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Working Party on General Safety Provisions (GRSG)

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agenda item 4.)

**PROTECTION OF PASSENGERS OF DOUBLE-DECK VEHICLES
IN CASE OF ROLLOVER ACCIDENT**

Transmitted by the expert from Hungary

Note: The text reproduced below was prepared according to the decisions of WP.29, taken at its one-hundred-and-thirtieth and one-hundred-and-thirty-first sessions (TRANS/WP.29/926, para. 39. and TRANS/WP.29/953, para. 51.). It is based on the text of informal document No. GRSG-86-8 (TRANS/WP.29/GRSG/65, para. 14.).

Note: This document is distributed to the Experts on General Safety Provisions only.

INTRODUCTION

This proposal follows the guidelines regarding proposing and developing of global technical regulations (gtr) (TRANS/WP.29/882), but can result, depending on the decision of WP.29, in a:

- modified version of the new Regulation No. 66;
- new annex 4 to Regulation No. 107/Rev.1 (TRANS/WP.29/2003/71); and/or
- a new gtr.

Therefore, the proposal relates generally to new regulation(s).

PROPOSAL

The aim of the new regulation(s) is to protect the passengers of buses in case of rollover accident.

The requirements should cover all categories of buses (vehicle category 1-2 of the draft Consolidated Resolution (R.E. 5)).

They should assure the structural integrity (strength of superstructure) and integrity of survival space.

There are three UNECE Regulations dealing with the general construction of buses and coaches:

Regulation No. 36 (Large vehicles)

Regulation No. 52 (M2 and M3 small capacity vehicles)

Regulation No. 107 (Double-deck large vehicles).

These three Regulations, following the example of the EU Directive 2001/85/EC, will be integrated into one regulation. Now the existing Regulation No. 66 (Strength of the superstructure of large vehicles) covers only vehicles belonging to Regulation No. 36. The integrated Regulation No. 107 should be completed by an extended Regulation for the strength of the superstructure.

The new requirements on the strength of superstructure for all categories of vehicles could be adopted as a new, integrated UNECE Regulation, and/or as a gtr as well. Thus, these regulations could be developed parallel like other gtr and UNECE Regulations. This could result in harmonized technical requirements and test methods for both the gtr and the UNECE Regulations.

BACKGROUND OF THE PROPOSAL

The following accident statistics were presented to GRSG about bus rollover accidents:

- I. 78th GRSG, April 2000, informal doc. No. 6
- II. 80th GRSG, April 2001, informal doc. No. 5
- III. 83rd GRSG, October 2002, informal doc. No. 7
- IV. 84th GRSG, May 2003, informal doc. No. 4

V. 85th GRSG, October 2003, informal doc. No. 1

Data on more than 230 rollover accidents were collected and analysed in these documents, which could give a good basis for the technical discussions. The following further informal documents could also be considered:

83rd GRSG, October 2003, informal doc. No.6
(The problem of high-deck coaches in the standard rollover test)

83rd GRSG, October 2003, informal doc. No.10
(Brief description of a serious bus rollover accident)

The accident statistics mentioned above and the consideration of the vehicle lateral stability (the ratio of the Centre of gravity's (CG's) height and track) prove that high buses (HD and DD) as well as small buses have an increased risk for rolling over, compared to the traditional large buses, in the same situation.

The existing national regulations (see ADR, SANS and FMVSS mentioned later) show that there is an international demand and tendency to extend the scope of the existing Regulation No. 66 to other bus categories. This is a logical demand and effort, which could be harmonized by the new regulation(s).

The European Commission also raised the question of the minibuses, regarding the strength of their superstructure, in its Memorandum of 16 May 2002 and asked in GRSG about the extension of the scope of Regulation No. 66 to small buses.

In the "Results and Conclusions" of the ECBOS project, it is urged to extend the scope of Regulation No. 66 and the Directive 2001/85/EC to small buses.

DESCRIPTION OF THE PROPOSED NEW REGULATION(S)

The concept of the proposed new regulation(s) could be similar to that used in Regulation No. 66.

In a standardized rollover accident, which could be the basis of the approval test, the strength of the superstructure shall assure:

- a well defined unharmed survival space in which
- restrained passengers have a high level probability to avoid serious injury.

The standardized rollover test could be similar to the basic approval test used in Regulation No. 66. The vehicle, without any kind of speed, rotates down into a well-defined ditch. The only thing to be considered is the geometry of the ditch, which should be adjusted to all categories of buses. This question has to be studied and discussed.

Other equivalent approval tests methods may be also specified in the new regulation(s), similarly to Regulation No. 66.

It is important to emphasize that it does not seem to be necessary:

- to develop new test method, test technology;
- to introduce new instrumentation;
- to develop new calculation method.

All of these requirements may be based on the existing practices.

The frame of the new regulation(s) could be:

- Scope and purpose
- Definitions
- General requirements (precise formulation of the ideas given above)
- General specifications (considerations (if any) for the individual bus categories, like articulated buses, bus families (group of buses), etc.
- Basic test method (rollover test with complete vehicle). Test conditions and procedure
- Optional equivalent test methods (body section rollover test, quasi-static test, calculation, simulation, etc. (could be 4-5). Test conditions and procedures.

EXISTING REGULATIONS AND STANDARDS

There are no regulations in the Compendium of Candidates. The following international regulations and national rules are available as technical references and examples for the new regulation(s):

Regulations of the United Nations Economic Commission for Europe (UNECE)

Regulation No. 66 Uniform provisions concerning the approval of large passenger vehicles with regard to the strength of their superstructure. This regulation is in force.

Regulation No. 66/Rev.1 Uniform provisions concerning the approval of large passenger vehicles with regard to the strength of their superstructure. The draft is under discussion in GRSG (TRANS/WP.29/GRSG/2003/25).

Directives of European Commission (EC)

2001/85/EC Special provisions for vehicles used for the carriage of passengers comprising more than 8 seats in addition to the driver's seat, annex IV. Strength of superstructure

National standards/regulations

Australia

ADR 59/00 Omnibus rollover strength
Modified version of UNECE Regulation No. 66. Applicable for light
and heavy omnibuses. Mandatory.

South Africa

SANS 1563 The strength of large passenger vehicle superstructures
(rollover protection). Application for M2 and M3 vehicles where the
passenger capacity is over 16. Mandatory.

United States of America

FMVSS 220 School bus rollover protection. Applicable for school
buses. Mandatory
