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## Economic Commission for Europe

### Inland Transport Committee

#### Working Party on the Transport of Dangerous Goods

##### Ninety-ninth session

Geneva, 9-13 November 2015

Item 6 (a) of the provisional agenda

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

### **Report of the informal working group on the electrical system of vehicles carrying dangerous goods**

#### **Transmitted by the Government of the Netherlands**

##### **Introduction**

The informal working group met for the third session on 2 and 3 June in Utrecht, the Netherlands under a mandate of the WP.15. Thirteen experts attended the working group representing France, Germany, Norway, Sweden, the Netherlands, OICA and CLEPA.

##### **Summary**

The working group took note of the comments received by WP.15 during the May 2015 session and the new information that had become available since the second session. It was agreed not to discuss hybrid electric vehicles and the construction of EX/III bodies as this required specialized input that currently is not available. Only one of the five additional issues that were raised during the first session could be concluded. Another was discussed and an interpretation by WP.15 is required.

A number of particular issues were discussed which are reflected in the report.

After the publication of document ECE/Trans/WP.15/2015/15 remarks have been received. These and the consequential corrections on the proposed texts can be found in Annex 1 to this report.

##### **Feedback by the International Group of experts on explosive risks of Unstable Substances–the Explosives, Propellants and Pyrrotechnics working group. (IGUS-EPP).**

The outcome of the second session concerning EX-vehicles was forwarded and discussed by the IGUS-EPP. They reported back as follows:

- the development of fire from an electrical failure is a concern;
- the upper threshold of 1000 A.C./1500 D.C. volt was supported with higher voltages possible if sufficient distance is kept to the load area;
- the additional value of a battery master switch (further BMS) was argued;
- the construction requirements for EX/III bodies currently in ADR are insufficient;
- the prohibition of engines with positive ignition for EX-vehicles should be re-evaluated by a structured risk analysis due to technical progress.

##### **The electrical requirements of chapter 9.2**

To simplify discussion and approval it was decided to split the proposals for the electrical requirements into three parts: a) the newly proposed sequence of provisions; b) the technical contents and c); the application of the requirements to the various vehicle types (EX/II, EX/III, FL, OX and AT).

The new sequence of provisions was accepted without reservations. The technical requirements were modified in a number of cases, in particular those of the electrical connections and the voltage.

In discussion on the harmonization of the application of the requirements to the various types of vehicles some experts expressed that extending application may only be allowed when there is a safety benefit related to the

additional costs, while others were of the opinion that costs would be limited and that harmonization would reduce approval costs and prevent confusion. In this regard it was recalled that many heavy goods vehicles (further HGV) manufacturers produced only two versions (with or without BMS) to cover the five types of vehicles.

The background of the BMS being different for EX/III and FL applications. For EX vehicles the reduction of the risk of the vehicle for catching fire rather than the risk for igniting of an explosive atmosphere for FL vehicles, did not justify to unify the types FL and EX/III.

In the light of the report of IGUS-EPP it was decided not to extend the requirement for the BMS to EX/II vehicles for the time being. For EX/II it was decided to extend the additional protection of cables behind the drivers cab to EX/II vehicles for HGV and trailers, but to exempt panel vans where protection is provided by the bodywork. The requirement for fuses was extended to EX/II vehicles. Although technical problems are not to be expected, but this was placed in square brackets for decision by WP.15 because no consensus could be reached. The outcome of this work is represented in document ECE/TRANS/WP.15/2015/15.

### **Limiting the vehicle types and harmonization of requirements other than electrical ones**

One of the additional topics raised during the first session dealt with the harmonization of the requirements for vehicles in chapter 9.2 other than the electrical ones. The various requirements were discussed and the table amended it accordingly.

Concerning limiting the vehicle types it was suggested that vehicle type OX could be harmonized with FL, and OX could be deleted. Type OX is only required for the carriage of UN 2015; hydrogen peroxide aqueous solution with more than 60% hydrogen peroxide content. The only specific OX requirement concerns the burning behavior of the drivers cab or alternative measures such as a heat shield. It was indicated by manufactures or their representatives of HGV that all materials used in the drivers cab are nowadays fire retardant and in line with the requirement.

While the other requirements for the prevention of fire risks is shared between OX and FL, but not with AT, it was decided that the most appropriate type vehicle for UN 2015 was FL.

The outcome of this work is represented in document ECE/TRANS/WP.15/2015/15.

### **Other issues**

#### *Application of chapter 9 to vehicles carrying dangerous goods other than EX/II, EX/III, AT, FL and OX.*

Being one of the additional issues that were raised during the first session it was stated that it may not be clear whether Chapter 9.1 applied to all vehicles carrying dangerous goods or not.

It was felt that parts of chapter 9.1 were applicable to all vehicles carrying dangerous goods but that 9.1.1.1 can be read in two ways:

- a) it applies only to vehicles of the category N and O, vehicles of other categories such as M (passenger cars), T (agricultural tractors) or L (2 or 3 wheeled vehicles) may be used;
- b) it applies to all vehicles carrying dangerous goods but only vehicles of the category N and O may be used. It is not allowed to use vehicles of categories M, T or L.

The WP.15 is asked for the correct interpretation to allow for future work on chapter 9.1.

#### *Placing of batteries and battery master switch (BMS) on tractors for semi-trailer and the length of cable unprotected by a fuse.*

Several tractor manufacturers have decided to place the batteries behind the fifth wheel. Besides a possible risks for the battery due to leakage of the load tank this also results in a longer than normal cable that is not protected by a fuse. The wording used for the relative position of the BMS to the batteries (“as close to the battery as practicable”) and the length of the cable unprotected by a fuse (“as short as possible”) may also lead to discussion and different interpretation.

It was concluded that the BMS should be as close as possible to the battery and that the length of the cable not protected by a fuse may not always be the shortest because of the relative position of the various components that need unprotected cables. Discussion on the risk for the battery, when there is leakage of the load tank, would be discussed in relation to batteries of hybrid-electric vehicles for which placing may also not be conventional.

Electrical energy storage devices in the drivers cab

Additional electrical storage devices may be expected in the vehicles equipment and consumer electronics in the drivers cab. An example was given for a road-toll box containing Lithium Ion cells of considerable capacity that was expected to present a risk and were required to be removed for FL vehicles. On the other hand it was questioned if there are significant energy source in the vehicles electrical system itself, it was recalled that when the (starter) battery is disconnected memories for motor management and drivers comfort systems are erased. It was felt that more information was needed on this subject.

Energizing automatic fire extinguishers on EX/III tank-vehicles and MEMUs

The representative of Sweden said that even during parking, when the BMS had broken the circuits, the automatic extinguisher system needed to be energized. In the schematic presentation of the system many components were included that may require a significant amount of energy. However 9.2.2.9.2 (9.2.2.5.2 in ADR 2015) only requires a protection of the circuit by a suitable means such as a fuse or circuit breaker without limitation to the current, unlike the requirements for FL vehicles. This makes it possible to energize these components but may hinder the simultaneous approval of these particular vehicles as type FL.

Outflow of hot gases during (automatic) regeneration of catalytic converters (soot filters)

Euro 6 requires “closed” converters that need active regeneration to prevent blockage of the exhaust system. The regeneration process can lead to an outflow of very hot exhaust gases for several minutes. The outflow is such that this may harm other road users, such as pedestrians and cyclists in urban traffic situations. Unintended regeneration may also create problems at depots where explosives atmospheres occur. Environmental regulations prescribe countermeasures such as preventing regeneration below a certain speed, but the actual method is left to the vehicle manufacturer. To take this risk in account it was felt this was to be considered for awareness during driver training rather than for technical measures in ADR.

**Future meetings of the working group**

Awaiting the approval of the proposed changes and approval of WP.15 to continue the work, no future meetings have been planned.

## Annex 1

For this annex existing wording in *italic* script, deleted wording ~~stricken through~~ and new wording in ***bold italic*** script.

Remark 1:

Subsection 8.3.8 should be consequentially be amended to read:

*In the case of a transport unit equipped with an anti-lock braking system, consisting of a motor vehicle a trailer with a maximum mass exceeding 3.5 tonnes, the connections referred to in ~~paragraph~~ **subsection 9.2.2.6.3 9.2.2.6** shall be connecting the towing vehicle and the trailer at all times during carriage.*

Remark 2:

*The subject of subsection 9.2.2.6. is connections between motor vehicles and trailers. Other connections in the wiring system of (motor) vehicles are not included. This is indicated in the first sentence of subsection 9.2.2.6.1. However subsection 9.2.2.6.3 may be interpreted to apply also to other connections in the wiring system. For this reason it is proposed to move the wording “between motor vehicle and trailers” from 9.2.2.6.1 to the heading of 9.2.2.6.*

“9.2.2.6                      **Electrical connections *between motor vehicles and trailers***

9.2.2.6.1

*Electrical connections ~~between motor vehicles and the trailers~~ shall be designed to prevent: ”*

Remark 3:

It was brought to the attention that tank of tank vehicles may have electrical heating directly on the outside of the tank shell. The heating systems operate mainly on 230 Volts. The new proposed 9.2.2.7 requires a distance from the load area of 0.5 meters for systems working on a voltage higher than 25 V A.C. of 60 V D.C. which is based on the particular risks of higher voltages on explosive substances and articles in load compartments of EX vehicles.

It is proposed to amend the table in chapter 9.2 of document ECE/TRANS/WP.15/2015/15 as follows:

TECHNICAL SPECIFICATION	EX/II	EX/III	AT	FL	Comments
9.2.2.7	X	X	✗	✗	