

Proposed Seat Design of Additional Third-Row Seats



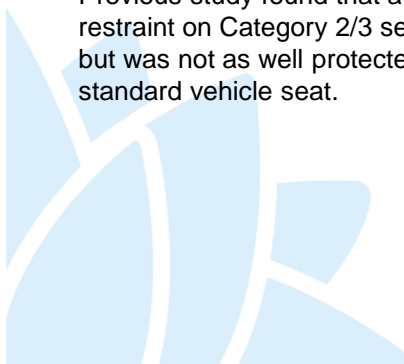
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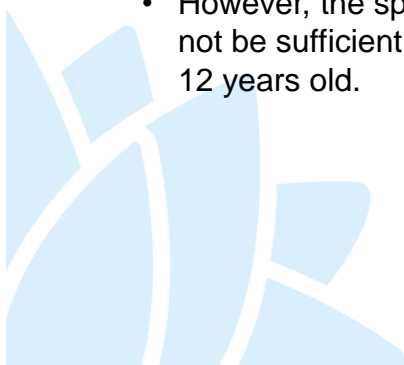
Introduction

- Design and installation of After-market additional seats are regulated under the Vehicle Safety Bulletin 05. The seats are categorised as:
 - Category 1: For use by adults;
 - Category 2: For use by children up to 12 years of age; and
 - Category 3: For use by children up to 8 years of age.
- Previous study found that a child under 4 years old sitting in a child restraint on Category 2/3 seat was better protected than sitting directly, but was not as well protected as sitting in a child restraint on a standard vehicle seat.



Introduction (continued)

- It is impractical for children aged between 4 and 7 years old to use booster seat on Category 2 or 3 seat. Some states allow these children to occupy these seats without a booster seat.
- However, the space requirements for VSB 5 may not be sufficient for children aged between 4 and 12 years old.



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Illustrating the issue

- The current VSB-5 requirements for head and leg spacing were tested using dummies representing 4, 6, 10 and 12 years old children.
- The results show the current spacing requirements are too short and too narrow for the larger occupants, increasing their risk of abdominal and head injuries in the event of a crash.



4 years old

6 years old

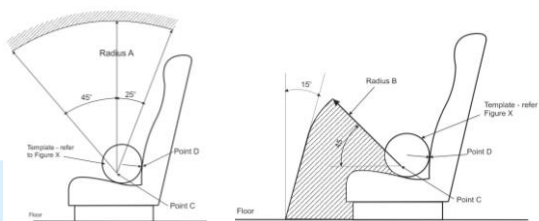
10 years old

12 years old

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Matching Seat Geometries and Child Anthropometry

- Child Anthropometry data from the University of Michigan was used in this study.
- Head space (Radius A) and Leg Space (Radius B) as specified in VSB 5 were compared against the seated height and knee length of the intended seat occupants*.

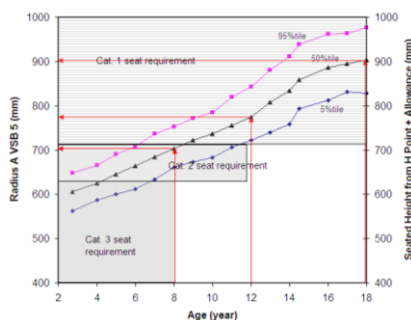


* All dimensions were measured from the hip of the occupants plus allowances for head and leg movements in a crash.

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Head Space

- The current head space requirements are too short to accommodate the intended occupants.
- Category 1 seat's minimum head space (710mm) is shorter than that of an average 18 years old (900mm).
- Likewise for Categories 2 and 3 seats.

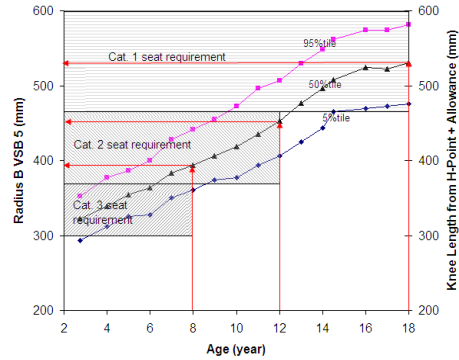


	CATEGORY OF SEAT		
	1	2	3
Current VSB 5 requirements (mm)	710 min	630 min; 710 max	630 max
Seated height of the intended occupant (mm)	900	774	700

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Leg Space

- The current VSB 5 leg space requirements are too narrow to accommodate the intended occupants.
- Category 1 seat's minimum leg space (460mm) is narrower than that of an average 18 years old (530mm).
- Likewise for Categories 2 and 3 seats.



	CATEGORY OF SEAT		
	1	2	3
Current VSB 5 requirements (mm)	460 min	370 min	300 min
Knee length of the intended occupant (mm)	530	453	394

Proposed Revisions of VSB 5

- Children younger than 4 years old are not allowed to use Category 2 and 3 seats, even with a child restraint.



Proposed Revisions of VSB 5

- The upper limit for Category 3 seat is limited to 7 years of age, for consistency with the Road Rules.
- The minimum head and leg space requirements are increased to accommodate the intended occupant.

DIMENSION	CATEGORY OF SEAT		
	1	2	3
Radius A	898 mm	803 mm	700 mm
Radius B	560 mm	490 mm	400 mm

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Next Step

- Validate the proposed design.



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Thank You

