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Item 6(a) of the provisional agenda
Proposals for amendments to Annexes A and B of ADR: construction and approval of vehicles

Rear protection of vehicles – 9.7.6 ADR

Transmitted by the Government of Germany[1]

Summary

Executive summary:	In the ninety-fourth session, the German delegation presented a short version of the research report prepared by the German Federal Institute for Materials Research and Testing (BAM) on the design of the rear protection in accordance with section 9.7.6 of ADR. The other delegations enquired about some technical details mentioned in the report. The German delegation now wants to provide answers to the issues raised.
Action to be taken:	Acknowledgement
Related documents:	Report ECE/TRANS/WP.15/219 on the ninety-fourth session, paragraphs 25 to 27, Informal document INF.20 presented at the ninety-fourth session - (Germany) Section 9.7.6 Rear protection of vehicles Informal document INF**.** 5 (Germany)

[1] 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)".

1. During the German presentation of informal document INF.20 at the ninety-fourth session of the Working Party, a series of questions was raised. Below, they are listed with relevant answers:

Apparently, only the rear protection section was considered, but not the force transmission points and/or the remaining frame. What is the reason for this?

2. The primary aim of the investigation report was to develop a test method for the rear protection. Furthermore, it must be assumed that only the rear protection by itself is a requirement of ADR. While it is true that the collision energy has to be absorbed also by the frame or by other vehicle parts, this issue is not limited to dangerous goods. For example, in the case of the underrun protection only a test of the section is required. There are no specifications in relation to the mounting required in the European Union (see European Union directive 2006/20/EC) fixture or similar.

Why does the current protection not suffice?

3. From the investigations carried out it has become apparent that the underrun protection sections currently used can absorb 7 kJ of energy. This is many times lower than the recommended capacity of 150 kJ.

On what basis was the recommended absorption capacity of 150 kJ for collisions calculated?

4. To determine the deformation work of the tank vehicle, calculations were made for eight rear-end collision tests carried out within the framework of the THESEUS study. The test specification comprised the exact vehicle masses and speeds: The mass of the impacting vehicle varied between 15 900 kg (tests SH 92.13 and SH 93.02) and 22 075 kg (test SH 94.08). The mass of the vehicle hit amounted to 37 600 kg. The impact velocity ranged between 25 km/h and 27 km/h (see THESEUS, 1995, table 4.2, p. 110 and table 4.8, p. 124). The deformation work absorbed by the rear end of the tank vehicle reached approximate values between 125 kJ and 185 kJ (see table 3). The average value calculated on the basis of the eight tests was 165 kJ. Hence, 150 kJ was defined as the minimum energy absorption capacity to be reached by the rear protection.

5. In the light of the risk-oriented analyses which have been developed in the meantime, a review of this limit value is also considered to be useful.

What is the maximum possible collision speed that can be tolerated?

6. The maximum collision speed that can be tolerated primarily depends on the mass of the impacting vehicle.

What crash scenario are the considerations regarding the required strength based on? Passenger car crashes? Heavy goods vehicle crashes?

7. According to the data available, relevant rear-end damage was only detected as a cause of accidents involving solely heavy good vehicles (HGV). The geometry of passenger cars prohibits a realistic assessment of a penetration of the tank.

Why did the investigations just focus on the protection of the tank (and of this vehicle)? What is the impact on collision partners (impacting vehicles) when the rear protection safety level is raised? "(Should this issue be discussed also by the World Forum for Harmonization of Vehicle Regulations (WP.29))?"

8. The rear protection of the tank is to prevent leakage and damages to the tank. In the case of an accident, it is to provide additional protection to the vulnerable points at the rear

end of the vehicle. Consequences for the vehicle of the other party involved in the accident, whatever they may be, shall not be taken into account. ADR describes the basic requirements for dangerous goods tanks and vehicles but does not make reference to risks design characteristics might pose for third parties.

Why is the rear protection under ADR not adequately defined?

9. ADR only makes reference to the "adequate strength" and the geometry of the rear protection. Neither a definition nor test criteria for meeting the requirements are mentioned.

Were different types of tanks considered? (For example, the walls of tanks for liquefied petroleum gases are already thicker, and additional protection might therefore not be necessary.)

10. Different types of tanks were not considered. However, this issue was raised, and the advantages and disadvantages of the individual protection measures were compared (see report on the rear protection component). It is desirable to take a closer look at these matters in the course of further works.

What is the reason for the general differentiation between underrun protection and rear protection?

11. Underrun protection, by definition, is to provide effective protection for passenger cars against running under the rear of heavy goods vehicles and thereby prevent their occupants from being injured. The rear protection, in contrast, primarily serves to protect the tank and not other parties. In Germany, both functions are often combined in the underrun protection.

When considering the investment costs, was there any comparison made with electronic systems (such as a distance control)?

12. A problem in connection with the introduction of active safety measures is that these measures would often have to be installed and thus also required in the vehicle of the other party involved in the accident in order to protect the vehicle carrying dangerous goods. For example, the automatic distance control or the brake assistant is only effective for the potentially impacting vehicle. This can be a HGV without dangerous cargo in which the active safety system would have to be installed to prevent the accident.