

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 571

Federal Motor Vehicle Safety Standards; Child Restraint Systems; Denial of Petition for Rulemaking

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

ACTION: Denial of petition for rulemaking.

SUMMARY: This document denies a petition for rulemaking from Xportation Safety Concepts, Incorporated, requesting that NHTSA amend an air bag warning label requirement in the Federal motor vehicle safety standard for child restraints. The standard requires that each child restraint that can be used rear-facing bear a label directing caregivers not to place the child restraint on the front seat with an air bag, and provides other related warnings. The petitioner suggests that if a rear-facing child restraint is able to limit forces imposed on a test dummy by a deploying air bag, the child restraint should be excluded from the warning label requirement. The petitioner believes that its rear-facing child restraint is such a restraint.

NHTSA is denying the petition because the petitioner's suggested

methodology for testing the capability of rear-facing child restraints to protect against air bag forces does not adequately assess the safety risks that air bags pose to children. Further, there is no other available test that assures that a child restraint will perform well with the myriad of air bag systems in current and future vehicles. The agency reaffirms the merits of urging parents to place infants in a rear-facing child restraint in a rear seating position because a child is safer there than in a front passenger seating position. This document also presents other reasons for denying the petition.

FOR FURTHER INFORMATION CONTACT: For non-legal issues, you may call Mike Huntley of the NHTSA Office of Crashworthiness Standards, at 202-366-0029.

For legal issues, you may call Deirdre Fujita of the NHTSA Office of Chief Counsel at 202-366-2992.

You may send mail to both of these officials at the National Highway Traffic Safety Administration, 400 Seventh St., SW., Washington, DC., 20590.

SUPPLEMENTARY INFORMATION:

Background

To prevent or mitigate the effects of a crash, Federal Motor Vehicle Safety Standard No. 208 requires that vehicles be equipped with seat belts and, for front seat occupants, air bags that provide protection in frontal crashes.

Lap/shoulder belts, when used properly, are highly effective in reducing the risk of fatal and moderate-to-critical injury. Frontal air bags are also highly effective in reducing fatalities. Between 1986 and July 1, 2002, air bags saved an estimated 9,325 front seat occupants (7,786 drivers: 2,180 belted and 5,606 unbelted; and 1,539 front-right passengers: 431 belted and 1,108 unbelted). The number of lives saved annually by air bags is continuing to increase as the percentage of air bag-equipped vehicles on the road increases.

However, while air bags are saving an increasing number of people each year in moderate and high speed crashes, some air bags, particularly those installed in vehicles manufactured prior to model year (MY) 1998, have also caused fatalities, especially to unrestrained, out-of-position children, in relatively low speed crashes. As of October 1, 2002, NHTSA's Special Crash Investigation (SCI) program has confirmed a total of 221 fatalities induced by the deployment of an air bag. Of that total, 137 were children, 74 were adult drivers, and 10 were adult passengers. The number of air bag-related fatalities generally increased from 1990 (1) to 1997 (53), and decreased from 1997 to 2001 (6 confirmed¹) and 2002 (2 confirmed). The following table sets forth the number of confirmed air bag-related fatalities by crash year.

COUNTS FOR CONFIRMED* AIR BAG RELATED FATALITIES BY CRASH YEAR
[Through 10/01/02]

Fatals by Year	Children in rear-facing child safety seat (RFCSS)	Children not in RFCSS	Adult drivers	Adult passengers	Totals by year (confirmed)	Females 62" or less (confirmed)
1990	0	0	1	0	1	1
1991	0	0	4	0	4	1
1992	0	0	3	0	3	2
1993	0	1	4	0	5	2
1994	0	5	8	0	13	1
1995	3	5	5	0	13	4
1996	6	19	7	2	34	2
1997	4	27	18	4	53	4
1998	5	27	13	2	47	6
1999	3	18	3	0	24	2
2000	0	8	6	2	16	3
2001	1	3	2	0	6	0
2002	0	2	0	0	2	0
2003	0	0	0	0	0	0
Total	22	115	74	10	221	28

*Confirmed cases are those where the air bag has been confirmed to be the injury mechanism.

Infants in rear-facing child restraints have been killed by air bags primarily

because their riding position places them close to the air bag. A rear-facing

infant seat that is installed in the front seat of a vehicle with a passenger air bag

¹ Confirmed means that the Special Crash Investigation has been completed.

will almost always position the infant's head very close to that air bag. Closeness is a problem because, in order for an air bag to cushion an occupant's head, neck, chest and abdomen and keep the occupant from hitting the steering wheel, windshield or instrument panel, the air bag must move into place quickly. The force of a deploying air bag is typically greatest close to the air bag module as the air bag begins to inflate. If occupants are very close to or in contact with the cover of an air bag, they can be hit with enough force to cause serious injury or death when the air bag begins to inflate. Twenty-two fatally-injured infants were close to the air bag because they were in rear-facing infant seats installed directly in front of a passenger air bag.

In recent years, significant changes have occurred that have reduced the number of persons killed by air bags. As a result of public education programs, improved labeling, and media coverage, the public is much more aware of the dangers air bags pose to children in the front seat and is taking steps to reduce those dangers. Children are riding in the back seat more regularly. In cars with passenger air bags, the percentage of toddlers and infants riding in the back seat increased from about 70 percent in 1995 to about 90 percent in 1999. Technological changes in the design of air bag systems have also reduced the risk posed by air bags. These changes include reducing the air bag outputs (*i.e.*, pressure rise rate and the peak pressure), relocating the air bag modules farther away from the driver and passenger, and changes to features of air bags. Additional technological changes will be made in the future. NHTSA has amended Standard No. 208 by adding a wide variety of new requirements, test procedures, and injury criteria to require that future air bags be designed to create less risk of serious injury than current air bags, particularly for small women and young children. 65 FR 30680, May 12, 2000; as amended 66 FR 65376, December 18, 2001.

Petition for Rulemaking

Today's document responds to a December 3, 2001 petition for rulemaking from a child restraint manufacturer that seeks to amend Federal Motor Vehicle Safety Standard No. 213, "Child Restraint Systems" (49 CFR 571.213), to implement changes that the petitioner believes would aid the sale of its restraints. The petitioner, Xportation Safety Concepts, Inc. (Xportation), believes it has developed an "air bag resistant, rear-facing infant restraint." The petitioner further believes that it has identified a test

procedure that can be used to demonstrate the compatibility of its infant restraints with an air bag. Xportation asks that the test procedure be added to Standard No. 213, and that child restraints shown, when tested in accordance with that test procedure, to be able to limit sufficiently the forces that are imposed on a test dummy restrained in the child restraint be excluded from the requirement to bear the air bag warning label specified in S5.5.2(k)(4) and Figure 10 of the standard. The label, which is required to be a permanent and prominent part of rear-facing restraints, is intended to provide greater assurance that caregivers are aware of the dangers posed by passenger air bags to children in rear-facing restraints.

Xportation's very brief petition did not discuss in any level of detail the suggested test procedure, the test devices, or the injury criteria. It did not provide any test data regarding its child restraint. Instead, Xportation stated that the standard should be amended because: (a) The agency indicated in a rulemaking document (59 FR 7643; February 16, 1994) that it would consider a test procedure then under development by the Society of Automotive Engineers (SAE) for testing child restraints with air bags for incorporation into Standard No. 213; and, (b) in the petitioner's view, since the SAE-developed test procedure was completed, the agency should now proceed to incorporate the work of SAE and others into the standard to facilitate the manufacture of "air bag resistant infant restraints." Xportation did not discuss the merits of the work, but attached a bibliography to its petition and referred to documents referenced in the bibliography.

The following constitutes the bulk of the petition:

The [SAE] task force completed the aforementioned guidelines, which were published by the Society of Automotive Engineers as a Surface Vehicle Information Report (Reference 1). Section 7 of the document discusses dynamic test procedures, and section 10 describes the test fixture. The seating portion of the fixture resembles that of the FMVSS 213 test fixture, and it is likely that its features could be incorporated into that fixture.

At the request of the CRABI² Task Force, the SAE Infant Dummy Task Force developed specifications for the 6 Month Old and 12 Month Old CRABI Dummies, and they are now readily available (Reference 2). Further, a member of the CRABI Task Force has developed the appropriate injury assessment

values for the 6 Month Old Dummy (Reference 3).

NHTSA, in its early efforts to determine the interaction of child restraints and passenger air bags, conducted a number of impact simulations using a HYGES sled. The study was reported in Reference 4. In the report, it is noted that the test buck is similar to the buck design in the CRABI Task Force Information Report, and that it used the Standard 213 seat. The report further notes that the Standard 213 seat was modified to have the same seat cushion and seat back attitudes as the seat in the CRABI buck.

We submit that there are now a test procedure, a test buck, dummies, and injury assessment values, all of the elements necessary to allow the agency to proceed with rulemaking to accommodate air bag resistant, rear-facing infant restraints. The rulemaking will, of course, include the incorporation of the CRABI dummies into 49 CFR part 572.³

Discussion

Previous Rulemaking

In 1994, before there were any injuries or fatalities to infants in rear-facing restraints caused by an air bag, NHTSA issued a final rule that required these restraints to have a warning label against using the restraint in any vehicle seating position equipped with an air bag (59 FR 7643). Public comments on the notice of proposed rulemaking (NPRM) preceding the rule expressed concerns that the rule would restrict child restraint design in the face of what was then only a theoretical risk posed to children. In response, the agency stated that it "[did] not intend for this rule to impede the development of rear-facing restraints that are compatible with an air bag." The agency explained that it was monitoring the work of a task force on Child Restraint and Air Bag Interaction (CRABI) formed by the Society of Automotive Engineers (SAE), particularly the work on test procedures that could evaluate the performance of an infant restraint when used with a passenger air bag. NHTSA stated that if the CRABI task force were to develop a test procedure from its guidelines, NHTSA would evaluate it to determine whether the procedure is appropriate for Standard No. 213. "Among other things," the agency stated, "the procedure would have to be suitable for

² CRABI: Child Restraint Air Bag Interaction. (Footnote not in quoted text.)

³ "Reference 1" in petitioner's bibliography was "Guidelines For Evaluating Child Restraint System Interactions With Deploying Airbags." SAE J2189 (March 1993); Reference 2 was "FTSS Product Catalog: CRABI 6 Month Older Infant Dummy 910420-000; 12 Month Old Child Dummy 921022-000;" Reference 3 was "Injury Assessment Values for the CRABI 6-Month Infant Dummy in a Rear-Facing Infant Restraint With Airbag Development. SAE 950872," J.W. Melvin, 1995; and Reference 4 was "Child Restraint/Passenger Air Bag Interaction Analysis. Final Report, HS 808 004," L.K. Sullivan, 1992. (Footnote not in quoted text.)

testing all types of infant restraints, and be able to provide test results that assess the performance of the restraint in the real world." The agency also stated that it "will consider a test procedure for incorporation into Standard 213 as soon as a suitable one is developed" (59 FR 7646).

We do not agree with Xportation that the CRABI test procedure merits adoption into the Federal safety standard or that child restraints tested to the procedure need not be labeled with the air bag warning label that all rear-facing restraints must now bear. The agency's knowledge of air bags has changed tremendously since 1994, when NHTSA undertook the rulemaking that first required an air bag warning label. We undertook the air bag warning rulemaking after finding in NHTSA laboratory sled tests with top- and mid-mounted air bags that the air bags produced substantial increases in the values for the head injury criterion (HIC) and chest acceleration of dummies seated in rear-facing restraints, compared to the values for dummies in rear-facing restraints tested with no air bag. There had not yet been any deaths or injuries caused by an air bag at that time. At that time, the agency was guardedly optimistic about the possibility that a suitable test procedure could develop out of the CRABI task force work that would obviate the need for requiring all rear-facing restraints to have an air bag warning label.

Beginning in 1994, however, the risk posed by passenger air bags to infants in rear-facing restraints began to manifest itself in real-world deaths and injuries. Three air bag-related fatalities were children in rear-facing restraints in 1995, 6 in 1996, 4 in 1997, 5 in 1998, and 3 in 1999.⁴ NHTSA developed various strategies to counter the rising number of fatally-injured children in rear-facing child restraints, including amending Standard No. 213 to make the warning label more direct in its warning and much more conspicuous (61 FR 60206; November 27, 1996). The agency, together with the automobile industry and child passenger advocates, also began a vigorous and successful consumer information campaign to get children seated in the back seat rather than in the front passenger seat.

We also became much more knowledgeable about air bags. In December 1997, to better understand air bag design and performance characteristics, NHTSA sent an information request to nine automobile manufacturers requesting detailed technical information on then-current

industry practices on air bag technologies and how design and performance had evolved through the 1990s. The agency analyzed the responses and identified numerous trends in air bag design both on the driver side and the passenger side. The information showed that manufacturers have made many changes to air bag design. "Air Bag Technology In Light Passenger Vehicles," Hinch *et al.*, October 26, 1999 (*see* Docket 2814-47).

This information has led us to evaluate the CRABI procedure in a better informed, more critical light. While at one point we were somewhat optimistic about the CRABI procedure, we now do not believe that it or any other procedure adequately assesses the safety risks to rear-facing children from an air bag.

Review of the SAE procedure

The CRABI procedure is set forth in the SAE's Surface Vehicle Information Report SAE J2189, "Guidelines for Evaluating Child Restraint System Interactions With Deploying Airbags," March 1993. As noted by the SAE in that document, there are many uncertainties associated with the procedure. The SAE explained that the document is styled an "information report," as opposed to a "recommended practice," "because of the general inexperience in testing the interaction between child restraint systems and deploying air bags and the lack of real-world accident data." The explanation continues:

This document describes dummies, procedures, and configurations that can be used for investigating the interactions that occur between a deploying airbag and a CRS [child restraint system]. Static tests may be used to sort CRS/airbag interaction on a comparative basis in either an actual or a simulated vehicle environment. Systems that appear to warrant further testing may be subjected to an appropriate dynamic test at a speed near that needed to deploy an airbag or at a higher speed commonly used to evaluate CRS performance. No test matrix is specified at this time for evaluating either a CRS or an airbag during interaction with each other. Instead, engineering judgment based on prior experience with CRS and/or airbag testing should be used in selecting the tests to be conducted with each individual system. Such tests may be aimed not only at producing interactions with the most severe results but also at identifying those conditions that produce the least interaction and/or satisfactory CRS performance results. Baseline tests to indicate the performance of a CRS in the absence of airbag deployment are also recommended for comparison purposes.

The CRABI test procedure could be an acceptable *starting point* in evaluating the performance of particular child

restraints with specific air bag systems. However, NHTSA believes that the procedure alone would not be able to provide test results that sufficiently assess the performance of a restraint in the real world. J2189 does not specify a test matrix, but relies on the tester's engineering judgment as to the test configurations and conditions that should be used. Xportation provides no explanation or discussion as to which configurations and conditions it believes need or need not be specified that would assure the safe performance of a child restraint with the air bags in existing and future model year vehicles.

Perhaps the reason that Xportation did not do so is because it is virtually impossible to do so. J2189 is predicated on the tester's being able to tune the air bag system to simulate a specific air bag system. If J2189 were incorporated into Standard No. 213, a very limited type of air bag system would be simulated by the standard. Yet, NHTSA's survey data (Hinch *et al.*, *supra*) show great variation in air bag system characteristics and performance. Moreover, air bag systems have changed significantly in recent years. Some of the changes reduced the aggressivity of air bags, such as by reducing air bag outputs in the most recent model year vehicles compared to the earlier generation vehicles. Some of the changes involved changes in inflator characteristics, new air bag shapes, sizes, fabrics, venting systems and venting levels, occupant size and location sensors, seat position sensors, belt use sensors, and crash severity sensors, as well as computation algorithms that use the information in making air bag deployment decisions. Manufacturers also seem to be on the threshold of making a significant leap in introduction of sophisticated technologies to improve air bag performance. In short, a test procedure that only replicates one or a few types of air bag systems does not assure that a child restraint that meets performance criteria tested to that procedure will perform adequately with the myriad of air bag designs currently on the road and those that will be installed in future vehicles.

The safety risk posed to infants in rear-facing child restraints by deploying air bags is so great that a test procedure used to assess the performance of the child restraint must carefully evaluate that risk. For example, if an "air bag-resistant" child restraint fails to work, an infant in that restraint is almost certain to be injured when the air bag deploys. Xportation has not provided data showing that a child would not be injured by a type of air bag system that

⁴ There were 0 in 2000 and 1 in 2001.

was not simulated by the J2189 procedure, or that the child would be protected if the restraint were misused.⁵ Nor did Xportation provide data showing that the test dummies could satisfactorily evaluate the harm resulting from a deploying air bag. In the absence of such data, we conclude that the suggested amendment would subject rear-facing infants to too high a risk of injury from an air bag.

As a practical matter, NHTSA cannot test products in every configuration or circumstance they could be used. However, this limitation is generally acceptable since test procedures simulating a relatively narrow set of real world circumstances generally have a positive impact on individuals in a broader range of circumstances. However, in this particular case, testing to a test procedure of one sort could have severe consequences to a child in a broad range of circumstances. Thus, we deem the requirements and test procedures to be too narrow and not adequately representative of types of air bag systems not simulated by the J2189 procedure.

The agency will not attempt to develop a suitable test procedure in response to the petition. Developing a suitable test procedure (assuming that it would be practicable to do so) would use agency resources that are better spent on areas that would result in definite safety benefits. Moreover, for the reasons stated above, we believe that

⁵ The SAE explains in J2189 that the information report "addresses only the effects of the interactions between deploying airbags and child restraint systems that would have been considered properly installed and used in the right and center front passenger positions before the advent of passenger airbags and may be properly installed there in the future. Child restraint misuse is not otherwise addressed in this document."

no procedure could adequately assure the overall safety of children. There is a risk of injury associated with the forces imposed by the air bag on a rear-facing infant.⁶ There are no such risks when the child is in the back seat. Even in vehicles without air bags, infants, as well as other occupants, are 26 percent safer against fatality when seated in the rear seat than in the front seat. Thus, even if air bag risks could be completely controlled, overall safety would be diminished if some infants were restrained in the front seat instead of in the rear seat, which would occur if petitioner's suggested amendment was adopted. Keeping infants restrained in the rear seat instead of in the front seat assures that a more injurious event would not be substituted for a less injurious one.⁷

Xportation has argued that placing children in the back increases the risk for crashes because of the possibility of distraction due to parents' having to turn to attend to them. Based on a review of 2000 Fatal Analysis Reporting System (FARS) data⁸, a total of 3,946 drivers (or 6.9 percent of all drivers involved in fatal crashes) were

⁶ Limits on the force levels imposed on the dummy indicate an injury risk assessment above which the risk of injury is unacceptably high. The risk of injury of force levels below the threshold, while lower, still exists.

⁷ For vehicles with either (a) no rear seats, or (b) rear seats that are too small to accommodate rear-facing child restraints in accordance with the provision of S4.5.4.1(b) of FMVSS No. 208, vehicle manufacturers may install a device (an on/off switch) that deactivates the air bag at the front passenger position. In addition, under appropriate circumstances, owners of all vehicles may obtain an on/off switch (see 49 CFR part 595).

⁸ "Traffic Safety Facts 2000: A Compilation of Motor Vehicle Crash Data From the Fatal Analysis Reporting System and the General Estimates System," National Highway Traffic Safety Administration, National Center for Statistic and Analysis, December 2001.

determined to be inattentive. However, the 2000 FARS database does not distinguish between various causes of inattentiveness, such as talking, eating, cell phone use, or attending to a child in either the front or rear seat. As such, the agency is unable to definitively ascertain from this data whether children are more or less of a distraction in the front seat as compared to the rear seat. However, placing children in rear seats does significantly increase the chances that the child will survive a crash should one occur as noted in the preceding paragraph.

In conclusion, NHTSA has evaluated the test procedure suggested by the petitioner for incorporation into the Federal standard. We conclude that the procedure does not go far enough in assessing the injury risk posed by air bags to infants in rear-facing restraints. Further, we affirm the continuing merit of urging parents to place infants in rear-facing restraints in a rear seating position, since the infants are safer there than in a front passenger seating position. This message saves lives.

In accordance with 49 CFR part 552, this completes the agency's review of the petition. The agency has concluded that there is no reasonable possibility that the amendment requested by the petitioner would be issued at the conclusion of the rulemaking proceeding. Accordingly, the petition is denied.

Authority: 49 U.S.C. 322, 30111, 30115, 30117 and 30166; delegation of authority at 49 CFR 1.50.

Issued on January 9, 2003.

Stephen R. Kratzke,

Associate Administrator for Rulemaking.

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