

Rule established, on an interim basis, a maximum unbelted test speed for tests using the 5th percentile adult female and 50th percentile adult male dummies of 40 km/h (25 mph). While the rule retained the existing 48 km/h (30 mph) belted test requirement for the 50th percentile adult male test dummy throughout the first phase-in, it added a new belted test for the 5th percentile adult female test dummy at impact speeds up to and including 48 km/h (30 mph). It also established a 56 km/h (35 mph) maximum test speed for the 50th percentile adult male in phase two of the requirements (65 FR 30685).

While the agency has been performing a 56 km/h (35 mph) frontal barrier impact test with 50th percentile adult male dummies in the New Car Assessment Program (NCAP), now for the first time, FMVSS No. 208 has rigid barrier test requirements for belted occupants at a higher test speed than for unbelted occupants.¹ Until the Advanced Air Bag Rule, FMVSS No. 208 specified the same maximum test speed for both belted and unbelted rigid barrier testing. From the early 1970s, when FMVSS No. 208 was first issued, up through the early 1990s, when air bags first began to be widely introduced, seat belt use was quite low, reaching only 51 percent in 1991. Since that time, seat belt use has risen to 75 percent nationally, and is as high as 92 percent in states with primary seat belt laws and strong enforcement programs. By increasing the maximum speed for belted testing requirements, the Advanced Air Bag Rule amended FMVSS No. 208 to better serve the safety needs of the growing number of Americans using seat belts on a regular basis.

In the preamble to the Advanced Air Bag Rule the agency stated that “we did not propose including the 5th percentile adult female dummy in [the 56 km/h (35 mph) phase-in] requirement because we had sparse information on the practicability of such a requirement. NHTSA will initiate testing to examine this issue and anticipates proposing increasing the test speed for belted tests using the 5th percentile adult female dummy to 56 km/h (35 mph), beginning at the same time that the 50th percentile adult male is required to be used in belted testing at that speed.” [60 FR 30680, 30690.] This position was

reiterated when the agency declined a petition to immediately begin rulemaking to establish a requirement for vehicles to meet a 0–56 km/h (0–35 mph) belted barrier test with the 5th percentile adult female dummy (66 FR 65376; December 18, 2001). However, the agency continued research on the feasibility and practicability of increasing the testing speed for belted testing using the 5th percentile adult female dummy.

Based on the results of our research, we are proposing to increase the maximum belted rigid barrier test speed for the 5th percentile adult female in accordance with the same phase-in schedule already adopted for the 50th percentile adult male test dummy. The proposed amendment would apply to all vehicles required to meet the requirements of the Advanced Air Bag Rule.

II. Tests Conducted To Assess the Feasibility of a 56 km/h (35 mph) Belted Barrier Test Requirement Using the 5th Percentile Adult Female Test Dummy

Preliminary testing conducted by NHTSA and Transport Canada indicates that a belted 5th percentile adult female dummy may be subject to higher injury measures than a belted 50th percentile adult male dummy in comparable frontal barrier crash tests, when both are seated in accordance with the applicable FMVSS No. 208 seating procedures. In 2001, NHTSA conducted a series of ten crashes to demonstrate the feasibility of meeting the performance requirements adopted in the Advanced Air Bag Rule using belted 5th percentile adult female driver and passenger dummies in a 56 km/h (35 mph) rigid barrier test. NHTSA then conducted an additional eight tests through a joint research program with Transport Canada. Mini, light, and medium passenger cars were tested, along with sport utility vehicles, minivans, and a pickup truck.² None of the tested vehicles were designed to meet the new test requirements of the Advanced Air Bag Rule (See, NHTSA–2001–10687).

Of the eighteen vehicles tested, twelve were able to meet the driver and right front passenger dummy Injury Assessment Reference Values (IARVs) required under FMVSS No. 208. The six vehicles that exceeded the IARVs for the 5th percentile adult female dummy were found to exceed injury measures in the head, chest, and/or neck regions. When comparable NCAP crash tests were conducted with 50th percentile

adult male dummies, none of the adult male dummies exceeded the IARVs.

In a test of a 2001 Dodge Durango, the driver-side test dummy measured injury levels that exceeded the IARVs for HIC, Nij, and neck tension; the passenger dummy exceeded the Nij criteria. Both driver and passenger dummies exceeded the chest acceleration criteria in a test of a 2002 Chevy Trailblazer, with acceleration levels approximately 17 percent higher than the levels measured in the next highest vehicle for both driver and passenger. The driver dummy measured a Nij reading equivalent to the IARV in a test of a 2001 Ford Taurus and two times the IARV in a test of a 1998 Geo Metro. The high injury measurement in the 1998 Geo Metro test was more indicative of cars manufactured in the mid-1990s than of newer models, many of which have been redesigned to have a less aggressive air bag deployment. In all four of these vehicles, NHTSA believes the high injury readings were the result of the deploying air bag interacting with the dummy.

The driver dummy in a 2001 Dodge Grand Caravan test exceeded both Nij and chest acceleration limits. Film analysis of the test indicated that the steering wheel rotated upward during the crash test and the air bag deployment pattern was such that it inflated under the dummy's chin, causing high neck loads. At the same time, the air bag may have failed to prevent dummy contact with the steering wheel through the air bag, resulting in the high chest acceleration measurement. The sixth test involved a 2001 Toyota Echo. In that test, the driver dummy exceeded the HIC criteria. It appears that in this instance the force limiting seat belt system did not yield effectively and allowed the dummy's head to snap forward and exceed the HIC criteria. These tests suggest that the deployment characteristics of some air bag systems and the force limiting capabilities of some seat belt systems will need to be optimized for the smaller occupants represented by the 5th percentile female dummy to provide better protection.

While the remaining twelve vehicles all tested within the IARV limits, the overall average injury values for the 5th percentile adult female driver dummies in these vehicles were somewhat higher than the values for 50th percentile adult male driver dummies tested in the same vehicles. The greatest discrepancy was with the neck injury criteria (Nij). Fourteen of the tested vehicles met the neck IARVs for the 5th percentile adult female driver dummy, but on average the Nij values for the 5th percentile

¹ Vehicles manufactured after March 18, 1997 not certified to the Advanced Air Bag Rule may comply with the standard by means of an unbelted sled test, as opposed to the unbelted rigid barrier test. 49 CFR 571.208, S13. The sled test does not involve an impact with a rigid barrier but uses the same crash pulse for each vehicle and fires air bags artificially without the use of the vehicle sensor system.

² The vehicle classifications were based on those adopted by NHTSA in NCAP.