

3. Decrease Pulse Severity

While there was almost unanimous agreement among commenters that the crash pulse should not be increased, commenters expressed opposing opinions on whether the severity of the test pulse should be decreased. The crash pulse is more severe than most other pulses, but is similar to crash pulses of large sport utility vehicles and light trucks (passenger vehicles that are becoming more and more popular for use as family vehicles) and very similar to the crash pulse of small school buses. The agency determined in the NPRM that the crash pulse should maintain its level of stringency so as to replicate vehicle crashes involving vehicles that had relatively severe crash pulses. Some commenters disagreed, believing that the crash pulse should be reduced in severity because the most frequent crashes involving children in child restraints are those with lower crash pulse severities than the test pulse, while others agreed that a relatively severe, "worst case" scenario should be replicated.

In support of reducing the severity of the crash pulse, the Alliance of Automobile Manufacturers (Alliance) stated that the current sled pulse represents—

an extremely rare "worst case" [(e.g., a stiff vehicle hitting a full-width non-deformable wall at high speed)]. As a result the addition of the new dummies/injury criteria coupled with this unrepresentative test pulse may create significantly unintended consequences such as reduced availability and increased costs of compliant restraints as well as the addition of features that may make them more cumbersome and less user friendly. All of which will reduce their use in the real world.

The Alliance stated that an attachment it submitted with its comment contains an analysis comparing the severity (acceleration pulses) of full frontal barrier crashes with vehicle-to-vehicle crash tests. "In this analysis a 30 mph full frontal barrier test is found equivalent to a 41 mph vehicle-to-vehicle crash. A reduced speed of 22 mph for full frontal rigid barrier test is found to represent vehicle-to-vehicle crashes with 50%–100% overlap, with each vehicle traveling at 30 mph."

Along the same lines, General Motors (GM) believed that the crash pulse should represent the most frequent collision event. The commenter urged

research to define the real world collision speeds and deceleration pulses at which the majority of the harm to children occurs. GM believed that increasing the pulse duration and widening the corridor increases the pulse severity somewhat, and coupling this increase with the use of the new test dummies and injury criteria "could make compliance more difficult." GM suggested that NHTSA consider using the FMVSS No. 208 generic sled pulse if the final rule adopts the Hybrid III test dummies and injury measures proposed in the NPRM.

The Children's Hospital of Philadelphia (TraumaLink) supported altering the pulse to be more representative of the passenger car environment to "make it more relevant to a larger proportion of the real-world crash-involved population." The commenter stated that out of the 59,968 children studied in TraumaLink's Partners for Child Passenger Safety study, only 24.1 percent of children were riding in SUV's and light trucks.

In contrast, in support of the agency's decision not to reduce the severity of the crash pulse, Advocates for Highway and Auto Safety (Advocates) believed that although cars remain more numerous in the vehicle fleet, use of an LTV crash pulse is representative of real-world crash experience given that increasing numbers of LTVs have entered the fleet and are frequently used as passenger and family vehicles. The commenter also discussed why it believed the crash pulse should replicate the "worst case" scenario over the "most frequent" or "average" crash:

Although Advocates has urged the agency to update its test procedures in certain respects to ensure that they are representative of the modern vehicle fleet, this does not mean that critical test procedures should mirror the attributes or test the performance of only the "average" vehicle. While test procedures should be representative of the vehicle fleet in many respects, not all tests or test procedures should be based on the most common or average vehicle in the fleet. To ensure safety protection for all vehicle occupants, critical aspects of test procedures should replicate more stringent conditions than would be experienced in the average vehicle. This is especially true when only one test and a single set of test conditions are used as the basis for compliance. Thus, although there are still more cars than LTVs on U.S. highways, and even though more children are injured while riding in cars than are injured while riding in LTVs, the FMVSS 213 sled test should replicate the faster

acceleration onset rate and higher peak acceleration exerted in an SUV crash pulse. Of the two, the LTV crash pulse presents the more stringent test condition. Using the LTV-like crash pulse ensures that children exposed to such a severe force, as well as children exposed to less severe conditions in cars, will be afforded protection. The reverse, however, is not true. If FMVSS 213 adopted a car-like sled test crash pulse, children in cars may be protected but that same degree of safety would not necessarily be provided to children in LTVs with "stiffer" frames that transfer more of the crash generated energy to the occupants. As a result, Advocates concurs in the agency's judgment that the existing FMVSS 213 crash pulse be retained.

After reviewing all the comments on this issue, NHTSA has decided to retain the current severity of the pulse and not reduce it. The agency concurs with Advocates that to ensure safety protection for as many child occupants as possible, "critical aspects of test procedures should replicate more stringent conditions than would be experienced in the average vehicle," and that, given that child restraints are used with a wide range of vehicle types and are involved in crashes of varying degrees of severity, such a critical aspect is the sled pulse. Accordingly, the agency declines to replicate the crash conditions of the most frequent collision event.

GM suggested that NHTSA consider using the FMVSS No. 208 generic sled pulse if this final rule adopts the Hybrid III test dummies and injury measures proposed in the NPRM. As discussed later in this preamble, this final rule adopts the Hybrid III test dummies but does not adopt the majority of the injury measures proposed in the NPRM. Nonetheless, the agency makes the following observations about the suggestion to use the FMVSS No. 208 generic sled pulse. The generic sled pulse is less severe than the FMVSS No. 213 pulse. As shown in the following overlay of the existing FMVSS No. 213 pulse with the FMVSS No. 208 generic sled pulse, the former has a greater onset rate, higher peak acceleration and shorter time duration. Further, the FMVSS No. 208 sled pulse, with a peak acceleration of about 17 g's, is less stringent than most 30 mph passenger vehicle crashes. Because the FMVSS No. 208 sled pulse is less severe than the FMVSS No. 213 pulse, this final rule declines the suggestion to adopt it.

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