

proposed corridor in the NPRM.” ARCCA stated:

This minimum acceleration level should be high enough to ensure that a child restraint will offer acceptable performance and be capable of remaining structurally intact. Testing performed by one auto manufacturer in a minivan demonstrated that various child restraints structurally failed in 30 mile per hour sled testing using the vehicle's barrier crash pulse. By setting a high minimum peak acceleration, confidence can be gained in the ability of a child seat to remain structurally intact and protect a child no matter in what vehicle it is installed.

ARCCA suggested that the agency specify in Standard No. 213 that the test pulse must fall within a specific corridor and must have a velocity of at least 30 mph and a peak acceleration of at least some predetermined value. ARCCA believed that that acceleration value should be based on the values obtained from barrier crash tests and be greater than the majority of all FMVSS No. 208 tests reported. ARCCA was also concerned about how the values presented in Table 4 of the NPRM were calculated, especially the peak g values. The commenter believed that the values in the NPRM were erroneously based on “average pulses” *i.e.* point-by-point averaging of the pulse data to form a single curve for a class of vehicles. ARCCA stated that the problem with this method is that when pulses with peaks at different times are combined, the resulting peak is less than either of the pulses averaged. “This is due to the fact that the crash pulses are out of phase. This is similar to the principle used in noise cancellation devices, when two waves are superimposed the magnitude of the resulting pulse is less.”

The agency does not agree with ARCCA that the standard's pulse is deficient and should be increased. The pulse is representative of a severe crash and subjects child restraints to “worst case” testing in a sufficient manner. The severity of a crash pulse is determined through a combination of three factors: the acceleration onset rate, the peak acceleration, and the time duration of the pulse. The data presented in the PAX report are based on FMVSS No. 208 rigid barrier testing at 30 mph impact speed (approximately 32 mph total change in velocity, ΔV) and New Car Assessment Program (NCAP) rigid barrier testing at 35 mph (approximately 37 mph ΔV).

The FMVSS No. 213 pulse was very similar to the pulses generated by sport utility vehicles (SUVs), trucks and small school buses in an FMVSS No. 208 (32 mph ΔV) crash test. NHTSA believes that the pulse should be severe enough

to be adequately representative of these vehicles since child restraints are regularly and increasingly used in these types of vehicles. That is, the stringency of the pulse is justified to better ensure that each child restraint will not have structural degradation in a crash and will limit forces to the child's head, neck and torso to tolerable levels, no matter the vehicle the child is in.

ARCCA was correct that the agency had averaged the pulses for the three classes of vehicles (SUVs, trucks and a small school bus) to develop a composite pulse for each vehicle class, and that the composite pulses had peak acceleration levels that are typically lower than the highest peak accelerations measured in the individual tests. However, the averaged pulses allowed the agency to examine general trends with respect to the crash parameters that determine the performance of vehicles in a crash. As such, they are representative of the pulses of vehicles in which child restraints are likely to be used and provide a reasonable foundation upon which the standard's pulse can be based. Further, the agency is unaware of the testing to which ARCCA referred that allegedly demonstrated “that various child restraints structurally failed in 30 mile per hour sled testing using the vehicle's barrier crash pulse.” To the contrary, child restraints have proven very effective in real world crashes and have performed well in the agency's studies of child restraint performance in vehicles tested in NCAP 35-mph frontal crashes.

ARCCA suggested that the standard specify that the dynamic test will be conducted at velocities of not less than 30 mph. This specification is unnecessary, since the standard currently requires the dynamic tests to be frontal barrier impact simulations “at a velocity change of 48 km/h [30 mph] with the acceleration of the test platform entirely within the curve shown in Figure 2 * * *.” Thus, the agency already conducts the dynamic test at velocities as close as possible to 30 mph without exceeding 30 mph or causing the pulse to fall outside of the curve of Figure 2 of the standard.

ARCCA believed that the velocity of the sled test should be increased from 30 mph to 33 mph to replicate the change in velocity typically seen in a 208 barrier test. “For the 213 pulse to be near the 30 mph barrier test the velocity, acceleration and duration would all have to be increased.” The commenter also believed that, since “well-restrained adult occupants are capable of surviving crashes comparable to a 35 mph barrier crash where the

change in velocity is closer to 40 mph,” tests of child restraints should be performed at the levels specified by the agency in testing vehicles in the New Car Assessment Program.

In contrast, all other commenters except ARCCA commenting on this issue did not want to increase the severity of the crash pulse. SafetyBeltSafe (SBS) believed that the velocity change should not be raised to 33 mph because “the current test is already reflective of the top few percent of crashes.” SBS stated that increasing the velocity “will not significantly improve child restraint performance in the real world but will surely make the products more expensive.” Graco stated that if the pulse were increased to 33 mph, it would expect a large number of child restraints needing to be redesigned with “minimal benefit to child passenger safety.” UMTRI stated that the change in velocity for the test should remain at 30 mph, stating that it conducted a recent analysis of National Automotive Sampling System (NASS) data from 1995–2000 which showed that a 30 mph change in velocity is more severe than approximately 98 percent of the frontal impact crashes nationwide. UMTRI further noted that since the NASS database only includes tow-away crashes, “this is a conservative estimate of the percentage of frontal impacts that are less severe than 30 mph.” UMTRI was concerned that increasing the velocity of the test is not likely to increase safety, but will increase consumer cost of child restraints and may lead to child restraint designs that could make the restraints less effective or more easily misused at lower severity crashes, “which occur much more frequently.” The Insurance Institute for Highway Safety (IIHS) stated that its review of NASS cases showed that child restraints designed to pass the current 30 mph sled test are providing very good protection to children in frontal crashes. IIHS also stated, “There was no indication, based on an analysis of injuries, crash description, and photos in these 10 frontal crashes that designing child restraints to withstand higher crash forces could have prevented or mitigated any of the serious or fatal injuries.”

NHTSA concurs with these comments that the standard's crash pulse adequately meets a safety need. Increasing the severity could necessitate the redesign of many child restraints and could increase costs of the restraints to manufacturers, without a proportionate safety benefit. Thus, the agency concludes that the pulse should not be made more severe at this time.