

All chest acceleration measurements recorded were well within the current limit of 60 g's maximum. It is noted, however, that while most chest acceleration measurements were comparable in magnitude between the two test seat assemblies, there was one test in which the measured values differed by 42 percent for the same child

restraint. *iv. Head Excursion.* It is not evident whether use of the revised test seat assembly will have a positive or negative effect on measured head excursion.

In the tests outlined in Tables 2 and 3, *supra*, head excursion was measured. In addition, head excursion was measured in sled tests performed with

the TNO 9-month-old dummy on two different forward-facing convertible restraints. Head excursion was compared to the head excursion measured in compliance tests of the identical child restraints using the same dummies. Table 4 provides this comparison.

TABLE 4.—HEAD EXCURSION IN TESTS OF FORWARD-FACING CHILD RESTRAINTS

Child restraint	Type	Dummy (Hybrid II)	Head excursion (mm)— Test seat assembly		Change (%)
			Existing	Revised	
Cosco Touriva .....	Convertible .....	9-month-old	432	434	+0.6
Century Accel .....	Convertible .....	9-month-old	483	396	– 17.9
Cosco Touriva .....	Convertible .....	3-year-old ..	660	498	– 24.6
Century Accel .....	Convertible .....	3-year-old ..	635	495	– 22.0
Century Breverra .....	Hybrid Booster .....	3-year-old ..	483	572	+18.4
Cosco High Back Booster .....	Hybrid Booster .....	3-year-old ..	432	572	+32.4
Cosco Grand Explorer .....	Backless Booster .....	6-year-old ..	381	363	– 4.7
Cosco Grand Explorer .....	Backless Booster .....	6-year-old ..	381	457	+20.0
Century Breverra .....	High-back Booster .....	6-year-old ..	457	500	+9.4
Cosco High Back Booster .....	High-back Booster .....	6-year-old ..	432	447	+3.5

In three of four tests conducted using forward-facing convertible child restraints, a decrease in head excursion was observed in tests using the revised test seat assembly. However, in tests conducted on the revised seat assembly using forward-facing hybrid boosters, backless and high back belt-positioning booster seats, a marginal increase in head excursion was observed. All measured head excursions, on the existing and revised test seat assemblies,

were well within the established 813 mm limit prescribed in FMVSS No. 213.<sup>6</sup>

*v. Knee Excursion.* For the tests of forward-facing child restraints outlined in Table 4 above, NHTSA also measured the dummy's knee excursion. These results were compared to the knee excursion measured in compliance tests of the identical child restraints using the same dummies. The knee excursion measurements did not demonstrate a

direct correlation between tests conducted with the revised test seat assembly versus the existing test seat assembly, or with the type of child restraint used or the test dummy used. Table 5 presents the results. As with the other injury criteria discussed above, all knee excursion measurements were well within the established 915 mm limit prescribed in FMVSS No. 213.

TABLE 5.—KNEE EXCURSION IN TESTS OF FORWARD-FACING CHILD RESTRAINTS

Child restraint	Type	Dummy (Hybrid II)	Knee excursion (mm)— Test seat assembly		Change (%)
			Existing	Revised	
Cosco Touriva .....	Convertible .....	9-month-old	483	546	+13.2
Century Accel .....	Convertible .....	9-month-old	559	485	– 13.2
Cosco Touriva .....	Convertible .....	3-year-old ..	813	671	– 17.5
Century Accel .....	Convertible .....	3-year-old ..	762	681	– 10.7
Century Breverra .....	Hybrid Booster .....	3-year-old ..	584	696	+19.1
Cosco High Back Booster .....	Hybrid Booster .....	3-year-old ..	635	660	+4.0
Cosco Grand Explorer .....	Backless Booster .....	6-year-old ..	686	610	– 11.1
Cosco Grand Explorer .....	Backless Booster .....	6-year-old ..	686	653	– 4.8
Century Breverra .....	High-back Booster .....	6-year-old ..	610	500	– 17.9
Cosco High Back Booster .....	High-back Booster .....	6-year-old ..	686	701	+2.2

*vi. Summary of PAX Testing.* Overall, while differences were seen in tests using identical child restraints on the existing versus the revised test seat assembly, NHTSA did not identify any specific trends along specified parameters, *i.e.*, child restraint type, dummy, *etc.* All of the measured injury

criteria in the tests were well within the established limits of FMVSS No. 213. This leads the agency to conclude that the changes to the standard test seat assembly will not have a significant effect on compliance test results of child restraint systems that meet the current requirements of the standard.

Manufacturers will not need to redesign their restraints due to the changes in the seat assembly.

## 2. Response to Comments

There was unanimous support for amending Standard No. 213's specifications for the test seat assembly

<sup>6</sup>Excursions are measured from Point Z identified in Figure 1B of FMVSS No. 213, which is located

in the same place on both the existing and revised test seat assemblies.