. The position of the blocks might be much different depending on whether the vehicle belts or straps are used. By contrast, the test procedure in this final rule mandates the position of the blocks when the preload is applied, regardless of whether the vehicle belts or straps are used.

With respect to the Alliance's suggestion for ensuring that the lowest point of the torso block be rearward of the forwardmost point of the pelvic body block, this suggestion would also seem to require that the torso body block be pushed against the seat which we have decided against. Furthermore, the Alliance was commenting on the zone concept, similar to that used in FMVSS No. 222, which was initially used in developing body block zones, that uses the torso belt adjusted height. However, the final zones for positioning the body blocks are now based on the SgRP. Using the final zones, the lowest point on the torso body block may be located forward of the forwardmost plane on the top surface of the lap belt block that the Alliance is referring to, as shown in the docketed test reports. The fleet testing done in the development of the final body block zones showed that the body blocks can be positioned properly without interference with each other in the zones developed with the SgRP as the reference point.

We are declining to specify the torso body block pivot point as in ECE R14. The current regulatory text only specifies (Figure 3 in FMVSS No. 210) the torso body block dimensions and the material used to cover the body blocks; it does not further specify the body block, such as weight, material, or the specific design (to which weight is correlated). Accordingly, the designs of

[90] UN Regulation No. 14 Revision 7—7 August 2023, Section 6.3.4.

[91] S6.3.4.

[92] ''Development of Positioning Zones for FMVSS No. 210 Body Blocks,'' pgs. 13–16.

[93] The test procedure for the FAD does specify resting the FAD against the seat back, but does not specify cinching the FAD against the seat back.

the torso body blocks that are in use in testing labs may and do differ. NHTSA's research found that test labs use torso body blocks that differ in weight and pivot point location.[94] Our research identified a range of torso body block weights, ranging from 7.7 kg (17 lb) to 13.7 kg (30.3 lb). Our research also identified two different types of torso body blocks designs in use that have different pivot point locations. One type has a yoke-style pull arm attached at the center rear of the body block; the pivot point is near the end of the body block nearest the seat. The second type is a front-pull style body block; the pivot point is at end of the body block furthest from the seat.[95] Not specifying the pivot point location gives test labs the flexibility to continue testing with different styles of pull arm, as is currently the practice. Our testing examined the effect of the torso body block pull style on the body block position; it showed that the two different body block styles positioned differently at preload (an average difference in position of about 15 mm), and that the positioning was more repeatable for the front pull style. We included both types of body blocks in the fleet study, and this positioning data is included in the data set on which the finalized zone are based. The final zones therefore take the variation in the pivot point location into account. We also believe that it would be possible to position a torso body block with a pivot point in the location specified in ECE R14 within the zone specified in the final rule.

ii. Canadian Test Method 210

Comments

Global recommended that the agency should consider providing manufacturers the option to utilize the placement procedure specified in Canada Test Method 210, ''Seat belt anchorages.'' That standard is largely the same as the current FMVSS No. 210 (*e.g.,* same body blocks and test requirements including the loads applied to the seat belts and hold time), but it also specifies an alternative approach that describes how to position the body block to prevent interference with the seat belt buckle.[96] That procedure involves using a 50th percentile male test dummy to determine the maximum amount of webbing payout to use in positioning the body blocks to minimize the likelihood of buckle damage. The dummy is placed in the seat and belted with the slack removed. The belt is marked to indicate how far the belt extends from the retractor. The body blocks are then placed. If the belt buckle appears to be susceptible to damage from the test loads, the blocks can be moved forward, but not farther than where the belt was marked following the ATD placement.

Agency Response

NHTSA acknowledges Global's concern about seat belt buckle interference,[97] but NHTSA believes that the suggested procedures are not necessary. The finalized zones allow for positioning of the blocks to avoid seat belt buckle interference. As discussed in the agency's research study, the use of positioning devices, spacers, and manual manipulation were taken into consideration during the development of the body block zones. In addition, the standard does not require the use of the seat belts for testing, so if seat belt buckle interference cannot be avoided in a particular vehicle, the seat belt assembly can be replaced with a material of equal or greater strength (*e.g.,* steel cable) to transfer the loads to the seat belt assembly anchorages.

iii. Facilitating Consistent Positioning

Comments

To facilitate consistent positioning of the body blocks, IMMI suggested creating a standardized positioning device and revising the design of the existing torso block to simplify and reduce mass. (IMMI also recommended increasing the preload to position the torso block. This possibility is discussed in section V.B.7.)

Agency Response

The agency's research study evaluated IMMI's suggestions. As noted earlier, the current laboratory test procedure for FMVSS No. 210 has long instructed NHTSA's contractor test laboratories to apply a preload equal to 10% of the test force to the body blocks so that photographs and measurements of the load application angles can be taken. Next, the load is increased to the full test force. FMVSS No. 210 seat belt assembly anchorage testing specifies test forces of 22,241 N (5,000 lb) for the pelvic body blocks loading a Type 1 belt and 13,345 N (3,000 lb) each for torso and pelvic body blocks loading Type 2 belts. NHTSA's research study evaluated the effects on body block position under preloads of 1,335 N and 2,224 N. The study found that the magnitude of the preload force did not have a significant effect on the body block position but noted that a 2,224 N preload force could begin to deform the seat prior to the required test force being applied. Accordingly, NHTSA has decided not to increase the preload force and the final regulatory text specifies the use of a preload force of 1,335 N for both pelvic and torso body blocks for testing Type 1 and Type 2 belts.

The research study also took into consideration the use of a positioning device when developing the zones. NHTSA's research showed that very simple fixtures could be used to aid in the initial body block position, but that required preload positions could be easily achieved without the use of such aids. Accordingly, NHTSA has decided not to require the use of such a device and instead give test laboratories the flexibility to use whatever method they would prefer to reach the preload positions, as the preferred method may vary depending on the vehicle environment and the test laboratory's preferences. NHTSA also decided not to revise the design of the body blocks.

iv. FEA Modeling for Positioning the Body Blocks

JCI's SNPRM comment noted that it establishes the appropriate positioning of the body blocks through finite element analysis (FEA) modeling for its evaluation testing, but it recognizes that NHTSA's testing contractors would be unable to replicate that process.[98]

We concur with JCI that it would not be a viable solution to require our testing laboratories to use FEA modeling to replicate the positioning used by the vehicle manufacturer for the FMVSS No. 210 compliance tests, because the agency would not want to be limited to a manufacturer-specific position for the body blocks. In addition, FEA modeling would require an information collection to obtain detailed seat information about each designated seating position for the various trim packages of every vehicle, which would result in added cost and time burden to the agency and vehicle manufacturers.

[94] ''Pivot point'' refers to where the test load is applied (*i.e.,* the point on the body block to which the actuator chain is connected). The standard does not specify the location of the pivot point. The laboratory test procedure depicts a point but does not define it. In addition, given the minimal design specifications in FMVSS No. 210, there could be additional body block designs in use, as evidenced by IMMI's comment.

[95] ''Development of Positioning Zones for FMVSS No. 210 Body Blocks,'' pgs. 9–11.

[96] Transport Canada. 2010. Test Method 210, Seat Belt Anchorages, S2.3.

[97] *See* NPRM at pg. 19158.

[98] NHTSA–2012–0036–0026.

C. Issues Common to the FAD and Body Blocks

1. Shoulder Belt Height Adjustment

Neither the current regulatory text nor the regulatory text proposed for the FAD specify the shoulder belt anchorage height adjustment (also referred to as the D-ring).[99] The laboratory test procedure for FMVSS No. 210 does specify that the ''center position'' for the shoulder height adjustment be used for the compliance test, and that if there is no center position, the contracting officer's technical representative will make the final decision as to which position will be tested. In NHTSA's fleet study testing to develop the body block zones, the D-ring was set to mid-height.[100]

Comments

The Alliance, commenting on the NPRM, questioned at what position the anchorage height adjustment (referred to by the Alliance as the ''adjustable turning loop'') should be set (highest, mid, or lowest position).

Agency Response

We have clarified the regulatory text to specify that the shoulder belt anchorage height adjustment (D-ring) may be set to any height. We note that the revised laboratory test procedure continues to specify the center position for the shoulder height adjustment. However, we also note (as also noted in the laboratory test procedure [101]) that the laboratory test procedure is intended only to provide guidance to NHTSA's compliance testing contractor, but that with respect to manufacturer certification, the test procedure in the regulatory text controls.

2. Preload Force Magnitude and Duration

FMVSS No. 210 specifies that the test force (22,241 N for Type 1 seat belts and 13,345 N on the lap portion and on shoulder portion for Type 2 seat belts) be attained in not more than 30 seconds and maintained for 10 seconds. FMVSS No. 210 does not currently specify a preload force. However, the laboratory test procedure has long provided that a preload of 10% of the required target load should be applied to the body block(s) at the onset of the test (*i.e.,* 2,224 N for a pelvic body block loading a Type 1 seat belt and 1,335 N each for the torso and pelvic body blocks loading Type 2 seat belts); while at this load level, photographs and measurements of the load application angle are taken. NHTSA's fleet study examined the effect on body block position of each of these preloads, and concluded that they did not have a meaningful effect on the body block position.[102] The SNPRM proposed specifying zones for the placement of the body blocks when a preload force is applied to the blocks. FMVSS No. 222, to which the SNPRM referred, specifies a preload force of 600 ± 50 N be applied to the torso body block positioned under each torso belt.[103] This preload force is, depending on the weight of the vehicle being tested (because the test forces specified in FMVSS No. 222 depend on vehicle weight), approximately 8 percent to 18 percent of the full test load. Neither the FMVSS No. 210 laboratory test procedure nor FMVSS No. 222 specify a duration for the preload force application.

The NPRM did not explicitly address or provide for any preload force in connection with the FAD testing procedure; it simply specified a procedure for replacing FAD1(s) if there was contact ''after the FAD1 devices are installed but prior to conducting the test.'' [104]

Comments

In comments to the SNPRM, Honda requested clarification of when the 30-second test force ramp-up starts in relation to the preload force. IMMI stated that the mass of the torso body block and load chain make it challenging to consistently position the torso body block and suggested that increasing the preload force could facilitate consistent positioning of the torso body block.

Agency Response

The final rule specifies a preload force for the body blocks, but not the FAD. The test procedures in the regulatory text for the body blocks specify that the body blocks be positioned in the applicable zones with a preload of 1,335 N being applied to each. Because a lower preload is preferable from a laboratory safety standpoint and our testing found that it did not have a meaningful effect on positioning the body blocks, we decided not to specify the higher preload force, so the final rule specifies a preload for each body block of 1,335 N for both Type 1 and Type 2 seat belts.

Although the final rule does not specify a preload for testing with the FAD, the longstanding laboratory test procedure for the body blocks—prior to use of the zones for positioning—has specified that a preload (equal to 10% of the target test load) be applied to allow verification of the required pull angle, apply tension to the pull chains, and take pre-test photographs. The updated laboratory test procedure will similarly specify a preload for the FAD equal to 1,335 N each at the pelvis and torso attachments for Type 2 belts and at the bridged pull yoke for Type 1 belts, to match the preload specified for the body blocks.

When testing with the body blocks, we are specifying that there be no contact between the body blocks while the preload force is being applied. When testing with the FAD, we assess whether there is any contact between adjacent FAD1s before any preload is applied; if there is contact, a FAD1 is replaced with a FAD2 according to the FAD positioning procedure in the regulation text (S5.5).

In response to Honda's comment, we clarify that the time during which the preload force is being applied is not part of the 30-second test force ramp-up, for either the body blocks or the FAD. For example, when testing with the body blocks, the 30-second ramp-up period commences once the body blocks have been positioned and the test force begins to be applied; therefore, positioning adjustments can be made before or during preload without interfering with the time requirements specified in the existing regulation. The final rule does not specify how long the preload force may or must be applied before the test force is applied. This is again consistent with the longstanding laboratory test procedure for the body blocks. The duration of the preload force will vary depending on the test

[99] Some vehicles are equipped with seat belt anchorages and torso belt height adjusters that allow the shoulder belt's upper anchorage to be adjusted. The shoulder belt anchorage height adjustment is sometimes referred to as the D-ring and for outboard designated seating positions is typically attached to a pillar of the vehicle (*e.g.,* B-pillar for front outboard seating positions).

[100] ''Development of Positioning Zones for FMVSS No. 210 Body Blocks,'' pg. 29.

[101] The laboratory test procedure for FMVSS 210 Seat Belt Assembly Anchorages states in Section 1 ''Purpose and Application,'' that ''[t]he OVSC Laboratory Test Procedures, prepared for use by independent laboratories under contract to conduct compliance tests for the OVSC, are not intended to limit the requirements of the applicable FMVSS(s). In some cases, the OVSC Laboratory Test Procedures do not include all the various FMVSS minimum performance requirements. Sometimes, recognizing applicable test tolerances, the Test Procedures specify test conditions, which are less severe than the minimum requirements of the standards themselves. Therefore, compliance of a vehicle or item of motor vehicle equipment is not necessarily guaranteed if the manufacturer limits certification tests to those described in the OVSC Laboratory Test Procedures.''

[102] ''Development of Positioning Zones for FMVSS No. 210 Body Blocks,'' pg. 39.

[103] S5.1.6.5.4.

[104] Proposed S5.3(a).

laboratory equipment and personnel, the type and number of seats being tested, and the type of test device used. We believe that variation in the duration of the preload force application will not affect test results because it is of such low magnitude; during NHTSA's long history of testing the anchorage strength requirements there has been no indication that preload affects test outcomes. Similarly, because the additional step of positioning the body blocks in the zones will occur during preload for the body blocks but not for the FAD, it is possible that the preload duration will be longer for the body blocks than for the FAD. For the same reasons, we believe this slight difference between the two test procedures will not affect test outcomes.

3. Seat Adjustment

The longstanding regulatory text in FMVSS No. 210 states that before applying the test load the seat is placed ''in its rearmost position.'' [105] The regulatory text proposed for the FAD positioning procedure specified that the seat (if adjustable) be placed in its rearmost position and, if separately adjustable in the vertical direction, at its lowest position.[106] It also specified that the seat back (if adjustable) be placed at the manufacturer's design seat back angle, as measured by SAE J826 (July 1995).[107] SAE J826 JUL95 defines and specifies a procedure, including a manikin, to determine the H-point. The H-point is defined in relation to the hip location of a driver in the driver seating position. The H-point is used in several other NHTSA standards and represents a specific landmark near the hip of a 50th percentile adult male positioned in a vehicle's driver seat.

Now that the agency is reinstating the option to test with the body blocks using the refined test procedure (with the zone), we are modifying the proposed seat adjustment provisions by using the SgRP instead of the H-point. This modification is because the seat adjustment procedures specified in the final rule apply to both the FAD and the body blocks. Because the body block zone placement procedure uses the SgRP—not the H-point—we are modifying the seat adjustment procedure so that it uses the SgRP.

Specifically, we are adding regulatory text to clarify that the seat is to be adjusted to the rearmost normal riding or driving position. The rearmost normal riding or driving position is specified by the manufacturer and includes all modes of seat adjustment, including horizontal, vertical, seat back angle, and seat cushion angle. We note that in the NPRM, the seat was proposed to be placed in its rearmost and lowest position when using the FAD, but no details were provided as to how such a position would be achieved. By specifying a seat position consistent with the SgRP, the agency is fully articulating a well-defined seat position with which all manufacturers are familiar. This information is typically already requested prior to testing by OVSC.

4. Seat Belt Pretension and Routing

With respect to the FAD, the seating procedure proposed in the NPRM specified that, once the FAD is positioned on the seat, the tester must ''[b]uckle and position the seat belt so that the lap belt secures the pelvis portion of the FAD1 or FAD2 and the shoulder strap secures the torso portion of the FAD1 or FAD2.'' It then specified that the technician removes enough slack from the seat belt such that a 31.75 mm (1.25 inch) diameter wooden rod cannot pass between the FAD and the belt with a maximum force of 2.22 N (0.5 lb-force) exerted tangent to the FAD shoulder or lap belt interface. The proposed regulatory text did not specify with any more specificity how the belt should be routed over the FAD.

With respect to the current body blocks, neither the current regulatory text nor the laboratory test procedure addresses seat belt tension or routing. NHTSA's research to develop zones for the body blocks did examine the effect of seat belt tension and belt routing. It found that the amount of seat belt webbing pulled out from the retractor had an effect on body block placement in the fore/aft direction (x plane); to address this circumstance, in the testing conducted in the study, the belt was marked at the D-ring at the desired length and locked at this position for the remaining positioning attempts on that seat. The study also examined the effect of seat belt routing on the torso block. The shoulder belt was initially placed at the center of the torso block belt path and the routing was not further controlled while the preload was applied. The study found that the routing of the shoulder belt on the torso block can affect its position.

Comments

In comments to the NPRM, Honda and JCI discussed belt tension/positioning with respect to the FAD. Honda asked NHTSA to clarify the proposed procedure with respect to measuring the load on and the displacement direction of the wooden rod. JCI commented that NHTSA's indicant testing of integrated seats [108] showed that the seats posed difficulties for positioning the belts correctly,[109] and commented that NHTSA should address this issue. With respect to the body blocks, IMMI commented that seat belt tension might vary between tests, resulting in variation in the position and/or movement of the body blocks at preload.

Agency Response

NHTSA has decided that the proposed procedure to remove slack when positioning the FAD is unnecessary. FMVSS No. 208 has long specified, in the context of positioning dummies for crash tests, the simple directive to ''remove all slack.'' [110] In NHTSA's extensive experience with FMVSS No. 208 testing, this specification has not occasioned difficulties. Accordingly, rather than specifying a new test procedure for the same action, the regulatory text in the final rule has been modified to adopt this longstanding specification. With respect to JCI's comment, the challenges noted in the testing status report concern installing instrumentation for measuring belt force on the seat belt for the research tests. This testing was conducted for research purposes and is not part of the anchorage strength test, so it does not present an issue for FMVSS No. 210 compliance testing.

With respect to the body blocks, the fact that belt tension and routing affect body bock placement at preload does not present an issue for real-world compliance testing. NHTSA addressed these factors in its research because in developing the body block zones, if we had used inconsistent amounts of slack across the different tests used to create the data set from which the zones were derived, doing so would have affected the data and led to unnecessarily large zones. In real-world compliance testing, test laboratories can adjust the amount of tension on, or routing of, the belt (or the material used to replace the belt) when positioning the blocks in the zone

[105] S5.1; S5.2.

[106] NPRM at pg. 19162.

[107] NPRM at pg. 19162.

[108] Integrated seats are equipped with seats belts built into the seat itself. In an integrated seat, the entire seat belt system is contained within the seat frame.

[109] JCI references Appendix F in ''Final Report: Development of a Combination Upper Torso and Pelvic Body Block for FMVSS 210 Test, Revision A,'' May 22, 2003, KARCO Engineering, LLC (NHTSA–2012–0036–0002) (referencing NHTSA–2012–0036–0002, p. 375). The reference material is a status report discussing development of the FAD positioning procedure. The page cited by JCE states that ''[t]he le Sabre's integrated seat did create some challenges in getting belt force gages [sic] and belt take up mechanisms on to the belt [sic].''

[110] S10.9, S16.3.5.4, S22.2.1.8.3.

at preload. Similarly, the routing of the belt on the torso block can be used for small adjustments to increase the distance between the torso and pelvic block to avoid interference. This technique was not required in this study because contact (interference) between the blocks was not observed before or during application of preload. Although webbing tension and belt routing affect the position of the block in the zone, they do not present a problem because the final rule explicitly provides that NHTSA, in testing for compliance, may position a body block (at preload) in any position in the applicable zone. A manufacturer must certify compliance at any position in the applicable zone.

5. Hold Time Requirement

The NPRM did not propose to alter the amount of time the required test load must be held, which is 10 seconds.[111]

Comments

Honda, in its comments on the NPRM, requested that the required hold time be reduced to one second. Honda claims that ''a one second hold time more closely aligns test and actual crash condition requirements while maintaining a sufficient margin of safety in the testing standards.'' According to Honda, this proposed revision is consistent with NHTSA's reasoning on FMVSS No. 225, ''Child restraint anchorage systems.'' Honda noted that the final rule establishing FMVSS No. 225 (68 FR 38223) reduced the hold time from ten seconds to one second because it did not result in a reduction of safety because it still surpassed the time of the actual crash event.

Agency Response

This issue is out of the scope of this rulemaking. NHTSA did not propose to alter the amount of time the required test load must be held in the NPRM. In any case, this change would potentially reduce the stringency of the requirements, which have been in place for well over 40 years.

6. Force Application Angle

The test procedure in the regulatory text has long specified that the forces be applied to the body block at an initial force application angle of not less than 5 degrees or more than 15 degrees above the horizontal.[112]

The agency's research study evaluated the effect of the force application angle on the preload position of the body blocks. Position repeatability testing with force application angles of 5°, 10°, and 15° showed that the pull angle had a small effect on the preload position; the results of three tests on multiple seating locations were within 1.3 inches (33 mm).

Comments

IMMI identified the wide tolerance for the force application angle as a source of large variance in load paths; however, it stated this tolerance is needed for ease of setup.

Agency Response

Because (as IMMI noted) a force application angle tolerance is desirable from a test setup perspective, the final rule retains the longstanding force application angle specification.

7. Use of a Dedicated Test Belt

FMVSS No. 210, S5 specifies that, when testing the seat belt anchorages, ''the anchorage shall be connected to a material whose breaking strength is equal to or greater than the breaking strength of the webbing for the seat belt assembly installed as original equipment at that seating position.'' For instance, some test facilities replace the seat belt with steel cable.

Comments

Honda, commenting on the NPRM, stated that a dedicated test belt that does not absorb energy is preferable when testing the strength of the seat belt assembly anchorages, and suggested that the standard should clarify that a ''dedicated test belt'' may be used for testing instead of the original seat belt installed in the vehicle.

Agency Response

Use of a ''dedicated test belt'' that does not absorb energy is allowed under S5 of the current regulation, which is unchanged by the amendments in this document. NHTSA does not see a need to further clarify this standard.

8. Testing of Side-Facing Seats

The NPRM noted that it was setting forth the proposed regulatory text in S4.2 without the clause ''except for side-facing seats,'' which appeared several times in the then-current S4.2. The agency explained that these clauses were made obsolete by an October 8, 2008 final rule which announced our decision to eliminate the exclusion of side-facing seats (and thus apply S4.2's strength requirements to side-facing seats) but which failed to amend S4.2 to reflect this change.[113] We stated in the NPRM that a correcting amendment removing the clauses from S4.2 would be issued by the agency, and that in the meantime, the proposed regulatory text in the NPRM showed S4.2 in corrected form. That correcting amendment was published in 2013, with an effective date of December 16, 2013.[114] Thus, side-facing seats in vehicles manufactured on or after that date were subject to the standard's strength requirements.

Comments

We received a few comments regarding the applicability of the anchorage strength requirements to side-facing seats and the testing of side-facing seats to those requirements.

The National Truck Equipment Association (NTEA) commented that, while the 2008 DSP final rule eliminated the exclusion for ''auxiliary seats,'' it believed that ''auxiliary or folding jumps seats'' do not automatically designate a seat as being side-facing. It stated it was concerned that because the previous definition of DSP (prior to the 2008 DSP final rule) excluded ''auxiliary seating accommodations such as temporary or folding jump seats,'' removing the exclusion may not necessarily include side-facing seats, and that the current definition for DSP may exclude side-facing seats.

NTEA also commented expressing concerns regarding the proposed regulatory text for vehicles manufactured before the effective date of the regulation. NTEA noted that the proposed regulatory text made it seem like side-facing seats in vehicles manufactured at any time before the effective date of this rulemaking—including before 12/16/2013, the effective date for the removal of the exclusion for side-facing seats—were subject to the strength requirements of FMVSS No. 210. NTEA requested that NHTSA clarify the regulatory text so that it does not indicate that the anchorage strength requirements applied to side-facing seats before the December 16, 2013, effective date of the amendments that removed the side-facing seat exclusion from the standard.

[111] S5.1, S5.2.

[112] S5.1, S5.2.

[113] 73 FR 58887 (October 8, 2008). FMVSS No. 210 was amended in 1970 to add multipurpose passenger vehicles, trucks, and buses to the scope of the rule, which up until then had covered only passenger cars. 35 FR 15293 (October 1, 1970). The 1970 amendments excluded side-facing seats from the strength requirements. In 2005, we proposed to remove this exclusion, as one component of a rulemaking proposal to amend the definition of ''designated seating position.'' 70 FR 36094 (June 22, 2005). However, when the agency published the DSP final rule in 2008 it inadvertently neglected to remove the exclusion for side-facing seats that appeared in S4.2.1 and S4.2.2 of FMVSS No. 210. 73 FR 58887 (October 8, 2008).

[114] 78 FR 68748 (November 15, 2013).

DTNA commented about the direction of the pull force for side-facing seats. DTNA stated that testing of side-facing seat belts in the direction perpendicular to the longitudinal centerline of the vehicle does not reflect real world requirements for these seat belts because the predominant forces exerted on any restraint in any vehicle will be in the direction parallel with the longitudinal centerline of the vehicle resultant from a collision impact when the vehicle is travelling in the forward direction.

Agency Response

Regarding NTEA's comment on the scope of the eliminated exclusion for side-facing seats, the changes to FMVSS No. 210 S4.2 that became effective on December 16, 2013, removed the exclusion for side-facing DSPs from the standard's strength requirements. Effective December 16, 2013, side-facing seats became subject to the anchorage strength requirements of the standard.

Regarding NTEA's comment on the proposed regulatory text for vehicles manufactured before the effective date of this rule, we are modifying the regulatory text to remove any implication that side-facing seats in vehicles manufactured before December 16, 2013, were subject to the anchorage strength requirements. DTNA's comment on the appropriateness of the test procedure for testing side-facing seats is outside the scope of this rulemaking, which is concerned with the method for applying the loads specified in the standard.

Additionally, we wish to clarify that removal of the side-facing seat exclusion made no distinction as to whether a seat is side-facing or adjustable to side facing. Thus, it is the agency's position that seats that face any direction, or can be adjusted to any direction, are subject to FMVSS No. 210 in any direction to which they can be adjusted. However, we have added regulatory text to explicitly state this position and remove any ambiguity. This language works together with the final regulatory text's use of the term ''seat reference plane'' to define a vertical plane that passes through the SgRP of any seat and that is parallel to the direction that the seat faces. The specified test forces are applied parallel to the seat reference plane so compliance would be required for a seat that could be adjusted to face any direction.

9. Compliance Options

The NPRM proposed replacing the current body blocks with the FAD for use as the testing device to transfer loads onto the seat belt assembly anchorages. The NPRM did not propose any exemptions or compliance options for vehicle manufacturers, such as making the use of the FAD optional or excluding certain vehicle types from having to use the FAD for testing. In the SNPRM, NHTSA explained that it was considering specifying, either instead of or as an alternative to the FAD, zones within which the current body blocks would be placed.

Comments

As explained in section V.A, commenters had variety of concerns about the FAD. Accordingly, several NPRM commenters suggested adopting the FAD as an optional test device. JCI, in its comments on the NRPM and SNPRM, stated that the use of the FAD for testing should be phased in by making it an optional test device. Global supported the FAD if it were an optional test device. Navistar suggested making the use of the FAD an option for 30 years to avoid having to recertify vehicles that are already compliant since their vehicle life is between 20–30 years. The Alliance, commenting on the NRPM, argued that manufacturers should be given the option to use the current body blocks until Canada adopts the use of the FAD.[115] Nissan North America, Inc. (Nissan) and Hino suggested making the FAD an optional test device to allow global manufacturers the option of using the current body blocks until testing with the FAD is globally harmonized. EMA, in its comments on the NPRM, proposed making the use of the FAD optional for manufacturers of class 3 through 8 vehicles or exempting these vehicles from having to use the FAD. DTNA also wanted to make it an optional test device for vehicles with a GVWR of more than 10,000 lb.

Consistent with these NPRM comments, in response to the SNPRM, as noted earlier (section V.B.1), several commenters supported the continued use of the body blocks. EMA, FSC, Global, and the Alliance supported the FAD as an optional test device that could be selected by the manufacturer. Global also stressed the importance of harmonization and supported the idea of making the FAD an optional test device to provide manufacturers more flexibility until there is greater international harmonization. The Alliance further commented that maintaining the current body blocks as a compliance option would negate the durability, lead-time, and cost concerns it had with respect to the FADs.

[115] NHTSA–2012–0036–0009.

Agency Response

NHTSA has decided to retain the current body blocks and adopt the FAD as an optional test device. We believe that providing these two compliance options will allow the potential advantages of both test methods. There is a long history of compliance testing with the body blocks, and corresponding manufacturer familiarity with them. We retain this option, but at the same time, add more specificity to the test procedure so that there is no ambiguity about where the agency may position the blocks at preload. At the same time, we continue to believe that the FADs offer potential advantages, including ease of testing and the ability to test new configurations such as 4-point belts.

10. Regulatory Alternatives

NHTSA considered alternatives to the final rule. In the preceding sections of this document, we have discussed various alternatives for different aspects of the proposed requirements. Executive Order 13609 [116] provides that international regulatory cooperation can reduce, eliminate, or prevent unnecessary differences in regulatory requirements. Similarly, section 24211 of 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.'' [117] (These directives are also discussed in the Regulatory Notices and Analyses section.) At the same time, the Safety Act authorizes NHTSA to establish motor vehicle safety standards that, among other things, are objective.

International regulations and industry consensus standards also establish seat belt anchorage strength requirements. NHTSA developed the FAD independently and it has not been adopted outside of the United States. On the other hand, other standards do mirror FMVSS No. 210 and specify the use of the body blocks. These standards include United Nations Regulation No. 14 (ECE R14), Transport Canada's Technical Standards Document No. 210, Australian ADR 05, and SAE Standard J384 (2014). All these standards specify pelvic and torso body blocks similar to the FMVSS No. 210 body blocks. There are some differences between the test

[116] *See* discussion in the Regulatory Notices and Analyses section.

[117] H.R. 3684 (117th Congress) (2021).

procedures in FMVSS No. 210 and those in these other regulations. These international and consensus standards are explained in more detail in section II.E and in other sections of the document where relevant.

Comments

We received comments regarding harmonization both with respect to the FAD and the body block zone concept.

Force Application Device. JCI, Navistar, EMA, Nissan, DTNA, Global, and Honda all mentioned concerns with harmonization in their NPRM comments. EMA stressed that a change to the U.S. standard would be a significant departure from the worldwide harmonization that manufacturers and governments strive to achieve. JCI agreed with EMA and noted that in the absence of a safety need NHTSA should not create disharmony with global regulations. Navistar, Nissan, and Global commented that manufacturers would need to conduct additional testing because of this disharmonization. The Alliance also commented that continued use of the body blocks would facilitate harmonization with Transport Canada.

Some of these commenters also suggested pursuing a global technical regulation (GTR). Global petitioned NHTSA to initiate the process for establishing a GTR under 49 CFR part 553, appendix C. Global commented that the longer time frame that would likely be necessary to adopt a GTR does not present a major concern. Honda and DTNA similarly noted that if the FAD were intended to facilitate testing or improve upon the body blocks, then a GTR would provide a better forum for developing it and facilitate global harmonization. JCI and Global reiterated their harmonization concerns in response to the SNPRM.

Body blocks and/or zone concept. A couple of commenters noted that retaining the body blocks would support harmonization. JCI and Global commented that maintaining the body blocks would harmonize with the requirements in other countries.

However, as noted earlier (see section V.B.1), comments from the Alliance, Global, FSC, Honda, and the People's Republic of China on the SNRPM appeared to question the appropriateness of specifying zones for the body blocks because they stated they believed it would not harmonize with regulations used in other countries or regions. The Alliance further recommended that NHTSA adopt the ECE R14, S6.3.4 requirements for the positioning of the pelvic and torso block during the initial test set-up, including against the seatback, and Global and FSC also suggested that the body blocks be placed against the seat back. The People's Republic of China also suggested referring to the European standard for the pre-test positioning of the body blocks.

Agency Response

NHTSA acknowledges that international harmonization is an important goal. We believe that by providing the FAD and the current body blocks together with the placement zone as compliance options, we are maintaining opportunities for harmonization with international standards since manufacturers may choose to continue testing with the body blocks.

We do recognize that the implementation of the body block zones may conflict with ECE R14 since R14 requires that the pelvic block be ''pushed back into the seat back while the belt strap is pulled tight around it,'' and the torso block must be ''placed in position, the belt strap is fitted over the device and pulled tight.'' [118] Following this requirement could preclude the torso body block from being in the required zone, depending on how much the torso block pulls away from the seat back when the preload is applied. However, as we explain in section V.B.7.a, we believe this deviation from R14 is necessary to ensure the standard is enforceable in the U.S., and because the suggested method of pushing the body blocks against the seat and cinching the seat belt tightly could potentially impact the seat structure and anchorage performance.

GTRs are developed by the World Forum for Harmonization of Vehicle Regulations (WP.29) under the 1998 Agreement on U.N. Global Technical Regulations. The WP.29 established the 1998 Agreement primarily to extend the benefits of harmonization by focusing on performance-oriented test procedures designed to quantify product behaviors as objectively as possible. This rulemaking would not impede the initiation of a GTR on seat belt anchorages. However, since the anchorage strength test in the current standard has been ruled unenforceable, the agency declines to delay amending the standard even further to wait for the initiation and completion of the GTR process.

11. Leadtime

The NPRM proposed a compliance date three years from the date of publication of the final rule for certifying vehicles using the FAD. The agency had tentatively concluded that three years would be sufficient time for manufacturers to procure and familiarize themselves with the FADs. The SNPRM did not propose a revised lead time.

Comments

Several commenters in response to the NPRM and SNPRM requested lead time extensions for a variety of reasons.

In their comments on the NPRM, the Alliance, JCI, Hino, and Honda requested more time for additional certification testing, and/or design changes. For example, the Alliance stated that any time test procedures and hardware change, individual vehicle designs might have to be modified to remain in compliance; because FMVSS No. 210 directly tests a seat belt anchorage's structural integrity, any modifications needed to comply using the new test hardware and procedures would require changes to the vehicle structure. Such body-in-white structural changes, according to the Alliance, demand long lead-times. And, even if vehicle modification is not necessary, the new test hardware and procedures could require additional certification testing. JCI and Hino had similar comments. Accordingly, these commenters requested a longer lead time. JCI stated that seating structures are designed three to five years before a new vehicle is introduced, and in response to the SNPRM stated that a five-year lead time would be necessary to incorporate the FAD requirement. The Alliance requested that the FAD be an optional test device for a period of 8 to 10 years. Honda suggested a three-year lead time in part to give manufacturers time to modify its test procedures to include the use of FAD1 and FAD2.

Some NPRM commenters argued that heavy vehicles and/or light trucks have long platform or model lives, and argued that a longer lead time was necessary to avoid significant additional costs. EMA and DTNA commented that 30 to 40 years of lead time was necessary for heavy-duty trucks. EMA explained that heavy truck cabs often stay in production for as long as 30 years because the heavy-duty market has relatively low volumes, so a manufacturer may use one basic cab structure for many product variations over time, such that the compliance testing that was done when the cab shell was originally developed often remains valid for many years. Accordingly, EMA believed that the only way to avoid the significant costs and potential liability

[118] UN Regulation No. 14 Revision 7—7 August 2023, Section 6.3.4.

of re-testing is to allow at least 30 years of lead time before testing with a FAD would be required. (In response to the SNPRM, EMA suggested that the final rule should include a provision that the new requirements would only apply to newly developed cab structures since no safety need was established.) DTNA similarly commented that lead time should be 30 to 40 years. Hino stated that the model lives of heavy-duty trucks are longer than those for passenger cars and can exceed 10 years, and requested that that existing vehicle platforms be exempt from the new requirements for the entire model life of the vehicle with a maximum allowable period of 10 years from the effective date. The Alliance noted that vehicles such as light trucks can maintain a single body structure for many years, and requested a lead time of 8 to 10 years. RVIA commented that the use of the FADs should not be required until changes in the seating or vehicle structure requires retesting of the vehicle for compliance. EvoBus suggested a five-year lead time, because the proposed three years is too short with respect to the life cycles of current seats in buses and motorcoach buses.

NPRM commenters also cited the time it would take to procure FADs as another reason for a longer lead time. JCI stated that the proposed use of the FAD would result in demand for large volumes of FADs, and that none are likely to be available in the marketplace until after the final rule is published. Because there is no identified safety need for new test devices, allowing the requisite time to transition to the FADs and/or allowing for their optional concurrent use would not detract from any safety enhancement. The Alliance estimated that it would take 26 weeks before the first FADs could be delivered, and that additional time would be needed to gain experience using the FADs. Honda suggested that the effective date be three years from the time (after publication of the final rule) at which NHTSA can confirm that vehicle manufacturers, suppliers, and test laboratories have sufficient FAD inventories. Honda stated that this approach would accommodate the minimum six-month delivery time for dummy suppliers to produce dummies and the time required for every vehicle manufacturer, supplier, and test laboratory to purchase enough FADs. DTNA noted that it was unaware of who supplied the FADs and their availability.

Agency Response

Providing vehicle manufacturers the option to continue to use the current body blocks or the FAD for certification should alleviate the lead time concerns with certifying vehicles using the FAD. We are providing a two-year lead time for both options. Consistent with 49 CFR 571.8(b), multi-stage manufacturers and alterers would have an additional year to comply.

We believe this is a reasonable lead time for the body blocks. The body blocks have been part of the regulatory test procedure for the anchorage strength requirements since 1970.[119] The zones that we are adopting in this rule are simply a clarification of the existing test procedure. Whereas the current version of the standard does not specify where the agency will place the body block on the seat when conducting compliance testing, the amendments in this document specify zones within which the agency will place the body blocks. This specification essentially serves to restrict the agency's discretion by restricting the possible test configurations to those bounded by the zones. Accordingly, we do not believe that manufacturers should have more trouble certifying compliance with the amended body block test procedure than they do with the current version. Moreover, as we noted earlier, in the agency's history of compliance testing for the anchorage strength requirements there have been few failures, indicating that manufacturers generally do not have trouble passing this test; we do not anticipate any need for redesign of currently compliant seat belt anchorages. Nevertheless, we are providing a two-year lead time to allow manufacturers to become familiar with the zones.

We are providing the same two-year lead time for the FAD. If a vehicle manufacturer prefers not to certify using the FAD, or is interested in certifying using the FAD but concludes that it would not be able to do so within the two-year lead time, it can certify to the body blocks, as explained above. Manufacturers that are interested in certifying to the FAD but would like additional time to verify compliance of existing vehicle platforms may continue certifying to the body blocks until they are confident in certifying to the FAD.

VI. Regulatory Notices and Analyses

Executive Orders (E.O.) 12866, 13563, and 14094 and DOT Regulatory Policies and Procedures

NHTSA has considered the impacts of this regulatory action under Executive Order 12866, Executive Order 14094, Executive Order 13563, and the Department of Transportation's regulatory policies and procedures.[120] This rulemaking action was not reviewed by the Office of Management and Budget under E.O. 12866. It is also not considered ''of special note to the Department'' under DOT Order 2100.6A. We have considered the qualitative costs and benefits of the proposed rule under the principles of E.O. 12866.

This document amends FMVSS No. 210 to specify zones for the placement of the currently-use body blocks, and to specify an optional alternative test device, the Force Application Device. The final rule makes minor changes to the existing test procedures that would apply to testing with either the body blocks or the FAD (minor changes in how the seat and shoulder belt anchorage height are adjusted). The final rule also sets out a simple procedure for positioning the body block, and simple procedures for choosing and seating the FAD. The amendments do not change the standard's strength requirements, and we do not expect these changes to have a meaningful impact on test outcomes. There are some minor costs and benefits compared to the baseline of testing with the body blocks without a zone placement procedure.

Body Blocks with zone procedure. The benefit of the amendment is a more objective and repeatable test, which could ultimately reduce the potential need for re-testing. Because this is an additional step in the test procedure, there may be some minor, incremental costs—primarily a somewhat increased time to set up for the test—associated with positioning the body blocks and ensuring that they are within the specified zones at the start of the test.

Force Application Device. We estimate the cost of each FAD, both the FAD1 and FAD2, to be approximately $8,000 each. Assuming a vehicle manufacturer or testing facility purchases a set of two FAD1s and three FAD2s, the principal cost associated with the NPRM is the one-time 14 purchase cost of the set, totaling $40,000. Because the use of the FADs is optional, manufacturers can choose to continue testing with body blocks and not incur the cost of purchasing FADs. As discussed above, the FADs require less effort, time, and personnel to install in the test vehicle. Thus, we believe that for manufacturers that chose to test using FADs, there would be associated

[119] 35 FR 15293 (October 1, 1970) (final rule amending FMVSS No. 210 with, among other things, the body blocks).

[120] 49 CFR part 5, subpart B; Department of Transportation Order 2100.6A, Rulemaking and Guidance Procedures, June 7, 2021.

cost savings that could offset the purchase cost of the FADs. The FAD2 is smaller than the FAD1 and would enable NHTSA to test belt anchorages at DSPs that do not fit the latter device. However, additional safety benefits accruing beyond those already attributable to FMVSS No. 210 cannot be quantified.

Executive Order 13609: 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.

This rule is different from comparable foreign regulations. For the reasons described in this preamble, these differences are necessary to ensure the standard is enforceable in the U.S. and to give manufacturers additional compliance options.

Executive Order 13045

Executive Order 13045 (62 FR 19885, April 23, 1997) applies to any rule that: (1) is determined to be ''economically significant'' as defined under E.O. 12866, and (2) concerns an environmental, health, or safety risk that NHTSA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, we must evaluate the environmental health or safety effects of the planned rule on children and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by us.

This final rule is not subject to the Executive order because it is not economically significant as defined in E.O. 12866.

Executive Order 13132 (Federalism)

NHTSA has examined this final rule pursuant to Executive Order 13132 (64 FR 43255, August 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 final rule would not have federalism implications because it will 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]compliance 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 is 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 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, prescribes only a minimum safety standard. As such, NHTSA does not intend that this final rule will 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 minimum standard in this final rule. Without any conflict, there could not be any implied preemption of a State common law tort cause of action.

Severability

The issue of severability of FMVSSs 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.

Regulatory Flexibility Act

The Regulatory Flexibility Act of 1980 (5 U.S.C. 601 *et seq.*) requires agencies to evaluate the potential effects of their proposed and final rules on small businesses, small organizations and small Government jurisdictions. The Act requires agencies to prepare and make available an initial and final regulatory flexibility analysis (RFA) describing the impact of proposed and final rules on small entities. An RFA is not required if the head of the agency certifies that the proposed or final rule will not have a significant impact on a substantial number of small entities. The head of the agency has made such a certification with regard to this final rule.

The factual basis for the certification (5 U.S.C. 605(b)) is set forth below. Although the agency is not required to issue an initial regulatory flexibility analysis, this section discusses many of the issues that an initial regulatory flexibility analysis would address.

Section 603(b) of the Act specifies the content of an RFA. Each RFA must contain:

1. A description of the reasons why action by the agency is being considered;

2. A succinct statement of the objectives of, and legal basis for a final rule;

3. A description of and, where feasible, an estimate of the number of small entities to which the final rule will apply;

4. A description of the projected reporting, recording keeping and other compliance requirements of a final rule including an estimate of the classes of

small entities which will be subject to the requirement and the type of professional skills necessary for preparation of the report or record;

5. An identification, to the extent practicable, of all relevant Federal rules which may duplicate, overlap or conflict with the final rule;

6. Each final regulatory flexibility analysis shall also contain a description of any significant alternatives to the final rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the final rule on small entities.

A description of the reason why action by the agency is being considered and the objectives of, and legal basis for, the final rule are discussed at length earlier in this document.

This final rule will directly affect manufacturers subject to FMVSS No. 210. The Small Business Administration's size standard regulation at 13 CFR part 121, ''Small business size regulations,'' prescribes small business size standards by North American Industry Classification System (NAICS) codes. NAICS code 336211, Motor Vehicle Body Manufacturing, prescribes a small business size standard of 1,000 or fewer employees. NAICS code 336390, Other Motor Vehicle Parts Manufacturing, prescribes a small business size standard of 1,000 or fewer employees. Most motor vehicle manufacturers would not qualify as a small business. There are a number of vehicle manufacturers that are small businesses.

This rule does not create any new reporting or recording requirements, nor does it affect any existing reporting or recording requirements. Small manufacturers have options available to certify compliance, none of which will result in a significant economic impact on these entities. The final rule provides manufacturers with the flexibility to determine the most cost-effective means of meeting the requirements. As a result, small manufacturers can choose which option, either continuing use of the body block or using the FAD, is most suitable for them.

We know of no Federal rules which duplicate, overlap, or conflict with the final rule. The final rule provides compliance options (alternatives) to manufacturers, including small entities. This flexibility reduces the economic impact of the final rule on small entities. NHTSA also designed the final rule to provide two years of lead time for the use of the body blocks and the FAD as established by this final rule. It also provides an additional year for multi-stage manufacturers and alterers to comply with the final rule. (49 CFR 571.8(b).) This additional year provides these entities flexibility and ample time—a total of three years from publication of a final rule—to work with seat manufacturers and/or incomplete vehicle manufacturers (both of which are large entities), or to undertake the evaluation themselves, to make the necessary assessments to acquire a basis for certifying their vehicles' compliance.

National Environmental Policy Act

NHTSA has analyzed this final rule for the purposes of the National Environmental Policy Act and determined that it will not have any significant impact on the quality of the human environment.

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 this order, NHTSA notes as follows: The issue of preemption is discussed above in connection with E.O. 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 Paperwork Reduction Act of 1995, a person is not required to respond to a collection of information by a Federal agency unless the collection displays a valid control number from the Office of Management and Budget (OMB). This final rule does not have any requirements that are considered to be information collection requirements as defined by the OMB in 5 CFR part 1320.

National Technology Transfer and Advancement Act

Under the National Technology Transfer and Advancement Act of 1995 (NTTAA),[121] ''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.'' [122] However, if the use of such technical standards would be ''inconsistent with applicable law or otherwise impractical, a Federal agency or department may elect to use technical standards that are not developed or adopted by voluntary consensus standards bodies[.]'' [123] 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. The NTTAA directs the agency to provide Congress, through OMB, explanations when the agency decides not to use available and applicable voluntary consensus standards. Circular A–119 directs that evaluating whether to use a voluntary consensus standard should be done on a case-by-case basis.[124] An agency should consider, where applicable, factors such as the nature of the agency's statutory mandate and the consistency of the standard with that mandate.[125]

The agency identified an SAE standard (J384, Rev. 2014) that has testing recommendations for seat belt anchorages. The standard recommends the use of body blocks, similar to those currently specified in FMVSS No. 210, for applying the required test loads. SAE J384 specifies test procedures for seat belt anchorages. It is nearly identical to FMVSS No. 210, with similar body block specifications (the torso body block has the same dimensions, but also includes a pull arm), test loads, and the option to replace the seat belt webbing with other material. The standard specifies a preload of 10%. The body blocks are positioned at each DSP and the seat belts are positioned around the blocks ''to represent design intent routing.''

The SAE standard does not specify a zone for body block placement, nor does it permit the use of the FAD. The preamble explains why NHTSA believes

---

[121] National Technology Transfer and Advancement Act of 1995, Public Law 104–113, 110 Stat. 775 (1996).

[122] *Id.* at section 12(d)(1).

[123] *Id.* at section 12(d)(3).

[124] Office of Management and Budget, Circular No. A–119, ¶ 5(a)(i), Federal Participation in the Development and Use of Voluntary Consensus Standards and in Conformity Assessment Activities (Jan. 26, 2016).

[125] *Id.*

these deviations from consensus standards are justified. In short, the body block placement zones are necessary to ensure that the standard is enforceable. With respect to the FAD, manufacturers may continue to certify to the requirements as tested with the body blocks if they do not want to use this new test device. But NHTSA believes that the FAD does have advantages over the body blocks, including that the FADs require significantly less effort and time to install in a test vehicle.

Unfunded Mandates Reform Act

The Unfunded Mandates Reform Act of 1995 (Pub. L. 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.

This rule would not result in expenditures by State, local, or tribal governments of more than $177 million annually.

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.

Regulation Identifier Number

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.

Privacy Act

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 document (or signing it, 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 (65 FR 19477–78), or you may visit *www.dot.gov/privacy.html.*

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.

Submission of Confidential Information

You should submit a redacted ''public version'' of your comment (including redacted versions of any additional documents or attachments). This ''public version'' of your comment should contain only the portions for which no claim of confidential treatment is made and from which those portions for which confidential treatment is claimed has been redacted. See below for further instructions on how to do this.

You also need to submit a request for confidential treatment directly to the Office of Chief Counsel. Requests for confidential treatment are governed by 49 CFR part 512. Your request must set forth the information specified in part 512. This information includes the materials for which confidentiality is being requested (as explained in more detail below); supporting information, pursuant to § 512.8; and a certificate, pursuant to § 512.4(b) and part 512, appendix A.

You are required to submit to the Office of Chief Counsel one unredacted ''confidential version'' of the information for which you are seeking confidential treatment. Pursuant to § 512.6, the words ''ENTIRE PAGE CONFIDENTIAL BUSINESS INFORMATION'' or ''CONFIDENTIAL BUSINESS INFORMATION CONTAINED WITHIN BRACKETS'' (as applicable) must appear at the top of each page containing information claimed to be confidential. In the latter situation, where not all information on the page is claimed to be confidential, identify each item of information for which confidentiality is requested within brackets: ''[ ].''

You are also required to submit to the Office of Chief Counsel one redacted ''public version'' of the information for which you are seeking confidential treatment. Pursuant to § 512.5(a)(2), the redacted ''public version'' should include redactions of any information for which you are seeking confidential treatment (*i.e.,* the only information that should be unredacted is information for which you are not seeking confidential treatment).

NHTSA is currently treating electronic submission as an acceptable method for submitting confidential business information to the agency under part 512. Please do not send a hardcopy of a request for confidential treatment to NHTSA's headquarters. The request should be sent to Dan Rabinovitz in the Office of the Chief Counsel at *Daniel.Rabinovitz@dot.gov.* You may either submit your request via email or request a secure file transfer link. If you are submitting the request via email, please also email a courtesy copy of the request to John Piazza at *John.Piazza@dot.gov.*

VII. Appendices to the Preamble

A. Appendix A: List of Comments

COMMENTS TO THE NPRM

Commenter	Comment ID
Alliance of Automobile Manufacturers	NHTSA–2012–0036–0009
American Honda Motor Co., Inc	NHTSA–2012–0036–0016
Association of Global Automakers	NHTSA–2012–0036–0021
Daimler Trucks North America LLC	NHTSA–2012–0036–0010

COMMENTS TO THE NPRM—Continued

Commenter	Comment ID
EvoBus GmbH	NHTSA–2012–0036–0004
Freedman Seating Company	NHTSA–2012–0036–0008
Hino Motors, Ltd	NHTSA–2012–0036–0006
Johnson Controls, Inc	NHTSA–2012–0036–0015
National Truck Equipment Association	NHTSA–2012–0036–0007
Navistar, Inc	NHTSA–2012–0036–0013
Navistar, Inc	NHTSA–2012–0036–0014
Nissan North America, Inc	NHTSA–2012–0036–0012
Recreation Vehicle Industry Association	NHTSA–2012–0036–0017
Truck and Engine Manufacturers Association	NHTSA–2012–0036–0011
TÜEV Rheinland Kraftfahrt gMBH	NHTSA–2012–0036–0005

COMMENTS TO THE SNPRM

Commenter	Comment ID
Alliance of Automobile Manufacturers	NHTSA–2012–0036–0025
American Honda Motor Co., Inc	NHTSA–2012–0036–0030
Association of Global Automakers, Inc	NHTSA–2012–0036–0029
Freedman Seating Co	NHTSA–2012–0036–0027
IMMI	NHTSA–2012–0036–0024
Johnson Controls Inc	NHTSA–2012–0036–0026
Jung Ho Yoo	NHTSA–2012–0036–0031
People's Republic of China	NHTSA–2012–0036–0032
Truck and Engine Manufacturers Association	NHTSA–2012–0036–0028

COMMENTS TO THE NOTICE OF AVAILABILITY OF TECHNICAL DOCUMENTS

Commenter	Comment ID
Alliance of Automobile Manufacturers	NHTSA–2012–0036–0047
Truck and Engine Manufacturers Association	NHTSA–2012–0036–0048

List of Subjects in 49 CFR Part 571

Imports, Incorporation by reference, Motor vehicle safety, Motor vehicles, Tires.

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 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 § 571.5 by adding paragraphs (k)(8) and (9) to read as follows:

§ 571.5 Matter incorporated by reference.

* * * * *

(k) * * *

(8) ''Drawing Package for the Force Application Device 1 (FAD1),'' April 9, 2024, into § 571.210.

(9) ''Drawing Package for the Force Application Device 2 (FAD2),'' April 9, 2024, into § 571.210.

* * * * *

■ 3. Amend § 571.210 by:

■ a. Adding, in alphabetical order, definitions of ''Actuator,'' ''Bridged pull yoke,'' ''FAD,'' ''FAD1,'' ''FAD2,'' ''Midsagittal plane,'' and ''Seat reference plane'' to paragraph S3;

■ b. Revising paragraphs S4.2.1 and S4.2.2;

■ c. Adding paragraph S4.2.6;

■ d. Revising paragraphs S5, S5.1, and S5.2;

■ e. Adding paragraphs S5.3, S5.3.1, S5.3.2, S5.4, and S5.5;

■ f. Removing Figures 2A, 2B, and 3;

■ g. Adding Figures 2A, 2B, 3, 6, 7, and 8 in numerical order at the end of the section; and

■ h. Adding Table 1 at the end of the section.

The revisions and additions read as follows:

§ 571.210 Standard No. 210; Seat belt assembly anchorages.

* * * * *

S3. *Definitions.*

Actuator means the device used to apply the load in performing testing.

Bridged pull yoke means the yoke that bridges the torso and pelvis on the FAD1 or FAD2 and is used for testing Type 1 seat belt assemblies.

FAD means the force application device, either the FAD1 or the FAD2, a one-piece device consisting of an upper torso portion and a pelvic portion hinged together.

FAD1 means the larger version of the force application device specified in drawings NHTSA221–210–01, ''Drawing Package for the Force Application Device 1 (FAD1),'' April 9, 2024 (incorporated by reference, see § 571.5). FAD1 is depicted in figure 7 to this standard (figure provided for illustration purposes).

FAD2 means the smaller version of the force application device specified in drawings NHTSA221–210–01J, ''Drawing Package for the Force Application Device 2 (FAD2),'' April 9, 2024 (incorporated by reference; see § 571.5). FAD2 is depicted in figure 8 to this standard (figure provided for illustration purposes).

Midsagittal plane means the vertical plane that separates the FAD into equal left and right halves.

* * * * *

Seat reference plane means 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.

* * * * *

S4.2 *Strength.*

S4.2.1 *Seats with Type 1 or certain Type 2 seat belt assemblies.*

(a) For vehicles manufactured on or after September 17, 2024, and before September 1, 2027, except as provided in S4.2.5, the anchorages, attachment hardware, and attachment bolts for any of the following seat belt assemblies shall withstand a 22,241 N (5,000 pound) force when tested in accordance with, at the choice of the manufacturer, S5.1(a), (b), or (c):

(1) Type 1 seat belt assembly; and

(2) Lap belt portion of either a Type 2 or automatic seat belt assembly, if such seat belt assembly is equipped with a detachable upper torso belt.

(b) For vehicles manufactured on or after September 1, 2027, except as provided in S4.2.5, the anchorages, attachment hardware, and attachment bolts for any of the following seat belt assemblies shall withstand a 22,241 N (5,000 pound) force when tested in accordance with, at the choice of the manufacturer, S5.1(b) or (c):

(1) Type 1 seat belt assembly; and

(2) Lap belt portion of either a Type 2 or automatic seat belt assembly, if such seat belt assembly is equipped with a detachable upper torso belt.

S4.2.2 *Seats with certain Type 2 or automatic seat belt assemblies.*

(a) For vehicles manufactured on or after September 17, 2024, and before September 1, 2027, except as provided in S4.2.5, the anchorages, attachment hardware, and attachment bolts for any of the following seat belt assemblies shall withstand a 13,345 N (3,000 pound) force applied to the lap belt portion of the seat belt assembly simultaneously with a 13,345 N (3,000 pound) force applied to the shoulder belt portion of the seat belt assembly, when tested in accordance with, at the choice of the manufacturer, S5.2(a), (b), or (c):

(1) Type 2 and automatic seat belt assemblies that are installed to comply with Standard No. 208 (49 CFR 571.208); and

(2) Type 2 and automatic seat belt assemblies that are installed at a seating position required to have a Type 1 or Type 2 seat belt assembly by Standard No. 208 (49 CFR 571.208).

(b) For vehicles manufactured on or after September 1, 2027, except as provided in S4.2.5, the anchorages, attachment hardware, and attachment bolts for any of the following seat belt assemblies shall withstand a 13,345 N (3,000 pound) force applied to the lap belt portion of the seat belt assembly simultaneously with a 13,345 N (3,000 pound) force applied to the shoulder belt portion of the seat belt assembly, when tested in accordance with, at the choice of the manufacturer, S5.2(b) or (c):

(1) Type 2 and automatic seat belt assemblies that are installed to comply with Standard No. 208 (49 CFR 571.208); and

(2) Type 2 and automatic seat belt assemblies that are installed at a seating position required to have a Type 1 or Type 2 seat belt assembly by Standard No. 208 (49 CFR 571.208).

* * * * *

S4.2.6 *Manufacturer's choice of compliance option.* The manufacturer shall select the compliance option by the time it certifies the vehicle and may not thereafter select a different option for the vehicle. Each manufacturer shall, upon the request from the National Highway Traffic Safety Administration, provide information regarding which of the compliance options it selected for a particular vehicle or make/model.

* * * * *

S5. *Test procedures.*

(a) *General provisions.* Where a range of values is specified, the vehicle shall be able to meet the requirements at all points within the range. The anchorage shall be connected to material whose breaking strength is equal to or greater than the breaking strength of the webbing for the seat belt assembly installed as original equipment at that seating position. The geometry of the attachment duplicates the geometry, at the initiation of the test, of the attachment of the originally installed seat belt assembly.

(b) *Seat adjustment.* If adjustable, the seat shall be adjusted in the following way. Using any seat adjustment controls, place the seat and its components into the configurations and positions of the rearmost normal design driving or riding position consistent with the seating reference point (SgRP), where rearmost is in reference to the direction the seat is facing. The seat may face any direction in which it can be occupied while the vehicle is in motion.

(c) *Shoulder belt anchorage height adjustment.* The shoulder belt anchorage height adjustment (D-ring) may be set to any height.

S5.1 *Seats with Type 1 or certain Type 2 seat belt assemblies.*

(a) Apply a force of 22,241 N (5,000 pounds) in the direction in which the seat faces to a pelvic body block as described in figure 2A to this standard, in a plane parallel to the seat reference plane with an initial force application angle of not less than 5 degrees or more than 15 degrees above the horizontal. Apply the force at the onset rate of not more than 222,411 N (50,000 pounds) per second. Attain the 22,241 N (5,000 pound) force in not more than 30 seconds and maintain it for 10 seconds. At the manufacturer's option, the pelvic body block described in figure 2B to this standard may be substituted for the pelvic body block described in figure 2A to apply the specified force to the center set(s) of anchorages for any group of three or more sets of anchorages that are simultaneously loaded in accordance with S4.2.4.

(b) Choose the FAD(s) in accordance with S5.4 and position the FAD(s) in accordance with S5.5. Apply a force of 22,241 N (5,000 pounds) to the actuator attachment point of the bridged pull yoke attached to the FAD1 or FAD2 in the direction in which the seat faces, in a plane parallel to the seat reference plane with an initial force application angle of not less than 5 degrees or more than 15 degrees above the horizontal. Apply the force at the onset rate of not more than 222,411 N (50,000 pounds) per second. Attain the 22,241 N (5,000 pound) force in not more than 30 seconds and maintain it for 10 seconds.

(c) Apply a force of 22,241 N (5,000 pounds) in the direction in which the seat faces to a pelvic body block as described in figure 2A to this standard and positioned in accordance with S5.3.1, in a plane parallel to the seat reference plane with an initial force application angle of not less than 5 degrees or more than 15 degrees above the horizontal. Apply the force at the onset rate of not more than 222,411 N (50,000 pounds) per second. Attain the 22,241 N (5,000 pound) force in not more than 30 seconds and maintain it for 10 seconds. At the manufacturer's option, the pelvic body block described in figure 2B to this standard may be substituted for the pelvic body block described in figure 2A to apply the specified force to the center set(s) of anchorages for any group of three or more sets of anchorages that are simultaneously loaded in accordance with S4.2.4.

S5.2 *Seats with certain Type 2 or automatic seat belt assemblies.*

(a) Apply forces of 13,345 N (3,000 pounds) in the direction in which the seat faces simultaneously to a pelvic body block (as described in figure 2A to this standard) and an upper torso body block (as described in figure 3 to this standard) in a plane parallel to the seat reference plane with an initial force application angle of not less than 5 degrees or more than 15 degrees above the horizontal. Apply the forces at the onset rate of not more than 133,447 N (30,000 pounds) per second. Attain the 13,345 N (3,000 pound) force in not more than 30 seconds and maintain it for 10 seconds. At the manufacturer's option, the pelvic body block described in figure 2B to this standard may be substituted for the pelvic body block described in figure 2A to apply the specified force to the center set(s) of anchorages for any group of three or more sets of anchorages that are simultaneously loaded in accordance with S4.2.4.

(b) Choose the FAD(s) in accordance with S5.4 and position the FAD(s) in accordance with S5.5. Apply forces of 13,345 N (3,000 pounds) in the direction in which the seat faces simultaneously, to the eye bolt attached to the pull bracket of the torso pull yoke on the FAD and the thru hole on the pelvis of the FAD in a plane parallel to the seat reference plane with an initial force application angle of not less than 5 degrees or more than 15 degrees above the horizontal. Apply the forces at the onset rate of not more than 133,447 N (30,000 pounds) per second. Attain the 13,345 N (3,000 pound) force in not more than 30 seconds and maintain it for 10 seconds.

(c) Position a pelvic body block (as described in figure 2A to this standard) and an upper torso body block (as described in figure 3 to this standard) as described in S5.3. There shall be no contact between the pelvic and torso body blocks at the end of the preload force application (*i.e.,* before the test force is applied). Apply forces of 13,345 N (3,000 pounds) in the direction in which the seat faces simultaneously to the pelvic body block and the upper torso body block in a plane parallel to the seat reference plane with an initial force application angle of not less than 5 degrees or more than 15 degrees above the horizontal. Apply the forces at the onset rate of not more than 133,447 N (30,000 pounds) per second. Attain the 13,345 N (3,000 pound) force in not more than 30 seconds and maintain it for 10 seconds. At the manufacturer's option, the pelvic body block described in figure 2B to this standard may be substituted for the pelvic body block described in figure 2A to apply the specified force to the center set(s) of anchorages for any group of three or more sets of anchorages that are simultaneously loaded in accordance with S4.2.4.

S5.3 *Body Block Zones.*

S5.3.1 *Pelvic Body Block Zone.*

(a) With a 1,335 N (300 pound) force being applied to the pelvic body block in the direction in which the seat faces, the target depicted in figure 2A or figure 2B to this standard shall lie within the zone described in S5.3.1(a)(1) through (3) and in table 1 to this standard (and depicted in figure 6 to this standard):

(1) At or rearward of the transverse vertical plane of the vehicle located 50 mm longitudinally forward of the SgRP and at or forward of the transverse vertical plane located 155 mm rearward of the SgRP.

(2) At or below the horizontal plane located 210 mm above the SgRP and at or above the horizontal plane 65 mm above the SgRP.

(3) At or rightward of the plane parallel to the seat reference plane and located 170 mm to the left of the SgRP and at or leftward of the plane parallel to the seat reference plane and located 170 mm to the right of the SgRP.

S5.3.2 *Torso Body Block Zone.*

(a) With a 1,335 N (300 pound) force being applied to the torso body block in the direction in which the seat faces, the target depicted in figure 3 to this standard shall lie within the zones described in S5.3.2(a)(1) through (3) and in table 1 to this standard (and depicted in figure 6 to this standard):

(1) At or rearward of the transverse vertical plane of the vehicle located 230 mm longitudinally forward of the SgRP and at or forward of the transverse vertical plane located 10 mm rearward of the SgRP.

(2) At or below the horizontal plane located 425 mm above the SgRP and at or above the horizontal plane 180 mm above the SgRP.

(3) At or rightward of the plane parallel to the seat reference plane and located 265 mm to the left of the SgRP and at or leftward of the plane parallel to the seat reference plane and located 265 mm to the right of the SgRP.

S5.4 *Choice of FAD.*

(a) If testing in accordance with S4.2.4, position a FAD1 in accordance with S5.5 at each DSP being simultaneously tested. If there is contact between adjacent FAD1s when positioned as required by S5.5, or if adjacent FAD1s cannot be positioned as required by S5.5 due to contact with each other, then replace the FAD1(s) according to the following hierarchy.

(1) For forward or rearward facing designated seating positions:

(i) If contact occurs between a FAD1 in an inboard seat and a FAD1 in an outboard seat, replace the FAD1 in the inboard seat with a FAD2.

(ii) If contact occurs between adjacent FAD1s in inboard seats, replace the FAD1 on the right-hand side (as viewed in the direction the seat is facing) with a FAD2. For multiple instances of contact between FAD1s, begin replacing FAD1s at the rightmost seating position.

(iii) If contact occurs between an inboard FAD1 and an inboard FAD2, replace the FAD1 with a FAD2.

(iv) If contact occurs between a FAD1 in an outboard seat and a FAD2 in an inboard seat, replace the FAD1 in the outboard seat with a FAD2.

(2) For non-forward and non-rearward facing designated seating positions:

(i) If contact occurs between adjacent FAD1s, replace the FAD1 on the right-hand side (as viewed in the direction the seat is facing) with a FAD2. If contact remains, replace the FAD1 on the left-hand side with a FAD2. For multiple instances of contact between FAD1s, begin replacing FAD1s at the rightmost seating position.

S5.5 *FAD Positioning Procedure.*

(a) Place the FAD1 or FAD2 on the seat such that the midsagittal plane is parallel to and within 10 mm of the seat reference plane, with the torso portion of the FAD contacting the seat back.

(b) While keeping the midsagittal plane within 10 mm of the seat reference plane, move the pelvis portion of the FAD toward the seat back until it contacts the seat back.

(c) If the torso is not in contact with the seat back, rotate the torso portion of the FAD while holding the pelvis in place until the back of the torso contacts the seat back.

(d) Buckle and position the seat belt so that the lap belt secures the pelvis portion of the FAD and the shoulder belt secures the torso portion of the FAD.

(e) Remove all slack from the seat belt.

(f) If testing a Type 2 or Type 2A seat belt assembly, attach one actuator to the eye bolt attached to the pull bracket of the torso pull yoke on the FAD and one to the thru hole on the pelvis of the FAD. If testing a Type 1 seat belt assembly, attach the actuator to the actuator attachment point on the bridged pull yoke attached to the FAD.

* * * * *

BILLING CODE 4910–59–P

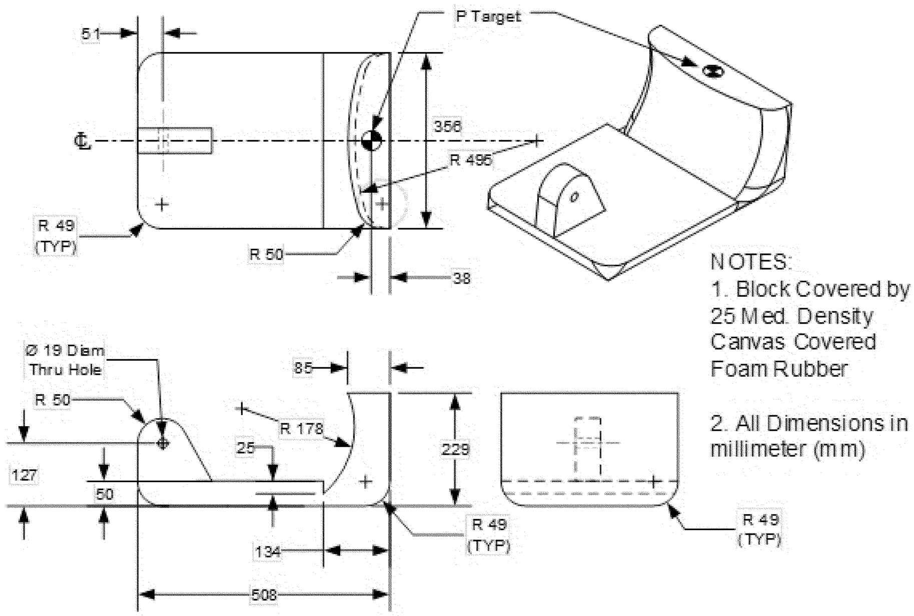


Figure 2A to § 571.210—Body Block for Lap Belt Anchorage and Target Location

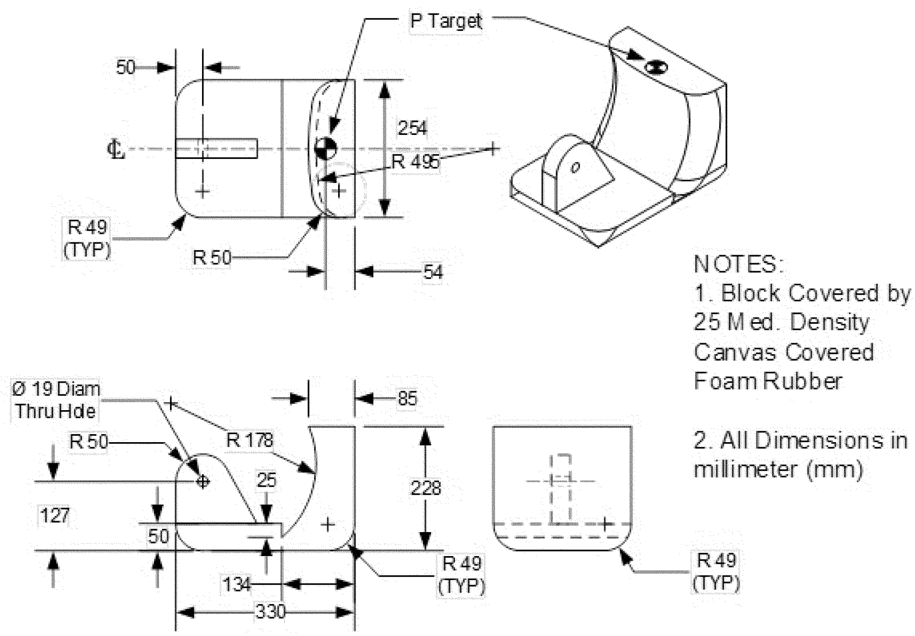


Figure 2B to § 571.210—Optional Body Block for Center Seating Positions Lap Belt Anchorage and Target Location

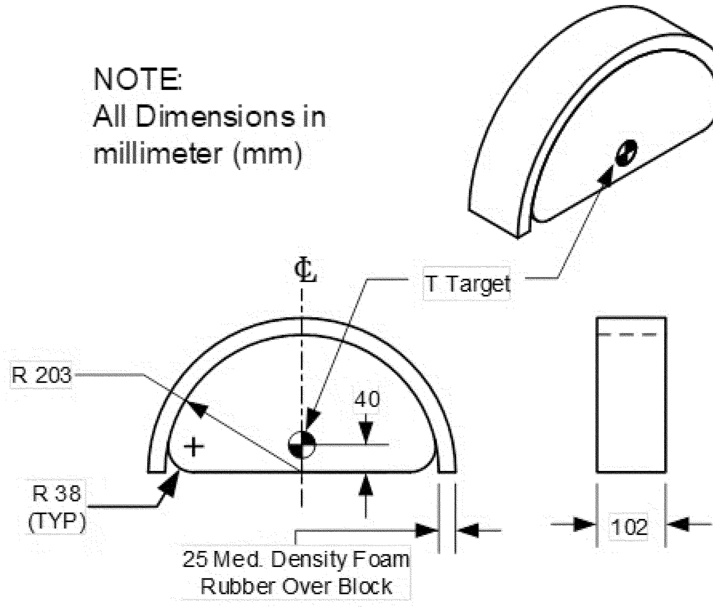


Figure 3 to § 571.210—Body Block for Combination Shoulder and Lap Belt Anchorage and Target Location

* * * * *

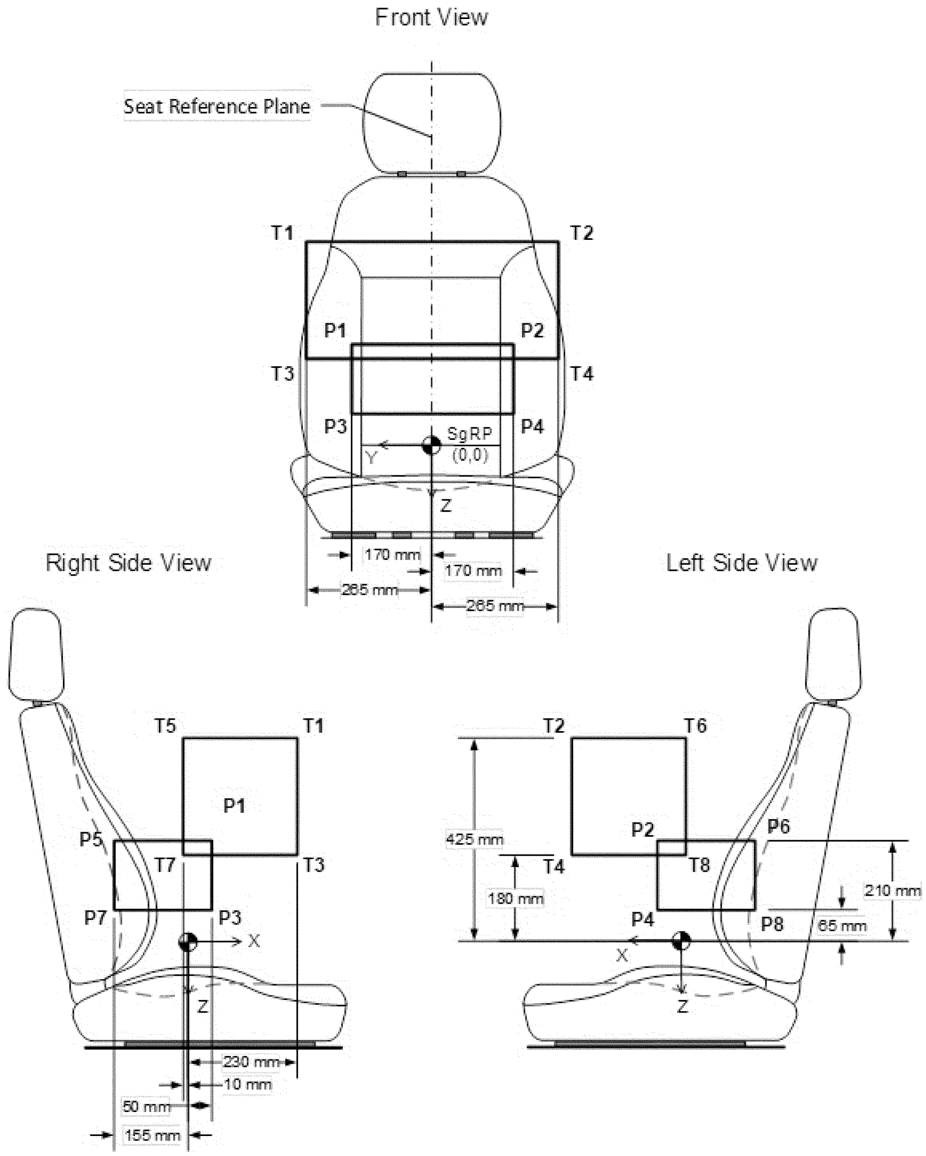


Figure 6 to § 571.210—Body Block Zones (provided for illustration purposes)

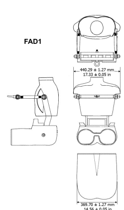


Figure 7 to § 571.210—FAD1 (provided for illustration purposes)

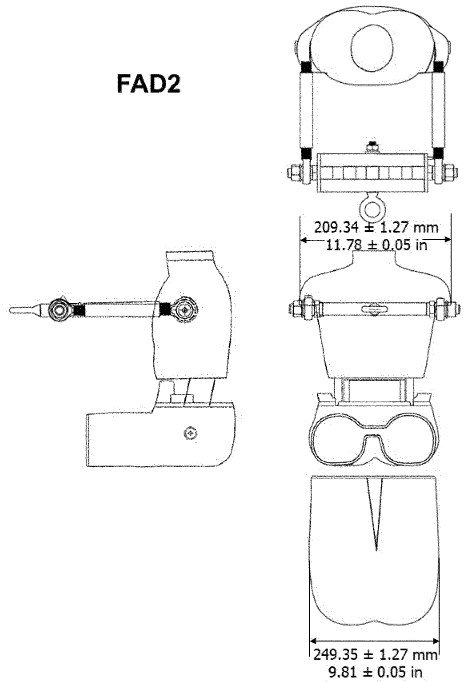


Figure 8 to § 571.210—FAD2 (provided for illustration purposes)

TABLE 1 TO § 571.210–COORDINATES OF THE VERTICES FROM THE SgRP

Coordinates of Zone Vertices from SgRP; [(X,Y,Z) in (mm) and *(in)*]					
Vertices of Torso Body Block Zone	T1	(230, 265, −425) (9.1, 10.4, −16.7)	Vertices of Pelvic Body Block Zone	P1	(50, 170, −210) (2, 6.7, −8.3)
	T2	(230, −265, −425) (9.1, −10.4, −16.7)		P2	(50, −170, −210) (2, −6.7, −8.3)
	T3	(230, 265, −180) (9.1, 10.4, −7.1)		P3	(50, 170, −65) (2, 6.7, −2.6)
	T4	(230, −265, −180) (9.1, −10.4, −7.1)		P4	(50, −170, −65) (2, −6.7, −2.6)
	T5	(−10, 265, −425) (−.4, 10.4, −16.7)		P5	(−155, 170, −210) (−6.1, 6.7, −8.3)
	T6	(−10, −265, −425) (−.4, −10.4, −16.7)		P6	(−155, −170, −210) (−6.1, −6.7, −8.3)
	T7	(−10, 265, −180) (−.4, 10.4, −7.1)		P7	(−155, 170, −65) (−6.1, 6.7, −2.6)
	T8	(−10, −265, −180) (−.4, −10.4, −7.1)		P8	(−155, −170, −65) (−6.1, −6.7, −2.6)

Issued in Washington, DC, under authority delegated in 49 CFR 1.95 and 501.5.

Sophie Shulman,

Deputy Administrator.

[FR Doc. 2024–19727 Filed 9–16–24; 8:45 am]

BILLING CODE 4910–59–C