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Economic Commission for Europe**Inland Transport Committee****World Forum for Harmonization of Vehicle Regulations****Working Party on General Safety Provisions****Ninety-ninth session**

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Item 3(a) of the provisional agenda

Regulation No. 107 (M₂ and M₃ vehicles) – Proposals for further amendments**Proposal for draft amendments to Regulation No. 107
(M₂ and M₃ vehicles)****Submitted by the expert from Spain***

The text reproduced below was prepared by the expert from Spain in order to increase the seat spacing in Class III vehicles to improve the comfort and safety of passengers. This document is based on Informal document No. GRSG-98-17 distributed at the ninety-eighth session of the Working Party on General Safety Provisions (GRSG) (see report ECE/TRANS/WP.29/GRSG/77, para. 8). Modifications to the current provisions of the Regulation are marked in bold for new characters.

* In accordance with the programme of work of the Inland Transport Committee for 2006-2010 (ECE/TRANS/166/Add.1, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Annex 3, paragraph 7.7.8.4.1., amend to read:

“7.7.8.4.1. In the case of seats facing in the same direction, the distance between the front of a seat squab and the back of the squab of the seat preceding it (dimension H), shall, when measured horizontally and at all heights above the floor between the level of the top surface of the seat cushion and a point 620 mm above the floor, not be less than:

H	
Class I, A and B	650 mm
Class II	680 mm
Class III	730 mm

Annex 4, figure 12, the table, amend to read:

H	
Class I, A and B	650 mm
Class II	680 mm
Class III	730 mm

II. Justification

1. The study titled “Analysis of Coaches Rows Seats Distance Influence on the Passengers Comfort and Safety” has been presented at Enhanced Safety of Vehicles (ESV)-2009. This study shows improvements in passengers comfort and safety when the seat spacing is increased 5 cm with respect to the current minimum spacing according to Regulation No. 107 (see Informal document No. GRSG-98-18).

2. The safety of passengers has been evaluated with a tests series replicating the two dynamic tests of Regulation No. 80. To assess the passenger’s safety, both injury criteria from Regulations Nos. 80 and 94 have been used with the Hybrid-III dummy. The tables below show the comparison of the injury criteria variation when the seat pitch is increased by 5 cm, for both seat belt configurations (two point and three point belts):

		Criterion	3 Rows (Bealted)	2 Rows (Unbealted)	2 Rows (Bealted)
3 Point seat belt	R 80	Head HIC _{36ms}	+	-	+
		Thorax AcRes	=	-	-
		Femur Fz	+	-	+
	R 94	Head AcRes 3ms	+	-	+
		Neck Fx	+	+	-
		Neck Fz	+	-	=
		Neck My	=	-	+
		Thorax V * C	-	+	=
		Thorax Def	-	+	=
		Knee Slider	+	-	+
	Total			6+; 2=; 2-	3+; 0=; 7-

		Criterion	3 Rows (Bealted)	2 Rows (Unbealted)	2 Rows (Bealted)
2 Point seat belt	R 80	Head HIC _{36ms}	=	-	-
		Thorax AcRes	=	=	+
		Femur Fz	+	-	+
	R 94	Head AcRes 3ms	+	+	-
		Neck Fx	-	-	-
		Neck Fz	+	=	-
		Neck My	+	-	-
		Thorax V * C	=	=	+
		Thorax Def	=	=	+
	Knee Slider	+	=	+	
	Total			5+; 4=; 1-	1+; 5=; 4-

3. To increase the comfort of passengers in coaches, the study recommends establishing a seat spacing of 730 mm, namely 50 mm higher than current one. This comfort improvement will provide a better passenger positioning on the seats and therefore a better safety belt routing and belt restraint performance in case of collision.

4. The effect of this new seat spacing in the passenger's safety for seats fitted with 3 point belts is:

- a) If the safety belts are used, the passenger protection is improved.
- b) If the safety belt is not used, the passenger protection will be slightly lower. Currently, safety belts usage is mandatory in the European Union according to Directive 2003/20/EC.

5. The effect of this new seat spacing in the passenger's safety for seats fitted with 2 point belts remains equivalent.

6. In summary, the balance of all tested configurations shows safety benefits to the passengers with the proposed seat spacing.

7. The benefits of safety belts in roll-over accidents (which have largest influence in coach safety) are not affected by this change.