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WORKING PARTY ON PASSIVE SAFETY (GRSP)

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Agenda Item 2.2 (safety belt anchorages)

UK DISCUSSION PAPER ON POSSIBLE AMENDMENTS TO REGULATION 14 ANCHORAGE STRENGTH REQUIREMENTS FOR CERTAIN VEHICLE CATEGORIES

INTRODUCTION

The UK has recently completed a programme of research on seat belts in M2 class vehicles[1]. This research has highlighted areas where current standards, particularly relating to anchorages, might be improved. This paper discusses

1) Possible nearer-term amendments to ECE Regulation 14 and
2) consideration of longer term changes to regulations concerning these vehicles.

1) Amendments to Regulation 14

The anchorage static strength requirements contained in paragraph 6.4 of Regulation 14 specify loadings which are dependent on the particular vehicle category. The current requirements are based on the following assumptions of vehicle deceleration in a frontal impact:

M1 and N1 = 20g
M2 and N2 = 10g
M3 and N3 = 6.6g

It might be argued that the basis for this is that a larger heavier vehicle will have a lower deceleration, either because a large vehicle has a greater crush depth, or because a heavier vehicle is more likely to collide with a vehicle lighter than itself. However, unlike 'N' category vehicles, the definition of 'M' category vehicles is not based on weight alone; ie

M1 = passenger vehicles with no more than eight seats, plus driver (no weight limit).
M2 = passenger vehicles with more than eight seats plus driver, and a maximum mass not exceeding five tonnes (no minimum weight limit).
M3 = passenger vehicles with more than eight seats plus driver, and a maximum mass exceeding five tonnes

N1= goods vehicle with maximum mass not exceeding 3.5 tonnes.
N2= goods vehicle with maximum mass exceeding 3.5 tonnes but not exceeding 12 tonnes.
N3 =goods vehicle with maximum mass exceeding 12 tonnes.

Therefore we can have the situation where a small M2 vehicle weighing less than 3.5 tonnes can have anchorages of half the strength of a goods vehicle of identical weight.

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[1] Study of improved safety for minibuses by better seat and occupant retention: Graham J L Lawrence, TRL, ESV conference 2001, Paper Number 01-S9-334

The TRL research highlights this issue. The first phase of this work examined minibus accidents and crash test data to determine the deceleration characteristics for severe accidents likely to result in death or serious injury. The analysis concluded that the deceleration characteristics of the vehicles under study could be reasonably represented by the established crash pulse used in ECE Regulation 44. For the next phase of the research, a series of commercially available minibus shells fitted with seats and seat belts were dynamically tested to the Regulation 44 pulse. The shells were tested with restrained dummy occupants, and in some cases with unrestrained dummies positioned behind a seat containing a restrained occupant. This explored a severe 'double loading' test condition. The research suggested that, with relatively simple modification, it was feasible for minibus seat belt systems to withstand even the 'double loading' test under the Regulation 44 pulse.

The research discusses possible approaches for revising the seat belt anchorage requirements for these vehicles:

i) Adaptation of current seat belt anchorage pull test requirements to require minibuses to have the same anchorage strength as required for cars in ECE Regulation 14. This could be achieved by testing the complete minibus shell using the Regulation 44 test pulse. However, this would require a high capacity sled test. An alternative approach would be to use the static M1 Regulation 14-pull test instead of a dynamic test. This would involve similar loadings to the Regulation 44 dynamic pulse, but would be achievable using existing test equipment.

ii) Adoption of the Australian coach floor/seat regulation ADR68 to require a sled test of rows of seats using test dummies combined with a matching pull test of the seat mountings in the vehicle floor. This would require a high capacity sled and could be used to test for double loading. However, care needs to be taken when testing seats and mountings in isolation.

UK POSITION

Near term benefits might be achieved simply by aligning the static strength testing requirements for M class vehicles to match those for N class vehicles of an equivalent weight. This would mean that M2 vehicles under 3.5 tonnes maximum weight (representing over 80% of M2 vehicles registered in the UK) would need to meet N1 or M1 anchorage standards. Additionally, M3 vehicles under 12 tonnes maximum weight would need to meet N2/M2 anchorage standards. The TRL work has demonstrated that these improved anchorage standards are technically feasible.

LONGER TERM CONSIDERATIONS

In the medium to longer term, we believe that the whole issue of minibus crashworthiness needs to be examined carefully. Since many minibuses are based on N1 or N2 vehicle chassis, it is appropriate that the broader aspects of minibus crashworthiness are examined in the context of proposals to improved N class vehicle crashworthiness (possibly through improvements to ECE Regulation 29, or adoption of Regulation 94 for the smaller vehicles). Other issues, such as rear-loading of seats, would need to be considered in the context of future legislation on seat belt wearing, so that the risk of unrestrained rear seat passengers can be assessed.