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## Economic Commission for Europe

### Inland Transport Committee

### Working Party on the Transport of Dangerous Goods

#### Eighty-ninth session

Geneva, 26–29 October 2010

Item 5 (a) of the provisional agenda

**Proposals for amendments to annexes A and B of ADR:  
construction and approval of vehicles**

### Section 9.7.6: Rear protection of vehicles

Transmitted by the Government of Germany<sup>1</sup>

#### *Summary*

**Executive summary:** This document presents a feasibility study on rear protection and proposes that further action should be taken on this matter.

**Action to be taken:** Decision on future work.

**Related documents:** TRANS/WP.15/2002/11 and TRANS/WP.15/170, paragraphs 47 and 48.

### Introduction

1. Since the 1980s, requirements concerning the rear protection of special dangerous goods vehicles (tank-vehicles, battery-vehicles and vehicles with demountable tanks with a capacity of more than 1 m<sup>3</sup>) have been contained in ADR (currently in section 9.7.6). Additionally, MEMU's have also been regulated since 2009. The section stipulates that "a bumper sufficiently resistant to rear impact shall be fitted over the full width of the tank at the rear of the vehicle".

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<sup>1</sup> The present document is submitted in accordance with paragraph 1(c) of the terms of reference of the Working Party, as contained in document ECE/TRANS/WP.15/190/Add.1, which provides a mandate to "Develop and update the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)".

2. The provision does neither lay down performance parameters, nor definitions as to the position of the rear protection or test criteria for the requirement of a sufficiently resistant bumper.
3. At the beginning of the 1990s, due to serious road accidents involving dangerous goods vehicles, Germany carried out the research project "THESEUS – Tank-vehicles with maximum attainable safety through experimental accident simulation" in order to enhance the safety of tank-vehicles. The analysis of accidents showed that rear-end collisions with tank-vehicles were a predominant type of accident. This has not changed to the present day; high-consequence collisions with tank-vehicles still occur throughout Europe. The accident statistics of the UNECE Inland Transport Committee also show this.
4. Back then, the findings gained from THESEUS as regards the enhancement of tank-vehicle safety resulted, among other things, in a proposal to the Working Party to improve the rear protection of dangerous goods tank-vehicles. The suggestions for improvement included fitting energy absorbers to the rear of the vehicle or a targeted energy influx (e.g. by means of crossbars bearing against the tyres). At that time, after long and intensive discussions, the Working Party did not follow these proposals (see TRANS/WP.15/170, paragraphs 47-48).
5. There were two main arguments against the proposal for enhancing the safety at the rear end of the vehicle by means of additional measures: one was the fact that the THESEUS statistics referred to Germany and that other states could not confirm the accident statistics as regards rear-end collisions; the other counter-argument was that no appropriate test method for a "new" rear protection could be presented.
6. A further problem to be mentioned here is the inconsistent application/implementation of the current ADR requirements with regard to rear protection at European level. Many Member States interpret the European Union (EU) underrun protection as complying with the requirement of the ADR rear protection and, therefore, do not provide for this type of protection as a separate measure. In Germany, too, the EU underrun protection is in many cases designed in such a way that it complies with the ADR requirements as to rear protection as well as with the requirements as to underrun protection.
7. After several, in some cases serious rear-end collisions, not only in Germany but all over Europe, Germany would again like to take the initiative to enhance the safety at the rear end of vehicles.

## **Feasibility study**

8. To this end, a feasibility study has been elaborated which, besides a review of the history of the relevant studies and of the previous proposals submitted to the Working Party, contains in particular new approaches to deal with this issue in the future (see informal document INF.3 of the eighty-eighth session).
9. The study stresses the necessity of once again dealing with the subject of "rear protection" in a new quality and sets forth the current situation of the rear protection of tank vehicles for the carriage of dangerous goods. It is comprised of an analysis of the UNECE accident statistics which shows that the problem of rear-end collisions continues to exist in Europe and which identifies ways to address the former obstacle concerning the testability of a qualified rear protection. Owing to the rear-end collisions involving tank vehicles carrying dangerous goods which have occurred during the last ten years in Germany and the accident situation described for rear-end collisions in Europe, the installation of special

rear protection devices at these vehicles is still considered to be a safety-enhancing requirement.

## **Future work**

10. From the above statements concerning the underrun protection, its detailed representation in the sets of regulations becomes apparent. In contrast to this, ADR does not contain the requirement and definition of a test for rear protection; it is, therefore, necessary to make an amendment to this effect.

11. In the course of further works, especially new findings for the following issues are to be compiled:

- Elaboration and proof of a test method for rear protection;
- Design type of rear protection.

12. For example, the test method for a rear protection device could be modelled on the basis of the quasi-static punch test as included in the European Union directives for underrun protection. This means that there is no intention to favour a single design solution within ADR. The alternative of a simulated test seems also appropriate in the light of the evolution of modern calculation methods.

13. It is essential to require a defined energy absorbing capability. This would not restrict the design options of an enhanced rear protection and it would provide for development opportunities for future market and material developments. Thus, the combined rear and underrun protection which is already used in some countries could be retained after passing the additional rear protection test.

14. In order to develop a test method, it would, however, be necessary to carry out experiments to develop this new test method in such a way so as to provide effective protection against the release of hazardous material in the case of rear-end collisions.

15. For reasons of the complex technological character of possible design solutions concerning rear protection (key word: unit consisting of the vehicle and the tank) a systematic approach is proposed to reach this objective. This approach consists of an analytical and experimental procedure (see Chapter 11 of the study). The design of the rear protection can be performed as an EU investigation of individual components which provides the bases for the subsequent approval test of the individual component "rear protection".

16. The intended rear protection is to be constructed as a prototype in order to show, by means of crash tests to be carried out, the higher protection effect as compared with the current situation. It is to be expected that these results may substantiate the justification of a future work with this issue.

## **Proposal**

17. The study presented in informal document INF.3 of the eighty-eighth session is a sound basis for taking up this issue which is relevant for safety in ADR countries, and Germany would like to ask the ADR Contracting Parties for their support in this matter. If the ADR Contracting Parties agree that work on this issue should be continued, Germany is willing to prepare a working document based on an initial proposal and present it at the next meeting of the Working Party in May 2011.