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**DEPARTMENT OF TRANSPORTATION**

**National Highway Traffic Safety Administration**

**49 CFR Part 571**

**[Docket No. NHTSA-2011-0176]**

**RIN 2127-AL10**

**(Formerly RIN 2127-AJ44)**

**Federal Motor Vehicle Safety Standards,**

**Child Restraint Systems,**

**Incorporation by Reference**

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

**ACTION:** Final rule.

**SUMMARY:** This final rule amends the Federal motor vehicle safety standard for child restraint systems to expand its applicability to child restraints sold for children weighing up to 36 kilograms (kg) (80 pounds (lb)). This rule also amends the standard to incorporate use of a Hybrid III 10-year-old child test dummy (HIII-10C), weighing 35 kg (78 lb), in compliance tests of child restraints newly subject to the standard. In a companion document published in today's edition of the **Federal Register**, NHTSA is adding specifications and qualification requirements

for the HIII-10C to our regulation for anthropomorphic test devices. This rulemaking establishes performance and other requirements for child restraint systems heretofore not regulated by a safety standard, i.e., child restraints manufactured for children weighing 65 to 80 lb.

This rulemaking originally had the RIN 2127-AJ44. Today's final rule has a new RIN (AL10) because a September 2011 final rule on one of the issues of the rulemaking was considered to have completed action on the previous RIN.

**DATES:** This final rule is effective [**INSERT DATE TWO YEARS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**]. The incorporation by reference of certain publications listed in the standard is approved by the Director of the Federal Register as of [**INSERT DATE TWO YEARS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**]. If you wish to petition for reconsideration of this rule, your petition must be received by [**INSERT DATE 45 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER**].

**ADDRESSES:** If you wish to petition for reconsideration of this rule, you should refer in your petition to the docket number of this document and submit your petition to: Administrator, National Highway Traffic Safety Administration, 1200 New Jersey Avenue, S.E., West Building, Washington, D.C., 20590.

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 (Volume 65, Number 70; Pages 19477-78).

For access to the docket to read background documents or comments received, go to <http://www.regulations.gov> and follow the online instructions for accessing the docket. You may also visit DOT's Docket Management Facility, 1200 New Jersey Avenue S.E., West Building Ground Floor, Room W12-140, Washington, D.C. 20590-0001 for online access to the docket.

**FOR FURTHER INFORMATION CONTACT:** For technical issues, you may call Ms. Cristina Echemendia (Telephone: 202-366-6345) (Fax: 202-493-2990). For legal issues, you may call Ms. Deirdre Fujita, Office of Chief Counsel (Telephone: 202-366-2992) (Fax: 202-366-3820). You may send mail to these officials at the National Highway Traffic Safety Administration, U.S. Department of Transportation, 1200 New Jersey Avenue, S.E., West Building, Washington, D.C. 20590.

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### I. INTRODUCTION

The dynamic test requirements in FMVSS No. 213 comprehensively assess the crashworthiness of child restraint systems (CRSs) in a rigorous 48 kilometers per hour (kmph) (30 miles per hour (mph)) frontal sled test. The assessment uses available anthropomorphic test devices (ATDs) (crash test dummies) representing children of different ages. The ATDs are regularly assessed, upgraded, replaced or supplemented with new ATDs by NHTSA, as needed and as new state-of-the-art test dummies become available.

Through the history of FMVSS No. 213, the number and sizes of ATDs used to assess CRSs' compliance with the standard has greatly expanded. Child occupants of many different ages are represented by the ATDs, to provide an expansive assessment of the ability of CRSs to restrain the children for whom the CRS manufacturer has designed the restraint.

The agency began the FMVSS No. 213 sled test program in 1979 with a 6-month-old child (uninstrumented) ATD and a three-year-old child (instrumented) ATD.<sup>1</sup> In 1995, NHTSA expanded the test devices by replacing the 6-month-old with ATDs representing a newborn infant and a 9-month-old child, and added a 6-year-old child instrumented ATD, the latter to test

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<sup>1</sup> 44 FR 72131, December 13, 1979.

booster seats.<sup>2</sup> In 2003, NHTSA added an instrumented 12-month-old infant ATD to the standard in place of the uninstrumented 9-month-old dummy, and replaced the 3-year-old child and 6-year-old child ATDs with their state-of-the-art Hybrid III counterparts.<sup>3</sup> In that 2003 rulemaking, NHTSA expanded the applicability of FMVSS No. 213 to CRSs for children who weigh up to 65 lb and added a weighted Hybrid III 6-year-old child ATD to test restraints recommended for children in the upper weight range. The agency aimed to have an array of ATDs representing children at or near the extremes of the weight ranges identified by a manufacturer as being suitable for each type of child restraint.

In early 2000, NHTSA asked the Society of Automotive Engineers (SAE) Dummy Family Task Group (DFTG) to develop a test dummy representative of a 10-year-old child. NHTSA had sought development of a test dummy between the sizes of a 6-year-old and a 12-year-old for several years.<sup>4</sup>

### Legislative Activity

The agency's adoption of new ATDs into FMVSS No. 213 has long been of interest to Congress. The 1995 and 2002 rulemakings, supra, adding the new ATDs began from agency planned upgrades to FMVSS No. 213. During the course of NHTSA's development of the test dummies, legislative goals mirroring agency initiatives to adopt the ATDs were enacted.<sup>5</sup> NHTSA's adoption of the ATDs in furtherance of agency goals also satisfied these legislative goals.

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<sup>2</sup> 60 FR 35126, July 6, 1995.

<sup>3</sup> 68 FR 37620, June 24, 2003.

<sup>4</sup> A 12-year-old is approximately the size of a 5<sup>th</sup> percentile adult female. There are ATDs in NHTSA's regulations representing a 5<sup>th</sup> percentile adult female for use in its vehicle frontal and side impact programs. (49 CFR Part 572, Subparts O and V, respectively.)

<sup>5</sup> See, the NHTSA Authorization Act of 1991 (sections 2500-2509 of the Intermodal Surface Transportation Efficiency Act (ISTEA), and the Transportation Recall Enhancement, Accountability and Documentation (TREAD) Act, respectively.

Legislative activity has likewise followed the development of an ATD representing a 10-year-old child. In 2002, NHTSA began evaluating the first production prototype of the 10-year-old child dummy that DFTG had developed in response to NHTSA's request.<sup>6</sup> On December 4, 2002, Pub. L. 107-318, 116 Stat. 2772 was enacted (Anton's Law), which contained provisions for NHTSA to develop and evaluate a test dummy that represents a 10-year-old child for use in testing child restraints, and to initiate a rulemaking proceeding for the adoption of the dummy within 1 year following that evaluation.

NHTSA moved promptly to fulfill Anton's Law. Activities that would satisfy many of the statute's mandates were already underway in NHTSA in 2002 and subsequently completed by NHTSA by 2005. An August 31, 2005 NPRM (RIN 2127-AJ44) published by NHTSA was the final step in fulfilling the agency's obligations under Anton's Law. With that 2005 NPRM and previous NHTSA initiatives, NHTSA fully met the mandates of the statute.<sup>7</sup>

### Later Developments

With the 2005 NPRM, the agency had high hopes that the HIII-10C would enhance FMVSS No. 213 by ensuring that booster seats and other CRSs recommended for older children would be robustly assessed to ensure sound performance in a 48 kmph (30 mph) crash when used by children at the upper limit of their recommended weight range, typically up to 80 lb. When we published the 2005 proposal to include the dummy in FMVSS No. 213, we proposed that booster seats must conform to several new requirements based on HIII-10C measurements, including a head injury criterion (HIC). We demonstrated in our pre-proposal testing that while most CRSs conformed to the new requirements, there were some failures, including those where

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<sup>6</sup> Extensive evaluation of the dummy continued through mid-2004. "Technical Evaluation of the Hybrid III Ten Year Old Dummy (HIII-10C)," Stammen; Vehicle Research and Test Center, National Highway Traffic Safety Administration (September 2004).

<sup>7</sup> The August 31, 2005 NPRM provides a detailed overview of NHTSA's responses to the child restraint provisions of Anton's Law. See 70 FR at 51721.

HIC was exceeded. However, during extensive post-NPRM booster seat testing, inconsistencies in the test protocol revealed variability in the kinematics and measurements of the HIII-10C. In particular, the agency discovered that a slight perturbation in the test protocol could create a large change in HIC. The high variability in HIC measurements was attributable to a design feature unique to the HIII-10C in which chin-to-chest contact during the impact event can be excessively hard.<sup>8</sup>

Subsequently, the agency devoted substantial rulemaking and research efforts to try to address test variability. NHTSA investigated the ATD's chin-to-chest contact and developed a seating procedure that was proposed in an SNPRM published in 2008. Later, after analyzing comments opposing the SNPRM, NHTSA published a second SNPRM in 2010 which proposed a different seating procedure, but acknowledged that HIC appeared unusable as an FMVSS No. 213 injury criterion when the HIII-10C was used so positioned. Throughout the rulemaking proceeding, NHTSA informed the public of its research findings, concerns and ideas about using the HIII-10C in FMVSS No. 213, and in turn learned from comments from research organizations, consumer groups, CRS, vehicle, and ATD manufacturers, and others. Considerable effort was devoted to revising the test protocol to eliminate high variability in HIC.

The endeavor has led to a new dummy positioning procedure that improves test repeatability with no substantial change to the HIII-10C. The agency expended substantial research and rulemaking resources in this rulemaking. The ATD appeared to be a worthwhile test instrument notwithstanding its problems in measuring HIC. We also wished to implement Anton's Law as fully as possible.

The agency has determined that the HIII-10C is an important ATD that will enhance our ability to assess the performance of CRSs and other occupant protection systems in protecting

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<sup>8</sup> This is described in detail in the January 23, 2008 supplemental notice of proposed rulemaking (SNPRM).

children.<sup>9</sup> In the accompanying 49 CFR Part 572 final rule published today, we adopt the HIII-10C into our regulation for anthropomorphic test devices. The HIII-10C will provide an enhanced assessment of child restraint performance and is worthy of adoption into FMVSS No. 213. However, due to the variability in HIC measures resulting from hard chin-to-chest contacts, we will not assess HIC as an FMVSS No. 213 injury criterion when using this ATD.

## **II. SUMMARY OF RULEMAKING PROPOSALS<sup>10</sup>**

### a. August 31, 2005 NPRM

On August 31, 2005, NHTSA published an NPRM initiating rulemaking proposing to amend FMVSS No. 213, Child Restraint Systems, to adopt an instrumented 35 kg (78 lb) Hybrid III test dummy representing a 10-year-old child. 70 FR 51720, August 31, 2005, Docket No. NHTSA-2005-21245 (RIN 2127-AJ44). NHTSA proposed to:

1. Expand the definition of “child restraint system” in FMVSS No. 213 to include devices designed for use in a motor vehicle or aircraft to restrain, seat, or position children who weigh 80 lb (36 kg) or less;
2. Use the HIII-10C dummy to test belt-positioning seats and other child restraint systems recommended for children weighing more than 50 lb (22.7 kg);
3. Incorporate, with the HIII-10C, the injury criteria and other performance measures specified in FMVSS No. 213 for evaluating child restraint systems;
4. Remove a 4.4 kg mass limit for belt-positioning seats (S5.4.3.2 of FMVSS No. 213).

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<sup>9</sup> The HIII-10C represents children of a size heretofore not represented by the ATDs used in NHTSA regulations. The child ATDs in 49 CFR Part 572 that NHTSA uses for testing CRSs are ATDs representing a newborn infant, a 12-month-old, a 3-year-old, a 6-year-old, and a weighted 6-year-old. In 49 CFR Part 572, there is also specified a 5<sup>th</sup> percentile adult female ATD, which is approximately the size of a 12-year-old.

<sup>10</sup> For readability purposes, this section summarizes the more noteworthy rulemaking proposals still outstanding, which are resolved by today’s final rule. It does not summarize more minor proposals, such as housekeeping amendments, or issues that were decided in previously-published documents, such as the continued optional use of the Hybrid II 6-year-old dummy to test CRSs, which was discussed in a final rule published under RIN 2127-AJ44 on September 9, 2011. All outstanding proposals, including those not summarized here, are discussed in this preamble.



b. January 23, 2008 SNPRM (2008 SNPRM)

The comments on the August 31, 2005 NPRM supported extending the applicability of FMVSS No. 213 to child restraints recommended for children up to 80 lb (36 kg), and supported having a 10-year-old dummy to test higher weight-rated child restraints. However, several commenters raised concerns about the biofidelity of the HIII-10C dummy, particularly with regard to the interaction of the dummy's chin with the upper sternal bib region covering the upper portion of a metal "spine box." Commenters said that the dummy exhibited "chin-to-chest" contacts resulting in high HIC scores and high HIC variability when tested multiple times under the same conditions.

In response to these comments, the agency conducted a series of tests with the HIII-10C dummy to investigate the factors that influenced chin-to-chest contact and the resulting high HIC scores and HIC variability. Results revealed that dummy posture was the primary factor contributing to HIC variation observed in testing of belt-positioning seats.<sup>11</sup> A more upright dummy posture minimized the hard chin-to-chest contact, which resulted in more repeatable and generally lower HIC values. Accordingly, the agency developed a new dummy positioning procedure which established dummy posture (14 degree torso angle<sup>12</sup>) and a belt positioned at specific landmarks of the dummy's body, and prepared an SNPRM to propose the procedure for use in FMVSS No. 213.

On January 23, 2008, the agency published the 2008 SNPRM.<sup>13</sup> The document supplemented the 2005 NPRM by:

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<sup>11</sup> Detailed explanation provided in the January 23, 2008 SNPRM (73 FR at 3904-3905).

<sup>12</sup> In the January 23, 2008 SNPRM, *infra*, torso angle was defined as the angle between the line joining the center of gravity of the dummy's head to its H-point and a vertical plane (73 FR 3901, 3907).

<sup>13</sup> SNPRM for FMVSS No. 213, 73 FR 3901, Docket No. NHTSA-2007-0048; reopening of comment period, 73 FR 15963, March 26, 2008.

1. Proposing dummy positioning procedures that establish dummy posture (14 degree torso angle) and seat belt positions based on specific landmarks of the dummy's body. NHTSA proposed that the dummy positioning procedures would be used when using the HIII-10C and the Hybrid III 6-year-old child dummy (HIII-6C) to test belt-positioning seats.

2. Changing an earlier proposal concerning which CRSs would be tested with the HIII-10C test dummy. The 2008 SNPRM proposed that child restraints recommended for children weighing 22.7 to 29.5 kg (50 to 65 lb) be tested with the HIII-6C dummy for performance, and with the weighted HIII-6C dummy for structural integrity. The HIII-10C dummy would be used to test CRSs recommended for children weighing more than 29.5 kg (65 lb).

c. November 24, 2010 SNPRM (2010 SNPRM)

The comments received on the January 23, 2008 SNPRM strongly opposed the 14 degree torso angle positioning procedure. Several commenters supported the dummy positioning procedure developed by the University of Michigan Transportation Research Institute (UMTRI) and urged NHTSA to adopt those procedures. However, some commenters noted that the UMTRI procedure results in unrealistically high HIC values measured by the dummy due to the more slouched positioning of the dummy. UMTRI suggested that NHTSA not use HIC in the testing of belt-positioning seats with the HIII-10C until the biofidelity of the test dummy is improved.

Based on an analysis of the comments to the 2008 SNPRM and other information, including the results of additional testing by NHTSA of belt-positioning seats using the UMTRI positioning procedure, NHTSA issued the 2010 SNPRM on November 24, 2010. The document supplemented the proposals of the earlier NPRMs by proposing to:

1. Adopt a procedure for positioning the HIII-10C dummy in belt-positioning seats based on the procedure developed by UMTRI, instead of the 14 degree torso upright procedure. The UMTRI procedure includes specifications for positioning the belt-positioning seat on the standard seat assembly. The 2010 SNPRM also proposed using the UMTRI procedure when testing with the HIII-6C in belt-positioning seats in FMVSS No. 213 tests.

2. Withdraw the proposal for the HIC criterion for the HIII-10C dummy, until problems with the dummy that resulted in uncharacteristically high HIC values and HIC variability in FMVSS No. 213 testing have been resolved.

3. Specify that a child restraint system recommended for children weighing over 29.5 kg (65 lb) will not be subject to testing with the HIII-10C when attached to the standard seat assembly using the Lower Anchors and Tethers for Children (LATCH)<sup>14</sup> system. These CRSs would be tested with the HIII-10C while attached to the standard seat assembly with the seat belt system. To reduce the likelihood that a consumer may mistakenly use this type of CRS with LATCH, the 2010 SNPRM proposed to require harness-equipped CRSs recommended for children of a weight range that includes children weighing over 29.5 kg (65 lb), to be labeled with an instruction to the consumer not to use the vehicle LATCH system with a child weighing more than 29.5 kg (65 lb).

#### Comments Received on November 24, 2010 SNPRM

The agency received 14 comments on the 2010 SNPRM, from child restraint manufacturers, motor vehicle manufacturers, child passenger advocacy groups, and research organizations. Generally, all commenters expressly or implicitly supported using the UMTRI

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<sup>14</sup> LATCH refers to Lower Anchors and Tethers for Children, a term that was developed by industry to refer to the child restraint anchorage system required to be installed in vehicles (FMVSS No. 225). FMVSS No. 213 requires harness-equipped conventional child safety seats to be able to be installed in a vehicle by both a vehicle's LATCH system, and the vehicle's seat belt.

positioning procedure to test the HIII-10C and HIII-6C dummies in belt-positioning seats, agreeing that the procedure would position the ATDs in a more realistic seating posture than the 14 degree torso angle positioning procedure. JPMA asked that NHTSA not use a pelvis positioning pad referenced in the proposed UMTRI procedure, believing that the pad increases the likelihood of hard chin-to-chest contact that may result in high HIC values and HIC variability, and asked several technical questions relating to how the UMTRI procedure is conducted. Commenters expressed support for not adopting HIC, although several made clear their view that NHTSA should begin measuring HIC as soon as possible.

In commenting on the proposal that the HIII-10C dummy would be used to test CRSs recommended for children weighing more than 29.5 kg (65 lb), Britax suggested that the cut-off should be 70 lb, so that its CRS that is currently recommended for use with children weighing more than 65 lb would not be tested with the HIII-10C dummy.

A number of commenters had views on the proposed label for harness-equipped CRSs sold for heavier children. All agreed that consumers are in need of information as to how heavy a child could be without potentially overloading the LATCH anchors. Most commenters on this issue supported a label, but several (including JPMA and associations of vehicle manufacturers) believed that, to avoid overloading the LATCH anchors, the maximum child occupant weight for LATCH use specified on the label should be based on the combined weight of the CRS and the child occupant, rather than the child weight alone. On the other hand, Sunshine Kids, a CRS manufacturer, suggested that the standard should provide CRS manufacturers the ability to determine the maximum weight of the child the CRS can hold, if the CRS manufacturer could provide crash test results showing that the CRS with an ATD with a maximum recommended

weight will remain structurally intact and will not exceed a 12,000 Newton (N) load on the anchors in a 35 mile per hour (mph) frontal barrier crash test with a 47 g deceleration pulse.

Some commenters (including consumer advocates) supported a weight limit only on using the lower LATCH anchors, and not the top tether anchor. Several commenters (including CRS and vehicle manufacturers) suggested that the label ought to allow CRS manufacturers to state that the LATCH anchors could be used to secure a belt-positioning booster to the vehicle seat, to avoid having the booster become a flying projectile in a crash.

#### Differences With the 2010 SNPRM

After reviewing the comments to the 2010 SNPRM, we have decided to adopt the following modifications of its proposal:

Regarding the UMTRI procedure, we changed the proposal regarding use of the pelvis positioning pad, to only prepare the HIII-10C dummy with the pad, and not the HIII-6C dummy. The lap shield used with the HIII-6C dummy and the HIII-10C are the same but the dimensions of the drawing of the lap shield proposed in the 2010 SNPRM are reduced to better fit the child dummies. We added steps to the procedure preparing the HIII-10C dummy to set the dummy's neck and lumbar angle. This setup was proposed in the 2008 SNPRM.

We did not adopt the proposed instructions on how to apply the seat belt on the dummy during the positioning procedure due to an oversight with the proposal. The proposed instructions were specific to continuous belts. FMVSS No. 213 does not specify a continuous belt so the provisions were not relevant to the FMVSS No. 213 belt system.

Other changes are to the proposed requirements for labeling and written instructions, with regard to how heavy a child can be before LATCH should no longer be used to attach a harness-equipped CRS to the vehicle seat.

These and other changes are discussed in today's preamble.

### **III. OVERVIEW OF ISSUES DECIDED IN THIS FINAL RULE**

Based on our analysis of all available information, including comments to the 2005 NPRM, 2008 SNPRM, and 2010 SNPRM, today's final rule amends FMVSS No. 213 in the following manner.

(a) We extend the applicability of FMVSS No. 213 to child restraint systems recommended for use by children weighing 80 lb or less, from the current criterion of 65 lb or less.

(b) We adopt the following injury criteria for the HIII-10C dummy in the sled test: chest acceleration = 60 g's; head excursion = 813 mm for untethered condition and 720 mm for tethered condition; and knee excursion = 915 mm.

(c) This final rule adopts a procedure for positioning the HIII-6C and HIII-10C dummies in belt-positioning seats based on the procedure developed by UMTRI but without the use of the pelvis positioning pad for the HIII-6C dummy.

(d) We specify our use of the HIII-10C dummy in FMVSS No. 213 compliance tests of CRSs recommended for children weighing more than 65 lb. We test CRSs rated for children weighing 50 to 65 lb with the HIII-6C instrumented dummy for performance, and with the weighted HIII-6C uninstrumented dummy for structural integrity.

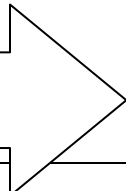
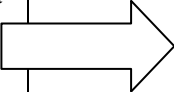
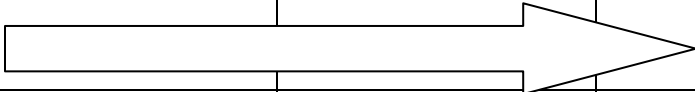
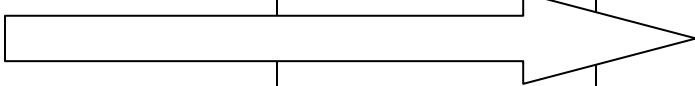
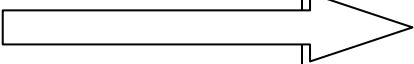
(e) This final rule requires a label to be placed on a CRS equipped with internal harnesses for which the combined weight of the CRS and the maximum recommended child weight for use with the internal harnesses exceeds 65 lb. The label informs the consumer that the lower anchors may be used to attach the CRS to the vehicle seat up to a combined child and CRS weight of 65 lb when the child is restrained by the internal harnesses. The purpose of the label is to reduce

consumer confusion about using lower LATCH anchorages, and to ensure that forces generated by the child and CRS in most crash conditions do not exceed the lower anchors' design limits. This final rule also specifies that in a compliance test, NHTSA will not attach harness-equipped CRSs to the standard seat assembly using the lower anchorages of the LATCH system, when the test involves an ATD whose weight is greater than the manufacturer-recommended maximum child weight for lower LATCH anchor use.

(f) Other issues. This final rule also amends FMVSS No. 213 to: delete the mass limit of 4.4 kg for belt-positioning boosters (S5.4.3.2); make housekeeping amendments (e.g., remove reference to a 9-month-old child ATD since it is no longer used in compliance tests); address views expressed on possible future belt fit requirements, and provide a lead time of two years.

Table 1 provides a summary of the proposals underlying this final rule, the provisions they contained and how they progressed.

**Table 1. Progression of Proposed Changes**

| 2005 NPRM   | 2008 SNPRM  | 2010 SNPRM   | Today's Final Rule   |
|---|---|--|--|
| Extend FMVSS No. 213 to CRSs recommended for children 80 lb or less. Adopt HIII-10C for testing CRSs with a weight rating of 50-80 lb | Use HIII-10C to test CRSs with a weight rating of 65-80 lb. CRSs with a weight rating of 50-65 lb will continue to be tested with HIII-6C and Weighted HIII-6C dummies. |  |   |
| Injury Criteria: HIC=1000, chest 60 g's, head excursion=813mm (untethered), head excursion = 720mm (tethered), knee excursion = 915mm |   | Not use HIC for HIII-10C dummy. All other criteria apply.  |   |
|   | 14 degree positioning procedure   | UMTRI procedure (belt-positioning seats) with pelvis pad   | UMTRI procedure (belt-positioning seats), with pelvis pad for HIII-10C and without pelvis pad for HIII-6C; belt provisions   |
| Buckle Release=437 N  |   |  |   |
| Delete mass limit of S5.4.3.2 for belt-positioning seats  |   |  |    |
|   | Head support surface S5.2.1.2 not applicable for HIII-10C testing   |  |    |
|   |   | All harnessed CRSs with a 65+ lb weight rating tested with the HIII-10C dummy will not be tested using LATCH | If the combined weight of the CRS plus child is greater than 65 lb, the CRS will not be tested using lower LATCH attachments with an ATD that results in the combined weight exceeding 65 lb |
|   |   | Include label on all CRSs indicating not to use LATCH attachments with children weighing over 65 lb.         | Include label on harnessed CRSs indicating the maximum allowable child weight for lower LATCH use. The lower anchors may be used up to a combined weight of child and CRS of 65 lb.          |



#### IV. AGENCY DECISIONS

##### **a. Extend the Applicability of FMVSS No. 213**

There has been considerable interest over the years in expanding the applicability of FMVSS No. 213 to increase the likelihood that CRSs that are recommended for older children will perform adequately in a crash. This interest goes hand-in-hand with efforts to increase CRS use among older children who cannot adequately fit a vehicle's lap and shoulder belt system. The goal of expanding the applicability of FMVSS No. 213 is to ensure that CRSs that are recommended for children over the current 65 lb weight limit of the standard meet the dynamic test requirements of the standard.

In the TREAD Act final rule (supra), the applicability of FMVSS No. 213 was expanded to child restraint systems for children who weigh up to 65 lb. The agency also specified the use of the weighted 6-year-old (62-lb) test dummy to test restraints recommended for children weighing 50 to 65 lb. In the TREAD Act final rule, the agency considered the merits of extending the standard to restraints recommended for use by children weighing up to 80 lb, but decided against that expansion because there was not then any test dummy that could adequately assess the dynamic performance of a child restraint in restraining an 80 lb child. NHTSA believed that expanding the standard to restraints for children weighing up to 80 lb would not be meaningful in the absence of a dummy of suitable size and weight that could assess the conformance of the restraints with the performance requirements of the standard.

The HIII-10C is now available for incorporation into FMVSS No. 213. The agency has evaluated the test dummy, and is satisfied that the dummy's performance merits its use in FMVSS No. 213 compliance tests, subject to the condition that HIC will not be a performance criterion in FMVSS No. 213 when this ATD is used. In a separate final rule published today, we

are amending 49 CFR Part 572, “Anthropomorphic test devices,” to adopt the HIII-10C into subpart T.

Today’s final rule enhances child passenger safety by way of the requirements discussed below. It should be noted, however, that data indicate that booster seats are generally very effective items of equipment. Analyses of NHTSA’s crash databases<sup>15</sup> and insurance claims databases<sup>16</sup> indicate that use of belt-positioning seats by 4 to 8 year-old children reduces the risk of moderate<sup>17</sup> and greater severity injuries by 45 percent compared to when only seat belts are used.

Further, we do not expect this rule to increase costs noticeably because all CRSs that we tested with the HIII-10C dummy met the FMVSS No. 213 performance requirements adopted today. (Labeling of the CRSs will be revised pursuant to this rule, involving minimal costs.) Yet, by requiring that all future CRSs recommended for children weighing more than 65 lb will be tested with the 10-year-old child dummy, this rule will ensure that the satisfactory performance of current CRSs for older children will be maintained.

#### Comments; Agency Decision

All commenters to the NPRMs supported extending the applicability of FMVSS No. 213 to child restraints recommended for children up to 80 lb, and supported having a 10-year-old dummy to test higher-weight rated child restraints. With regard to the Hybrid III 10-year-old dummy, the concerns about the HIII-10C dummy’s measurement of HIC are addressed by the next section below in this preamble.

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<sup>15</sup> Booster Seat Effectiveness Estimates Based on CDS and State Data, NHTSA, DOT HS811338, July 2010.

<sup>16</sup> Arbogast, K. B., Jermakian, J. S., Kellan, M.J., Durbin, D. R., Effectiveness of Belt-Positioning Booster Seats: An Updated Assessment, *Pediatrics*, Vol. 124, pp. 1281-1286, 2009.

<sup>17</sup> Moderate injuries are of severity level 2 in the Abbreviated Injury Scale (AIS).

In response to the 2005 NPRM, Public Citizen (PC) requested that NHTSA reevaluate its weight limits for booster seats to make sure all children are adequately protected in motor vehicles because the average 10-year-old today weighs more than 80 pounds and the weight of children is steadily increasing. PC also suggested that the 10-year-old dummy should be up-weighted to more closely match the mean weight of children today. It stated that the agency's proposed increase for recommended restraints does not accurately reflect the increased weight of children who will need to use the booster seats.

We disagree with PC that the HIII-10C is unrepresentative and should be up-weighted. The HIII-10C dummy, with a weight of 77.6 lb (35 kg), a seated height of 29 inches (in) (74 cm), and a standing height of 51 in (130 cm), is ideally suited to test the upper load and height limits of safety restraints for nearly all 9-year-old and more than half of 10-year-old children. The agency notes that weight and seated height are the most relevant parameters for child occupant injury assessment purposes. Weight relates to the structural integrity of the CRS and belt restraints. Seated height establishes the location and fit of the seat belts on the shoulder and on the torso as well as head trajectory and its forward displacement during the sled test. Being slightly above the average, the mass of the HIII-10C dummy is sufficiently suitable for testing the structural integrity of CRSs and assures their durability for use by children in the 6- to 10-year-old age range.

We conclude that the weight and seated height of the HIII-10C are well-chosen for testing CRSs rated up to 80 lb. The ATD's anthropometry fits and is centered on the mid distribution range of physical dimensions of an average 10-year-old identified in the Centers for Disease Control and Prevention (CDC) 2000 growth charts. Its weight and seated height are well suited to address the structural integrity and the belt fit of booster seats, respectively, being

offered in the market place for those size children.<sup>18</sup> The HIII-10C successfully fills the gap between a 6-year-old and a 12-year-old child, and warrants incorporation into FMVSS No. 213. Further discussion can be found in the 49 CFR Part 572 final rule published concurrently with this document.

The incorporation of the HIII-10C dummy will now allow testing of CRSs and belt-positioning seats for children weighing more than 65 lb and up to 80 lb, which is a growing segment of the CRS market that currently is not undergoing compliance testing for performance at the maximum recommended weight limit. Incorporating the ATD fulfills NHTSA's plan to have an ATD representing children between the size of a 6-year-old and a 12-year-old, and is as Anton's Law envisioned. Adopting the HIII-10C makes the regulation of CRSs for children up to 80 lb meaningful, as the performance of the CRSs to protect larger children will now be dynamically tested in a rigorous sled test with an ATD better representative of children for whom the CRS is recommended than current ATDs in FMVSS No. 213.

**b. Weight Ranges**

Originally, the 2005 NPRM proposed the HIII-10C be used to test CRSs for children over 50 lb. In its comment to that NPRM, Britax suggested that, due to the size of the HIII-10C, the HIII-10C dummy should be used for CRSs recommended for children weighing more than 65 lb instead of 50 lb. NHTSA agreed, and in the 2008 SNPRM proposed the use of the HIII-10C to test CRSs recommended for use by children weighing more than 65 lb and the use of the HIII-6C dummy and the weighted HIII-6C dummy to assess the compliance of CRSs recommended for children in the 50 to 65 lb weight range.

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<sup>18</sup> As used in FMVSS No. 213, the HIII-10C will also measure head and knee excursions and chest accelerations, providing a meaningful assessment of injury risk.

### Comments

In its comment on the 2010 SNPRM, Britax requested that the 65 lb cut-off be increased to 70 lb, so that only CRSs recommended for children weighing 70 lb or more would be tested with the HIII-10C. Britax stated that it produces convertible<sup>19</sup> CRSs recommended for children weighing 5 to 70 lb. The commenter stated that the HIII-10C weighs 8 lb more than the recommended weight range of the CRS and does not fit properly in the restraint. Britax stated that the proposed requirement would result in the removal of such convertible CRSs from the market. Increasing the standard's weight cut-off to 70 lb, as Britax suggested, would result in this CRS not being tested with the HIII-10C dummy.

### Agency Response

We are declining Britax's request. We believe that CRSs recommended for children weighing 65 lb or more should be tested with the HIII-10C. If the standard's criterion were 70 lb, child restraints rated for children up to 70 lb would only be tested at the upper weight range with an instrumented test dummy weighing just 51 lb (the HIII 6-year-old). This would create a large gap in testing the CRS to its performance using an ATD. The agency seeks to limit large gaps in FMVSS No. 213 testing to the extent possible.

In the past, problems arose when the gap was too large. When FMVSS No. 213 first adopted dynamic test requirements, two child test dummies were used in the test. (44 FR 72131; December 13, 1979.) One represented a 6-month-old child, the other a 3-year-old child. Due to the unavailability of other ATDs, the standard was written such that CRSs recommended for children weighing 0 to 20 lb were tested with the 6-month-old ATD, and CRSs recommended for children 20 to 50 lb were tested with the 3-year-old ATD (weighing 33 lb).

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<sup>19</sup> Britax Marathon, Boulevard and Advocate convertible seats.

Alarming, CRSs (shield-type boosters) recommended for children weighing 20 to 70 lb were subsequently produced under that scenario. Manufacturers were recommending the CRSs for a wide range of children (20 to 70 lb), but were only required by FMVSS No. 213 to test them with just a 3-year-old (33 lb) dummy. Concerned about the ability of CRSs to restrain children in such a large weight/size range, NHTSA conducted tests on shield-type booster seats using newly-developed ATDs representing a 9-month-old (20 lb) child and a 6-year-old child (48 lb).

The test results confirmed that the assessment of performance under then-FMVSS No. 213 needed to be expanded. In some tests, the CRS ejected the 9-month-old (20 lb) dummy, or structurally failed or yielded excessive head excursions in tests with the 6-year-old (48 lb) dummy. These CRSs—all recommended for children 20 to 70 lb--were certified as meeting FMVSS No. 213. The problem was that the standard only required testing of the restraint with the 3-year-old (33 lb) test dummy. The standard was not assessing the CRSs at the extremes of the recommended weight ranges.<sup>20</sup>

As FMVSS No. 213 evolved and more ATDs became available for testing, we adopted more ATDs. To the extent possible, we try to ensure that there are no large gaps in FMVSS No. 213 testing of CRSs, particularly at the extremes of recommended weight ranges.

In the 1995 ISTEA rulemaking adding ATDs to FMVSS No. 213, NHTSA decided that CRSs for children weighing more than 40 lb would be tested with a 6-year-old (48 lb) dummy. Id. In a petition for reconsideration of the final rule, a CRS manufacturer asked that the weight cut-off be 43 lb instead of 40 lb, so that its CRSs rated for children up to 43 lb would continue to be tested just with the 3-year-old (33 lb) dummy, rather than with the 6-year-old (48 lb) dummy. In a June 18, 1996, final rule responding to the petition, NHTSA disagreed and kept the cut-off at

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<sup>20</sup> ISTEA final rule, 60 FR 35126, July 6, 1995.

40 lb, believing that use of the 6-year-old dummy, weighing 48 pounds, would result in a more rigorous and better assessment of the CRS in protecting children for whom the CRS was recommended than a test with a 3-year-old dummy that weighs only 33 lb. (61 FR 30824.) That is, if a CRS were recommended for children up to 43 lb, it should be tested with the 6-year-old (48 lb) dummy as that ATD better represents the children for whom the CRS is recommended at the upper recommended weight range, than the 3-year-old dummy. Later, the CRS manufacturer adjusted its CRS's weight cut-off from 43 lb to 40 lb.

We recognize that competing interests have to be balanced in deciding this topic. On the one hand is the interest in having children restrained as long as possible in a restraint mode (e.g., rear-facing, harness-restraint, or belt-positioning seat) rather than being prematurely graduated to the CRS for children in the next older age group. On the other hand, there is a need to assure that CRSs are reasonably sled tested and are structurally sound to ensure that they protect the children for whom the restraint is recommended, as advertized.

Our increasing the cut-off over which the HIII-10C would be used, from 50 lb as originally proposed to 65 lb in this final rule, achieves a balance. It will accommodate the majority of CRS manufacturers.<sup>21</sup> It is possible that manufacturers that lower the CRS recommended weight cut-off to 65 lb from some higher weight could redirect a small segment of children to move to a belt-positioning sooner. However, CRSs recommended for children weighing up to 65 lb would accommodate all 6-year-old children and up to 93 percent of 7-year-old children. This covers the large majority of children whom the agency recommends be restrained in child restraints with harnesses until they exceed the recommended height and

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<sup>21</sup> The agency does not have the resources to add an intermediate dummy (e.g., a 70 lb ATD) to further accommodate Britax on this issue, to permit them to recommend their CRS for children weighting up to 70 lb without being subject to testing with the HIII-10 C (78 lb) dummy.

weight limit.<sup>22</sup> If the weight cut-off were 70 lb, the nearly 20-lb gap between the weight of the instrumented ATD (50 lb, 6-year-old child test dummy) used to test the Britax CRS and the upper limit of the Britax CRS (70 lb) would be too large for NHTSA to conclude that the performance of the CRS in protecting a child weighing just under 70 lb was adequately assessed.

In the 1996 rulemaking (61 FR 30824), we recognized that there was a risk that, as a result of the decision to keep the weight cut-off at 40 lb, CRS manufacturers might revise the recommended upper weight limit for their convertible CRSs from 43 lb to 40 lb. The negative implication of this was that parents may transition their children out of toddler restraints to booster seats or a vehicle belt system sooner than when the child is more physically developed. Yet, the agency was also hopeful that, in time, manufacturers could develop designs that would enable a harness-equipped CRS to meet the performance requirements in FMVSS No. 213 when tested with the 6-year-old child dummy, thereby allowing the manufacturers to recommend their CRSs for children weighing more than 40 lb (resulting in children being kept in the harnessed-equipped CRS until they are older).

Following the rulemaking, we have found first the former, then the latter, was realized. CRS labels were initially revised such that convertible (harness-equipped) restraints were recommended for children only up to 40 lb. Later, newer designs emerged of convertible restraints with upper weight limits up to 50 lb or 65 lb. The newer CRSs have been designed to meet FMVSS No. 213 when tested with the 6-year-old ATD.

We do not believe that today's decision will have negative safety consequences of any note. Manufacturers of CRSs such as the one Britax described could revise the weight cut-off downward to 65 lb so as to avoid being tested with the HIII-10C, rather than completely

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<sup>22</sup> <http://www.nhtsa.gov/ChildSafety/step3> The website (last accessed Sep. 6, 2011) states, "Keep your 4 to 7 year old children in their **FORWARD-FACING** car seat with a harness until they the top height or weight limit allowed by your car seat's manufacturer."



removing the CRS from the market. If a harnessed CRS is needed for children weighing above 65 lb, experience has shown that CRS manufacturers could fill that need. We are optimistic that manufacturers that see a need will be able to redesign their harness-equipped CRSs such that the CRS would be able to meet FMVSS No. 213 when tested with the HIII-10C dummy.

Today's decision to make the cut-off 65 lb will benefit safety by better ensuring that CRS recommended for use with children weighing more than 65 lb will be dynamically assessed with an ATD that represents the older children for whom the CRS is recommended. Accordingly, the proposed weight categories are adopted.

The final rule's weight categories are illustrated in Table 2.

**Table 2: Final Rule Weight Categories**

| <b>CRS Recommended For Use by Children of These Sizes--</b>   | <b>Are Compliance Tested by NHTSA With These ATDs (Subparts Refer to 49 CFR Part 572)</b>                                   |
|---|---|
| Weight not greater than 5 kg (0 to 11 lb), or height not greater than 650 mm  | Newborn (subpart K)   |
| Weight greater than 5 but not greater than 10 kg (11 to 22 lb) or height greater than 650 mm but not greater than 850 mm            | Newborn (subpart K), CRABI (subpart R)  |
| Weight greater than 10 kg but not greater than 18 kg (22 to 40 lb), or height greater than 850 mm but not greater than 1100 mm      | CRABI (subpart R), HIII 3-year-old (subpart P)  |
| Weight greater than 18 kg (40 lb) but not greater than 22.7 kg (50 lb), or height greater than 1100 mm but not greater than 1250 mm | HIII 6-year-old (subpart N) or HII 6-year-old (subpart I) (manufacturer's option)   |
| Weight greater than 22.7 kg (50 lb) but not greater than 30 kg (65 lb), or greater than 1100 mm but not greater than 1250 mm        | HIII 6-year-old (subpart N) or HII 6-year-old (subpart I) (manufacturer's option), and weighted HIII 6-year-old (subpart S) |
| Weight greater than 30 kg (65 lb), or height greater than 1250 mm   | HIII 10-year-old (subpart T)*   |

\* No HIC measured with HIII-10C

### **c. Performance and Other Criteria**

#### **1. HIII-10C Dummy**

The 2005 NPRM proposed performance criteria for the HIII-10-year-old dummy similar to the current FMVSS No. 213 criteria, because the agency was not aware of any injuries unique to children in booster seats<sup>23</sup> that would necessitate separate and differing injury criteria limits. The specific injury criteria measurement maximums for the HIII-10-year old dummy were:  $HIC_{36} = 1000$ ; chest acceleration = 60 g's (3 millisecond clip); head excursion = 813 millimeters (mm) for untethered condition, 720 mm for tethered condition (if applicable); and knee excursion = 915 mm. We also proposed applying other FMVSS No. 213 requirements to CRSs rated for children who weigh up to 80 lb, including structural integrity, force distribution, installation, child restraint webbing and belt assembly requirements, and flammability requirements. (The agency also proposed to eliminate S5.4.3.2's limit on the mass of belt-positioning boosters. This provision will be discussed later in this preamble.)

The 2008 and 2010 SNPRMs added to or superseded some of the 2005 NPRM proposals on performance criteria. In response to comments to the 2005 NPRM pointing out high HIC values and HIC variability related to hard chin-to-chest contact in FMVSS No. 213 testing with the HIII-10C dummy, the 2010 SNPRM proposed not to adopt the HIC criterion for tests conducted with the HIII-10C dummy in all CRSs. Correcting an oversight, the 2008 NPRM proposed to amend S5.2.1.2 of FMVSS No. 213 to specify that the HIII-10C would not be used to determine the applicability of the head support surface requirements of S5.2.1.1. Also in response to comments, the 2010 SNPRM proposed to exclude CRSs tested with the HIII-10C

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<sup>23</sup> NHTSA focused on booster seats in the NPRM because in 2005 CRSs for children weighing 65 to 80 lb were primarily booster seats.

from a requirement that the CRS must meet the requirements of FMVSS No. 213 when installed by means of the lower anchorages of a LATCH system.

### Comments

In general, the commenters supported the proposal not to adopt HIC when using the HIII-10C. UMTRI, Consumers Union (CU), Evenflo and JPMA concurred with not using HIC until the uncharacteristically hard chin-to-chest contact in the dummy has been corrected. JPMA agreed with applying existing FMVSS No. 213 injury criteria and dynamic performance measures for the HIII-10C dummy except for the HIC.

Advocates for Highway Safety (Advocates), the American Academy of Pediatrics (AAP) and SafeRideNews also concurred with not using HIC but requested that NHTSA expedite improving the dummy's biofidelity to incorporate HIC into the injury requirements. Advocates and SafeRideNews also requested that NHTSA include a HIC incorporation date in the final rule. Advocates believed that, without the implementation of HIC, quantification of the risk of head injury to children in belt-positioning seats will be limited to head excursion which, the commenter believed, provides only a "rudimentary surrogate" measure of contact and non-contact head injuries.

In supporting the proposal, UMTRI believed that NHTSA's injury data analysis cited in the SNPRM did not identify a significant injury problem that could be addressed by the inclusion of HIC in an FMVSS No. 213 booster seat test, regardless of the biofidelity of the dummy. It suggested that efforts to reduce the number of head injuries in the field should focus on reducing head excursion rather than reducing the linear head acceleration used to calculate HIC.

CU stated its belief that NHTSA's not adopting HIC at this point is warranted when testing with the HIII-10C. CU stated that it too concluded that the HIC values obtained from its

sled tests (which are similar to FMVSS No. 213) could not be used, due in part to the potential variability of the data. CU believed that not adopting HIC is “far preferable to suspending the use of the higher weight dummies altogether, as those dummies serve a key purpose in evaluating other potential injury criteria and structural integrity of seats recommended for higher weight children.”

### Agency Response

#### HIC

For the reasons explained in the 2010 SNPRM, this final rule does not adopt the use of HIC as an injury measure for the HIII-10C dummy in FMVSS No. 213 tests at this time. CRSs tested with the current HIII-10C ATD can produce HIC values in the ATD indicating an unacceptable risk of head injury, even though head injuries due to chin-to-chest contact are not occurring in the real world.

NHTSA analyzed the National Automotive Sampling System (NASS) Crashworthiness Data System (CDS) data files for the years 1999 to 2008 to better understand real world injuries among children in different restraint conditions. The risk and source of injury to different body regions was also determined. The sampled data consisted of children, 5-12 years of age, in rear seats of light passenger vehicles that were involved in non-rollover frontal towaway crashes. Weighting factors in NASS/CDS were applied to the sample data to represent national estimates of towaway crashes. The weighted data consisted of 910,308 (1940 unweighted sample) children of which 49 percent were 5-7 year olds and 51 percent were 8-12 year olds. Among the 5-7 year olds, 69 percent were using vehicle seat belts, 22 percent were in harness CRS or belt-positioning seat, and 9 percent were unrestrained. Among the 8-12 year olds, 90 percent were

using the vehicle belts, 1 percent was in harness CRS or belt-positioning seat, and 9 percent were unrestrained.

The risk of AIS 2+ injury<sup>24</sup> for children 5-7 years old was 5.2 percent for unbelted children, 1.2 percent for belted children and 0.9 percent for children in CRSs. The AIS2+ injury risk for children 8-12 years old was 8.1 percent for unbelted children and 1.3 percent for belted children. There were no cases of children 8-12 years old in CRSs. Both age groups showed a decrease of injury risk when using restraints (belt or CRS).

The most common AIS 2+ injuries among children restrained (vehicle seat belt or CRS) in rear seats were to the head and face (48 percent), followed by upper extremities (19 percent), torso (17 percent) and lower extremities (16 percent). The most-common known contacts for AIS2+ head injuries to 5-12 year old children restrained by vehicle seat belts or CRS (including belt-positioning seat) was the seat back (50 percent). There was only one case in this sample of restrained children where an AIS 2+ head injury occurred due to self-contact. Further examination of this particular case indicated that it involved a 7 year-old child restrained with a vehicle seat belt. The child's head contacted his/her knee resulting in an AIS 2-severity concussion.

The results of this real-world data analysis indicate that the injury risk is substantially reduced when the child is restrained by vehicle seat belts or in child restraints. The results show that most head injuries in restrained children are caused by contact with the seat back. Only one head injury case was associated with self contact (head contact with knee) but no cases were reported where there was chin-to-chest contact that resulted in a head injury.

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<sup>24</sup> AIS 2+ injuries are those of moderate or greater severity according to the Abbreviated Injury Scale (AIS); AIS 2+ include injury severity levels: 2 – moderate, 3 – serious, 4 – severe, 5 – critical, 6 – unsurvivable.

These data indicate that the high HIC values measured by the HIII-10C dummy in laboratory sled tests due to chin-to-chest contact are not replicating a real world injury mechanism. Children are not being injured by chin-to-chest contact.

Another reason we have decided not to use HIC as a criterion when using the HIII-10C dummy to test belt-positioning seats is UMTRI's information demonstrating that HIC can be reduced by poor shoulder belt placement.<sup>25</sup> UMTRI found in sled tests that when the shoulder belt slips off the HIII-10C dummy shoulder, the chin-to-chest contact did not occur because the dummy rolls out of the shoulder belt and moves forward. As a result, the HIC value was low but head excursion increased as the dummy's upper torso was not restrained by the shoulder belt. Although head excursion increased in situations where the shoulder belt slipped off the dummy, the values were still substantially within compliance limits, therefore giving a "passing" value to the belt-positioning seat. These data demonstrated that using HIC as an injury measure may encourage poor belt routing designs that place the shoulder belt more outboard, which could allow the dummy to roll out of the belt in a sled test.

NHTSA will focus efforts to adopt a head injury criterion as soon as possible. However, we will not set a date by which the HIC requirement will be adopted, as Advocates suggested. As noted in the 2010 SNPRM and earlier in this document, the agency has research projects underway to improve the capability of child dummies to assess CRS performance.<sup>26</sup> After the agency evaluates these improvements in the HIII-10C dummy, they will be considered for incorporation into FMVSS No. 213 and Part 572. At the time that the current dummy biofidelity

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<sup>25</sup> Klinich, K.D., Reed, M.P., Ritchie, N.L., Manary, M.A., Schneider, L.W., Rupp, J.D., "Assessing Child Belt Fit, Volume II: Effect of Restraint Configuration, Booster Seat Designs, Seating Procedure, and Belt Fit on the Dynamic Response of the Hybrid III 10 YO ATD in Sled Tests," September 2008, UMTRI-2008-49-2.

<sup>26</sup> The near-term Phase I upgrades to the HIII-6C and the HIII-10C dummies that are expected to be completed in the 2013 timeframe include improvements in the biofidelity of the dummy kinematics. The Phase II research is directed toward developing biomechanical response data for developing future improved child dummies. The Phase III of this research includes design, development, and evaluation of a new prototype 3, 6 and 10-year-old child dummies which is expected to be completed in the 2015 timeframe.

concerns are addressed, the agency will consider adopting HIC in the agency's compliance tests. A termination date in the standard would cause confusion, as HIC would not be adopted into the standard without a rulemaking proceeding providing notice of and an opportunity to comment on the adoption of the improved ATD and HIC.

The agency is not adopting the Alliance's recommendation to limit the HIC calculation to periods prior to chin-to-chest contact. We do not agree that the timing of chin-to-chest contact can be determined by the calculation of external forces applied to the head. We examined such an approach in detail in our research tests and found it difficult to determine the time of chin-to-chest contact in a definitive manner.

SafeRideNews inquired why HIC would not be adopted in tests of the HIII-10C in harnessed CRSs, when the problematic dummy readings occurred with the dummy in belt-positioning boosters. In response, the agency did not conduct an evaluation of the HIII-10C dummy in harness-equipped CRSs due to unavailability of harness-equipped CRSs rated for children weighing more than 65 pounds at the time of testing. However, the agency believes that there is a likelihood of uncharacteristically hard chin-to-chest contact using the HIII-10C in CRSs with harnesses. In tests with the HIII-10C dummy restrained in a CRS with a harness, the dummy's chest is restrained by the harness, letting the head move and rotate forward in a similar manner as when it is tested restrained in a belt-positioning seat. Accordingly, we are not adopting HIC for tests of the HIII-10C in all CRSs.

With this decision, other problems the commenters raised concerning the HIC measurement in FMVSS No. 213 are moot.

## Excursion

For the reasons provided in the notices of proposed rulemaking, we have adopted the proposal to measure head and knee excursions. Measuring the ATD's head excursion is an appropriate metric for evaluating belt-positioning seat performance. We believe that the HIII-10C exhibits good biofidelity for measuring head and knee excursion and that measuring a CRS's ability to limit excursions and chest acceleration provides a meaningful assessment of the protective capabilities of the CRS.

As discussed in the 2010 SNPRM (75 FR at 71655), in 2008, Ash et al.<sup>27</sup> published results of a study comparing the responses of a pediatric cadaver restrained by a three-point belt with that of a HIII-10C dummy in frontal sled tests. The cadaver sled test was replicated using the HIII-10C dummy, and the kinematics of the dummy and cadaver were compared, along with the accelerations of the head, shoulder and lap belt loads of the cadaver and dummy. (Due to anthropometric and age-equivalent differences between the cadaver and the dummy, geometric scaling was performed on the signals based on the seated height and material properties.)

The study showed similarities in the shoulder belt and lap belt forces and head excursions of HIII-10C and the scaled pediatric cadaver. The head excursions between the ATD and the scaled cadaver were similar, although there were differences in how the head reached its maximum excursion point. The T1 vertebra (base of the neck) of the cadaver had greater forward travel than that of the dummy while the dummy experienced greater rotation at the base of the neck than the cadaver. These differences in kinematics were attributed to the rigid thoracic spine of the dummy, along with extensive bending at the cervical and thoracic spine junction. The greater neck rotation at the base of the neck of the dummy compared to the

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<sup>27</sup> Ash, JH, Sherwood, CP, Abdelilah, Y, Crandall, JR, Parent, DP, Kallieris, D., "Comparison of Anthropomorphic Test Dummies with a Pediatric Cadaver Restrained by a Three-point Belt in Frontal Sled Tests," Proceedings of the 21<sup>st</sup> ESV Conference, June 2009.



cadaver led to greater angular velocity of the head. This greater head velocity, coupled with the stiff chin-to-chest interaction reported by NHTSA,<sup>28</sup> resulted in significantly higher HIC values for the dummy than that expected based on field injury risk.

Limiting head excursion will provide protection to the child occupant. We strongly disagree with Advocates that a head excursion limit is only a “rudimentary” surrogate measure of contact and non-contact head injuries. As discussed above, most head injuries to 8- to 12-year-old children are contact injuries and are due to impact with the vehicle interior. Also discussed above was the similarity between the shoulder belt and lap belt forces and head excursions of the HIII-10C and a scaled pediatric cadaver. Therefore, we believe a limit on the excursion of the HIII-10C dummy’s head in FMVSS No. 213 sled tests will mitigate the risk of head contact with interior surfaces in frontal crashes, and thereby result in reduced risk of head injury to heavier children restrained in CRSs. For that reason also, the agency disagrees with JPMA’s position that the HIII-10C dummy is only appropriate for evaluating the structural integrity of the CRS.

IIHS asked whether the head excursion limits are adequate to prevent children’s heads from striking forward structures, especially in the prevention of children sitting in back seats from striking front seats. CHOP recommended that NHTSA consider the head excursions of the HIII-10C as a minimum estimate of the true head excursion.

In response, the agency is currently reexamining<sup>29</sup> how well the test parameters of the FMVSS No. 213 sled test replicate the real world, including test velocity, excursion limits, and the test bench seat.<sup>30</sup> Among other things, this research, targeted for completion in 2013, will

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<sup>28</sup> Stammen, J., Sullivan, L., NHTSA Vehicle Research and Test Center, “Development of a Hybrid III 6 Yr. Old and 10 Yr. Old Dummy Seating Procedure for Booster Seat Testing,” January 2008, Docket NHTSA-2007-0048.

<sup>29</sup> The representativeness of the seat assembly and excursion limit were examined by NHTSA in the rulemaking responding to the TREAD Act. 68 FR 37620.

<sup>30</sup> See, NHTSA Vehicle Safety and Fuel Economy Rulemaking and Research Priority Plan 2011 – 2013, March 2011, Docket No. NHTSA-2009-0108-0032.

help the agency determine if the current head excursion limits need to be revised. NHTSA is also working on improving the biofidelity of the HIII-6C and -10C dummies by implementing revisions to the shoulder, thoracic spine, and neck which can be retrofitted into both the HIII-6C and -10C dummies. We will investigate how these revisions will affect head and neck kinematics of the two dummies.

In the meantime, the agency will adopt the head excursion proposed in the NPRM. The HIII-10C dummy is a reasonable and valuable tool for establishing the maximum head excursion limits.

In a comment to the 2005 NPRM, Advocates stated that children are not adults and should have injury criteria limits scaled to levels lower than those applied to adults. Advocates disagreed with NHTSA's tentative conclusion that "given the effectiveness of booster seats currently in use, the proposed injury values would be appropriate to ensure continued effectiveness of child restraints recommended for children weighting up to 80 pounds." Advocates stated that greater benefits can be obtained if appropriate injury criteria are tailored for children in this age group. In contrast, Graco stated its preference toward the application of the same criteria across all weight ranges and crash test dummies.

In response, it should be noted that in the TREAD Act rulemaking (final rule, 68 FR 37620), NHTSA considered adopting the scaled injury criteria adopted by FMVSS No. 208. NHTSA proposed that the FMVSS No. 208's scaled HIC limits of 390<sub>15</sub>, 570<sub>15</sub> and 700<sub>15</sub> be incorporated into FMVSS No. 213 for tests with the CRABI 12-month-, and Hybrid III 3- and 6-year-old dummies, respectively. However, NHTSA decided against adopting the scaled injury criteria because the agency was unable to confirm the existence of a safety problem that the scaled injury limits of FMVSS No. 208 would remedy. Relatedly, not enough was known about

what modifications to child restraints could be made for the restraints to meet the proposed injury limits. In balancing the effects of meeting the scaled injury criteria against the possible impacts on the price of restraints, the agency determined that the scaled injury limits should not be added to FMVSS No. 213 at that time. (See 68 FR at 37649.)

We continue to believe that the HIC limit of 1000 is appropriate for FMVSS No. 213. However, as NHTSA continuously considers potential improvements to FMVSS No.213, the agency has a series of research projects to generate improved response data for the head, neck, thorax, abdomen, and pelvis for future child dummies. NHTSA will continue to support and monitor this ongoing research and will consider the findings of this research in its efforts to enhance child passenger protection.

#### Chest Acceleration

The HIII-10C satisfactorily measures chest acceleration, which is a performance criterion adopted by today's final rule. A chest acceleration limit is established in FMVSS No. 213 to ensure that the CRS safely manages the crash energy of the 48 kmph (30 mph) crash simulated by the FMVSS No. 213 sled test. Chest acceleration measurement evaluates how well the child restraint and the seat belts allow the occupant to "ride down," or absorb, the crash forces over a period of time in a manner that avoids injury.<sup>31</sup>

#### Abdominal injury

The agency did not propose an abdominal injury criterion in this rulemaking. The 2005 NPRM and 2010 SNPRM discussed some of the agency's research projects that are exploring changes to the ATDs to measure abdominal loads.

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<sup>31</sup> The concept of "ride down" can be understood in baseball terms. When you move your hand rearward while catching a baseball, you are "riding down" the force from the ball and do not feel any pain due to the impact of the ball on your hand. If you held your hand stationary while catching the ball, the impact on your hand would be painful. With the chest g limit in FMVSS No. 213, the CRS will have to dissipate the crash forces in a controlled manner, so that the child will have a greater likelihood of safely riding down the crash forces.

In response to Advocates' comment that NHTSA should adopt the Abdominal Injury Ratio (AIR) injury criterion at this point until research on an instrumented abdomen is completed or an alternative abdominal injury measure established, there is not enough information at this time to support the AIR criterion. NHTSA discussed in the NPRM the development of AIR but did not propose the AIR criterion. As stated in the 2005 NPRM, we will continue to explore different techniques to measure abdominal injury, such as measuring abdominal loads directly with an abdominal insert under development. This issue is discussed in more detail in the accompanying 49 CFR Part 572 final rule published today.

We are hopeful that the instrumented abdominal insert under development could be retrofitted into the existing HIII-6C and HIII-10C dummies. The goal is for the abdominal insert to provide direct measurement of abdominal loads on the dummies and facilitate the agency's ability to determine abdominal injury and submarining potential in frontal sled tests. However, adopting an abdominal injury measure at this time would be premature.

For immediate use now, the agency has adopted the use of a correlate to abdominal injuries, i.e., knee excursion. This final rule for FMVSS No. 213 imposes limits on knee excursion and head excursion for the HIII-10C. The limit on knee excursion prevents restraint manufacturers from controlling head excursion by designing their restraints so that children submarine excessively during a crash. The agency has observed a strong correlation between knee excursion and submarining in the child dummies.<sup>32</sup>

The agency is not proposing to test the dummies seated in an out-of-position state (i.e., slouched position). The agency believes out-of-position testing would unnecessarily increase the testing burden. We also believe that achieving an acceptable, repeatable, and reproducible out-

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<sup>32</sup> Klinich, K., Reed, M., Orton, N., Manary, M., Rupp, J., "Optimizing Protection for Rear Seat Occupants: Assessing Booster Performance with Realistic Belt Geometry Using the Hybrid III 6YO ATD," UMTRI Report, University of Michigan, Ann Arbor, MI, March 2011.

of-position test would take a substantial amount of time and agency resources due to the difficulty of positioning the dummy in a consistent manner, when not seated as intended. We have not found a safety need that would justify further complications and delays in this rulemaking that would result from developing out-of-position requirements.

## 2. HIII-6C Dummy

We do not agree with the suggestion from Evenflo to suspend the use of HIC for the HIII-6C dummy. Some CRS manufacturers are using the HIII-6C dummy to certify the compliance of their CRSs to FMVSS No. 213 and have found the dummy to be a satisfactory test instrument even with the use of HIC as an injury measure. The manufacturers have developed products that are able to meet the HIC criterion and that are able to limit hard chin-to-chest contact of the ATD. We do not find good reason to suspend the criterion for those products.

We realize that, for some manufacturers of products, using the HIII-6C dummy to certify the product has been problematic. The agency believes it would be prudent to improve the HIII-6C dummy to make it more useful as an FMVSS No. 213 test device before making its use mandatory. On September 9, 2011 (76 FR 55825), NHTSA issued a final rule that permits, at the manufacturer's option, the use of either the Hybrid II 6-year-old child dummy (H2-6C) or the HIII-6C dummy in compliance tests of CRSs. Products that are currently certified as meeting FMVSS No. 213 when tested with the H2-6C need not be removed from the market, contrary to what Evenflo suggests. Therefore, we see no need to suspend the use of HIC for the HIII-6C dummy.

### d. UMTRI Positioning Procedure

Generally described, the UMTRI procedure, developed for the HIII-6C and HIII-10C dummies, first involves centering the belt-positioning seat on the seating position of the test

bench seat. A 30 lb (133 Newton (N)) force is then applied to push the belt-positioning seat rearward into the test bench seat. The dummy is prepared with a lap shield and a pelvis positioning pad before being positioned on the belt-positioning seat. The lap shield is placed on the ATD's lap to keep the lap belt from intruding into a gap that the Hybrid III ATDs have between the pelvis flesh and thigh flesh. A pelvis positioning pad, placed behind the dummy, is used to help position the dummy with a slight slouch, which allows the dummy to adopt a posture similar to a child seated in a relaxed position. The dummy is positioned and centered on the belt-positioning seat or other CRS and is pushed rearward by applying a 40 lb (177 N) force on the dummy's lower pelvis and the thorax. The dummy's knees are placed pelvis width apart. These steps help the dummy achieve a "natural" seating position on the belt-positioning seat.

The UMTRI dummy positioning procedure results in a more slouched dummy when compared to the 2008 SNPRM procedure using the same belt-positioning seat model. The slouched dummy, replicating a child in a relaxed position, results in higher HIC values than if the dummy were in a more upright position.

### Comments

All but one of the commenters were supportive of using the UMTRI positioning procedure to test the HIII-6C and HIII-10C dummies in belt-positioning seats, believing that the procedure would position the ATDs in a more realistic seating posture than the 14 degree torso angle positioning procedure. Several commenters did not support the UMTRI positioning procedure's inclusion of a pelvis positioning pad.

Evenflo opposed the inclusion of the UMTRI positioning procedure into FMVSS No. 213. NHTSA had stated in the 2010 SNPRM that the UMTRI dummy positioning procedure resulted in the highest torso angles (i.e., a more slouched dummy) when compared to the 2008

SNPRM procedure using the same belt-positioning seat model, resulting in higher HIC values. Consistent with that observation, in its comments Evenflo stated that it believes that the UMTRI procedure yields higher HIC values, and that some products that are currently compliant using the FMVSS No. 213 procedure may have to be removed from the market.

#### Agency Response

After evaluating the comments and all available information, the agency has decided to adopt the UMTRI dummy positioning procedure for the HIII-6C and HIII-10C dummies in belt-positioning seats, with the exception of the provision for use of the pelvis positioning pad for the HIII-6C dummy.

The UMTRI dummy positioning procedure was developed from a laboratory study funded by NHTSA. In this study, UMTRI measured the postures of 44 boys and girls 5 to 12 years in age in five different belt-positioning seats and a vehicle seat.<sup>33</sup> Using these data, UMTRI developed a positioning procedure for the HIII-6C and the HIII-10C dummies such that the dummy posture was representative of the average posture of children of similar size in the belt-positioning seats. Due to differences in child and dummy anthropometry, a pelvis positioning pad placed behind the dummy was needed to help position the dummy with a posture similar to that of a similar-size child seated in a relaxed position in a belt-positioning seat.

We have determined that the UMTRI procedure should be incorporated into FMVSS No. 213 for the reasons explained in the 2010 SNPRM. The UMTRI procedure is relatively easy to implement, and does not require numerous positioning iterations as did the procedure proposed by the 2008 SNPRM. The procedure is very similar to the procedure NHTSA currently uses to

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<sup>33</sup> Reed, M., Ebert-Hamilton, S., Klinich, K., Manary, M., Rupp, J., "Assessing Child Belt Fit, Volume I: Effects of Vehicle Seat and Belt Geometry on Belt Fit," University of Michigan Transportation Research Institute (UMTRI) Report to NHTSA, September 2008, <http://deepblue.lib.umich.edu/bitstream/2027.42/64459/1/102442.pdf> (last accessed Sept. 6, 2011).

position ATDs in child restraints for the FMVSS No. 213 compliance tests. However, the UMTRI procedure includes additional steps throughout the procedure, which facilitates more control of the CRS, the ATD, and the positioning of the seat belt, which results in reduced variability in the test procedure.

The UMTRI procedure lets the belt-positioning booster design dictate the posture of the dummy and the belt routing, so it results in a more accurate assessment of the CRS's characteristics than a procedure (proposed in the 2008 SNPRM) which tries to achieve a rigid positioning of the dummy in the CRS. The UMTRI procedure lets the dummy replicate a posture a child would adopt in a relaxed, seated position.

Importantly, the UMTRI procedure showed reasonable repeatability for all injury measures (with the exception of HIC). See discussion in the 2010 SNPRM, 75 FR at 71652-71653. (The HIII-10C dummy's neck and lumbar spine can be adjusted to different preset angles. To control for extraneous variables, this final rule is specifying setting the adjustment angle for the dummy's neck at SP-16<sup>34</sup> and that for the lumbar spine at SP-12.<sup>35</sup>)

With regard to Evenflo's comment, this final rule does not apply the UMTRI procedure to CRSs other than those tested with the HIII-6C and the HIII-10C ATDs. With regard to the HIII-6C, this final rule does not specify use of the pelvic positioning pad with the HIII-6C dummy (see discussion in next section below). With regard to the HIII-10C, this final rule does not adopt the HIC criterion. To our knowledge, with those allowances in this final rule, no product that is currently compliant using the FMVSS No. 213 procedure will become non-

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<sup>34</sup> See Figure 20 of the "Procedure for Assembly, Disassembly, and Inspection (PADI) of the HIII-10C," August 2011, which has been placed in the docket of the 49 CFR Part 572 final rule published today to accompany this final rule.

<sup>35</sup> See Figure 45 of the PADI document, supra.



compliant. Thus, we believe that Evenflo's concerns about the UMTRI procedure have been addressed.

#### Pelvis Positioning Pad

JPMA opposed the pelvis positioning pad for testing belt-positioning seats with both the HIII-6C and the HIII-10C dummies, stating that the pelvis positioning pad adds another variable into the testing procedures and would increase the pre-test torso angle of the dummies, which would increase the likelihood of hard chin-to-chest contact, thus exacerbating the variability of HIC scores. Evenflo also opposed the pelvis positioning pad, stating that, while there may be some evidence that children may sit more reclined than the test dummy, using the pad results in an artificial orientation that would be inconsistent with manufacturer's instructions. Evenflo added that the additional recline of the dummy may exacerbate the propensity for high HIC scores as a result of excessive neck movement and/or hard chin-to-chest contact during the dynamic test.

#### Agency Response Regarding the Pad and the HIII-6C

This final rule does not specify the use of the pelvis positioning pad for tests with the HIII-6C dummy.

We recognize that some manufacturers are currently using the HIII-6C dummy to certify the compliance of their CRSs to FMVSS No. 213, and that they are positioning the dummy, and measuring HIC, as currently required by FMVSS No. 213. The UMTRI positioning procedure without the pelvis positioning pad is very similar to the method of positioning the dummy in a belt-positioning seat specified in FMVSS No. 213. We have decided to keep the UMTRI procedure as close as possible to the present FMVSS No. 213 procedure, so that manufacturers currently using the HIII-6C dummy to certify the compliance of their CRSs to FMVSS No. 213

will not have to alter their CRS designs to certify compliance using the UMTRI positioning procedure with the HIII-6C dummy.

We agree with JPMA and Evenflo that the presence of the pelvis pad may result in a greater dummy torso angle than the current specified positioning procedure in FMVSS No. 213. Since the agency sled tests indicated that the dummy's torso angle affects the HIC values measured--higher torso angle may result in higher and more variable HIC values and a greater propensity for submarining--we agree with JPMA and Evenflo that the pelvis positioning pad may exacerbate the propensity for high HIC scores. So as not to magnify the HIC scores in this manner, we will not use the pelvis positioning pad with the HIII-6C ATD.

#### Agency Response Regarding the Pad and the HIII-10C

This final rule will use the pelvis positioning pad for the HIII-10C dummy in the UMTRI positioning procedure, as proposed in the 2010 SNPRM.

Since this final rule does not apply the HIC criterion to tests with the HIII-10C dummy, the concerns raised by the commenters that the pelvis positioning pad results in higher HIC measures in tests with the HIII-10C are moot.

Evenflo believes that the pelvis positioning pad creates an artificial orientation that would be inconsistent with manufacturer's instructions, and contrary to NHTSA's general practice to test CRSs in the manner set forth in the owner's manual. NHTSA disagrees that the orientation is artificial. The UMTRI laboratory test data shows that the pelvis positioning pad allows the dummy to adopt a posture similar to that of a child of a similar size in a belt-positioning booster seat. We believe that the pelvis positioning pad enhances the representativeness of the HIII-10C

ATD of children for whom the CRS is recommended, and makes for a more robust assessment of the effectiveness of the CRS in protecting a child occupant.<sup>36</sup>

This final rule also slightly modifies the specifications for the pelvis positioning pad from that proposed in the 2010 SNPRM. The final rule specifications are more general than the proposal, so as to provide flexibility in selecting material for the pelvis positioning pad while ensuring repeatable and reproducible performance. The compression set specifications for the pelvis positioning pad proposed in the 2010 SNPRM have not been adopted since they are not necessary for ensuring that the pad has good repeatability in FMVSS No. 213 dynamic sled tests. The proposed range of acceptable compression resistance in the compression-deflection test and the density of the foam have been increased, to provide flexibility in selection of material while ensuring performance that is repeatable and reproducible.

The pelvis positioning pad in this final rule is describes as: a 125 x 95 x 20 mm piece of closed cell (Type 2 according to ASTM D-1056-07) foam or rubber with compression resistance between 9 to 17 pounds per square inch (psi) in a compression-deflection test specified in ASTM D-1056-07 and a density of 7 to 12.5 lb/ft<sup>3</sup>. This final rule incorporates by reference ASTM D-1056-07 into FMVSS No. 213.

### Lap Shield

The UMTRI positioning procedure uses a lap shield to prevent the lap belt from getting caught between the pelvis and thigh of the dummy. We have decided to use a lap shield for the reasons set forth in the 2010 SNPRM,<sup>37</sup> but have corrected the figure depicting the form.

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<sup>36</sup> The desire to maximize the representativeness of the test dummy must be balanced with other factors. With regard to the HIII-6C dummy, HIC is still measured. NHTSA has determined that the HIC measurements would not be realistic reflections of the ability of the CRS to protect the child occupant if the dummy depicted a child in a relaxed position, i.e., if the pelvic positioning pad were used. Thus, for the HIII-6C, the agency has decided that, in order to obtain a valid HIC measurement, we will not to use the pelvic positioning pad to place the dummy in the “relaxed” position.

JPMA supported the UMTRI procedure and use of the lap shield but noted that the hip width of the HIII-10C is two inches wider than the HIII-6C dummy. The commenter asked whether the 2010 SNPRM intended to specify the use of the same lap shield for both dummies.

Agency Response: UMTRI has conducted sled tests with the HIII-6C and the HIII-10C dummies using the same lap shield for both dummies, and the results indicate that the same size lap shield is sufficient for both ATDs.<sup>38</sup> However, NHTSA has examined the lap shield that was depicted in proposed Figure 13 of the SNPRM and found that the dimensions of the lap shield drawing were incorrect, as they were significantly larger than the lap shield that UMTRI has used with the dummies. We have revised the lap shield drawing for this final rule with the correct dimensions.<sup>39</sup>

#### Lap Belt Tension

Concerning the specification for lap belt tension, the agency is not adopting the proposed sections S10.2.3 (d) (1) through (7) from the 2010 SNPRM, and is instead adopting an instruction to simply attach the vehicle belts and tighten them as specified in S6.1.2. We did not adopt the proposed instructions because they were specific to continuous belts. FMVSS No. 213 currently does not specify the use of continuous belts and thus the SNPRM's provisions for a continuous belt system were not relevant to the FMVSS No. 213 belt system.

#### Applying the Procedure to Other ATDs

In the 2010 SNPRM, the agency requested comment on whether the UMTRI procedure should be extended to dummies other than the HIII-10C and the HIII-6C dummies in belt-

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<sup>37</sup> In our tests leading up to SNPRM No. 2, we did not use the lap shield. In none of our tests did the lap belt get caught in the gap between the pelvis and thigh. However, we have decided that the lap shield should be specified for use in the FMVSS No. 213 compliance test to avoid the possibility that the lap belt could get caught in the thigh/pelvis gap. Thus, in the regulatory text adopted today, we specify use of the lap shield.

<sup>38</sup> The lap shield adheres to the dummy with double-sided tape, and because of this and its flexibility, conforms to the shape of the dummy's pelvis and thighs. Thus, only one lap shield is needed.

<sup>39</sup> See ex parte memorandum in Docket No. NHTSA-2010-0158.

positioning seats. The current FMVSS No. 213 procedure and the UMTRI procedure are very similar, except that the UMTRI procedure includes additional steps controlling the positioning of the CRS on the standard seat assembly, the positioning of the dummy, and positioning of the seat belts.

In its comment, JPMA stated that since its members have no testing experience using the UMTRI procedure with other dummies, the JPMA does not support using this procedure at this time with other dummies.

NHTSA has decided not to apply the UMTRI procedure to ATDs other than the HIII-6C and the HIII10C dummies. We are not aware of a need to apply the UMTRI procedure to the other ATDs. Some CRSs were tested with the HIII-3C dummy. In those tests, the ATD was positioned on the CRS using the current FMVSS No. 213 procedure. Changing the positioning procedure for the HIII-3C dummy to use the UMTRI procedure would require developing and evaluating a different size lap shield and pelvis positioning pad, endeavors for which agency time and resources are not available, and for which we do not see a need at this time.

**e. LATCH Issues**

The agency proposed in the 2010 SNPRM that a harness-equipped CRS tested with the HIII-10C dummy would be attached to the standard seat assembly with the seat belt system and would not be tested with the lower anchorages of the LATCH system. The agency proposed this restriction based on a comment<sup>40</sup> from the Alliance to the 2008 SNPRM requesting the amendment. The Alliance explained:

When NHTSA adopted FMVSS No. 225, “Child Restraint Anchorage Systems,” and made corresponding changes to FMVSS No. 213 to require CRSs to comply with that standard when tested utilizing Lower Anchorage and Tethers for Children (LATCH) anchorages, the LATCH systems in vehicles were intended

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<sup>40</sup> Docket No. NHTSA-2007-0048-0008, page 7.

for use by children up to 48 pounds. No vehicle manufacturer recommends the use of LATCH anchors with children that even approach the weight of the 10-year-old dummy. And although some CRS manufacturers are offering harness-equipped CRSs that are recommended for use by children that weigh up to 65 pounds, it is the Alliance's understanding that they explicitly instruct parents and caregivers to use the vehicle belts rather than the LATCH anchorages when using such a CRS with a child that weighs more than 50 pounds.

In the 2010 SNPRM, NHTSA also explained our view that, if NHTSA would not test a CRS with LATCH using the HIII-10C even though the CRS is recommended for use by children weighing over 29.5 kg (65 lb), then we believed that the CRS should bear a label informing the consumer not to attach the CRS with LATCH when restraining a child weighing more than 65 lb. The consumer would be instructed to use the seat belt system instead of LATCH. NHTSA proposed the labeling requirement to reduce the likelihood that a consumer would use the CRS with LATCH attachments when restraining heavier children and risk possible failure of the interface or the anchor system.<sup>41</sup>

### Comments

The proposal that the agency will not assess the CRS using LATCH when conducting compliance tests of CRSs with the 10-year-old dummy was generally supported by the commenters. In opposition was Sunshine Kids (SSK), which believed that the HIII-10C should be used to test the LATCH system of a CRS that has a stated capacity above 65 lb. SSK believed that consumers will use the LATCH system even if there is a label with a stated weight limit. SSK supported a certain dynamic approach that would enable CRS manufacturers to

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<sup>41</sup> There is also disparate messaging to consumers that needs to be addressed. Some CRS manufacturers of harness-equipped CRSs that are recommended for children weighing up to 65 lb, explicitly instruct the consumer to use the vehicle seat belt rather than the LATCH lower anchorages with a child that weighs more than approximately 50 lb. However, some CRS manufacturers do not prohibit the use of LATCH for CRS installation even when used by children weighing 65-80 lb. Vehicle manufacturers are largely silent about the recommended child weight limit for LATCH installation. Some vehicle models specify in the owner's manual a child weight limit of 40 to 48 lb for LATCH installation, while a few models specify a higher weight limit for LATCH installation of up to 50 lb child weight and permit tether anchor use for children weighing up to 60 lb. These differing weight limits have created confusion among consumers.

produce harness-equipped CRS for children up to 80 lb. JPMA also expressed a preference to use, in the future, a “dynamic test to define the labeling required on the CRS, if any, and define the testing for installation with LATCH based on the LATCH use limit specified on the CRS.” JPMA indicated that this approach is under development by an inter-industry working group.

There was widespread support for a label providing a weight limit as a means of providing needed information to the consumer. Many urged changes to the content of the labeling.<sup>42</sup> Safe Ride News urged NHTSA to consider that it must be the CRS manufacturer, not the vehicle manufacturer, that determines the LATCH limit for each car seat model, and CRS manufacturers should be required to determine such limits for all models. The Alliance and the Association of Global Automakers (Global Automakers) (formerly known as the Association of International Automobile Manufacturers (AIAM)) jointly urged the agency to adopt a requirement that CRS labels provide a maximum weight recommendation that is specific to each restraint model, based on the difference between 65 lb and the actual weight of the restraint.

Several consumer advocates believed that a label was needed also to address the different messages consumers receive from CRS and vehicle manufacturers on LATCH usage. There is consumer uncertainty about the strength of the LATCH anchors to withstand the forces of a CRS restraining an older child (i.e., how long before LATCH should no longer be used to attach the CRS and when the belts should be used instead). CU stated: “whether or not the research demonstrates the ability of the LATCH anchors to withstand child masses greater than 65 pounds, a clear message needs to be provided to consumers as to what such limits are.”

The Alliance and many others were concerned that the proposed wording that referred to a 65-lb child weight limit did not adequately account for the weight of the CRS, and thus may be

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<sup>42</sup> These will be discussed below. Main points involved: the reference to the weight of the child alone versus the combined weight of child and CRS; distinguishing lower anchorage use from upper tether anchorage use; and allowing provision for securing booster seats so they do not become projectiles in a crash.

providing misinformation. The Alliance indicated that the 2010 SNPRM's discussion of the reasons for the 65-lb child weight limit did not recount accurately enough the agency's analysis in the FMVSS No. 225 rulemaking that supported the 15,000 N LATCH anchorage load requirement (response to petitions for reconsideration, June 27, 2003, 68 FR 38208, 38218). The commenter believed that, because both the terms "child" and "child + CRS" were used in the FMVSS No. 225 analyses, the 2010 SNPRM's reference to "the child's weight of 65 lb" alone was inaccurate since the LATCH load requirements were developed using a combined maximum "child+CRS" weight of 65 lb. The Alliance believed the label should refer to the combined weight.

The Alliance stated that referring to the combined weight would also accord with vehicle manufacturer recommendations to discontinue the use of LATCH when the child is in the 48-lb range. That is, it is assumed that the weight of the CRS is about 15 lb, so a child in the 48-lb range, plus the typical weight of the CRS (15 lb), leads to a combined weight of approximately 65 lb.

Child restraint manufacturers differed in their response to the proposal. JPMA expressed a preference for an approach that uses a dynamic test to define the labeling required on CRS, but recognized that such an approach is not developed at this time. Commenting on the labeling proposal, the commenter recommended limiting the use of the LATCH system to children weighing 48 lb or less, until the joint industry study is completed. JPMA explained that the 48-lb recommendation was based on a total mass of 65 lb attached to the LATCH anchorages, which includes the mass of the CRS. The commenter stated that the recommendation is supported by the agency's calculations for the FMVSS No. 225 load requirements, and is consistent with most LATCH use limits defined by vehicle manufacturers.



Evenflo referred to work underway by vehicle and CRS manufacturers seeking to determine the maximum force exerted on the lower anchors by an occupied CRS under severe crash conditions. According to the commenter, the intent is that CRSs “exceeding this force threshold in laboratory testing be labeled accordingly so to alert caregivers to discontinue using the lower anchor system once the child reaches a specified mass, which will vary based on the specific design of the child restraint system.” Evenflo stated that this would allow more flexibility for CRS manufacturers to offer CRSs with internal harnesses that can be used to higher weight limits when installed with the lower anchors. Evenflo acknowledged that “[i]n the interim, a more conservative threshold based on occupant mass can be used,” which NHTSA understands to refer to the proposed label. Evenflo suggested that the label(s) should include the alert symbol and warning caption on a contrasting background and should be placed at or near the location where the lower anchor system attaches to or enters the child restraint to better draw attention to it.

As noted above, Sunshine Kids (SSK) supported an alternative approach rather than the proposed approach. It suggested that, “[u]sing the dynamic capacity for lower anchors and top tether is a more practical approach to determine the LATCH capacity of child restraints.” SSK stated that this approach would require all child restraints to be tested to a structural validation test that would measure the lower anchor load using the largest stated occupant capacity of the CRS for the dummy in the test. SSK provided a research paper in which 12 kN was assumed as a safe dynamic load limit for the LATCH lower anchors in NCAP-type crash testing, when using a size-appropriate dummy for a particular CRS model. SSK stated: “[L]oad limitation is designed into the structural assembly of the Radian [produced by SSK], effectively limiting the Lower Anchor loads to 12 KN for any ATD configuration under 35 mph 47 G sled pulse loads.”

The commenter believed that by requiring all CRSs to be tested under what the commenter believed to be a worst case loading, the consumer would be assured that the LATCH system and the CRS are designed around a maximum dynamic load that, the commenter believed, will not exceed the structural limits of the vehicle. SSK believed that this approach will allow the most freedom to design restraints that can fit large occupant weights and can work within the proposed dynamic limit of 12 kN for each lower anchor attachment in the vehicle.

Britax requested the proposed warning language be revised to permit the use of LATCH anchors for belt-positioning seats equipped with LATCH. Britax stated that some CRS manufacturers recommend the use of LATCH with the boosters solely to secure the booster, to ensure that if unoccupied, the booster will not become a flying projectile (and injure other vehicle occupants) in a vehicle crash. (This suggestion was echoed by JPMA and the Alliance.) Britax added that the occupant of the belt-positioning seat is secured by the vehicle seat belts and those vehicle seat belts would bear the occupant load in a motor vehicle crash, so the child occupant in the booster seat does not load the LATCH anchors.

SafetyBeltSafe asked that the label permit the top tether anchorage to be used to a higher weight of child occupant than the lower LATCH anchorages. The commenter stated that vehicle manufacturers often state or imply that 40 lb is the top weight that is acceptable for tether anchor use, but that Transport Canada testing has tested heavy dummies in seats using tether anchors and lower anchors with no failures. In its comment, Safe Ride News pointed out that while lower anchors have a functional alternative in the form of seat belts, the tether system does not usually have an alternative method. Safe Ride News asked NHTSA to be mindful of extending the option of tether use whenever possible, since “adding a tether to installation greatly increases the performance of a forward-facing car seat.” The commenter encouraged NHTSA “to be

careful in any rulemaking regarding testing and labeling to be certain that it does not inadvertently discourage or unnecessarily limit tether use.”

That view about the benefits of using the tether anchor to higher weights than the lower LATCH anchorages have been echoed by other parties in the context of other CRS programs. On February 25, 2011, NHTSA published a document requesting comments on a CRS-to-vehicle fit program that the agency was considering establishing under NHTSA’s New Car Assessment Program (NCAP).<sup>43</sup> Some commenters to that NCAP document suggested that the upper tether should be permitted for use with heavier/older children in harnessed CRSs since real world data indicates benefits of tether use and no adverse effects when used for heavier children. Some indicated that tether use should be permitted for children weighing up to 65 lb (child occupant weight alone, not combined with CRS).

#### Agency Response

All relevant issues raised by the commenters on the LATCH issue are addressed below.

##### 1. The Label<sup>44</sup>

The agency believes that a label on the CRS with a clear and consistent message to consumers regarding lower LATCH anchorage use is an appropriate means of reducing the likelihood that CRSs are attached to the vehicle seat with lower LATCH anchorages when occupied by children too heavy for the lower LATCH anchors. This would help prevent lower LATCH anchor loads from exceeding their required strength level specified in FMVSS No. 225. Such consistent labeling will reduce confusion regarding LATCH use amongst parents and caregivers and result in reduced misuse.

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<sup>43</sup> 76 FR 10637, Docket NHTSA-2010-00062.

<sup>44</sup> The following requirements apply only to CRSs equipped with an internal harness to restrain the child and with components to attach to a LATCH system, and for which the combined weight of the CRS and the maximum recommended child weight for use with the internal harness exceeds 65 lb.

## 2. Combined Weight

While the 2010 SNPRM proposed the label to have a 65-lb child weight limit, the agency agrees with the Alliance and others that the 65-lb weight limit should be the combined weight of the child and the weight of the CRS. In calculating the appropriate strength requirements of FMVSS No. 225, NHTSA based its calculations on an assumption that a combined weight of 65 lb (from the CRS + child) would be attached to the LATCH anchors (68 FR at 38218). This matter is of more significance today than before because CRSs have substantially increased in mass since the LATCH rulemaking, and children are riding in harnessed CRSs longer. At the time of the LATCH rulemaking, CRSs weighed on average about 15 lb and children were in harnessed CRSs until about age 4. Now, CRSs are heavier, with some weighing up to 30 lb, and there are harnessed CRSs marketed for children who weigh up to 80 lb.

## 3. Account for Weight of CRS

Similar to the Alliance, JPMA recommended that the label should state a weight limit for the child of 48 lb, rather than a child weight of 65 lb, to be more consistent with the analysis performed by the agency in setting the FMVSS No. 225 strength requirements. We concur with the commenter's view that the NPRM's reference to the child weight of 65 lb was not correct, the NPRM reference should have been to the combined weight of the CRS and the child. We note, though, that while having all CRSs refer to a single child weight of 48 lb has simplicity, there are some safety concerns with such an approach. Currently, there are some very heavy CRSs being produced, some weighing nearly 30 lb. If those very heavy CRSs had a label indicating that they could be used with LATCH with children up to 48 lb, the LATCH anchors could be overloaded in a crash (30 lb CRS+48 lb child).

Safe Ride News also raised concerns about a requirement that required all CRSs to reference a singular child weight. The commenter thought it would be confusing if there were, say, a manufacturer of a “high-weight harness seat” that intended its seat to only be used with LATCH with children up to 50 lb. If NHTSA required the CRS to be labeled with a warning against use with LATCH when the child reaches 65 lb, the consumer could be misled to believe the CRS can be used until the child reaches 65 lb. Safe Ride News believed that clear labeling regarding upper weight limits for each model is a better solution.

After considering all the comments on this issue, NHTSA has decided to modify the proposed label requirement, to take a more direct approach than referencing a single weight to be included on all CRS labels. As explained above, we are using combined weight (CRS + child) rather than child weight alone. The label will be unique to each CRS model equipped with an internal harness, for which the combined weight of CRS and the maximum recommended child weight for use with internal harness exceeds 65 lb. Such CRSs will have to be labeled with information instructing the consumer that the LATCH lower anchorages may be used to attach the CRS to the vehicle seat when restraining a child weighing  $x$  lb or less using the CRS’s internal harness. The “ $x$ ” value is 65 lb minus the weight of the CRS. The  $x$  value indicates the maximum weight of the child for which the LATCH lower anchorages can be used such that the combined weight (weight of CRS + child) does not exceed 65 lb. We believe that this approach is clearer to the consumer, because the caregiver is likely to know the weight of the child better than the “combined” weight of the CRS + child. The clear and direct information will reduce the risk that the consumer will keep the child attached to the vehicle via the LATCH lower anchorages beyond the design parameters of the LATCH system.

#### 4. Top Tether

A significant portion of the harm to children resulting from motor vehicle crashes could be prevented by the tether. Accident data from NHTSA's NASS CDS data files from 1995-2007 indicate that 39 percent of AIS 2+ injuries to children 0-12 years of age restrained in rear seating positions in frontal crashes were to the head and face, with 60 percent of these injuries resulting from contact with the seat and back support. Sled test data indicates that use of the upper tether reduces head excursions of the occupant restrained in the CRS and therefore, reduces the likelihood of head impacts against the vehicle structure.<sup>45</sup>

Tethers provide much more secure attachment of child restraints compared to being attached by the seat belt only or lower LATCH anchors only. In particular, they provide more rigid attachment at the top part of the child restraint, so that the CRS can "ride down" the crash while the vehicle is crushing. This considerably reduces excursion of the child's head relative to the vehicle interior, so the head is far less likely to hit other parts of the vehicle interior - the most likely cause of serious injury to a properly restrained child. A study in New South Wales, Australia found that top tether use was extremely effective in reducing injuries to children in CRSs.<sup>46</sup>

CRSs are required by FMVSS No. 213 to meet a minimum head excursion limit (a 32-inch requirement) without use of the tether. CRSs must also meet an enhanced head excursion requirement (28-inch) where a tether may be used to meet the more stringent requirement. Some child passenger safety consumer advocates suggest that the risks associated with the tether not

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<sup>45</sup> Legault, F. Gardner, B., Vincent, A., "The Effect of Top Tether Strap Configurations on Child Restraint Performance," Society of Automotive Engineers, SAE No. 973304, 1997. In addition, the quantifiable safety benefits that NHTSA estimated will accrue from the LATCH rulemaking was due to the tether.

<sup>46</sup> Paine M., Vertsonis, H., "Surveys of Child Restraint Use in South Wales," 2001 ESV Conference, NHTSA, 2001, <http://www-nrd.nhtsa.dot.gov/pdf/nrd-01/esv/esv17/proceed/00237.pdf>.

holding in a crash are small<sup>47</sup> and so the use of the top tether should not be limited by the weight of the child.

Although there are demonstrable benefits associated with a top tether, we are not convinced that tether use should be unlimited, i.e. that there need not be any weight restriction on use of the tether. Not enough is known about the consequences of not having any weight restriction on the use of the tether anchorage. Field data do not indicate any failure of tether anchors, likely because only few higher-weight rated harnessed-CRSs are in use by children weighing more than 50 lb. We believe that more field and research data are needed to determine reasonable limits for the combined child + CRS weight, to ensure that the tether anchor does not fail in most crash conditions, and to explore the consequences that may result from overloading the tether anchorage. The agency has initiated a research program to address weight limits for LATCH use, and the Alliance, JPMA, and Global Automakers also have been researching LATCH use weight limits. The agency will be able to better assess weight limits for the top tether after the research is complete. For now, the agency is not requiring a commensurate label on weight limits for use of the top tether.

#### 4. Testing with the HIII-10C

We agree with the Alliance and others that the LATCH load requirements in FMVSS No. 225 (68 FR 38218) were developed to ensure that the vehicle LATCH anchorages would be able to withstand forces resulting from a 65 lb mass in a severe crash of a vehicle into a rigid barrier (peak CRS acceleration of 48.4 gs). Using the HIII-10C dummy (weighing almost 80 lb) to test the CRS using the lower LATCH attachments could exceed the assumptions behind the strength

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<sup>47</sup> Comment from Safe Ride News on “Open Letter to the Curriculum Committee: Tethers Need Special Attention in Next Update,” <http://saferidenews.com/srndnn/srndnn/CPSTsProfessionals/EditorialsfromSafeRideNews/OpenLettertotheNCPSBCurriculumCommittee/tabid/281/Default.aspx>.

requirements of FMVSS No. 225. Accordingly, we believe that use of the ATD in such tests of the CRS would be unreasonable, since the LATCH system as a whole was not designed with such use in mind. Therefore, the agency will not attach CRSs using lower LATCH anchors in compliance tests when using the HIII-10C dummy. (See newly adopted paragraph S5(f) in the regulatory text.) However, as explained earlier, the top tether is used for meeting the enhanced head excursion requirements in FMVSS No. 213 and the agency will test harness equipped CRSs with and without tether attachment when using the HIII-10C dummy.

In coming to this position, we are mindful to view the LATCH system as a whole. It would not make sense to require CRSs to meet a LATCH performance requirement if vehicle manufacturers, for good reason, are not permitting the CRSs to be installed in their vehicles using LATCH. We also must be mindful that developments in CRS technologies must be compatible with vehicle technologies, and vice versa, when it comes to child passenger safety, since the interaction between CRSs and the vehicle in protecting occupants is crucial. (Incompatibilities between CRS and vehicle designs were the reasons NHTSA commenced the LATCH rulemaking which resulted in FMVSS No. 225.)

In response to SSK which wanted us to test CRSs with the HIII-10C when attached to LATCH in part due to concerns about consumer misuse, the label required by this final rule will reduce the likelihood of consumers misusing the LATCH lower anchorages to attach harness-equipped CRSs for which the LATCH system was not designed. Today's rule requires CRSs to provide information about lower LATCH use limits that is very specific to each CRS model. Consumers will be provided information on lower LATCH use limits that is clearer than ever. This clear instruction will facilitate the consumer's understanding--and that of any child seat



fitting station technicians assisting them--of when they should transition from the LATCH system and reattach the CRS using the seat belt system.

Evenflo also expressed concern about misuse, but noted that, to date, it was unaware of any real world data to suggest that misuse of this type was an issue. The agency did not receive data or comments on this issue from any other commenters. The agency believes that the label required by the final rule to be on the CRS, which provides a clear and consistent message regarding lower LATCH use, improves the current situation where no information or inconsistent information is typically provided the consumer. The information will help ensure that CRSs are not attached using lower LATCH anchors to the vehicle seat when occupied by children of weights outside of the design parameters of the lower LATCH system.

As noted above, the agency also has initiated a research program to address various issues with LATCH, and will be examining the weight limit for LATCH use. NHTSA also is aware of the project of the Alliance, the JPMA, and the Global Automakers to determine LATCH use limits.<sup>48</sup> However, an alternative to specify LATCH weight limits based on a dynamic assessment, as suggested by JPMA, Sunshine Kids, and Evenflo, is not developed at this time and may not be available in the foreseeable future. In the absence of a viable dynamic test or other approach, the engineering calculations used in the FMVSS No. 225 rulemaking, supra, to determine the LATCH load limits are appropriate.

The agency disagrees with the suggestion of JPMA, Evenflo, SSK, and Safe Ride News that CRS manufacturers should have the sole responsibility of determining the maximum weight limit for LATCH usage when this limit exceeds a combined weight of 65 lb. While the agency does not want to inhibit innovation, the agency believes that more research needs to be conducted in order to allow a higher weight limit for lower LATCH anchor use than the

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<sup>48</sup> This work has been on-going since mid-2006.

anchorage strength requirement in FMVSS No. 225 when compatibilities between the CRS and the vehicle are at issue.

Although SSK has stated that it has developed CRSs with load limiters that result in reduced lower LATCH anchor loads in sled tests, we know that crash pulse, the geometry and location of the vehicle anchors, the weight of the child and the CRS, and the unique design of the CRS are some of the factors affecting the anchor loads and we do not have enough information to conclude that these CRSs will keep anchor loads below the anchor strength of the vehicle in all configurations and uses in vehicles.<sup>49</sup> The agency believes that a well-considered assessment of these new CRSs would likely entail developing new procedures and requirements for this type of CRS. Such a change in the standard is out of the scope and timeframe of this rulemaking.<sup>50</sup>

The agency will continue to address various outstanding issues with LATCH in a research program we initiated in 2011. The agency will also examine closely the results from the ongoing research efforts by the industry working group to decide LATCH issues in the future, as appropriate.<sup>51</sup>

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<sup>49</sup> The April 11, 2011 joint comment from the Alliance and Global Automakers (p. 3) stated that it would support a provision in FMVSS No. 213 that would allow CRS manufacturers to certify their CRSs to a higher maximum weight rating (child+CRS greater than 65 lb) in certain circumstances, with the CRS attached using LATCH or with LATCH+belts simultaneously. The comment stated “This certification could be based on [an] FMVSS 213-type sled test with modifications to the pulse, test buck or other aspects of the FMVSS 213 test as appropriate for this purpose. In the absence of such certification, testing of restraints that are intended to accommodate larger children (CRS+child weighing more than 65 pounds) should not be tested under FMVSS [No.] 213 using the LATCH system.” This comment indicates that determining that a CRS is indeed compatible with LATCH in a range of vehicles, crash situations, and CRS use conditions involves a complex evaluation of the factors we mentioned and perhaps more.

<sup>50</sup> The risk of allowing such CRSs at this time when not enough is known about the compatibility factors is the increased risk of anchorage failure in a crash, which can be catastrophic to the child occupant. The risk of catastrophic failure can be avoided by having CRSs for heavier children labeled with an instruction to the consumer to use the vehicle seat belt system when the child attains a certain weight. Seat belts are a readily available, safe alternative for the consumer to use.

<sup>51</sup> The April 11, 2011 joint comment from the Alliance and Global Automakers presented certain scenarios (pp. 2-3) and asked NHTSA to address them in developing consumer labeling and FMVSS No. 213 testing protocols. For the most part, these comments are beyond the scope of this rulemaking.

Under today's final rule, harness-equipped CRSs, for which the combined weight of the CRS and the maximum recommended child weight for internal harness use exceeds 65 lb, will not be attached to the standard seat assembly using lower LATCH anchors when tested with a dummy whose weight is greater than the manufacturer-recommended child weight limit for LATCH use. (See S5(f) of the regulatory text.) For example, a harness-equipped CRS weighing 15 lb and recommended for children weighing up to 65 lb, will be attached to the standard seat with a lap belt when tested with the weighted 6-year old dummy since the ATD weighs 65 lb. The weight of the ATD will be greater than the manufacturer-recommended child weight for LATCH use (under today's final rule, the label will indicate that the CRS may be used with LATCH lower anchorages up to a child weight of 50 lb (65 lb – 15 lb = 50 lb). On the other hand, when tested with the HIII-6C dummy (which weighs 48 lb), the CRS will be tested separately with the lap belt attachment and with the LATCH attachment.

## 6. Boosters

In response to Britax and the JPMA, we agree that a child in a belt-positioning booster seat is restrained by the vehicle seat belt and that the LATCH lower anchors will not be excessively loaded if the booster happens to have LATCH attachments. The agency is not aware of any information indicating the use of belt-positioning seats with LATCH is a risk. Therefore, we are excluding belt-positioning seats from the LATCH maximum recommended weight label.

## 7. Other

1. In response to Evenflo's suggestion to include an alert symbol and warning caption on a contrasting background on the label and to place the label at or near the location where the lower anchor system attaches to or enters the child restraint, this final rule specifies standardized language that should appear on the label and instruction manual of each CRS. The inclusion of

the new language on the label will modify the current section S5.5.2(g)(1)(ii) regarding LATCH usage. This label is specified to have a capitalized statement “WARNING! DEATH or SERIOUS INJURY can occur” according to S5.5.2(g)(1) and a yellow heading area with the word “warning” and the alert symbol in black according to S5.5.2(k)(3)(1). With regard to location, FMVSS No. 213 already specifies the recommended locations for labels which are meant to be visible to the user.

2. In response to a comment from Advocates, we disagree with the suggestion to state on the label that LATCH is the preferred method of CRS attachment for children. LATCH was promulgated to simplify CRS installation and to reduce the continued high incidence of misuse and incorrect installation of child safety seats. However, not all vehicles in the current fleet are equipped with LATCH and not all seating positions in a vehicle are equipped with full LATCH systems. Therefore, seat belts are still used by caregivers to install CRSs in some seating positions. We believe that properly-installed CRSs provide high levels of safety whether installed using LATCH or the vehicle seat belts, and making the suggested statement on the label is unsupported.

#### **f. Lead Time**

As proposed in the 2005 SNPRM, this final rule is effective two years after the date of publication of this final rule, meaning that CRSs manufactured on or after that 2-year date are required to meet the requirements of this final rule. Optional early compliance with the requirements is permitted. We believe there is good cause for providing two as opposed to one-year for the effective date. CRS manufacturers will have to assess their products’ conformance to FMVSS No. 213 when tested with the new ATD, and will have to gear up to meet new labeling and other requirements as well.

In its comment on the 2005 NPRM, Graco had referred to the spikes observed in the dummy's HIC measurements and suggested that three years of lead time should be provided to allow manufacturers time to gain experience with the HIII-10C dummy, and to make any necessary product design changes. Since today's final rule is not adopting the HIC requirement, we believe Graco's concerns about needing time to work with HIC are addressed.

Dorel commented in 2005 expressing concerns about an unavailability of the HIII-10C. We believe many manufacturers are already testing with the HIII-10C dummy and that the final version of the HIII-10C dummy is very similar to that currently available. This issue is also discussed in the accompanying 49 CFR Part 572 final rule.

Graco was concerned about having additional lead time to get adjusted to testing with the HIII-6C. We believe that needing more time to adjust to this ATD is no longer an issue as the agency has permitted manufacturers the choice of NHTSA testing their child restraints with either the H2-6C dummy or the HIII-6C dummy until further notice.

**g. Mass limit**

The NPRM requested comment on eliminating the 4.4 kg mass limit for belt-positioning boosters in S5.4.3.2, Direct restraint, of FMVSS No. 213. That section states: "Except for a child restraint system whose mass is less than 4.4 kg, ... each Type I and lap portion of a Type II vehicle belt that is used to attach the system to the vehicle shall, when tested in accordance with S6.1, impose no loads on the child that result from the mass of the system[.]" NHTSA sought the amendment because the agency announced in 2003 that it would not enforce the requirement of S5.4.3.2 against belt-positioning seats until further notice. (Letter to John Stipancich; April 11, 2003; Docket No. NHTSA 2003-15005-1.) We believed that it did not make sense to have a requirement in the standard that the agency was not going to enforce. However, in place of the

4.4 kg mass limit, NHTSA was considering whether to propose a chest deflection limit. The agency's concern was about belt-positioning seats over-compressing the child's chest between a bulky booster seat back and the shoulder belt in a crash.

In the NPRM, NHTSA presented data from VRTC tests of the HIII-10C<sup>52</sup> with belt-positioning seats of different mass. The VRTC tests explored whether more massive booster seats caused excessive belt forces. Data from the tests, while limited, did not demonstrate a correlation between seat mass and belt force.

VRTC also examined the relationship between seat mass and the measured chest deflection of an HIII-10C test dummy. The data showed that the heaviest booster tested in the agency's limited test series resulted in the highest measured chest deflection with the HIII-10C test dummy. However, the second heaviest booster resulted in the lowest measured chest deflection. NHTSA sought comments on a chest deflection limit.

#### Comments

Britax and JPMA concurred with eliminating the 4.4 kg mass limit. On the other hand, Graco stated that there are insufficient injury data at this time that would support the elimination of the 4.4 kg mass limit for belt-positioning seats. No commenter provided data to augment the VRTC test data.

Britax, Evenflo, and Graco stated that the chest deflection criterion needed further study before being considered for adoption as a performance criterion in FMVSS No. 213. Britax stated that it was important to adopt chest deflection performance criteria only after the biomechanics community has agreed on reasonable limits. Evenflo stated that, to propose the inclusion of a chest deflection requirement in FMVSS No. 213, the interaction between the booster seat mass and dummy response should be better understood.

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<sup>52</sup> "Hybrid III 10-Year-Old Dummy (HIII-10C) Injury Criteria Development," supra.

### Agency Response

The agency has decided to amend S5.4.3.2 to exclude belt-positioning seats from the requirement, for the reasons provided in the NPRM. Since the agency is not enforcing the requirement against belt-positioning seats, it does not make sense to retain the requirement. The requirement is removed from FMVSS No. 213 for those CRSs.

At this time, we are not proposing a chest deflection limit to address the risk that a massive belt-positioning seat could overload a child's chest. We have studied the video footage of the VRTC tests of the six belt-positioning seats discussed in the 2005 NPRM and believe there is a possibility that the design of the belt-positioning seat, including mass distribution, flexibility, vehicle seat belt routing and geometry, could have more of an influence on the dummy's chest deflection than the mass of the belt-positioning seat.

We observed that, in a frontal impact sled test of a high back belt-positioning seat, there is initially little relative motion between the dummy and the belt-positioning seat on which it is positioned.<sup>53</sup> As the dummy moves forward and interacts with the lap/shoulder belt, it begins to decelerate while the belt-positioning seat may continue its forward motion (since it is not attached to the sled bench seat, its forward motion is only restricted by frictional forces). Later in the simulated crash event, the seat back of the belt-positioning seat may interact with the dummy's back, whose forward motion is restricted by the lap/shoulder belt.

It is this stage in the event where there may be a potential for the seatback of the belt-positioning seat to load the dummy's back and thereby result in increased loading of the shoulder belt on the dummy's chest. If the seatback of the belt-positioning seat loads the dummy during

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<sup>53</sup> The scenario described here is that when using a deceleration sled system. The sled system only simulates forward movement as described in this paragraph.

the time of maximum upper torso excursion when the chest deflection is highest, this seatback interaction with the dummy may result in elevated dummy chest deflection.

We observed through our testing, however, that the different belt-positioning seats loaded the ATD differently. The Britax Bodyguard (Test #9498), which has a mass of 5.98 kg, resulted in the lowest chest deflection of the six belt-positioning seat models tested. The video showed that the back of the belt-positioning seat moved together with the dummy and bent forward following the dummy's back and head movement. This particular design showed a lot of flexibility, and due to the low chest deflection measured by the ATD, we infer that the belt-positioning seatback did not contribute or contributed minimally to the loading of the dummy's chest by the belts.

The Century Next Step (4.28 kg) (Test #9505), Cosco Voyager (3.09 kg) (Test #9493) and Graco Grand Cargo (3.44 kg) (Test #9496) showed that at the time of maximum forward excursion, which coincided with the time of peak belt loading, the belt-positioning seatback was not in contact with the dummy's back. We can deduce that the belt-positioning seatback was not contributing to the loading of the chest at the time of maximum belt loading.

On the other hand, the kinematics of the Century Breverra (4.25 kg) (Test #9495) and Recaro Young Start (8.87 kg) (Test #9497) were less conclusive as the back of the belt-positioning seats appeared to be in contact with the dummy's back at the time of maximum forward excursion. However, it is not clear from the test data if this contact resulted in additional loading to the dummy's chest. The relevant test videos are available on NHTSA's Vehicle Crash Test Database<sup>54</sup> and may be accessed by identifying the test numbers reported in this section.

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<sup>54</sup> <http://www.nhtsa.gov/database.aspx/vehdb/querytesttable.aspx>



Our examination leads us to believe that belt-positioning seats can be made to reduce the effect of belt loading of the child's chest. The agency also believes that because the loading of the seatback of the belt-positioning seat on the dummy occurs during the rebound phase, after the maximum belt loading, it appears that the risk of chest injury due to the mass of a seat back are lessened. Accordingly, we are excluding belt-positioning seats from S5.4.3.2 altogether.<sup>55</sup>

We recognize that the agency's test data represent a small sample of the variety of belt-positioning seats on the market. We are also concerned about future belt-positioning seats and how they might increase in mass to accommodate larger children. Accordingly, the agency will continue to monitor and collect data on the effect of belt-positioning seat mass on dummy responses.

## **h. Miscellaneous Issues**

### **1. Housekeeping**

This final rule amends S10.2.1 of FMVSS No. 213 to add reference to the 12-month-old test dummy in the heading of that section and to remove reference in the section to the 9-month-old ATD, which is no longer used in compliance tests. References to the 9-month-old ATD are also removed from other sections of the standard. This final rule also removes and reserves S5.2.3.2 and S6.3 (specifying head impact protection requirements for infant restraints manufactured before August 1, 2005) since those sections are obsolete.

### **2. Belt Fit**

For several reasons, the agency did not propose belt fit requirements in this rulemaking. In the 2005 NPRM, NHTSA considered performance requirements for seat belt fit for booster

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<sup>55</sup> S5.4.3.2 of FMVSS No. 213 limits the force that may be imposed on a child by a belt resulting from the mass of the CRS. While we are not aware of any non belt-positioning CRSs that can apply such loads through the belts due to its mass, this requirement prevents such future designs. Therefore, the agency believes there is a need to retain S5.4.3.2 for non-belt-positioning seats.

seats or for belt guidance devices, but determined that existing data did not demonstrate that small differences in belt fit resulting from various booster seats translated into associated improvements in the dynamic performance of a belt system in a crash (70 FR at 51726). The agency added that the point at which belt fit degrades the performance of the belts from the point of “acceptable” to “unacceptable” was not determined.<sup>56</sup> (Id.) NHTSA also determined that previous static belt fit studies demonstrated variation in fit could be attributed to the interaction between vehicle designs and the CRSs (i.e., some vehicle-to-booster seat combinations were not as good as others and some booster seats made the belts fit the child dummies better in some vehicles than in others).<sup>57</sup> (Id.)

Later, in the 2010 SNPRM, in the context of discussing the UMTRI positioning procedure, we mentioned that we had made observations of UMTRI’s belt fit criteria when we were working with the HIII-6C and HIII-10C dummies. The agency stated that the variance and range in repeated measurements, especially for shoulder belt fit, was unacceptably high (75 FR at 71656). The results suggested that the belt-positioning procedure can be influenced by the operator.

Several commenters submitted views in response to these discussions. In response to the 2005 NPRM, IIHS, PC and Advocates expressed support for NHTSA establishing criteria for safety belt fit for booster seats. Conversely, JPMA believed that belt fit criteria should not be included at this time. In response to the 2010 SNPRM, IIHS and UMTRI stated that NHTSA’s repeatability and reproducibility concerns were associated with differences in the dummy jackets

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<sup>56</sup> NHTSA also stated that, although we believe that belts are better positioned over bony structure of the body than over soft tissue, how much variation from the optimal placement of the belt should be permitted by a performance standard for the fit to be considered “passing” is unknown. 70 FR 51727.

<sup>57</sup> Such variability makes challenging the meaningfulness of a belt fit assessment that only uses a standard FMVSS No. 213-style bench seat. Further, even when using the same booster and the same vehicle seat, the belt fitting protocols that we assessed lacked sufficient repeatability and reproducibility for regulatory purposes.

and friction issues between the belt and the dummy's chest. They stated that the procedure for measuring belt fit has been improved and the repeatability and reproducibility issues have been addressed.

Agency Response: The agency has not proposed belt fit requirements for the reasons explained in the previous rulemaking documents. We are not proceeding with a belt fit proposal at this time. We will keep an open mind to evaluating the merits of static belt fit criteria in the future. Among other issues, we will consider for future work whether belt fit could or should be measured statically. Data indicate<sup>58</sup> that the HIII-10C submarines like a human child. The dummy appears to have potential as an appropriate device for use in assessing seat belt syndrome in the event that we develop a sufficiently biofidelic abdomen that has a means to measure compression.

### **3. Shoe Size**

This final rule amends S9.1(f) of FMVSS No. 213 to amend the range of shoe sizes specified for the Hybrid III 6-year-old dummy, Hybrid III 6-year-old weighted dummy, and the Hybrid III 10-year-old dummy.

### **4. Preemption Language**

The American Association for Justice (AAJ) comments to the 2008 SNPRM objected to the preamble's discussion of the preemptive effect of the rule. NHTSA's June 14, 2010 final rule on FMVSS No. 305, "Electric-powered vehicles; electrolyte spillage and electrical shock protection," has already responded to AAJ's concerns about this issue. See, 75 FR 33515, at 33524-33525.

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<sup>58</sup> Reed, M., Klinich MA, Ebert-Hamilton, S., Klinich, K., Manary, M., Rupp, J., "Assessing Child Belt Fit, Volume II: Effects of Restraint Configuration, Booster Seat Designs, Seating Procedure, and Belt Fit on the Dynamic Response of the Hybrid III 10 YO ATD in Sled Tests," September 2008, UMTRI-2008-49-2.

## **V. RULEMAKING ANALYSES AND NOTICES**

### **Executive Order (E.O.) 12866, E.O. 13563 and DOT Regulatory Policies and Procedures**

This rulemaking action has considered the impact of this regulatory action under E.O. 12866 and E.O.13563 and the Department of Transportation's (DOT) regulatory policies and procedures. This rulemaking action was not reviewed by the Office of Management and Budget under E.O. 12866. The rulemaking has also been determined not to be significant under DOT's regulatory policies and procedures (44 FR 11034, February 26, 1979).

This final rule adopts use of a new test dummy in agency tests of child restraints. The benefits cannot be quantified. However, assuring that child restraints can meet the FMVSS No. 213 requirements when tested with a 10-year-old child test dummy should be beneficial. All child restraints tested by the agency with the HIII-10C met the performance requirements of this final rule, so costs will be minimal.

### **Regulatory Flexibility Act**

Pursuant to the Regulatory Flexibility Act (5 U.S.C. 601 et seq., as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever an agency is required to publish a notice for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small governmental jurisdictions). The Small Business Administration's regulations at 13 CFR Part 121 define a small business, in part, as a business entity "which operates primarily within the United States." (13 CFR §121.105(a)). No regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. The SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the

factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities.

NHTSA has considered the effects of this rulemaking action under the Regulatory Flexibility Act. I hereby certify that this final rule will not have a significant economic impact on a substantial number of small entities.

NHTSA estimates there to be 20 manufacturers of child restraints, eight or ten of which could be small businesses.

The certification responsibilities of manufacturers are generally not affected by this final rule. Manufacturers of child restraints currently must certify their products to the dynamic test of Standard No. 213. They typically provide the basis for those certifications by dynamically testing their products using child test dummies. The effect of this final rule on most child restraints will be to subject them to testing with a new dummy. All child restraints tested by the agency with the HIII-10C met the performance requirements adopted today, so costs will be minimal.

The labels and owner's manual of some child restraints will have to be revised to add a sentence on consumer information. The cost of revising the labels is minimal.

### **National Environmental Policy Act**

NHTSA has analyzed this rulemaking action for the purposes of the National Environmental Policy Act. The agency has determined that implementation of this action would not have any significant impact on the quality of the human environment.

### **Executive Order 13132 (Federalism)**

NHTSA has examined today's 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 rulemaking would not have sufficient federalism implications to warrant consultation with State and local officials or the preparation of a federalism summary impact statement. The final rule would 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 preempt 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 addressing the same aspect of performance.

The express preemption provision described above is subject to a savings clause under which “[c]ompliance with a motor vehicle safety standard prescribed under this chapter does not exempt a person from liability at common law.” 49 U.S.C. § 30103(e) Pursuant to this provision, State common law tort causes of action against motor vehicle manufacturers that might otherwise be preempted by the express preemption provision are generally preserved. However, the Supreme Court has recognized the possibility, in some instances, of implied preemption of such State common law tort causes of action by virtue of NHTSA’s rules, even if not expressly preempted. This second way that NHTSA rules can preempt is dependent upon there being an actual conflict between an FMVSS and the higher standard that would effectively be imposed on motor vehicle manufacturers if someone obtained a State common law tort

judgment against the manufacturer, notwithstanding the manufacturer's compliance with the NHTSA standard. Because most NHTSA standards established by an FMVSS are minimum standards, a State common law tort cause of action that seeks to impose a higher standard on motor vehicle manufacturers will generally not be preempted. However, if and when such a conflict does exist - for example, when the standard at issue is both a minimum and a maximum standard - the State common law tort cause of action is impliedly preempted. See Geier v. American Honda Motor Co., 529 U.S. 861 (2000).

Pursuant to Executive Order 13132 and 12988, 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 today's rule and finds that this rule, like many NHTSA rules, prescribes only a minimum safety standard. As such, NHTSA does not intend that this rule preempt state tort law that would effectively impose a higher standard on motor vehicle manufacturers than that established by today's rule. Establishment of a higher standard by means of State tort law would not conflict with the minimum standard announced here. Without any conflict, there could not be any implied preemption of a State common law tort cause of action.

#### **Executive Order 12988 (Civil Justice Reform)**

With respect to the review of the promulgation of a new regulation, section 3(b) of Executive Order 12988, "Civil Justice Reform" (61 FR 4729, February 7, 1996) requires that Executive agencies make every reasonable effort to ensure that the regulation: (1) Clearly

specifies the preemptive effect; (2) clearly specifies the effect on existing Federal law or regulation; (3) provides a clear legal standard for affected conduct, while promoting simplification and burden reduction; (4) clearly specifies the retroactive effect, if any; (5) adequately defines key terms; and (6) addresses other important issues affecting clarity and general draftsmanship under any guidelines issued by the Attorney General. This document is consistent with that requirement.

Pursuant to this Order, NHTSA notes as follows. The preemptive effect of this rule is discussed above. 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 OMB control number. Before seeking OMB approval, Federal agencies must provide a 60-day public comment period and otherwise consult with members of the public and affected agencies concerning each collection of information requirement. NHTSA believes the labeling requirement for the LATCH anchorages will result in a collection of information burden on child restraint system manufacturers. We are providing a 60-day comment period on reporting burdens and other matters associated with the labeling requirements.

Under the Paperwork Reduction Act of 1995, before an agency submits a proposed collection of information to OMB for approval, it must first publish a document in the **Federal Register** providing a 60-day comment period and otherwise consult with members of the public and affected agencies concerning each proposed collection of information. The OMB has



promulgated regulations describing what must be included in such a document. Under OMB's regulation (at 5 CFR 1320.8(d)), an agency must ask for public comment on the following:

Whether the proposed collection of information is necessary for the proper performance of the functions of the agency, including whether the information will have practical utility;

The accuracy of the agency's estimate of the burden of the proposed collection of information, including the validity of the methodology and assumptions used;

How to enhance the quality, utility, and clarity of the information to be collected;

How to minimize the burden of the collection of information on those who are to respond, including the use of appropriate automated, electronic, mechanical, or other technological collection techniques or other forms of information technology, e.g. permitting electronic submission of responses.

In compliance with these requirements, NHTSA asks for public comments on the following collection of information:

Title: "Consolidated Child Restraint System Registration, Labeling and Defect Notifications." OMB Control Number: 2127-0576.

Requested Expiration Date of Approval: Three years from the approval date.

Type of Request: Label revision of a currently approved collection.

Affected Public: Business, Individuals and Households.

Summary of the Collection of Information: This rulemaking adds a sentence to the printed instructions and labeling of certain child restraint systems (those that have internal harnesses, and that are recommended for older children). Currently, child restraint manufacturers are required to provide printed instructions with step-by-step information on how the restraint is to be used. Without proper use, the effectiveness of these systems is greatly

diminished. Each child restraint system must also have a permanent label.<sup>59</sup> A permanently attached label gives “quicklook” information on whether the restraint meets the safety requirements, recommended installation and use, and warnings against misuse. The requested revision is to add a sentence to the existing instructions brochure and labeling that will inform the consumer that the lower anchors of a LATCH system may be used up to a combined weight of child and harnessed-child restraint of 65 lb. The purpose of this label is to reduce consumer confusion about using LATCH, and to assure that the lower anchors will be able to withstand the forces generated by the child and CRS in virtually all crashes.

Under this rule, child restraint systems equipped with internal harnesses to restrain the child and with components to attach to a child restraint anchorage system and for which the combined weight of the child restraint system and the maximum recommended child weight for use with internal harnesses exceeds 65 pounds, will be required to be labeled with the following statement: “Do not use the lower anchors of the child restraint anchorage system (LATCH system) to attach this child restraint when restraining a child weighing more than \_\_\_\_\*  
[where \* is the recommended weight value in English and metric units such that the sum of the recommended weight value and the weight of the child restraint system does not exceed 65 pounds (29.5 kg)] with the internal harnesses of the child restraint.”

NHTSA anticipates a change to the hour burden or costs associated with the revised child restraint labels and written instructions. Child restraint manufacturers produce, on average, a total of approximately 4,500,000 child restraints per year. The label would apply to approximately 50 percent of the total annual production (2,250,000 units). The hour burden

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<sup>59</sup> FMVSS No. 213 also requires child restraint manufacturers to provide owner-registration cards and to keep records relating to owner registration information, so that owners can be notified about noncompliance or defect recall campaigns. These owner registration requirements are not affected by this rulemaking.

associated with the revised label consist of the child restraint manufacturer: (1) determining the maximum allowable child weight when using the lower LATCH anchor attachments as a means of installation by subtracting the weight of the child restraint from 65 pounds and (2) adding this information on an existing label and instruction manual. We estimate 2 seconds of additional burden per child restraint for the determination of the maximum allowable weight and the addition of the information on the existing label and instruction manual (2 sec x 2,250,000 units = 4,500,000 seconds = 1,250 hours).

Estimated Additional Annual Burden: 1,250 hours

Comments are invited on: Whether the proposed collection of information is necessary for the proper performance of the functions of the Department, including whether the information will have practical utility; the accuracy of the Department's estimate of the burden of the proposed information collection; ways to enhance the quality, utility and clarity of the information to be collected; and ways to minimize the burden of the collection of information on respondents, including the use of automated collection techniques or other forms of information technology.

You may submit comments (identified by the DOT Docket ID Number above) by any of the following methods: Federal eRulemaking Portal: Go to <http://www.regulations.gov>. Follow the online instructions for submitting comments. Mail: Docket Management Facility: U.S. Department of Transportation, 1200 New Jersey Avenue S.E., West Building Ground Floor, Room W12-140, Washington, D.C. 20590-0001. Hand Delivery or Courier: West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue S.E., Washington, D.C., 20590-0001 between 9 a.m. and 5 p.m. ET, Monday through Friday, except Federal holidays. Fax: 202-493-

2251. Regardless of how you submit your comments, you should mention the docket number of this document. You may call the Docket at (202) 366-9324.

Note that all comments received will be posted without change to <http://www.regulations.gov>, including any personal information provided. Anyone is able to search the electronic form of all comments 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).

### **National Technology Transfer and Advancement Act**

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), Public Law 104-113, section 12(d) (15 U.S.C. 272) directs NHTSA to use voluntary consensus standards in its regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. 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 the Society of Automotive Engineers (SAE). The NTTAA directs the agency to provide Congress, through the OMB, explanations when we decide not to use available and applicable voluntary consensus standards.

After carefully reviewing the available information, NHTSA has determined that there are no voluntary consensus standards relevant to this rulemaking, except this rule incorporates by reference an American Society for Testing and Materials standard for testing foam materials.

**Unfunded Mandates Reform Act**

Section 202 of the Unfunded Mandates Reform Act of 1995 (UMRA) requires Federal 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 expenditure by State, local or tribal governments, in the aggregate, or by the private sector, of more than \$100 million in any one year (adjusted for inflation with base year of 1995). This final rule would not result in the expenditure by State, local, or tribal governments, in the aggregate, or by the private sector of more than \$100 million annually.

**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. This rulemaking is not subject to the Executive Order because it is not economically significant as defined in E.O. 12866.

**Executive Order 13211**

Executive Order 13211 (66 FR 28355, May 18, 2001) applies to any rulemaking that: (1) is determined to be economically significant as defined under E.O. 12866, and is likely to have a significantly adverse effect on the supply of, distribution of, or use of energy; or (2) that is designated by the Administrator of the Office of Information and Regulatory Affairs as a significant energy action. This rulemaking is not subject to E.O. 13211.

**Plain Language**

The Plain Language Writing Act of 2010 (P. L. 111-274) and Executive Order 12866 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 is not 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 this rulemaking easier to understand?

If you have any responses to these questions, please send them to NHTSA at the ADDRESSES section in the heading of today's final rule.

**Regulation Identifier Number (RIN)**

The Department of Transportation assigns a regulation identifier number (RIN) to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. You may use the RIN contained in the heading at the beginning of this document to find this action in the Unified Agenda. This rulemaking originally had the RIN 2127-AJ44. Today's final rule has a new RIN because a September 9, 2011 final rule on one of the issues of the rulemaking was considered to have completed action on RIN 2127-AJ44.

## Privacy Act

Anyone is able to search the electronic form of all comments 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 at 19478).

## List of Subjects in 49 CFR Part 571

Incorporation by reference, Labeling, Motor vehicle safety, Reporting and recordkeeping requirements, Tires.

In consideration of the foregoing, NHTSA amends 49 CFR part 571 as follows:

### **PART 571 – FEDERAL MOTOR VEHICLE SAFETY STANDARDS**

1. The authority 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 1.50.

2. Section 571.5 is amended by redesignating paragraphs (d)(16) through (d)(37) as paragraphs (d)(17) through (d)(38) and adding new paragraph (d)(16), to read as follows:

#### **§ 571.5 Matter incorporated by reference.**

\* \* \* \* \*

(d) \* \* \*

(16) ASTM D1056-07, “Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber,” approved March 1, 2007, into § 571.213.

\* \* \* \* \*

3. Section 571.213 is amended by:

- revising the definition of “child restraint system” in S4,
- adding S5(e) and (f),
- revising the introductory text of S5.2.1.2,
- removing and reserving the heading of S5.2.3, and removing S5.2.3.1 through S5.2.3.2((b)),
- revising the introductory text of S5.4.3.2, revising S5.5.2(g)(1)(ii),
- adding S5.6.1.12,
- revising S6.1.1(d)(1) and (d)(2), S6.1.2(a)(1)(ii), S6.1.2(d)(2)(i) and (ii), S6.2.3, S6.2.3(a) and (b),
- removing and reserving S6.3, S7.1.1, S7.1.1(a) through (d),
- revising S7.1.2(d) and (e) and adding S7.1.2(f),
- removing and reserving S9.1(b),
- revising S9.1(f), S9.3.1, S9.3.2, the introductory text of S10.2.1,
- removing and reserving S10.2.1(a) and (b)(1), (b)(1)(i) and (ii),
- revising the first sentence of S10.2.1(b)(2), the introductory text of S10.2.1(c)(1)(i), and the introductory text of S10.2.2,
- adding S10.2.3 (introductory text through paragraph (e)(2)), and,
- adding Figures 13, 14a, and 14b.

The revised, added, and reserved text and figures read as follows:

**§571.213 Child restraint systems.**

\* \* \* \* \*



S4. Definitions.

\* \* \* \* \*

Child restraint system means any device, except Type I or Type II seat belts, designed for use in a motor vehicle or aircraft to restrain, seat, or position children who weigh 36 kilograms (kg) (80 lb) or less.

\* \* \* \* \*

S5 \* \* \*

(e) Each child restraint system tested with a part 572 subpart T dummy need not meet S5.1.2.1(a).

(f) Each child restraint system that is equipped with an internal harness to restrain the child need not meet this standard when attached to the lower anchors of the child restraint anchorage system, when tested with a test dummy of a weight that results in the combined weight of the child restraint system and the test dummy to exceed 65 pounds. Such a child restraint must meet this standard when tested using its internal harnesses to restrain such a test dummy while attached to the standard seat assembly using the belt system.

\* \* \* \* \*

S5.2.1.2 The applicability of the requirements of S5.2.1.1 to a front-facing child restraint, and the conformance of any child restraint other than a car bed to those requirements, is determined using the largest of the test dummies specified in S7 for use in testing that restraint, provided that the 6-year-old dummy described in subpart I or subpart N of part 572 of this title and the 10-year-old dummy described in subpart T of part 572 of this title, are not used to determine the applicability of or compliance with S5.2.1.1. A front facing child restraint system

is not required to comply with S5.2.1.1 if the target point on either side of the dummy's head is below a horizontal plane tangent to the top of-- \*\*\*

\* \* \* \* \*

### S5.2.3 [Reserved]

\*\*\*\*\*

S5.4.3.2 Direct restraint. Except for belt-positioning seats, each belt that is part of a child restraint system and that is designed to restrain a child using the system and to attach the system to the vehicle, and each Type I and lap portion of a Type II vehicle belt that is used to attach the system to the vehicle shall, when tested in accordance with S6.1, impose no loads on the child that result from the mass of the system, or--

\*\*\*\*\*

### S5.5.2 \* \* \*

#### (g)(1) \* \* \*

(ii) “Secure this child restraint with the vehicle's child restraint anchorage system, if available, or with a vehicle belt.” [For car beds, harnesses, and belt-positioning seats, the first part of the statement regarding attachment by the child restraint anchorage system (LATCH system) is optional. For belt-positioning seats, the second part of the statement regarding attachment by the vehicle belt does not apply.] Child restraint systems equipped with internal harnesses to restrain the child and with components to attach to a child restraint anchorage system and for which the combined weight of the child restraint system and the maximum recommended child weight for use with internal harnesses exceeds 65 pounds, must be labeled with the following statement: “Do not use the lower anchors of the child restraint anchorage system (LATCH system) to attach this child restraint when restraining a child weighing more

than \_\_\_\_\* [\*insert a recommended weight value in English and metric units such that the sum of the recommended weight value and the weight of the child restraint system does not exceed 65 pounds (29.5 kg)] with the internal harnesses of the child restraint.”

\* \* \* \* \*

S5.6.1.12 The instructions for child restraint systems equipped with an internal harness to restrain the child and with components to attach to a child restraint anchorage system, and for which the combined weight of the child restraint system and the maximum recommended child weight for use with internal harnesses exceeds 65 pounds, must include the following statement: “Do not use the lower anchors of the child restraint anchorage system (LATCH system) to attach this child restraint when restraining a child weighing more than \_\_\_\_\* [\*insert a recommended weight value in English and metric units such that the sum of the recommended weight value and the weight of the child restraint system does not exceed 65 pounds (29.5 kg)] with the internal harnesses of the child restraint.”

#### S6.1.1 Test conditions.

\* \* \* \* \*

(d)(1) When using the test dummy specified in 49 CFR Part 572, subparts I and K, performance tests under S6.1 are conducted at any ambient temperature from 19°C to 26°C and at any relative humidity from 10 percent to 70 percent.

(2) When using the test dummies specified in 49 CFR part 572, subparts N, P, R or T, performance tests under S6.1 are conducted at any ambient temperature from 20.6 °C to 22.2 °C and at any relative humidity from 10 percent to 70 percent.

\* \* \* \* \*

## S6.1.2 \* \* \*

(a) \* \* \*

(1) \* \* \*

(ii) Belt-positioning seats. A belt-positioning seat is attached to either outboard seating position of the standard seat assembly in accordance with the manufacturer's instructions provided with the system pursuant to S5.6.1 using only the standard vehicle lap and shoulder belt and no tether (or any other supplemental device). Place the belt-positioning seat on the standard seat assembly such that the center plane of the belt-positioning seat is parallel and aligned to the center plane of the outboard seating positions on the standard seat assembly and the base of the belt-positioning seat is flat on the standard seat assembly cushion. Move the belt-positioning seat rearward on the standard seat assembly until some part of the belt-positioning seat touches the standard seat assembly back. Keep the belt-positioning seat and the seating position center plane aligned as much as possible. Apply 133 N (30 pounds) of force to the front of the belt-positioning seat rearward into the standard seat assembly and release.

\* \* \* \* \*

(d) \* \* \* \* \*

(2) \* \* \*

(i) The lap portion of Type II belt systems used to restrain the dummy is tightened to a tension of not less than 9 N (2 pounds) and not more than 18 N (4 pounds).

(ii) The shoulder portion of Type II belt systems used to restrain the dummy is tightened to a tension of not less than 9 N (2 pounds) and not more than 18 N (4 pounds).

\* \* \* \* \*

S6.2.3 Pull the sling tied to the dummy restrained in the child restraint system and apply the following force: 50 N for a system tested with a newborn dummy (49 CFR part 572, subpart K); 90 N for a system tested with a 12-month-old dummy (49 CFR part 572, subpart R); 200 N for a system tested with a 3-year-old dummy (49 CFR part 572, subpart P); 270 N for a system tested with a 6-year-old dummy (49 CFR part 572, subpart N or I); 350 N for a system tested with a weighted 6-year-old dummy (49 CFR part 572, subpart S); or 437 N for a system tested with a 10-year-old dummy (49 CFR part 572, subpart T). The force is applied in the manner illustrated in Figure 4 and as follows:

(a) Add-on Child Restraints. For an add-on child restraint other than a car bed, apply the specified force by pulling the sling horizontally and parallel to the SORL of the standard seat assembly. For a car bed, apply the force by pulling the sling vertically.

(b) Built-in Child Restraints. For a built-in child restraint other than a car bed, apply the force by pulling the sling parallel to the longitudinal centerline of the specific vehicle shell or the specific vehicle. In the case of a car bed, apply the force by pulling the sling vertically.

\* \* \* \* \*

S6.3 [Reserved]

\* \* \* \* \*

S7.1.1 [Reserved]

S7.1.2 \* \* \*

\* \* \* \* \*

(d) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 18 kg (40 lb) but not greater than 22.7 (50 lb), or by children in a specified height range that

includes any children whose height is greater than 1100 mm but not greater than 1250 mm is tested with a 49 CFR part 572, subpart N dummy (Hybrid III 6-year-old dummy).

(e) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 22.7 kg (50 lb) but not greater than 30 kg (65 lb) or by children in a specified height range that includes any children whose height is greater than 1100 mm but not greater than 1250 mm is tested with a 49 CFR part 572, subpart N dummy (Hybrid III 6-year-old dummy) and with a part 572, subpart S dummy (Hybrid III 6-year-old weighted dummy).

(f) A child restraint that is recommended by its manufacturer in accordance with S5.5 for use either by children in a specified mass range that includes any children having a mass greater than 30 kg (65 lb) or by children in a specified height range that includes any children whose height is greater than 1250 mm is tested with a 49 CFR part 572, subpart T dummy (Hybrid III 10-year-old dummy).

\* \* \* \* \*

#### S9.1 Type of clothing.

\* \* \* \* \*

(b) [Reserved]

\*\*\*\*\*

(f) Hybrid III 6-year-old dummy (49 CFR Part 572, Subpart N) and Hybrid III 6-year-old weighted dummy (49 CFR Part 572, Subpart S), and Hybrid III 10-year-old dummy (49 CFR part 572, subpart T). When used in testing under this standard, the dummies specified in 49 CFR Part 572, Subparts N and S, are clothed as specified in Subpart N and with child or youth size 13 M sneakers weighing not more than 0.45 kg each. When used in testing under this standard, the

dummy specified in 49 CFR Part 572, Subpart T, is clothed as specified in Subpart T and with youth size 3 sneakers weighing not more than 0.6 kg each.

\* \* \* \* \*

S9.3.1 When using the test dummies conforming to part 572 C, I, or K, prepare the dummies as specified in this paragraph. Before being used in testing under this standard, dummies must be conditioned at any ambient temperature from 19°C to 25.5°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

S9.3.2 When using the test dummies conforming to part 572 subparts N, P, R, S or T, prepare the dummies as specified in this paragraph. Before being used in testing under this standard, dummies must be conditioned at any ambient temperature from 20.6° to 22.2°C and at any relative humidity from 10 percent to 70 percent, for at least 4 hours.

\* \* \* \* \*

S10.2.1 Newborn dummy and 12-month-old dummy. Position the test dummy according to the instructions for child positioning that the manufacturer provided with the system under S5.6.1 or S5.6.2, while conforming to the following:

(a) [Reserved]

(b)(1) [Reserved]

(2) When testing rear-facing child restraint systems, place the newborn, or 12-month-old dummy in the child restraint system so that the back of the dummy torso contacts the back support surface of the system. \* \* \*

\*\*\*\*\*

(c)(1)(i) When testing forward-facing child restraint systems, extend the arms of the 12-month old test dummy as far as possible in the upward vertical direction. Extend the legs of the

12-month-old test dummy as far as possible in the forward horizontal direction, with the dummy feet perpendicular to the centerline of the lower legs. Using a flat square surface with an area of 2,580 square mm, apply a force of 178 N, perpendicular to:

\* \* \* \* \*

S10.2.2 Other dummies generally. When using: (1) the Hybrid III 3-year-old (part 572, subpart P), Hybrid II 6-year-old (part 572, subpart I), and Hybrid III weighted 6-year-old (part 572, subpart S) in child restraint systems including belt-positioning seats; (2) the Hybrid III 6-year-old (part 572, subpart N) and the Hybrid III 10-year-old (part 572, subpart T) in child restraint systems other than belt-positioning seats, position the dummy in accordance with S5.6.1 or S5.6.2, while conforming to the following:

\* \* \* \* \*

S10.2.3 Hybrid III 6-year-old in belt-positioning seats and Hybrid III 10-year-old in belt-positioning seats. When using the Hybrid III 6-year-old (part 572, subpart N) or the Hybrid III 10-year-old (part 572, subpart T) in belt-positioning seats, position the dummy in accordance with S5.6.1 or S5.6.2, while conforming to the following:

(a) Prepare the dummy.

(1) When using the Hybrid III 10-year-old dummy, prepare the dummy according to the following:

(i) Set the dummy's neck angle at the SP-16 setting ("SP" means standard procedure), see Figure 14a.

(ii) Set the dummy's lumbar angle at the SP-12 setting, see Figure 14b. This is done by aligning the notch on the lumbar adjustment bracket with the SP-12 notch on the lumbar attachment.



(iii) Adjust the limb joints to 1–2 g while the torso is in the seated position.

(iv) Apply double-sided tape to the surface of a lap shield, which is a piece of translucent silicone rubber 3 mm  $\pm$ 0.5 mm thick (50A durometer) cut to the dimensions specified in Figure 13. Place the lap shield on the pelvis of the dummy. Align the top of the lap shield with the superior anterior edge of the pelvis skin. Attach the lap shield to the dummy.

(v) Apply double-sided tape to one side of a pelvis positioning pad, which is a 125 X 95 X 20 mm (+/- 2 mm tolerance in each of the three dimensions) piece of closed cell (Type 2 according to ASTM D-1056-07) (incorporated by reference; see §571.5) foam or rubber cut from material having the following specifications: compression resistance between 9 to 17 psi in a compression-deflection test specified in ASTM D-1056-07 (incorporated by reference; see §571.5), and a density of 7 to 12.5 lb/ft<sup>3</sup>. Center the long axis of the pad on the posterior of the pelvis with the top edge of the foam aligned with the superior edge of the pelvis skin. Attach the pelvis positioning pad to the dummy.

(vi) Dress and prepare the dummy according to S9.

(2) When using the Hybrid III 6-year-old dummy, prepare the dummy according to the following:

(i) If necessary, adjust the limb joints to 1–2 g while the torso is in the seated position.

(ii) Apply double-sided tape to the surface of a lap shield, which is a piece of translucent silicone rubber 3 mm thick  $\pm$ 0.5 mm thick (50A durometer) cut to the dimensions specified in Figure 13. Place the lap shield on the pelvis of the dummy. Align the top of the lap shield with the superior anterior edge of the pelvis skin. Attach the lap shield to the dummy.

(iii) Dress and prepare the dummy according to S9.

(b) Position the belt-positioning seat according to S6.1.2 (a)(1)(ii).

(c) Position the dummy in the belt-positioning seat.

(1) Place the dummy on the seat cushion of the belt-positioning seat such that the plane of the posterior pelvis is parallel to the plane of the seat back of the belt-positioning seat, standard seat assembly or vehicle seat back, but not touching. Pick up and move the dummy rearward, maintaining the parallel planes, until the pelvis positioning pad, if used, or the pelvis or back of the dummy and the back of the belt-positioning seat or the back of the standard seat assembly, are in minimal contact.

(2) Straighten and align the arm segments horizontally, then rotate the arms upward at the shoulder as far as possible without contacting the belt-positioning seat. Straighten and align the legs horizontally and extend the lower legs as far as possible in the forward horizontal direction, with the feet perpendicular to the centerline of the lower legs.

(3) Using a flat square surface with an area of 2580 square millimeters, apply a force of 178 N (40 lb) first against the dummy crotch and then against the dummy thorax on the midsagittal plane of the dummy, perpendicular to:

(i) The plane of the back of the belt-positioning seat, in the case of a belt-positioning seat with a back, or,

(ii) The plane of the back of the standard seat assembly or vehicle seat, in the case of a backless belt-positioning seat or built-in booster.

(4) Rotate the arms of the dummy down so that they are perpendicular to the torso.

(5) Bend the knees until the back of the lower legs are in minimal contact with the belt-positioning seat, standard seat assembly or vehicle seat. Position the legs such that the outer edges of the knees are 180 +/- 10 mm apart for the Hybrid III 6-year-old dummy and 220 +/- 10 mm apart for the Hybrid III 10-year-old dummy. Position the feet such that the soles are

perpendicular to the centerline of the lower legs. In the case of a belt-positioning seat with a back, adjust the dummy so that the shoulders are parallel to a line connecting the shoulder belt guides. This can be accomplished by leaning the torso such that the dummy's head and neck are centered on the backrest components of the belt-positioning seat. In case of a backless child restraint, adjust the dummy's torso so that the head is as close to laterally level as possible.

(d) Apply the belt. Attach the vehicle belts and tighten them as specified in S6.1.2.

(e) Dummy final positioning.

(1) Check the leg, feet, thorax and head positions and make any necessary adjustments to achieve the positions described in S10.2.3(c)(5). Position the legs, if necessary, so that the leg placement does not inhibit thorax movement in tests conducted under S6.

(2) Rotate each dummy arm downwards in the plane parallel to the dummy's midsagittal plane until the arm contacts a surface of the child restraint system or the standard seat assembly, in the case of an add-on system, or the specific vehicle shell or specific vehicle, in the case of a built-in system, as appropriate. Position the arms, if necessary, so that the arm placement does not inhibit torso or head movement in tests conducted under S6.

\* \* \* \* \*

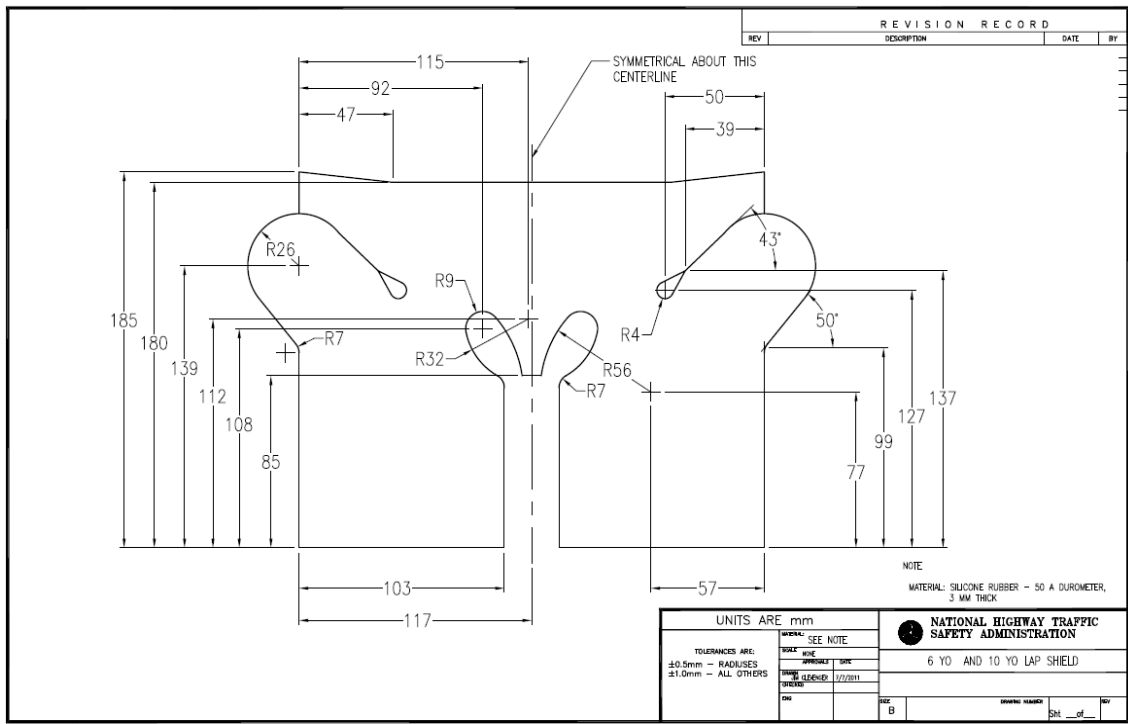


Figure 13 – Lap Shield

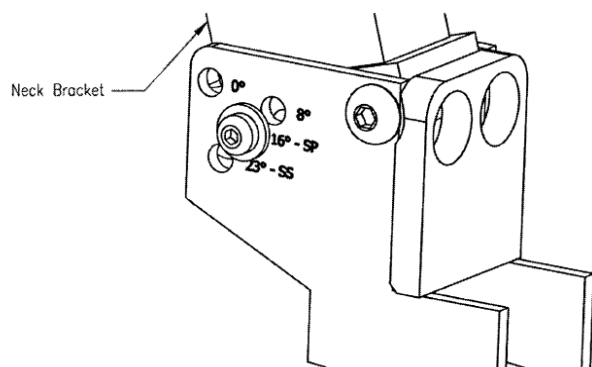


Figure 14a. HIII-10C Dummy Neck Angle Setting is SP-16 Degrees

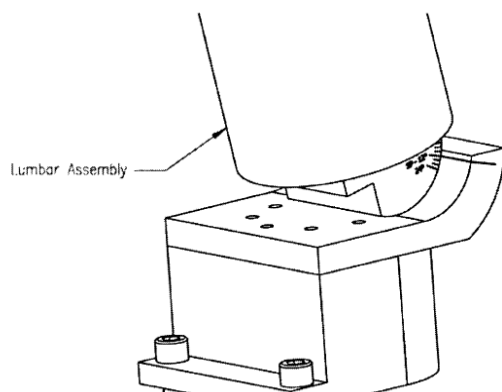


Figure 14b. HIII-10C Dummy Lumbar Angle Setting is SP-12 Degrees

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[Signature page for Final Rule, FMVSS No. 213, 10-yr-old test dummy]