Accordingly, the interim rule amending 48 CFR Chapter 15 which was published at 63 FR 10548–10549 on March 4, 1998, is adopted as a final rule without change.

Dated: July 20, 1998.

Betty L. Bailey,

Director, Office of Acquisition Management.

[FR Doc. 98–20770 Filed 8–3–98; 8:45 am]

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DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Parts 571

[Docket No. NHTSA–98–3847]

RIN 2127–AG07

Federal Motor Vehicle Safety Standards; Head Impact Protection

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

ACTION: Final rule.

SUMMARY: This final rule amends the upper interior impact requirements of Standard 201, Occupant Protection in Interior Impact, to permit, but not require, the installation of dynamically deploying upper interior head protection systems currently being developed by some vehicle manufacturers to provide added head protection in lateral crashes. Compliance with those requirements is tested at specified points called ''target points.'' Since compliance is often not practicable at target points located near the places where these dynamic systems are stored before they are deployed, vehicles equipped with the dynamic systems will be allowed to meet slightly reduced requirements at those points. However, these vehicles will also be required to meet new requirements to ensure that these dynamic systems enhance safety. This final rule adds procedures and performance requirements for testing the deployment of these systems and their protective capability through a combination of in-vehicle tests and a full scale vehicle crash test. In a separate final rule being published today, the agency is establishing specifications and qualification requirements for a newly-developed anthropomorphic test dummy to be used in determining compliance with the dynamic crash test requirements.

DATES: *Effective Date:* The amendments made in this rule are effective September 1, 1998.

Petition Date: Any petitions for reconsideration must be received by NHTSA no later than September 18, 1998.

ADDRESSES: Any petitions for reconsideration should refer to the docket and notice number of this notice and be submitted to: Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: The following persons at the National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590:

For non-legal issues: Dr. William Fan, Office of Crashworthiness Standards, NPS–11, telephone (202) 366–4922, facsimile (202) 366–4329, electronic mail ''bfan@nhtsa.dot.gov''

For legal issues: Otto Matheke, Office of the Chief Counsel, NCC–20, telephone (202) 366–5253, facsimile (202) 366–3820, electronic mail ''omatheke@nhtsa.dot.gov''.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Background

A. August 1995 Final Rule on Upper Interior Impact Protection

The August 1995 final rule issued by the National Highway Traffic Safety Administration (NHTSA) amended Standard 201 to require passenger cars, and trucks, buses, and multipurpose passenger vehicles (collectively, passenger cars and LTVs) with a gross vehicle weight rating (GVWR) of 4,536 kilograms (10,000 pounds) or less, to provide protection when an occupant's head strikes upper interior components, including pillars, side rails, headers, and the roof, during a crash. This final rule, which requires compliance pursuant to a phase-in schedule beginning on September 1, 1998, significantly expands the scope of Standard 201. Previously, the standard applied mainly to the portion of the vehicle interior in front of the front seat occupants, i.e., the instrument panel. The amendments added procedures and performance requirements for a new in-vehicle component test.

B. Petitions for Reconsideration

The agency received nine timely petitions for reconsideration of the final rule. The issues raised by the petitions can be divided into five categories: (1) Application of the new requirements to dynamically deployed upper interior head protection systems, (2) influence of systems variables, (3) lead time and phase-in, (4) exclusion of certain vehicles, and (5) test procedure.

With respect to the last four categories of issues raised by the petitions, NHTSA responded by issuing amendments to the August 18, 1995 final rule in a notice dated April 8, 1997 (62 FR 16718). In the April 8, 1997 notice, NHTSA modified the final rule to exclude certain vehicles from the upper interior impact requirements of Standard 201, allowed carry-forward credits, changed the phase-in requirements by providing manufacturers with the option of complying with an additional alternative schedule for meeting the upper interior impact requirements of the standard and amended other sections of the standard to address concerns about test procedures.

Since the first category of issues, those relating to dynamically deployed upper interior head protection systems, was outside the scope of the rulemaking that led to the August 18, 1995 rule, the agency announced that it was treating the requests relating to these issues as petitions for rulemaking, and was granting those petitions.

C. March 1996 ANPRM on Dynamically Deployed Upper Interior Head Protection Systems

On March 7, 1996, NHTSA published an advance notice of proposed rulemaking (ANPRM) to assist the

agency in evaluating the issues raised by dynamically deployed upper interior head protection systems (61 FR 9136). In the ANPRM, the agency noted that vehicles with inflatable frontal automatic protection systems (*i.e.*, air bags) meeting S5.1 of Standard No. 208, ''Occupant Crash Protection'' need only meet the performance requirements of Standard 201 when impacted at a relative velocity of 19 kilometers per hour (km/h) (12 mph) rather than the 24 km/h (15 mph) requirement imposed on vehicles not meeting S5.1 of Standard 208. This exception to the 24 km/h (15 mph) requirement is premised on the fact that the padding thickness required for surfaces to meet higher impact requirements interferes with the deployment of airbags. NHTSA allowed this exception based on the agency's belief that the tests contained in Standard 208 for dynamic systems provided adequate assurance that these systems perform well enough to protect occupants in the event of a crash at a speed higher than 19 km/h (12 mph).

At the time of the ANPRM, there was no comparable way of accommodating the dynamically deployed upper interior head impact systems since neither Standard 208 nor any other Standard contained performance requirements or test procedures for assessing the performance of those systems. Without such requirements or procedures, there was no readily available way of providing adequate assurance that the systems would yield sufficient safety benefits to justify reducing the upper interior impact requirements for vehicles with dynamically deployed upper interior protection systems.

The ANPRM suggested that performance requirements and test procedures be developed for those systems. Given the differences in design and performance between two of the best known types of such systems, dynamically deployed padding and dynamically deployed inflatable devices, the agency suggested further that those two types of systems be subjected to different tests. In the case of dynamically deployed padding, the agency suggested that existing targets specified in the final rule protected by the dynamic system be impacted at 19 km/h (12 mph) prior to the deployment of the padding and then be impacted at 32 km/h (20 mph) with the padding deployed. This test would accommodate the limitations of dynamic padding systems in their undeployed state while providing assurance that deployed padding provides additional protection to occupants. In the case of inflatable devices, the agency discussed the possibility that it might propose subjecting vehicles equipped with these systems to 19 km/h (12 mph) headform impacts at all points that would be covered by the devices when inflated. These tests would be conducted with the devices in their undeployed state. The performance of the devices as deployed would be tested in a side impact test into a fixed rigid pole at 30 km/h (18.6 miles per hour) or a side impact with a moving deformable barrier at 50 km/h (31 miles per hour). The ANPRM also requested responses to 17 questions relating to the design, performance, evaluation and testing of dynamically deployed upper interior head protection systems.

The agency received a total of ten comments on the ANPRM. Five automobile manufacturers (Ford, Volvo, BMW, VW, and Mercedes), one restraint system suppler (Autoliv), two safety organizations (Insurance Institute for Highway Safety (IIHS), and Advocates for Highway and Auto Safety (AHAS)), and one manufacturers' association (American Automobile Manufacturers Association (AAMA)) and a trade group (Automotive Occupant Restraint Council (AORC)), submitted comments in response to the ANPRM.

D. August 1997 NPRM on Dynamically Deployed Upper Interior Head Protection Systems

NHTSA's analysis of the comments received in response to the ANPRM is contained in a Notice of Proposed Rulemaking (NPRM) published in the **Federal Register** on August 26, 1997. (62 FR 45202). The NPRM proposed adding two test procedures to Standard 201 to accommodate development of dynamically deployed upper interior head protection systems. Under the agency's proposal, manufacturers would have the option of demonstrating compliance with Standard 201 in accordance with the requirements and procedures specified in the August 1995 final rule tests or with one of the two new test procedures. The first option, referred to as Option 1, specified performing free-motion headform (FMH) impacts at 24 km/h (15 mph) at all test points and target angles specified in the August 1995 final rule. The second and third options, referred to as options 2 and 3, respectively, proposed employing FMH testing at a reduced impact speed at those points located directly over a stowed dynamic system and its inflation and attachment hardware. To ensure that these systems offer safety benefits in the deployed mode commensurate with the reduction in protection provided in the undeployed mode as a result of the lower impact speed, options 2 and 3 required testing of the deployed system at impact speeds above 24 km/h (15 mph).

As proposed in the NPRM, Option 2 would use the existing FMH to simulate an occupant's head striking the interior of the vehicle in a crash. In this test, the headform would be propelled into specified targets within the vehicle at differing impact speeds. For those points that are not directly over a dynamic system or its attachment or inflation hardware, the specified impact speed would be 24 km/h (15 mph). For points directly over an undeployed dynamic system (including attachment points and inflation mechanisms), the headform would be propelled at the target at 19 km/h (12 mph) with the system in the undeployed mode and 29 km/h (18 mph) with the system deployed. In order to test the deployment of the system, the triggering mechanism would be tested through use of the lateral crash test contained in S6.12 of Standard 214. The proposal also set forth that once triggered, the system would have to reach full deployment in 30 milliseconds (ms) or less.

The other proposed optional test procedure, Option 3, employed a full scale side impact at 29 km/h (18 mph) into a fixed pole. Under this procedure, those target points likely to be struck in a crash, notwithstanding the deployment of the dynamically deployed device, would be tested at a higher speed than target points likely to be shielded by the deployed device. More specifically, any test points or targets inside the vehicle that do not intersect with a line oriented along any of the approach angles described in S8.13.4 and passing through an undeployed dynamic system or any of its components (excluding trim) would be subjected to a 24 km/h (15 mph) FMH impact at the target angles and conditions now contained in the Standard. For those targets that intersect with a line oriented along any of the approach angles described in S8.13.4 and passing through an undeployed dynamic system or any of its components (excluding trim), FMH impacts at a speed of 19 km/h (12 mph) would be employed to test the system in its undeployed condition.

The agency noted that, under Option 3, manufacturers choosing to employ dynamic systems whose components are not stored in roof rails or other areas covered by Standard 201 would be required to meet the 24 km/h (15 mph) FMH impact test even though such a system, in its deployed state, may provide head protection against impact with the target points specified in this

standard. The NPRM requested comments on whether a dynamic system which, when deployed and observed in a side view, completely covers the 95th percentile eyellipse as defined in SAE Recommended Practice J941—Motor Vehicle Driver's Eye Locations (June 92), would provide protection against impacts with targets on the A-pillar, B-pillar and side rails.

As proposed, Option 3 would test the effectiveness of the dynamic system in the deployed mode, in a full scale 29 km/h (18 mph) side impact into a 254 millimeter (10 inch) diameter fixed rigid pole. The point of impact would be aligned with the center of gravity of the head of a dummy seated in a designated front outboard seating position on the struck side. In this proposed test, the seat would be positioned as directed in S6.3 and S6.4 of Standard 214 and the dummy located as directed in S7 of Standard 214. However, the agency recognized that the use of this seating procedure might result in interference between the head of the test dummy and B-pillar when used in certain vehicles. Therefore, NHTSA proposed modifications to the seating procedure and asked for comments regarding seat adjustment. The NPRM also indicated that NHTSA was continuing to consider the use of a second dummy in the rear outboard seating position of the struck side.

Option 3 specified that the vehicle would strike the rigid pole at an angle of 90 degrees. The agency solicited comments on whether other impact angles would result in a test procedure better suited for evaluating performance in a crash and if the use of these other angles would present technical challenges in testing. The proposal indicated that initial pole-to-vehicle contact must occur within an area bounded by two transverse vertical planes located 38 mm (1.5 inches) forward and aft of the impact reference line. The agency requested comments on the degree of difficulty of achieving an impact within this range.

The agency also proposed a new test dummy for use in the Option 3 test. This test dummy is a SID dummy modified to accept the Hybrid III head and neck. The proposed performance requirements for Option 3 were identical to those found in the first and second options; the HIC(d) value would not exceed 1000.

NHTSA also solicited comments regarding potential safety concerns related to any possible effects of dynamically deployed upper interior head protection systems on out-of-position occupants.

E. Comments Submitted in Response to the NPRM

All commenters generally supported the agency's proposal, with a few exceptions on some issues. The commenters consisted of seven automobile manufacturers (BMW, Land Rover, Volvo, Nissan, Volkswagen, Mercedes and Toyota), two manufacturers' associations, the American Automobile Manufacturers' Association (AAMA) and the Association of International Automobile Manufacturers (AIAM), two safety groups, the Insurance Institute for Highway Safety (IIHS) and Advocates for Highway and Auto Safety (Advocates), one supplier (Autoliv) and one trade group, the Automotive Occupant Restraints Council (AORC).

BMW made several comments on target locations, rear seat protection, test repeatability, out-of-position occupants, and other subjects. BMW concurred with the proposal that those targets directly over the stowed dynamic system should be tested at 19 km/h (12 mph) with the system undeployed. However, BMW commented that the definition of target exclusion specified in S6.1(c) and S6.2(c) is too narrow. In BMW's view, a 50 mm (2 inch) transition area between the 24 km/h (15 mph) padding and the 19 km/h (12 mph) padding is needed for design purposes. The company indicated that its dynamic head protection system, the ITS (Inflatable Tubular System) deploys mainly out of the roof liner joint along the side rail and not directly through the area that covers it. Therefore, BMW submitted that a transition zone around the area where the system is stowed is necessary to ensure that countermeasures that would otherwise be required to meet the 24 km/h (15 mph) FMH impact tests would not interfere with ITS deployment. BMW also commented that all target locations covered or protected by the deployed system should be tested at 19 km/h (12 mph) when the system is in its undeployed mode and that the SAE 95th percentile eyellipse should not be used as a sole criterion to determine target exemption.

BMW enclosed a recent safety benefit study by K. Digges and Associates with its comments as evidence of the effectiveness of its system in protecting rear seat occupants. This study projected that for the rear seat occupants, the number of AIS 3–5 head/face injuries prevented by the ITS would be much larger than the baseline number of AIS 3–5 injuries resulting from head-to-side rail contacts. In view of this, BMW argued that target locations ''protected'' or ''covered'' by the ITS, notably the SR3 target location, should be subject to the 19 km/h (12 mph) FMH impact, instead of a 24 km/h (15 mph) FMH impact test as proposed in the NPRM under Option 3. BMW also commented that there is no justification for the inclusion of a rear seat dummy in the pole impact test.

BMW, which has used pole tests in the development of the ITS, concurred with the proposed specifications for the pole test outlined in Option 3. Based on its own test data, BMW concluded that the NPRM proposed test location tolerance limit of ±38 mm (1.5 inches) is reasonable. The company also noted that the ITS system is tailored to protect the head of an adult occupant in the front seat and is, therefore, relatively small and deploys with minimal energy. In view of this, it would not present a threat to vehicle occupants. Lastly, BMW recommended that the final rule be published by March 1998 and become effective 30 days after its publication.

Land Rover submitted comments relating to the size of its vehicles. The company indicated that its multipurpose passenger vehicles are all over the GVWR limit of 2,722 kilograms (6,000 pounds) applicable to LTVs under Standard 214 and therefore do not need to pass the side impact requirements of that standard. Land Rover submitted that it is not reasonable for the company to conduct a Standard 214 side impact test in order to certify the 30 ms full-deployment requirement specified in the Option 2 test. Land Rover requested that the Standard 301 lateral moving barrier crash test be an optional test to certify the 30 ms full-deployment requirement, if needed.

AAMA commented on the proposed test procedures, including Option 1, 2, and 3 tests. In regard to Option 1 test procedures, AAMA requested clarification in the wording in S6.1(a). AAMA believed that it was not clear from the proposal whether a vehicle not equipped with a dynamic system or one whose system components are not stored in the A-pillar, side rails or areas otherwise covered by Standard 201 must comply with the 24 km/h (15 mph) FMH impact requirement.

AAMA also commented on a number of issues concerning the proposed Option 2 test. The comments noted that AAMA member companies did not understand what types of dynamic systems would be tested under this proposed test and that to AAMA's knowledge, no system existed that would use the proposed Option 2 test procedure. The AAMA comments also took issue with the approach angles

proposed for this test option as, in AAMA's view, it is possible that a deployed system would not be interposed between the FMH and the existing target locations. As a result, AAMA argued that the approach angles proposed in the S8.13.4 are not practical for FMH impact tests when the dynamic system is deployed. AAMA also contended that, under the proposed Option 2 test, S8.13.3 indicates that initial forehead contact is not necessary when conducting 29 km/h (18 mph) FMH impact tests against a fully deployed system. AAMA questioned the intent of this exclusion and relevance of FMH HIC calculated from an impact in which forehead initial contact will most likely not occur between the forehead impact zone and the target circle. The organization also commented that the proposed target area for 19 km/h (12 mph) FMH impact tests was too narrow. According to AAMA, this makes the determination of which targets do or do not lie over the undeployed system extremely difficult and impractical because the system will be covered by the same piece of trim. Recognizing that those targets are to be protected by the deployed system, AAMA recommended that any target locations that are protected by the system in the deployed mode be qualified for 19 km/h (12 mph) FMH impact tests. AAMA also commented that coordination of inflation timing with FMH impacts would be necessary, especially if multiple impacts are required for certification or compliance tests. In addition, AAMA voiced concerns that the 29 km/h (18 mph) FMH impact requirement proposed for the deployed mode may discourage the development of such systems. AAMA also commented that any specification of a maximum on the time needed for a system to inflate is unwarranted, that imposing an arbitrary time requirement is design restrictive, and that specifying a short inflation time would result in an aggressive system. AAMA commented that the inflation time should be determined based on the specific system/vehicle designs and that the definition of ''full-deployment'' needs clarification.

Several aspects of the proposed Option 3 test created concerns for AAMA. AAMA indicated that the full scale crash test specified in S6.1(c) and S6.2(c) is burdensome, redundant, and without additional safety benefits. AAMA also argued against use of the proposed modified SID dummy (SID/HIII). The AAMA comments stated that the SID/HIII has a biofidelity rating of 3.8, which is below the ISO recommended acceptable level of 4.0. According to the AAMA, the SID is insensitive to padding stiffness. Further AAMA said that its tests confirmed that EuroSID–1 was a better dummy than the SID in discriminating change in door padding. AAMA also believes that other dummy test devices would be more appropriate and more biofidelic. AAMA stated that the EuroSID–1, an improved EuroSID dummy, has a biofidelity rating of 4.2. Other biofidelity ratings cited by AAMA in arguing against use of the SID/HIII are 5.9 for the BioSID, 4.2 for EuroSID–1, 3.8 for the SID/HIII, 3.2 for EuroSID and 2.3 for SID. In addition to concerns about biofidelity, AAMA commented that for international harmonization purposes, the EuroSID–1 is the most appropriate dummy. While AAMA requested that the International Standards Organization (ISO) make specific modifications to the EuroSID–1 dummy, AAMA strongly urged NHTSA to specify the EuroSID–1, with proper modifications as suggested by AAMA, as an interim dummy for Standard 201. AAMA also indicated it had concerns regarding the 254 mm rigid pole proposed for use with the Option 3 test. AAMA recommended that NHTSA specify a 350 mm pole in the final rule instead of the NPRM proposed 254 mm pole. According to the AAMA, a 254 mm pole was initially considered by ISO for its own side impact pole test but was rejected on the basis that the 254 mm pole is not representative of real world obstacles that cause serious injuries. AAMA also stated that neck loading has not been adequately studied by NHTSA and recommended that the topic be entered on the agenda of the Motor Vehicle Safety Research Advisory Committee and the programs of the International Harmonization Research Agenda. In regard to potential injury caused by the deployment of dynamically deployed upper interior head protection systems, AAMA recommended that an attempt be made to evaluate the impairment caused by head injuries and by potential hearing loss. AAMA suggested that a threshold for dynamic head protection system deployment be established at the crossover point between impairment caused by head injury and that caused by hearing loss. Due to the lack of actual test data on injuries from system deployment, AAMA recommended that this topic be a candidate topic for a special NHTSA study.

AIAM commented that some of its members have planned early introduction of dynamic systems to provide enhanced interior head impact protection and urged NHTSA to complete this rule as soon as practical, preferably no later than March 1998.

Volvo indicated its strong support for the proposed test procedures and recommended that all three options be included in the final rule. Volvo recommended that the final rule be published as soon as possible, preferably no later than March 1998. Volvo indicated that it is planning to install an inflatable curtain (IC) system in its production vehicles. Based on its current knowledge, Volvo concluded that the IC system would not only reduce head injuries but also prevent ejections through side windows. Results of its out-of-position occupant tests indicated that injuries of a greater severity level are not likely to occur as a result of an occupant, child or adult, being too close to, or in an undesirable position relative to the system. Volvo commented that the 30 ms full-deployment requirement contained in the Option 2 proposal appears appropriate. In regard to Option 3, Volvo supported the reduction of FMH impact speed from 24 km/h (15 mph) to 19 km/h (12 mph) for target locations above the stowed system, with the system undeployed. However, Volvo commented that all target locations covered by the deployed system should be also tested only up to 19 km/h (12 mph) and that the SAE 95th percentile eyellipse should not be used as a sole criterion to determine protection against head impacts against A/B-pillars and side rails. Volvo also indicated that clarification is needed in regard to those targets contiguous to the system's mounting and inflation components, but which are not within the 24 km/h (15 mph) impact target areas. Volvo commented that due to inadequate information it could not see any utility in the use of a rear seat dummy in pole impact tests.

Nissan offered comments on the proposed Option 2 and Option 3. Apparently, Nissan understood S6.1(b) ''* * * but exclusive of any cover or covers, * * *'' to mean that testing would take place with cover or covers removed and commented that testing dynamic systems with full components in place would be more representative. In addition, Nissan commented that the agency has not provided a clear justification for specifying the 29 km/h (18 mph) FMH impact requirement. Nissan questioned whether the increase in the FMH impact speed from 24 km/h (15 mph) to 29 km/h (18 mph) would actually result in safety benefits as projected by the agency. In regard to the Option 3 test procedure, Nissan commented that the Option 2 test is sufficient and the Option 3 test is

unnecessary. Nissan also believed that the agency has not provided a clear cost/benefits assessment for the new pole impact test. Nissan commented that the SID/HIII is a dummy without proven biofidelity characteristics and that biofidelity of the test dummy as a whole system must be approved before promulgating a regulation. In addition, Nissan commented that the use of the SID/HIII is in conflict with international harmonization efforts since ISO is considering the EuroSID–1 as the side impact dummy on the global basis.

IIHS supported the proposal contained in the NPRM. IIHS commented that two advanced side impact air bag systems (ITS and IC) might have to be excluded from the U.S. market in the near future if the Standard 201 requires 24 km/h (15 mph) FMH impact tests for all vehicle upper interior components. In addition, IIHS commented that the proposed 29 km/h (18 mph) pole impact test provides a reasonable demonstration of the effectiveness of such dynamic systems. However, IIHS commented that NHTSA should be more concerned about the seating height of the dummy test device since the baseline pole impact test is configured to ensure a significant head contact with the pole. Based on its test data, IIHS suggested that a taller dummy (SID with the Hybrid III head/neck system instead of SID/HIII (using a modified neck bracket)) may provide a more reliable test. In addition, IIHS commented that the 350 mm diameter pole would produce a more repeatable test.

Advocates supported the proposed amendments while offering several comments regarding the factual basis for the agency's tentative conclusions as set forth in the NPRM. Advocates argued that the quality of the administrative record for the NPRM was poor and that many public respondents were compelled to rely on the opinion of NHTSA about the value of the advanced dynamic systems. Advocates also argued that the agency was relying on manufacturer claims about the impossibility of complying with FMH impact speeds higher than 19 km/h (12 mph) for target SR3 without interrupting smooth interior trim design. In Advocates' view, the alleged marketing impact of discontinuous interior trim surfaces is a very poor reason for NHTSA to grant an exemption from a prevailing safety standard that could lead to additional injuries, especially when many young children would be placed in the rear seat. Advocates indicated that by exempting SR3 from 24 km/h (15 mph) FMH impact, NHTSA has begun to descend a slippery slope of exemptions. Advocates suggested that this is the second time in the last few years in which NHTSA has been willing to trade increases in certain types of injuries for a claimed greater reduction in overall injuries and in their severity.

Advocates also criticized the agency's tentative conclusion that the effectiveness of dynamic systems justified testing the target points near the undeployed systems at lower impact speeds. In Advocates' view, NHTSA's benefit estimate is based on some hypothetical assumptions, including the use of unproven levels of dynamic system effectiveness, two different injury curves, and manufacturer generated sled test data. Advocates also contends that the proposals in the NPRM do not sufficiently address safety concerns relating to rear seat occupants. The organization believes that the agency has ignored the fact that a massive displacement of young children from the front seats to rear seats will occur as frontal air bags become the norm. In particular, Advocates cited the agency's estimate of additional loss of only 17 lives and 230 non-fatal injuries contingent on exemption of SR3 from a 24 km/h (15 mph) compliance test as exceedingly optimistic.[1]

Advocates also noted that the dynamic head protection test options contained in the NPRM provide no specification for sensor performance. It is possible, Advocates states, that the number and rate of more severe injuries due to a system malfunction would be considerably larger than NHTSA expects. In addition, Advocates also contends that it is inappropriate for NHTSA to argue for or rely on anti-ejection benefits in its benefit estimate in support of the installation of dynamic systems when no rollover test was conducted by NHTSA, nor by any manufacturers, to verify these benefits.

Advocates made numerous comments related to the proposed pole impact test. Advocates commented that the rigidity of the pole is not specified and that the yaw, pitch and roll behavior of the vehicle is controlled in such a way that the proposed pole impact test would not be representative of the real world crash condition. To evaluate the effect of dynamic systems (including side thorax air bags) on out-of-position children in rear seats, Advocates supported the use of instrumented dummies in this seating position to determine the extent to which the head of occupants of various sizes would impact target points lying over the stowed dynamic system.

[1] Advocates evidently misread NHTSA's evaluation of additional deaths and injuries. The agency estimate was in fact far lower—4 fatalities.

Advocates also expressed concerns about head pocketing and neck injury that could potentially occur when occupants encounter an inflated dynamic system. In addition, Advocates voiced concerns that the SID/HIII test dummy proposed for use with the pole test may not be a reliable test device.

VW expressed concerns regarding harmonization, test procedures, and the effective date of the final rule. VW argued that any differences between NHTSA's proposed Option 3 test procedure and the ISO recommended pole test is contrary to international harmonization. In particular, VW argued that the pole used in the Option 3 test should be 350 mm in diameter and the EuroSID–1 should be used rather than the SID/HIII. VW pointed out that significant changes have been made to EuroSID since 1990 and that the EuroSID–1 has adopted the head of the Hybrid III dummy. Accordingly, VW believes that the EuroSid–1 would meet the requirements of the Option 3 pole test. VW stated that the proposed definition for the 19 km/h (12 mph) impact target areas is too restrictive. The company believes deployment requirements would involve system packaging and cover design that precludes the use of the padding needed to meet the 24 km/h (15 mph) impact within the areas adjacent to the undeployed system. VW contended that the dynamic system, in its full-deployment mode, would continue to provide protection by preventing head contacts with interior structural components. Therefore, VW believes that those target points that are covered by the deployed system should be also tested at 19 km/h (12 mph) impact speed. In regard to the proposed 30 ms maximum time period for reaching full deployment, VW stated that specifying a maximum time for full deployment is not necessary. VW urged NHTSA to issue a final rule with an immediate effective date to allow manufacturers to implement dynamically deployed upper interior head protection systems as soon as possible.

Mercedes offered comments on the proposed Option 2 and 3 test procedures. In regard to the Option 2 test procedure, Mercedes indicated that it at present is not considering its original design concept of a dynamic padding system and decided to adopt an inflatable curtain (IC) system. In Mercedes' view, none of the currently known dynamic systems (the ITS/IC systems) can be certified using the Option 2 test procedure. Mercedes commented that the maximum 30 ms time for full-deployment may be inappropriate but is sufficient for both

Option 2 and Option 3 tests. In addition, Mercedes requested that NHTSA address the procedure for maintaining system pressure during multiple impacts, when using Option 2 test. Mercedes also commented that the definition for exempted target points should include the area about 25 to 50 mm (1.0 inch to 2.0 inches) wide surrounding the stowed dynamic systems.

Mercedes' comments indicated its agreement with the proposed Option 3 test. Although Mercedes had no experience with pole tests other than the 90 degree impact using a EuroSID dummy, it supported the agency's concept that the 90 degree impact represents the possible worst case condition. Mercedes commented that target locations BP2 and BP3, being protected by the dynamic system in its deployed mode, should be tested at 19 km/h (12 mph) in its undeployed mode. Mercedes also indicated that the definition for exempted target points should include the area about 25 to 50 mm (1.0 inch to 2.0 inches) wide surrounding the stowed dynamic systems. In addition, Mercedes stated that the proposed SID/HIII dummy is not used in the ISO pole test procedure. The company believes that use of the SID/HIII is contrary to harmonization goals and that other dummies, such as EuroSID–1, should be allowed as an optional alternative to the SID/HIII during the phase-in period.

Autoliv, a safety equipment manufacturer and supplier, indicated that all three options should be maintained in the final rule. In addition, Autoliv offered specific comments on options 2 and 3. Autoliv stated that determining full-deployment is very difficult and manufacturers should be given an opportunity to provide clear data to describe that specific state. In addition, Autoliv commented that the 29 km/h (18 mph) FMH impact speed specified in Option 2 should be reduced to 24 km/h (15 mph). In reference to the Option 3 proposed test procedure, Autoliv argued that the 19 km/h (12 mph) FMH impact tests in the undeployed mode should be applicable to all target points that are covered or protected by the deployed system. While supporting the 90 degree pole impact using one front seat dummy, Autoliv recommended that the 350 mm pole be adopted for the purpose of enhancing test repeatability.

Toyota also offered comments on the Option 2 and Option 3 proposals. Toyota argued that the proposed options are excessive and unjustified when compared with the original 24 km/h (15 mph) FMH impact test. The company stated that the development of its air curtain system was based on 19 km/h (12 mph) FMH impact tests in its undeployed mode and 24 km/h (15 mph) pole impact tests using a EuroSID–1 dummy. However, Toyota indicated that it prefers the Option 2 test with a 24 km/h (15 mph) speed in the full-deployment mode since the FMH test, in spite of its relatively high HIC results, is more repeatable than the pole test. Toyota also noted that for Option 2 the 30 ms full-deployment requirement is restrictive and unnecessary. Toyota believes that it is more reasonable to require full-deployment prior to dummy head contacts with the side structure in a Standard 214 side impact test.

Toyota indicated that for Option 2 compliance tests, NHTSA should require that the system full-deployment condition be maintained throughout the testing and that impact angles be the same as those used for testing regular padding countermeasures. Toyota commented that all target areas that are covered by deployed system should only be required to meet 19 km/h (12 mph) FMH impact tests when undeployed.

Toyota raised several issues concerning Option 3 test. Toyota supported the use of the EuroSID–1 dummy and preferred the moving pole-to-vehicle test instead of the vehicle-to-pole test. Toyota commented that the +/−38 mm (1.5 inches) impact location tolerance is not acceptable because it is larger than 10% of the pole diameter. Toyota argued that the 29 km/h (18 mph) pole test is not acceptable and that Toyota has developed its air curtain system on the basis of 24 km/h (15 mph) pole impact tests. In addition, Toyota commented that all target areas that are covered or protected by deployed system are qualified for 19 km/h (12 mph) FMH impact test in its undeployed mode.

AORC supported the proposed Option 2 test procedure and recommended that the definition of the target points directly over the stowed system be expanded to include any area that would be protected by the system in its deployed mode. AORC supported the requirement of conducting a Standard 214 side impact test to evaluate the full system deployment condition. However, AORC commented that the 30 ms requirement does not measure the variance of vehicle design parameters and is, therefore, unnecessary. In its comments directed to the Option 3 test procedure, AORC supported the proposed test. However, AORC recommended the use of a 350 mm diameter pole and an existing test dummy with a proper biofidelity rating for the purpose of international harmonization. In regard to potential injuries associated with dynamically deployed upper interior head protection systems, AORC commented that sled test data, including tests on unrestrained, small or child seat occupant dummies, do not show increased neck loads or other injuries. In addition, AORC commented that NHTSA should conduct a benefit evaluation to determine the use of a rear seat dummy in pole testing.

II. Final Rule

After review of the comments submitted in response to the NPRM and further consideration of test and other data, NHTSA is adopting the proposed amendments with some modifications. The most significant of these modification is the abandonment, at the present time, of the in-vehicle test set forth as Option 2 in the NPRM. The agency has also concluded that certain modifications to the Option 3 proposal are appropriate. These modifications include an expansion of the area over a stowed dynamic system that is subject to testing at the reduced 19 km/h (12 mph) FMH impact speed, modifications to the specifications for the rigid pole, minor changes to the specifications for vehicle test attitude to accommodate different vehicle propulsion systems, and a modification to the proposed seating procedure for the SID/HIII dummy. Explanation of these changes is provided below.

A. Deletion of the Proposed In-Vehicle Test

Two commenters, Nissan and Toyota, indicated a preference for the Option 2 test over the Option 3 vehicle-to-pole test. Otherwise, none of the comments received in response to the NPRM indicated that any manufacturers intended to rely on the proposed test specified in Option 2. Mercedes indicated that, at present, none of the known dynamically deployed systems can be certified using the Option 2 test procedure. AAMA also commented that it do not know of any system that would be tested using this optional test procedure.

Following the publication of the August 1995 final rule, several manufacturers presented information to NHTSA regarding the development of advanced dynamically deployed systems. Ford indicated it was developing a new side impact air bag system for both chest and head protection. BMW and Volvo disclosed their development of the ITS and the IC, respectively. Mercedes indicated that it

was studying a ''dynamically deployed padding'' system. Mercedes described this system as special materials used for the molding and trim of the A- and/or B-pillars and side rails. In a side impact, those materials would be energized and enlarged to provide greater cushioning and improved head protection.

While the Option 3 test procedure was intended to be used for certifying the ITS, IC and other side impact air bag systems, the Option 2 test procedure was conceived by the agency as potentially appropriate for certifying potential dynamic padding designs such as the system once under development by Mercedes. Mercedes is presently not considering the inflatable padding concept and adopted an IC design. However, Toyota, which is also developing an IC design, indicated that it preferred to test this design through use of the Option 2 test with an FMH impact of 24 km/h (15 mph) against a deployed system rather than the Option 3 vehicle to pole test. The company's comments indicated that it believed the Option 2 test would be more repeatable and realistic. Toyota did not, however, elaborate on these points other than to express its view that Option 2 testing would be representative of a variety of crash modes while the Option 3 test represents a single crash mode. Nissan expressed its preference to the Option 2 test on the basis of cost, indicating that it believed the Option 3 test was not needed and would be a higher cost alternative to Option 2. Nissan did not, however, submit any data indicating that this belief was based on any testing it had performed or that its preference for the Option 2 test was based on any system it was developing.

NHTSA is concerned that the Option 2 test presents a number of technical challenges which indicate that it may not be as repeatable or reliable as the Option 3 test. For instance, the validity of the HIC transfer function specified in S7(a) is in question when it is applied to FMH impacts against a dynamically deployed system. In addition, there may be other technical problems with the test related to the flexibility of deployed dynamic systems and the behavior of the FMH when it makes contact with the system. The agency notes that it does not have any experience in conducting tests with the FMH against a deployed system and further observes that, with the exception of Toyota, which conducted 15 mph FMH impacts against a deployed system, no other manufacturers appear to have attempted such testing. This lack of experience and test data make it difficult or impossible for the agency to fully evaluate the Option 2 proposal at this time.

NHTSA is aware that the Option 2 test has the potential to evaluate system performance in a greater variety of crash modes than the Option 3 vehicle to pole test. However, the rapid development of dynamically deployed upper interior head protection systems necessitates immediate changes to Standard 201 to allow manufacturers the opportunity to place these systems in production vehicles. The agency is confident that the Option 3 test provides a valid means for assessing the performance characteristics of dynamic head protection devices. Unfortunately, the absence of data and experience in performing the proposed Option 2 test does not allow NHTSA to have the same degree of confidence in the Option 2 test. The agency may reconsider use of the Option 2 test in the future, but has concluded that Option 2 must be deleted from this final rule.

The agency's decision to delete the Option 2 proposal from the final rule renders further discussion of the comments relating to Option 2 unnecessary. However, several issues which are germane to both Option 2 and Option 3 are addressed in the discussion below relating to Option 3.

B. Vehicle-to-Pole Test

The agency is adopting the Option 3 Test Procedure with one modification. This modification, which expands the area over an undeployed dynamic system which is subject to the 19 km/h (12 mph) FMH impact test, does not substantially modify the Option 3 proposal set forth in the NPRM. The agency notes that BMW, Volvo, IIHS, and AORC substantially supported the Option 3 test procedure as outlined in the NPRM. IIHS commented that the NPRM proposed pole test provided a good demonstration of the additional head protection offered by systems such as the ITS and IC. Three commenters, Toyota, Nissan and AAMA, do not support the full scale pole impact test on the basis that the Option 3 test is redundant, burdensome and provides no additional safety benefits.

NHTSA observes that the 29 km/h (18 mph) vehicle-to-pole test was suggested by BMW and supported by several European manufacturers who have already installed or are planning to install dynamically deployed upper interior head protection systems in their production vehicles. The agency is employing this optional test procedure to accommodate dynamic systems, which testing has shown to have substantial safety benefits.

Toyota, which has been using a 24 km/h (15 mph) pole test itself in the development of a dynamic system, appears to be objecting to the 29 km/h (18 mph) impact speed of the Standard 201 pole test. As discussed elsewhere in this notice, NHTSA believes that the 29 km/h (18 mph) impact speed is necessary to provide assurance that dynamic systems will provide safety benefits. Nissan's principal objection to the Option 3 pole test was based on its view that the test was redundant when the proposed Option 2 test was also available. However, now that the Option 2 test has been withdrawn from consideration, Nissan's objection is not valid. AAMA's objection that the Option 3 test was unduly burdensome was not supported by any further explanation. Several commenters raised various questions concerning the test procedure. These questions included ones relating to the size and configuration of the rigid pole, the suitability of the SID/HIII dummy, inclusion of a dummy in the rear seat during testing, impact speeds, impact tolerances, out of position occupants, target points subject to reduced FMH impact speeds, benefit analyses, and the effective date of the final rule.

C. Rigid Pole

In regard to the size of the rigid pole struck in the Option 3 test, IIHS, VW, Nissan, Autoliv and AORC commented that the pole should be 350 mm in diameter, rather than the 254 mm pole proposed in the NPRM. IIHS also commented that the 350 mm pole impact test is less severe, but has higher test repeatability, than the 254 mm pole test. AAMA commented that the 254 mm pole was initially considered, but was rejected by ISO working groups because the 254 mm pole was not representative of real world obstacles that would produce serious injuries. In addition, AAMA pointed out that two recent ISO draft technical reports (issued in May 1997) concerning the performance of side air bags recommended the use of 350 mm pole. These 6 commenters support the use of the ISO 350 mm pole for international harmonization purposes.

NHTSA began research to develop a test procedure for certifying the advanced dynamic systems after the agency received information on the advanced dynamically deployed upper interior head protection systems from Ford, BMW, Mercedes and Volvo in 1995. The agency carefully examined the draft ISO Technical Report ''Road Vehicles—Test Procedures for Evaluating Various Occupant-Interactions with Deploying Side Impact

Air Bags'' (ISO/TC 22/SC 10/WG 3 N100; Oct. 19, 1995) and attempted to replicate, to the greatest possible extent, the test procedures outlined in the draft report. Section 3.5 of the ISO report provided the following specifications for the pole:

> A vertically-oriented circular, rigid pole-like metal structure, beginning no more than 100 mm above the ground, and extending above the roof of the impacting vehicle. The pole should be 200–380 mm in diameter and set off from any vertical mounting surface by at least 1500 mm.

NHTSA decided to adopt a 254 mm pole for the Option 3 test because it is within the ISO recommended pole diameter range, results in a more severe impact, and because the 254 mm pole is more representative of impacts occurring in the United States. The agency also notes that the Federal Highway Administration (FHWA) of the Department of Transportation has accumulated extensive experience on side impact tests against a 254 mm pole. FHWA's test experience enabled NHTSA to develop a practical test procedure in a relatively short period of time.

In 1989, FHWA published a technical paper (SAE Paper 890377 ''A Summary of Recent Side Impact Research Conducted by the Federal Highway Administration'') on the subject. The paper indicated that each year approximately 12,000 fatalities occurred in single vehicle crashes against fixed objects and about 2,700 of the 12,000 fatalities occurred in side crashes. About 60 percent of the 2,700 fatalities in single vehicle side crashes were associated with impacts against trees, utility poles, and other poles. FHWA concluded that the pole diameter at the window sill level for most poles is approximately 254 mm. NHTSA conducted a review of National Automotive Sampling System (NASS) data in an effort to determine if the 254 mm diameter object is representative of trees struck as well as poles. Unfortunately, the available NASS data do not allow the agency to determine if the 254 mm pole is representative of trees struck in crashes in the United States. Nonetheless, the 254 mm diameter pole does represent an important injury source responsible for a significant percentage of fatalities occurring in single vehicle side crashes against fixed objects in the United States. The ISO decision to reject the 254 mm pole was based on French crash data indicating that a larger pole more appropriately reproduced crashes in France. However, the French data also show that pole impacts are an important source of occupant fatalities/injuries in side crashes with fixed objects.

After review of the available data, NHTSA does not agree with AAMA's contention that the 254 mm diameter pole is not representative of real world obstacles producing severe head injuries. The agency notes that FHWA data, summarized and presented in SAE paper 890377, show that side impacts to poles constitute a serious highway safety problem in the United States. It should also be observed that the AAMA comments are based on the French crash data. However, the French data shows that the poles of 150–300 mm in diameter are an important injury source in side crashes with fixed objects.[2]

NHTSA has determined that a 254 mm pole, a size within the range recommended in the 1995 draft ISO technical report, simulates a real world crash condition corresponding to a known highway safety problem in the United States. As the 254 mm pole is representative of conditions in the U.S., the agency has performed testing and research using this pole size in developing the Option 3 test procedure.

The 254 mm pole used in this test was first described in the agency's March 7, 1996 ANPRM describing proposals for testing dynamic systems. NHTSA did not receive any comments regarding pole size in response to the ANPRM. The agency was aware, however, that some manufacturers were using the 254 mm pole for vehicle-to-pole impact tests while the agency pursued its own testing to validate the proposed test procedure. When the two ISO draft technical reports that rejected the 254 mm pole were issued in May 1997, the agency had already taken a considerable number of steps toward finalizing its test procedure. It should also be noted that those manufacturers who currently plan to install advanced dynamic systems in their vehicles do not oppose the use of 254 mm pole. In addition, adoption of the 350 mm pole size, which has not been finally adopted by the ISO working groups, would result in a significant delay of this rulemaking, since additional testing would be necessary.

NHTSA has concluded that testing with the 254 mm diameter pole is practical, that this test is repeatable, and that the test is a valid means for assessing the performance of dynamic systems. NHTSA is, however, modifying the specifications for the rigid pole. The diameter of the pole remains at 254 mm, but NHTSA is adding a tolerance of ±3 mm to the pole diameter specification. As proposed in the NPRM, S8.25 specified that the rigid pole must begin at a point not more than 102 mm (4 inches) off the ground and extend to a minimum height of 80 inches. As certain devices used for transporting a vehicle into the pole during a test may require that the vehicle be raised off of the ground, NHTSA has concluded that the dimensions proposed in the NPRM might result in a pole configuration where the pole does not extend above the roof of the vehicle or at its lowest point could interfere with carriage of the test vehicle into the pole. Accordingly, the final rule has modified S8.25 to specify that the lowest point of the pole be not more than 102 mm (4 inches) above the lowest point of the tires of the test vehicle and that the highest point of the pole extend above the highest point of the roof of the test vehicle.

In addition, the agency notes that, as proposed, S8.25 specified that the test vehicle not strike any portion of the pole mount at any time during the test. After conducting several tests, NHTSA has concluded that this specification is unrealistic and has modified it to state that the test vehicle may not contact any part of the pole support structure within 100 milliseconds of the initial vehicle to pole contact.

D. SID/HIII Dummy

Although the agency published a separate Notice of Proposed Rulemaking (NPRM) on December 8, 1997 (62 FR 64546) outlining proposed specification for the SID/HIII dummy, it also addressed the SID/HIII in the NPRM preceding this final rule. As the NPRM proposing the SID/HIII was not issued simultaneously with the proposed changes to Standard 201, some commenters offered their views regarding the SID/HIII in response to August 26, 1997 Standard 201 NPRM. Mercedes and VW commented that significant changes to EuroSID have been made since 1990 and that the ISO pole test procedure specifies the new EuroSID–1 dummy with the Hybrid III head. These commenters recommended that NHTSA adopt the EuroSID–1 for international harmonization purposes. Nissan commented that the SID/HIII dummy does not have a proven biofidelity rating and is in conflict with harmonization. Toyota also supported the use of the EuroSID–1. AORC

[2] French data show that the distribution of the tree/pole fatal impacts (excluding impacts with other fixed objects) is 18 percent to trees with a diameter of 300–400 mm, 24 percent to poles (this may include trees since there is no mention of trees with a diameter of less than 300 mm in the French crash data) with a diameter of 150–300 mm. The French data seem to support using a 254 mm pole instead of a 350 mm pole because it shows a larger percent of fatalities occurring in impacts against 150–300 mm poles than in impacts against 300–400 mm diameter trees.

commented that the dummy test device should have a proper biofidelity rating and be capable of harmonization with the ISO standard. The organization also stated that an existing dummy should be specified as an option pending further evaluation of the SID/HIII dummy. AAMA argued against use of the SID/HIII on the basis that the proposed dummy has a much lower biofidelity rating than the EuroSID–1 and the BioSID and that the EuroSID–1 is better in discriminating changes in door padding. Therefore, AAMA recommended that NHTSA adopt a modified EuroSID–1 as an interim dummy instead of the SID/HIII. IIHS raised the issue concerning the seating height of the dummy, stating that a taller dummy seating height provides for a better test configuration. Advocates commented that it is waiting to see if the SID/HIII is a reliable dummy test device.

The commenters raise two significant issues. The first is that the SID/HIII has a lower biofidelity rating than the BioSID and the EuroSID–1. Secondly, the use of any dummy other than the EuroSID–1 conflicts with international harmonization.

With respect to the dummy biofidelity, AAMA commented that the ISO biofidelity ratings (5.9, 4.2 and 3.8 for the BioSID, EuroSID–1 and SID/HIII dummies, respectively) demonstrate that the SID/HIII is not a proper choice for a pole impact test. The agency does not agree that the SID/HIII is not a proper choice for head-to-pole impact tests because the SID/HIII has a head and neck system similar to the BioSID. The biofidelity ratings cited by AAMA are ''overall'' ratings, not just for the head/neck complex. However, the critical component for the purposes of the Option 3 test is the head and neck. AAMA also commented that the NHTSA's biofidelity rating for the SID/HIII is high because the agency did not combine the neck and shoulder components into an integrated assembly for proper rating. Since the SID/HIII does not have a metal skeletal shoulder structure and is not sensitive to door padding stiffness, the ISO working group gave the SID shoulder assembly a ''zero'' rating. NHTSA has concluded that this rating is not relevant to use of the SID torso in the SID/HIII dummy proposed for the Option 3 test. The agency observes that no relevant data on pole (or high, rigid wall) impact tests were considered in the development of the ISO biofidelity rating for side impact dummies. In high speed lateral impacts against high, rigid walls, the shoulder of human cadaver test subjects collapse in a movement towards the spine. In a rigid pole impact (similar to a high, rigid wall impact), the dummy shoulder component should, like the shoulder of a human cadaver, collapse without shielding the head and neck from impacts with intruding objects such as a rigid pole. The agency notes that the current biofidelity rating scheme used by the ISO working group does not recognize this important factor. Further, NHTSA believes that existing data demonstrate that the SID shoulder, which collapses as a human cadaver shoulder does in side impact tests, should receive at least a 2.5–3.0 rating for pole impacts. With this 2.5–3.0 rating, the SID/HIII receives a 4.2 overall biofidelity rating. This rating is above the ISO recommended 4.0 acceptable level.

The BioSID shoulder is rigidly attached to a stiff clavicle component and the EuroSID–1 shoulder is a rigid component with limited forward rotation capability upon contact. The agency believes that the shoulders of those two dummies would not collapse and move out of the way under various lateral impact conditions. In contrast, the SID/HIII shoulder is made of foam materials and will collapse upon an impact. The ISO working group does not acknowledge that this special shoulder design makes the SID/HIII a desirable dummy test device for the 90 degree pole impact test. The agency notes that the BioSID that has the highest biofidelity rating among all five existing side impact dummies (new ratings from the ISO working group; BioSID=5.9, EuroSID–1=4.2, SID/HIII=3.8, EuroSID=3.2, and SID=2.3.), but that BioSID proved to be unsuitable in one of the 29km/h (18 mph), 90 degree pole impact tests conducted at IIHS in accordance with the NPRM proposed test procedures. In a test of a 1997 BMW 528i vehicle, the BioSID shoulder joint contacted the intruding side structure and failed to collapse. This failure to collapse, which is inconsistent with human cadaver tests, prevented head-to-pole contact. This unhuman-like response of the BioSID shoulder demonstrates a possible deficiency in the ISO biofidelity rating scheme. In a subsequent IIHS pole test using a SID with the Hybrid III head/neck assembly, the shoulder collapsed in a representative fashion and the test was successful. In its comments, IIHS pointed out that the vehicle-to-pole impact test is highly repeatable when the SID with a Hybrid III head/neck assembly is used.

NHTSA does not agree with those commenters urging use of the EuroSID–1 dummy for the Option 3 test. It is anticipated that the kinematics of the EuroSID–1 shoulder, if it does not prevent head-to-pole contact, may induce fore and aft head motion prior to head impact. NHTSA believes that such fore and aft head motion of the EuroSID–1 would be difficult to control. A 1988 report regarding the EuroSID (Proceedings of the Seminar held in Brussels, Dec. 11, 1988) indicated that the EuroSID shoulder rotation mechanism produces a force ranging from 2.0 to 3.4 kN (450 to 760 pounds) during a series of 4.3 m/s (9.6 mph) impacts using a 23.4 kg (51.5 pounds) impactor. The peak force occurs within 10 to 15 ms upon impact. NHTSA does not know if the performance of the EuroSID–1 is improved in this area and those urging use of the EuroSID–1 have not supplied any data on this point. The agency suspects that the head impact location tolerance for pole impact tests may be very difficult to define if the EuroSID–1 is used as the dummy test device. The EuroSID–1 has also not been generally accepted by the testing community as a valid test device. Modifications to this dummy are ongoing and an intensive evaluation program of the EuroSID–1 is expected to begin in 1999. NHTSA cannot seriously consider the EuroSID–1 as a test device, particularly for the 90 degree pole tests, until this device becomes generally accepted and sufficient data become available to assess its performance.

NHTSA, as well as IIHS and several interested manufacturers, have conducted vehicle-to-pole impact tests using the SID/HIII dummy (or SID+Hybrid III head/neck/neck bracket) for the purposes of evaluating proposed Option 3 test procedure. The agency has concluded that the SID/HIII is an appropriate dummy test device for this test. The BioSID is not acceptable and the EuroSID–1 is not yet ready. Given the fact that NHTSA must promulgate a final rule to accommodate dynamically deployed upper interior head protection systems and that the SID/HIII offers adequate performance using existing and proven components, the agency concludes that the SID/HIII is the best test device available for the Option 3 test.

With respect to the international dummy harmonization, the agency supports the goal of developing a global dummy test device. The agency will evaluate the global dummy test device after its completion and then decide what to do. At present, the agency has decided to adopt the SID/HIII dummy for head-to-pole impact evaluation.

In reference to the IIHS's concern on dummy seating height, the agency concludes that current test data show that the seating height of the SID/HIII

dummy is sufficient. With respect to the Advocates' concern on dummy reliability, the agency concludes that the SID/HIII, which is constructed from known components with sufficient durability, is a reliable dummy test device for the 90 degree pole test.

E. Rear Seat Dummy

A number of commenters discussed the use of a rear seat occupant dummy in the Option 3 test. AORC, Volvo and BMW each indicated that placing a dummy in the rear seat would not produce meaningful data and would add cost and complexity to the test procedure. After consideration of these comments and after performing several Option 3 vehicle to pole tests, NHTSA has concluded that placing a dummy in the rear seat of the struck side in a vehicle to pole test is unnecessary. Both the pole test data and a recent safety benefit analysis (Benefits Analysis of the Inflatable Tubular Structure (ITS), August 19, 1997) submitted by BMW indicate that a rear seat dummy is not needed. NHTSA conducted five 29 km/h (18 mph) pole impact tests using 1995 Hondas to verify the proposed dummy seating procedure and other aspects of the proposed Option 3 test. In the first two tests, the dummy head impacted the B-pillar without really contacting the pole. The HIC readings for those two tests were in the 500–600 range, far below the 1,000 limit. These results indicate that in a 29 km/h (18 mph) side impact with a 254 mm pole, HIC scores near or above 1000 are not likely to be encountered unless the dummy's head makes direct contact with the pole itself. The agency believes that the head of a rear seat dummy will not contact the intruding pole aimed at the front occupant's head and is likely to contact some components more forgiving than the B-pillar, resulting in a low HIC reading. A recent safety benefit analysis submitted by BMW estimates that, for rear seat occupants, the overall number of AIS 3–5 injuries saved by its ITS system would be larger than the baseline number of AIS 3–5 injuries from side rail contacts. Inflatable curtain systems now under development protect both the front seat and the rear seat occupants. In view of these factors, it appears that dynamic systems offer considerable safety benefits for rear seat occupants and the addition of a test dummy to the rear seat in the Option 3 test is unwarranted.

F. Impact Speed and Conditions

Toyota commented that the pole impact speed should be 24 km/h (15 mph) instead of 29 km/h (18 mph) and the proposed impact tolerance limit of ±38 mm (±1.5 inches) that is more than 10 percent of the pole diameter is not acceptable. In contrast, BMW commented that the proposed impact location tolerance limit is reasonable. In its comments, Advocates indicated that it supports the proposed pole test procedure because it represents the possible worst-case crash condition, although it does not conform with real crashes given that the roll, yaw and pitch angles are controlled in the test. Further, Advocates expressed concerns that many manufacturers will avoid the pole test since the agency proposed two alternative test procedures (*e.g.*, Options 2 and 3). Volvo commented that the pitch angle does not seem to have any effect, but the yaw angle appears to be a sensitive factor, to the proposed 90 degree pole impact test.

The agency has concluded that the 29 km/h (18 mph) impact speed specified for Option 3 is appropriate. Discussion of this issue in the NPRM indicated that this speed was selected in an attempt to ensure that any safety losses incurred by allowing manufacturers to test certain target points at 19 km/h (12 mph) would be offset by a safety benefit of similar or greater magnitude. Benefit analyses performed by the agency and by others indicate that the 29 km/h impact speed specified for Option 3 is appropriate to ensure a net increase in safety.

In regard to minimum tolerances for pole contact with the test vehicle, the agency does not agree with Toyota's contention that the ±38 mm (±1.5 inches) tolerance limit is not acceptable because it is greater than 10 percent of the pole diameter. The tolerance is measured from the longitudinal centerline of the pole to ensure a square head impact and is based on the head contacting the pole within a segment that is relatively perpendicular to the head velocity. In selecting this tolerance, the agency does not believe that the pole diameter is particularly relevant. Testing has revealed, however, that the tolerance is necessary to assure practicability. Accordingly, the agency has concluded that it will retain the impact tolerance proposed in the NPRM for the final rule.

NHTSA is also incorporating the requirement contained in the Option 3 proposal that the test vehicle strike the pole at an angle of 90 degrees with an impact tolerance of ±3 degrees. The agency has concluded that this specification is sufficient and that roll, yaw and pitch angles do not need be specified. NHTSA agrees with Volvo's comment that yaw angle may alter the impact location. However, the purpose of controlling those angles in a pole impact test is to determine a practical impact location tolerance level. The pole impact tests conducted by the agency and other interested manufacturers indicate that the impact location tolerance proposed in the NPRM is reasonable. In view of this, NHTSA has concluded that it is not necessary to specify roll, pitch and yaw angles in the final rule and that the NPRM proposed impact angle, with a tolerance limit of +3 degrees, will be incorporated in the final rule.

G. Target Locations

A number of commenters offered their views on target locations for the 19 km/h (12 mph) FMH impact test in Option 3. Mercedes, Volvo, VW, BMW, Toyota, Autoliv, and AAMA stated that the 19 km/h (12 mph) impact requirements for target locations over a stowed dynamic system is desirable and that target locations protected by the deployed dynamic system should also be tested at 19 km/h (12 mph) impact speed. In addition, Mercedes, VW, BMW and AAMA commented that the proposed 19 km/h (12 mph) target impact area is too narrow since the required system deployment would involve system packaging and cover designs. These commenters argued that the definition of 19 km/h (12 mph) targets should include the peripheral area surrounding the dynamic system in its stowed position. Mercedes commented specifically that this peripheral area include a 25 to 50 mm (1.0 to 2.0 inch) surrounding area. However, BMW suggested a 50 mm (2.0 inch) surrounding area. Both Volvo and BMW commented that the 95th percentile SAE eyellipse can not be the sole criterion to determine protection on head impacts against the A/B-pillars and side rails. BMW also commented that the range of occupant heads extends well above and behind the SAE eyellipse. Some manufacturers and AAMA indicated that target exemptions should be determined using the potential head protection capability of the deployed system.

The foregoing comments raise three issues: first, whether target locations covered or protected by the deployed system should be tested at 19 km/h (12 mph); second, whether the 19 km/h (12 mph) target location area should be expanded to include the peripheral area surrounding the stowed system; and third, whether the SAE 95th percentile eyellipse is a suitable measure for determining head protection. With respect to targets ''protected'' by a dynamic system, the agency proposed that all target locations that are located over a stowed dynamic system, including mounting and inflation

components, but exclusive of cover and covers, are excluded from the 24 km/h (15 mph) FMH impact requirements. However, those target locations must comply with the 19 km/h (12 mph) FMH impact requirements. Recognizing that a deployed system would prevent head contacts with some additional target locations other than those covered by the stowed system, the agency solicited comments on how to define the exclusion coverage. The commenters indicated that all target locations covered by the deployed system should be excluded from 24 km/h (15 mph) FMH impact tests. NHTSA notes that this definition is very subjective and would certainly create problems in testing and enforcement. However, the agency has found a more comprehensive definition of target points ''covered'' or ''protected'' by a dynamic system to be elusive. A point that may be protected from one class of occupant may not be protected from another. Similarly, the points protected and the extent of that protection may vary with system design. In the interests of expediting issuance of the final rule, the agency has concluded that the definition of target points subject to the reduced 19 km/h (12 mph) FMH impact requirements is the best definition available at this time and that no additional target locations should be excluded from 24 km/h (15 mph) FMH impact tests.

A number of manufacturers asked that the definition of the target locations subject to the 19 km/h (12 mph) FMH impact requirements be expanded to include an area 25 to 50 mm (1.0 to 2.0 inch) around the periphery of the undeployed system and its components. These commenters argued that dynamic systems do not simply deploy through the cover directly over the stowed system. Moreover, the manufacturers indicated that additional space is needed to provide the necessary transition between the ''24 km/h (15 mph)'' padding and the ''19 km/h (12 mph)'' padding.

NHTSA concludes that this is a valid concern. An inflatable system may not deploy directly through the area over where it is stowed. These systems may go through the surrounding area. In order to allow system deployment with minimum interference, it may be important to provide a transition area where padding is reduced. BMW indicated that target SR2 is slightly off the stowed ITS position and must be tested, according to the current proposal, at 24 km/h (15 mph) impact speed. Since the roof liner/trim is a continuous piece, the whole roof liner/trim must be redesigned to comply with the 24 km/h (15 mph) FMH impact requirements. BMW contends that this defeats the original purpose of exempting target locations from 24 km/h (15 mph) tests to allow manufacturers to install enhanced head protection systems, such as ITS and IC, in their production vehicles. The company suggested that an additional 50 mm (2.0 inch) area that surrounds the periphery of the stowed system be included in the definition of the exempted target locations. The agency does not agree with BMW's contention that compliance with the 24 km/h (15 mph) impact requirement in areas near a stowed system is difficult or impossible if the two areas share common trim, but it does acknowledge that the requirements of different dynamic systems may require that an area around the outside of the stowed system must be subject to the 19 km/h (12 mph) FMH impact requirement to allow a variety of systems an opportunity to deploy upward or downward as well as directly through the trim covering the device. NHTSA observes that the agency's benefit estimate assumed that SR1, SR2 and SR3 targets would be exempt from 24 km/h (15 mph) compliance tests. Accordingly, this modification, which may exclude these points depending on system design, would not alter the agency's prior safety benefit estimate. The final rule modifies the Option 3 proposal to add areas around the periphery of an undeployed system to those target points subject to the 19 km/h (12 mph) FMH impact requirements.

Commenters also offered their views regarding the use of the SAE 95th percentile eyellipse to define those targets that would be subject to FMH testing at reduced impact speeds. NHTSA agrees with Volvo and BMW that the eyellipse should not be used as a sole criterion to determine target location exemption. The agency entertained the possibility of using the eyellipse to accommodate side air bag systems installed inside the seat bolster or outer edge of the seat back. However, AAMA did not comment on this specific item but suggested, as did some foreign manufacturers, that any target locations where head contacts are protected by the deployed system should be excluded from the 24 km/h (15 mph) FMH impact test. As noted above, NHTSA believes this suggestion to be impractical. Since the agency's existing definition allows the installation of dynamic systems, there is insufficient justification for excluding additional target locations. NHTSA concludes that the SAE 95th percentile eyellipse is, by itself, not an appropriate mechanism for determining targets subject to lower impact speeds.

H. Safety Concerns

A number of commenters offered their views on safety concerns associated with the deployment of dynamically deployed upper interior head protection systems. Toyota, offering its view that the 29 km/h (18 mph) impact proposed for testing deployed systems was excessive, argued that the 29 km/h (18 mph) impact requirement would result in dangerously aggressive dynamic systems. Advocates commented that as frontal air bag concerns displace children from front seat to rear seats, reducing impact requirements for any rear seat area target points should be regarded with suspicion. In addition, Advocates commented that by excluding the SR3 target point without adequate justification, NHTSA is deferring to the wishes of manufacturers without any justification. Volvo commented that their out-of-position occupant tests indicate that injuries of a greater severity level are not likely to occur as a result of an occupant, child or adult, being too close to, or in an undesirable position relative to, the system. BMW commented that the ITS system, tailored to protect the head of an adult occupant, is very small and deploys with a minimum amount of energy. According to BMW, the ITS does not present an ''aggressive'' threat to vehicle occupants. In its comments, AORC indicated that sled tests, including tests on unrestrained, small or child seat dummies, do not show increased neck loads or other injuries resulting from the deployment of dynamic systems.

While NHTSA agrees with Advocates that many young children will be seated in rear seats instead of front seats, the agency does not agree that this phenomenon, in conjunction with the exclusion of SR3 from the 24 km/h (15 mph) compliance test, creates a safety concern. In a non-rollover crash, the head of a child in the rear seat is not likely to be in a position to contact SR3. In addition, NHTSA's analysis of 1992–1996 NASS, rollover/non-ejection data indicates that the head/face of 719 second-seat occupants, including 154 children of 10 years of age or younger, contacted the rear side rails resulting in five AIS–1 or greater head/face injuries, including one AIS–5 or greater injury and that no child of 10 years of age or younger sustained any head/face injury. It appears that the Advocates' comment that excluding SR3 will result in greater injuries to children is not borne out by data on real world crashes.

With respect to out-of-position child problems, the agency does not have its own studies and relies, at present, on the manufacturers' test data to evaluate the problem. Based on the comments from Volvo, BMW and AORC, it appears that out-of-position occupants, including children and adults, would not be placed at risk by dynamically deployed upper interior head protection systems. The agency notes that side air bags and dynamically deployed upper interior head protection systems are relatively small and less aggressive compared to front passenger air bags, and that the design of these systems has benefitted from the experience gained from frontal air bag systems. However, the agency will continue to monitor and test dynamically deployed upper interior head protection systems as they become available.

NHTSA has also concluded that dynamically deployed upper interior head protection systems would not present a risk of additional neck injuries. The results of the BMW 528i car-to-pole tests conducted at IIHS indicated that dummy neck loads in the test with the ITS system are either lower than, or at least remain approximately the same as those in the baseline test without the ITS system. In view of this, NHTSA concludes that despite the concerns voiced by Advocates, the ITS system or the IC system is not likely to increase the risk of neck injury. However, the agency agrees with AAMA that further exploration of the risk of neck injury should be conducted. With respect to potential auditory system injury, the existing data are not sufficient for NHTSA to explore the issue at this time. The agency notes that the SAE is currently studying the problem of air bag noise. At this time, NHTSA is declining to incorporate any limits relating to auditory injury in the final rule, but will continue to monitor air bag data and study occupant injuries.

I. Other Issues

Several commenters also asked that certain issues in the proposal be explained or clarified. Volvo requested the agency to more fully define those target points contiguous to the system's mounting and inflation components subject to the 24 km/h (15 mph) impact. AAMA requested that S6.1 (b) and (c) be redrafted or explained as it believed that these sentences are incomplete. The organization also asked for clarification of S8.13.3 concerning the exclusion of the initial FMH forehead-to-target contact found in Option 1 when testing a deployed system under proposed Option 2. VW commented that testing laboratory contractors must confirm target locations and impact speeds with manufacturers before conducting the test.

With respect to Volvo's comments requesting clarification of target points subject to the 24 km/h (15 mph) impact, the final rule excludes target points that are within the 50 mm (2.0 inch) areas surrounding the stowed system including its mounting and inflation units. This change from the Option 3 proposal should address Volvo's concern. With respect to the AAMA's concern on the text of S6.1 (b) and (c) and S6.2 (b) and (c), NHTSA has redrafted and reorganized the text of the section in order to clarify them. With respect to AAMA's comment regarding excluding initial FMH forehead-to-target contact (S8.13.3) in testing the deployed system, clarification of S8.13.3 is not needed because the Option 2 test procedure has been removed from the final rule. NHTSA disagrees with VW's position that a NHTSA testing contractor should confirm target locations and impact speed before conducting a compliance test. It is NHTSA's position that such a procedure would provide manufacturers with too much control over compliance testing. As with other safety standards, if any information is needed prior to a compliance test, NHTSA will ask for, and manufacturers will provide, that information.

Advocates commented that the data used by NHTSA to justify the 19 km/h (12 mph) FMH impact test were not available for public review and that the administrative record of the NPRM does not support the reduction of the FMH impact speed from 24 km/h to 19 km/h (15 mph to 12 mph) for target points that are located over a stowed system. Advocates also commented that since no sensor design specification is given to ensure the sensor performance, the number of severe injuries due to sensor malfunction may be considerably larger than the agency's expectation. In addition, Advocates questioned the validity of the agency's benefit analysis because it was based on the ITS sled tests generated by manufacturers and because not a single ITS test was conducted simulating rollover crashes. Advocates further stated that it is improper for NHTSA to argue for or rely on anti-ejection benefits that have not been tested. Both AAMA and Advocates raised questions on the potential risk of neck injury and urged that the topics be entered on the agenda of the Motor Vehicle Safety Research Advisory Committee and the program of International Harmonization Research Agenda. AAMA also raised questions on the potential risk of other injuries such as auditory system injuries and other injuries related to the system deployment.

NHTSA does not agree with allegation made by Advocates regarding the administrative record and justification for the reduction of FMH impact speed from 24 km/h to 19 km/h (15 mph to 12 mph) for targets located over the stowed system. The BMW test data, although confidential, were used by the agency to justify the reduction of FMH impact speed. NHTSA believes that an adequate explanation of this data, given in the PRE supporting the NPRM, exists in the administrative record of this rulemaking. The safety benefit analysis by K. Digges & Associates, recently submitted by BMW in its comments to the NPRM, provides further justification on the subject.

Advocates questioned the validity of the agency's benefit analysis because the analysis was based on ITS performance in manufacturer-generated sled tests, the ejection prevention capability of the ITS was projected without testing, and the proposed rule did not contain specifications for sensor performance. With respect to the validity of the BMW sled test data, NHTSA observes that the agency's safety benefit estimate was based on all available data, including crash test data and sled test data. While NHTSA recognizes the limitations of sled tests, the agency believes that sled tests can be a useful tool for the development of safety countermeasures and are valid in this instance. With respect to the projections regarding ejection mitigation, NHTSA notes that it is true that neither the agency nor any manufacturers had conducted any rollover tests using the ITS system prior to issuance of the NPRM. However, the agency examined the limited rollover test data and the real world crash data and, relying on its judgment and experience, made an appropriate benefit estimate in support of the NPRM. At present, the agency has completed three rollover tests at 48.3 km/h (30 mph) using the Standard 208 rollover cart. The test vehicles were Ford Explorers equipped with several different ITS designs. In each test, two Hybrid III dummies were seated in the outboard front seating positions. All dummies, except one right front seat passenger dummy, were unbelted. The test results showed that head ejections and complete ejections through side windows did not occur and that five out of the six test dummies had their hands/arms outside the windows after those rollover tests. These test results support the agency's assumption that the ITS system would greatly reduce the side window ejection casualties. In addition,

a recent safety benefit analysis by K. Digges & Associates provides further information on the subject. Based on those recent studies, it is concluded that the ITS and similar head protection systems will reduce side window ejections. However, the agency will continue investigation on this subject.

With respect to the lack of sensor specifications in the proposed rule, NHTSA believes that such specifications are not required. The agency notes that it did not issue a sensor specification for the frontal air bag systems and that manufacturers have gained considerable field experience in sensor designs since the introduction of the air bag systems nearly 10 years ago. In addition, many manufacturers have already installed side air bags in their production cars. In view of this, it appears that a sensor specification would be superfluous.

J. Dummy Seating Position

Agency testing has revealed that the dummy seating position proposed in the NPRM would result in interference between the B-pillar and the head of the test dummy in certain vehicles. Therefore, the final rule modifies the seating position to further increase the chance that a 2-inch head/window frame clearance will exist between the dummy head and the forward edge of the B-pillar/door window frame combination. Accordingly, S8.28 has been modified to specify that in those instances where the seating procedure and seat position procedures of S6.3, S6.4 and S7 of Standard 214 result in the back of the dummy head being less than 50 mm (2 inches) forward of the front edge of the B-pillar/door window frame combination, the seat is to be further adjusted to achieve the desired clearance. The first specified adjustment is to move the seatback forward a maximum of five degrees. If this does not result in sufficient clearance, the seat itself is to be moved forward until clearance is obtained or interference occurs between the dummy's knees and the dashboard or knee bolster. If forward adjustment of the seat does not produce the desired clearance, the seat back is adjusted again until clearance is obtained or until the seat is in its full upright locking position.

K. Selection of Options

NHTSA notes that, where a safety standard provides manufacturers more than one compliance option, the agency needs to know which option has been selected in order to conduct a compliance test. The agency is aware that a manufacturer confronted with an apparent noncompliance for the option it has selected (based on a compliance test) may argue that its vehicles would comply with a different option for which the agency has not conducted a compliance test. This could create difficulties in assessing the vehicle's compliance.

To address this problem, the proposed rule stated that manufacturers must select a test option prior to, or at the time of, certification. NHTSA did not receive any comments on this proposed provision. The final rule requires that where manufacturer options are specified, the manufacturer must select the option by the time it certifies the vehicle and may not thereafter select a different option. This will mean that failure to comply with the selected option will constitute a noncompliance with the standard regardless of whether a vehicle complies with another option.

L. Effective Date

Volvo and BMW commented that the final rule should be issued by March 1998 and become effective 30 days after its issuance. VW commented that the final rule should be issued as soon as possible with an immediate effective date. In the NPRM, the agency proposed that the final rule become effective 30 days after publication to facilitate the early introduction of dynamic systems that may be in an advanced stage of development or actually in production. However, NHTSA notes that the changes incorporated into the final rule are intended to allow the introduction of dynamic systems and more conventional countermeasures needed to meet the head impact protection requirements. As the phase-in of the head impact protection requirements begins on September 1, 1998, the agency notes that it is not legally necessary to establish an earlier effective date in order for manufacturers to take advantage of the amendments made by this final rule. Accordingly, the effective date of the amendments is September 1, 1998. NHTSA is aware, however, that production of vehicles with dynamic systems began prior to the effective date of the final rule and is allowing manufacturers of such vehicles to include them in their calculation of complying vehicles under S6.1.5 if such vehicles meet the requirements of S6.1(b) as promulgated in the final rule.

III. Rulemaking Analyses and Notices

A. Executive Order 12866 and DOT Regulatory Policies and Procedures

NHTSA has considered the impact of this final rule under E.O. 12866 and the Department of Transportation's regulatory policies and procedures. This rule was not reviewed under E.O. 12866, ''Regulatory Planning and Review'' and is not considered significant under the Department of Transportation's regulatory policies and procedures.

The agency has prepared a Final Regulatory Evaluation describing the economic and other effects of this rulemaking action. For persons wishing to examine the full analysis, a copy is being placed in the docket.

B. Regulatory Flexibility Act

NHTSA has also considered the effects of this final rule under the Regulatory Flexibility Act. I hereby certify that it will not have a significant economic impact on a substantial number of small entities. While the cost of new passenger cars or light trucks equipped with dynamically deployed upper interior head protection systems will be slightly increased by the amendments, the rule establishes optional test procedures which manufacturers need only use in the event they equip their vehicles with a dynamically deployed head impact protection system. Further, the amendments primarily affect passenger car and light truck manufacturers which are not small entities under 5 U.S.C. § 605(b). 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)). The agency estimates that there are at most five small final stage manufacturers of passenger cars in the U.S. and no small manufacturers of light trucks, producing a combined total of at most 500 cars each year.

The primary effect of the final rule will be on manufacturers of passenger cars and LTVs. If LTVs are produced with these systems some time in the future and provided as incomplete vehicles to final stage manufacturers, which are generally small businesses, these final stage manufacturers may have to certify compliance. However, as noted above, the amendments in this final rule do not impose any additional mandatory requirements that all manufacturers or final stage manufacturers must meet. Instead, these amendments provide a means for evaluating advanced dynamically deployed upper interior head protection systems where manufacturers choose to install them.

Manufacturer associations could also sponsor generic tests to determine the amount and type of padding or design of dynamic system needed for basic structures that will be used by a number of final stage manufacturers, to reduce

certification costs. Final stage manufacturers may also avoid any additional certification or compliance costs by relying on the certification provided by the manufacturer of the incomplete vehicle.

Other entities which qualify as small businesses, small organizations and governmental units will be affected by this rule to the extent that they purchase passenger cars and LTVs. They will not be significantly affected, since the potential cost increases associated with this action should only slightly affect the purchase price of new motor vehicles.

C. 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 will not have any significant impact on the quality of the human environment.

D. Executive Order 12612 (Federalism) and Unfunded Mandates Act

The agency has analyzed this rulemaking action in accordance with the principles and criteria set forth in Executive Order 12612. NHTSA has determined that the amendment does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

In issuing this final rule to permit optional testing to accommodate dynamic head protections systems, the agency notes, for the purposes of the Unfunded Mandates Act, that it is pursuing the least cost alternative. As noted above, any manufacturer may choose one of two options to test for compliance with Standard 201, including the test procedure established in the August 18, 1995 final rule. As this rulemaking does not require manufacturers to meet new minimum performance requirements but sets minimum performance criteria for optional systems, it does not impose new costs.

E. Civil Justice Reform

This amendment does not have any retroactive effect. Under 49 U.S.C. 21403, whenever a Federal motor vehicle safety standard is in effect, a State may not adopt or maintain a safety standard applicable to the same aspect of performance which is not identical to the Federal standard, except to the extent that the state requirement imposes a higher level of performance and applies only to vehicles procured for the State's use. 49 U.S.C. 21461 sets forth a procedure for judicial review of final rules establishing, amending or revoking Federal motor vehicle safety standards. That section does not require submission of a petition for reconsideration or other administrative proceedings before parties may file suit in court.

List of Subjects in 49 CFR Part 571

Imports, Motor vehicle safety, Motor vehicles, Rubber and rubber products, Tires.

In consideration of the foregoing, 49 CFR part 571 is amended as follows:

PART 571.201—[AMENDED]

1. The authority citation for part 571 continues to read as follows:

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

2. Section 571.201 is amended by adding a definition of Dynamically Deployed Upper Interior Head Protection System to S3, revising S6.1, S6.2, S7, and S8.13.3 and by adding S8.16 through S8.28 as follows:

§ 571.201 Standard No. 201; Occupant protection in interior impact.

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S3. *Definitions.*

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Dynamically deployed upper interior head protection system means a protective device or devices which are integrated into a vehicle and which, when activated by an impact, provide, through means requiring no action from occupants, protection against head impacts with upper interior structures and components of the vehicle in crashes.

* * * * *

S6.1 *Vehicles manufactured on or after September 1, 1998 and before September 1, 2002.* Except as provided in S6.3, for vehicles manufactured on or after September 1, 1998 and before September 1, 2002, a percentage of the manufacturer's production, as specified in S6.1.1, S6.1.2, S6.1.3, or S6.1.4, shall conform, at the manufacturer's option, to either S6.1(a) or S6.1(b). The manufacturer shall select the option by the time it certifies the vehicle and may not thereafter select a different option for the vehicle.

(a) When tested under the conditions of S8, comply with the requirements specified in S7 at the target locations specified in S10 when impacted by the free motion headform specified in S8.9 at any speed up to and including 24 km/h (15 mph). The requirements do not apply to any target that cannot be located using the procedures of S10.

(b) When equipped with a dynamically deployed upper interior head protection system and tested under the conditions of S8, comply with the requirements specified in S7 at the target locations specified in S10 as follows:

(1) Targets that are not located over any point inside the area measured along the contour of the vehicle surface within 50 mm (2.0 inch) of the periphery of the stowed system projected perpendicularly onto the vehicle interior surface, including mounting and inflation components but exclusive of any cover or covers, shall be impacted by the free motion headform specified in S8.9 at any speed up to and including 24 km/h (15 mph). The requirements do not apply to any targets that can not be located by using the procedures of S10.

(2) Targets that are over any point inside the area measured along the contour of the vehicle interior within 50 mm (2.0 inch) of the periphery of the stowed system projected perpendicularly onto the vehicle interior surface, including mounting and inflation components but exclusive of any cover or covers, when the dynamically deployed upper interior head protection system is not deployed, shall be impacted by the free motion headform specified in S8.9 at any speed up to and including 19 km/h (12 mph) with the system undeployed. The requirements do not apply to any target that can not be located using the procedures of S10.

(3) Each vehicle shall, when equipped with a dummy test device specified in part 572, subpart M, and tested as specified in S8.16 through S8.28, comply with the requirements specified in S7 when crashed into a fixed, rigid pole of 254 mm in diameter, at any velocity up to and including 29 kilometers per hour (18 mph).

* * * * *

S6.2 *Vehicles manufactured on or after September 1, 2002.* Except as provided in S6.3, vehicles manufactured on or after September 1, 2002 shall, when tested under the conditions of S8, conform, at the manufacturer's option, to either S6.2(a) or S6.2(b). The manufacturer shall select the option by the time it certifies the vehicle and may not thereafter select a different option for the vehicle.

(a) When tested under the conditions of S8, comply with the requirements specified in S7 at the target locations specified in S10 when impacted by the free motion headform specified in S8.9 at any speed up to and including 24 km/h (15 mph). The requirements do not apply to any target that cannot be located using the procedures of S10.

(b) When equipped with a dynamically deployed upper interior head protection system and tested under the conditions of S8, comply with the requirements specified in S7 at the target locations specified in S10 as follows:

(1) Targets that are not located over any point inside the area measured along the contour of the vehicle surface within 50 mm (2.0 inch) of the periphery of the stowed system projected perpendicularly onto the vehicle interior surface, including mounting and inflation components but exclusive of any cover or covers, shall be impacted by the free motion headform specified in S8.9 at any speed up to and including 24 km/h (15 mph). The requirements do not apply to any targets that cannot be located by using the procedures of S10.

(2) Targets that are over any point inside the area measured along the contour of the vehicle interior within 50 mm (2.0 inch) of the periphery of the stowed system projected perpendicularly onto the vehicle interior surface, including mounting and inflation components but exclusive of any cover or covers, when the dynamically deployed upper interior head protection system is not deployed, shall be impacted by the free motion headform specified in S8.9 at any speed up to and including 19 km/h (12 mph) with the system undeployed. The requirements do not apply to any target that cannot be located using the procedures of S10.

(3) Each vehicle shall, when equipped with a dummy test device specified in part 572, subpart M, and tested as specified in S8.16 through S8.28, comply with the requirements specified in S7 when crashed into a fixed, rigid pole of 254 mm in diameter, at any velocity up to and including 29 kilometers per hour (18 mph).

* * * * *

S7 *Performance Criterion.* The HIC(d) shall not exceed 1000 when calculated in accordance with the following formula:

$$HIC = \left[\frac{1}{(t_2 - t_1)} \int_{t_1}^{t_2} a\,dt \right]^{2.5} (t_2 - t_1)$$

Where the term *a* is the resultant head acceleration expressed as a multiple of *g* (the acceleration of gravity), and t1 and t2 are any two points in time during the impact which are separated by not more than a 36 millisecond time interval.

(a) For the free motion headform; HIC(d)=0.75446 (free motion headform HIC)+166.4.

(b) For the part 572, subpart M, anthropomorphic test dummy; HIC(d)=HIC.

S8 *Target location and test conditions.*

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S8.13 *Impact configuration.*

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S8.13.3 At the time of initial contact between the headform and the vehicle interior surface, some portion of the forehead impact zone of the headform must contact some portion of the target circle.

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S8.16 *Test weight—vehicle to pole test.* Each vehicle shall be loaded to its unloaded vehicle weight, plus 136 kilograms (300 pounds) or its rated cargo and luggage capacity (whichever is less), secured in the luggage or load-carrying area, plus the weight of the necessary anthropomorphic test dummy. Any added test equipment shall be located away from impact areas in secure places in the vehicle.

S8.17 *Vehicle test attitude—vehicle to pole test.* Determine the distance between a level surface and a standard reference point on the test vehicle's body, directly above each wheel opening, when the vehicle is in its ''as delivered'' condition. The ''as delivered'' condition is the vehicle as received at the test site, filled to 100 percent of all fluid capacities and with all tires inflated to the manufacturer's specifications listed on the vehicle's tire placard. Determine the distance between the same level surface and the same standard reference points in the vehicle's ''fully loaded condition.'' The ''fully loaded condition'' is the test vehicle loaded in accordance with S8.16. The load placed in the cargo area shall be centered over the longitudinal centerline of the vehicle. The pretest vehicle attitude shall be the same as either the ''as delivered'' or ''fully loaded'' attitude or is between the ''as delivered'' attitude and the ''fully loaded'' attitude. If the test configuration requires that the vehicle be elevated off the ground, the pretest vehicle attitude must be maintained.

S8.18 *Adjustable seats—vehicle to pole test.* Initially, adjustable seats shall be adjusted as specified in S6.3 of Standard 214 (49 CFR 571.214).

S8.19 *Adjustable seat back placement—vehicle to pole test.* Initially, position adjustable seat backs in the manner specified in S6.4 of Standard 214 (49 CFR 571.214).

S8.20 *Adjustable steering wheels—vehicle to pole test.* Adjustable steering controls shall be adjusted so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions.

S8.21 *Windows and sunroof—vehicle to pole test.* Movable windows and vents shall be placed in the fully open position. Any sunroof shall be placed in the fully closed position.

S8.22 *Convertible tops—vehicle to pole test.* The top, if any, of convertibles and open-body type vehicles shall be in the closed passenger compartment configuration.

S8.23 *Doors—vehicle to pole test.* Doors, including any rear hatchback or tailgate, shall be fully closed and latched but not locked.

S8.24 *Impact reference line—vehicle to pole test.* On the striking side of the vehicle, place an impact reference line at the intersection of the vehicle exterior and a transverse vertical plane passing through the center of gravity of the head of the dummy seated in accordance with S8.28, in the front outboard designated seating position.

S8.25 *Rigid Pole—vehicle to pole test.* The rigid pole is a vertical metal structure beginning no more than 102 millimeters (4 inches) above the lowest point of the tires on the striking side of the test vehicle when the vehicle is loaded as specified in S8.16 and extending above the highest point of the roof of the test vehicle. The pole is 254 mm ±3 mm (10 inches) in diameter and set off from any mounting surface, such as a barrier or other structure, so that the test vehicle will not contact such a mount or support at any time within 100 milliseconds of the initiation of vehicle to pole contact.

S8.26 *Impact configuration—vehicle to pole test.* The rigid pole shall be stationary. The test vehicle shall be propelled sideways so that its line of forward motion forms an angle of 90 degrees (±3 degrees) with the vehicle's longitudinal center line. The impact reference line shall be aligned with the center line of the rigid pole so that, when the vehicle-to-pole contact occurs, the center line of the pole contacts the vehicle area bounded by two transverse vertical planes 38 mm (1.5 inches) forward and aft of the impact reference line.

S8.27 *Anthropomorphic test dummy—vehicle to pole test.*

S8.27.1 The anthropomorphic test dummy used for evaluation of a vehicle's head impact protection shall conform to the requirements of subpart M of part 572 of this chapter (49 CFR part 572, subpart M). In a test in which the test vehicle is striking its left side, the dummy is to be configured and instrumented to strike on its left side, in accordance with subpart M of part 572.

In a test in which the test vehicle is striking its right side, the dummy is to be configured and instrumented to strike its right side, in accordance with subpart M of part 572.

S8.27.2 The part 572, subpart M, test dummy specified is clothed in form fitting cotton stretch garments with short sleeves and midcalf length pants. Each foot of the test dummy is equipped with a size 11EEE shoe, which meets the configuration size, sole, and heel thickness specifications of MIL–S–13192 (1976) and weighs 0.57 ±0.09 kilograms (1.25 ±0.2 pounds).

S8.27.3 Limb joints shall be set at between 1 and 2 g's. Leg joints are adjusted with the torso in the supine position.

S8.27.4 The stabilized temperature of the test dummy at the time of the side impact test shall be at any temperature between 20.6 degrees C. and 22.2 degrees C., and at any relative humidity between 10 percent and 70 percent.

S8.27.5 The acceleration data from the accelerometers installed inside the skull cavity of the test dummy are processed according to the practices set forth in SAE Recommended Practice J211, March 1995, ''Instrumentation for Impact Tests,'' Class 1000.

S8.28 *Positioning procedure for the Part 572 Subpart M Test Dummy—vehicle to pole test.* The part 572, subpart M, test dummy shall be initially positioned in the front outboard seating position on the struck side of the vehicle in accordance with the provisions of S7 of Standard 214, 49 CFR 571.214, and the vehicle seat shall be positioned as specified in S6.3 and S6.4 of that standard. The position of the dummy shall then be measured as follows. Locate the horizontal plane passing through the dummy head center of gravity. Identify the rearmost point on the dummy head in that plane. Construct a line in the plane that contains the rearward point of the front door daylight opening and is perpendicular to the longitudinal vehicle centerline. Measure the longitudinal distance between the rearmost point on the dummy head and this line. If this distance is less than 50 mm (2 inches) or the point is not forward of the line, then the seat and/or dummy positions shall be adjusted as follows. First, the seat back angle is adjusted, a maximum of 5 degrees, until a 50 mm (2 inches) distance is achieved. If this is not sufficient to produce the 50 mm (2 inches) distance, the seat is moved forward until the 50 mm (2 inches) distance is achieved or until the knees of the dummy contact the dashboard or knee bolster, whichever comes first. If the required distance cannot be achieved through movement of the seat, the seat back angle shall be adjusted even further forward until the 50mm (2 inches) distance is obtained or until the seat back is in its full upright locking position.

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Issued on July 29, 1998.

Ricardo Martinez,

Administrator.

[FR Doc. 98–20700 Filed 7–30–98; 3:39 pm]

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DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

49 CFR Part 572

[Docket No. NHTSA–97–3144]

RIN 2127–AG74

Side Impact Anthropomorphic Test Dummy

AGENCY: NHTSA, DOT.

ACTION: Final rule.

SUMMARY: This notice establishes specifications and qualification requirements for a newly developed anthropomorphic test dummy. The dummy will be used in compliance testing under amendments made to Standard 201 ''Occupant Protection in Interior Impact'' in a separate final rule being published today. The upper interior impact protection requirements of Standard 201 are being amended to facilitate the introduction of dynamically deployed interior head protection systems. Vehicles equipped with those dynamic systems will be permitted to comply with alternative reduced requirements. As a condition of being permitted to do so, however, the vehicle must also meet a new dynamic crash test that assesses the protection offered by the dynamic systems. The new dummy is used in conducting that test.

DATES: The amendments are effective September 1, 1998.

The incorporation by reference of the material listed in this document is approved by the Director of the Federal Register as of September 1, 1998.

Petitions: Petitions for reconsideration must be received by September 18, 1998.

ADDRESSES: Petitions for reconsideration should refer to the docket number of this rule and be submitted to: Administrator, National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: The following persons at the National Highway Traffic Safety Administration, 400 Seventh Street, SW, Washington, DC 20590:

For non-legal issues:

Stan Backaitis, Office of Crashworthiness Standards, NPS–11, telephone (202) 366–4912, facsimile (202) 366–4329, electronic mail ''sbackaitis@nhtsa.dot.gov''.

For legal issues:

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SUPPLEMENTARY INFORMATION:

A. Background

This final rule is issued in conjunction with a final rule amending Federal Motor Vehicle Safety Standard (FMVSS) No. 201, Head Impact Protection. The amendments to Standard 201 facilitate the introduction of dynamically deploying interior head protection systems by permitting vehicle manufacturers to comply with alternative performance requirements. To demonstrate compliance with those requirements, those amendments specify a dynamic crash test. Before the test, an anthropomorphic test dummy is placed in the outboard front seat on the struck side of the test vehicle. The vehicle is then propelled sideways at a speed of 29 km/h (18 mph) into a 254 mm (10 inch) rigid pole. This final rule establishes the specifications and calibration requirements for that test dummy.

The dummy specified in this notice is based on two existing dummies, the Part 572, Subpart F anthropomorphic test device (Side Impact Dummy or SID) that is used in testing under FMVSS 214, Side Impact Protection, and the Part 572, Subpart E anthropomorphic test device (Hybrid III or HIII) that is used in testing under FMVSS 208, Occupant Crash Protection. The new dummy combines the head and neck of the Hybrid III (HIII) with the torso and extremities of the Side Impact Dummy (SID) through the use of a redesigned neck bracket. The agency has concluded that the resulting SID/HIII dummy is appropriate for use in the new test.

B. Notice of Proposed Rulemaking

In a Notice of Proposed Rulemaking (NPRM) published in the **Federal Register** on December 6, 1997 (62 FR 64546), NHTSA outlined the specifications for the proposed side impact dummy. The NPRM contained, or incorporated references to, (1) a