

## Are Type-G Child Restraints (Large Forward-Facing Restraints with Inbuilt Harnesses) Safer than Booster Seats? A Preliminary Crash Test

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### Abstract

Type-G restraints are a new type of child restraint designed for children from six months to approximately eight years of age. These restraints are perceived to be safer than booster seats because they are fitted with six-point harnesses. This paper presents the results of a single preliminary crash test comparing a Type-G restraint and a booster seat. The dummy seated in the Type-G restraint experienced greater forward head excursion, increasing the risk of possible contact between the occupant's head and the front seat or the centre console. Further tests are needed to validate the findings.

### Background

Type-G restraints were introduced in the 2013 version of Australian/New Zealand Standard 1754, *Child restraint systems for use in motor vehicles*. These restraints are similar to Type-B forward-facing restraints but cater for older children. Australian child restraint laws require children aged four up to seven years to be secured in an approved forward-facing child restraint or booster seat. Children aged from seven to 16-year-old are strongly recommended to remain in approved booster seats until they are large enough to safely use adult seatbelts. Approved restraints that can accommodate older children are therefore a welcome addition to the market.

Type-G restraints are perceived to be safer than booster seats because they are fitted with six-point harnesses. However, no data on the comparative performance of Type-G restraints and booster seats are available. This test aimed to compare one Type-G restraint and one booster seat using a controlled crash test.

### Method

Crash protection performance was examined using a full-frontal impact test. The test specifications are presented in Table 1 and test setup in Figure 1. The restraints selected were those that achieved the highest crash protection rating in their category under the Child Restraint Evaluation Program and with the least forward excursion for Type-G.

**Table 1. Test specifications**

Test vehicle	Mazda 3
Test velocity	56 km/h
Test dummies	Two P10 child dummies <sup>a</sup> – seated in each child restraint Two Hybrid III 50 th percentile dummies seated in front seats
Child restraints	<ul style="list-style-type: none"> <li>• Five-star CREP rated booster seat in left-hand side</li> <li>• Three-star CREP rated Type-G restraint seat in right-hand side</li> </ul>

<sup>a</sup>The P10 dummy represents an average 10-year-old child, or a large eight-year-old.



**Figure 1.** Test Setup (above) and head excursion results for dummy in Type-G (bottom right hand side) and dummy in booster seat (bottom left hand side)

## Results

During impact, the dummy seated in the Type-G restraint exhibited contact between its head and both thighs. The dummy's knees impacted the rear of the driver's seat. The dummy seated in the booster seat did not show evidence of head contact with its thighs nor the front seat. There was evidence of light knee contact with the rear of the front passenger seat.

The dummy in the Type-G restraint demonstrated greater forward head excursion than the dummy in the booster seat (see Figure 1, two lower images). The maximum forward head excursion from the seat bight (intersection of seat cushion and seat back) was 669 mm for the Type-G and 517 mm for the booster seat.

It is important to point out that there was a difference in the seating positions of the two restraints due to differences in geometry and design. At test setup, the Type-G restraint sat further forward and higher than the booster seat. This contributed to the difference in forward head excursion.

A limitation of this research is that it involved a single test, with one of each type of restraint. Further tests using a wider range of Type-G restraints, vehicles and test protocols are needed to establish the safety implication of the difference in head excursion.

## Conclusions

In this preliminary test, the Type-G restraint resulted in greater head excursion than the booster seat, increasing the risk of the occupant's head striking the front seat or vehicle console.

Though further tests are needed to establish whether the increased head excursion measured for the Type-G restraint is a significant safety issue, these results suggest that when using a Type-G restraint, safety may be improved by providing extra space in front, for example by moving the front seat forward. Type-G restraints are new designs, and may be improved through future development.