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## Economic Commission for Europe

### Inland Transport Committee

### Working Party on the Transport of Dangerous Goods

#### 111th session

Geneva, 9–13 May 2022

Item 5 (a) of the provisional agenda

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

### Battery electric vehicles

#### **Transmitted by the Government of the Netherlands on behalf of the informal working group on electrified vehicles\***

#### *Summary*

<b>Executive summary:</b>	In order to use Battery Electric Vehicles and Hydrogen Fuel Cell Vehicles for the carriage of dangerous goods in EX, AT and FL vehicles provisions need to be included in the regulation. The informal working group on electrified vehicles studied these systems and evaluated the risks.
<b>Action to be taken:</b>	Adopt provisions given in annexes I and II of this document to allow the use of Battery Electric Vehicles as AT and FL as appropriate.
<b>Related documents:</b>	Informal document INF.13 from the 105 <sup>th</sup> session; informal document INF.10 from the 107 <sup>th</sup> session, informal documents INF.16 and INF.17 from the 109 <sup>th</sup> session; informal documents INF.14 and INF.20 from the 110 <sup>th</sup> session.

### Introduction

1. The informal working group was established by the Working Party at the May 2021 session to introduce vehicles with an electric drive system into the regulations. The introduction should be based on an evaluation of risks these vehicles present for the load.
2. The work is complex as these vehicles are still under development. To counter this the work is done in several sub-groups of which some of them have not yielded results yet due to the workload. However, despite the workload, substantial progress is made on

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\* A/76/6 (Sect.20), para 20.76.

clarification of the vehicle specifications, functioning of the various components and risk analyses.

3. As it is believed that the introduction of hydrogen fuel cell vehicles will take longer than battery electric vehicles the focus was on the last type.

4. In general, it may be concluded that the electric drive system itself is as safe as, or even safer than the drive system with an internal combustion engine. Not only is the waste energy favourable (less development of heat), but also the temperature of the components is much lower. Lithium-ion batteries, as energy supply for the electric drive system, may raise some concerns but prove to be reliable in other types of vehicles like passenger cars and buses that are already in use for several years. As fire risks are of a lower level in the current regulations for “AT” vehicles, it was felt appropriate to propose inclusion for this category in the regulation as soon as possible in ADR 2023. The introduction in ADR 2023 will allow to gain experience with these vehicles. Please find the proposals for the introduction of AT vehicles in Annex I to this document.

5. For “FL” vehicles several issues (e.g. fire safety of battery and safety in explosive atmospheres) remain to be answered at the time of drafting this document in time for the deadline for official documents for the 111<sup>th</sup> session. As work continues in the informal working group these issues may be resolved before the 111<sup>th</sup> session of the Working Party takes place. To take this into account additional proposals for FL vehicles are included in Annex II to this document that amend and complete the proposals in Annex I. Further detailing may be expected in forthcoming informal documents.

6. Discussion for the use of Battery Electric Vehicles for the approval of EX vehicles is still underway as well it is for the application of Hydrogen Fuel Cell Vehicles.

7. Specific decisions for the proposed amendments:

- A reference to UN Regulation No. 13 Rev.11 is introduced to assure correct application of braking requirements for vehicles with an electric drive system in the initial phase of introduction.
- It was decided to exclude the high voltage drive electrical system from 9.2.2. However other high voltage applications such as power steering, drive for the air-brake compressor and heating are included under 9.2.2. It should be noted that 9.2.2.7, concerning voltage, only applies to EX vehicles.
- A new sub-section 9.2.4.6 has been introduced in able to regulate the introduction of Battery Electric Vehicles.
- Sub-sections 9.2.4.3, 9.2.4.4 and new sub-section 9.2.4.6 are provided with a note in case hybrid vehicles, in various configurations, are used with combustion engine and electric drive.
- Sub-section 9.2.4.7 (renumbered 9.2.4.8) is amended to include electric (high voltage) heaters.

## Annex I

### Proposals for the introduction of Battery Electric Vehicles as category AT in 9.2 of ADR

1. In the table of 9.2.1.1 introduce a new 9.2.4.6 and renumber the current 9.2.4.6 and 9.2.4.7 and 9.2.4.7.1 to 9.2.4.7.6 as 9.2.4.7 and 9.2.4.8 and 9.2.4.8.1 to 9.2.4.8.6 respectively:

9.2.4.6	<u>Electric drive system</u>			X		
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2. In the table of 9.2.1.1 amend the heading of the new 9.2.4.8 to read:

9.2.4.8	<u>Combustion and electrical heaters</u>					
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3. Amend the second paragraph of 9.2.2.1 to read (new wording underlined):

“The electrical installation as a whole, with the exception of the high voltage drive system in compliance with the technical provisions of UN Regulation No. 100, shall meet the provisions of 9.2.2.2 to 9.2.2.9 in accordance with the table of 9.2.1.”

4. Amend 9.2.3.1.1 to read (new wording underlined):

“Motor vehicles and trailers intended for use as transport units for dangerous goods shall fulfil all relevant technical requirements of UN Regulation No.13<sup>4</sup>, as amended, in accordance with the dates of application specified therein. Battery Electric Vehicles shall fulfil all relevant technical requirements of Revision 11 or higher of UN Regulation No. 13 as applicable.”

5. Introduce a note after the heading of 9.2.4.3 to read:

“**NOTE:** 9.2.4.3 likewise applies to fuel tanks and cylinders used for hybrid vehicles which include an electric drive system in the mechanical driveline of the internal combustion engine or use an internal combustion engine to driving a generator to energize the electric drive system.”

6. Introduce a note after the heading of 9.2.4.4 to read:

“**NOTE:** 9.2.4.4 likewise applies to hybrid vehicles which include an electric drive system in the mechanical driveline of the internal combustion engine or use an internal combustion engine to driving a generator to energize the electric drive system.”

7. Introduce a new subsection 9.2.4.6 to read:

**“9.2.4.6      *Electric drive system***

***NOTE:** 9.2.4.6 likewise applies to hybrid vehicles that include an electric drive system in the mechanical driveline of an internal combustion engine. Electric drive systems shall not be used for EX and FL vehicles. [Electric drive shall only be used on tractors for semi-trailers.]*

The electric drive system shall meet the requirements of UN Regulation No. 100<sup>8</sup>. Measures shall be taken to prevent any danger to the load by heating or ignition.”

Footnote 8 reads:

<sup>8</sup>      *UN Regulation No. 100 (Uniform provisions concerning the approval of vehicles with regard to specific requirements for the electric power train). ”*

In Chapter 9.2, renumber subsequent footnotes accordingly.

8. Renumber the existing 9.2.4.6 and 9.2.4.7 as 9.2.4.7 and 9.2.4.8 respectively. Under 9.2.4.7, renumber the paragraphs and cross-references accordingly. In 9.3.2.2, replace “9.2.4.7.1, 9.2.4.7.2, 9.2.4.7.5 and 9.2.4.7.6” by “9.2.4.8.1, 9.2.4.8.2, 9.2.4.8.5 and 9.2.4.8.6”. In 9.7.7.1, in the first sentence, replace “9.2.4.7.1, 9.2.4.7.2, 9.2.4.7.5” by “9.2.4.8.1, 9.2.4.8.2, 9.2.4.8.5”. In 9.7.7.1, in the last sentence, replace “9.2.4.7.3 and 9.2.4.7.4” by

“9.2.4.8.3 and 9.2.4.8.4”. In 9.8.6.1, replace “9.2.4.7.1, 9.2.4.7.2, 9.2.4.7.5, 9.2.4.7.6” by “9.2.4.8.1, 9.2.4.8.2, 9.2.4.8.5, 9.2.4.8.6”.

9. Amend the heading of the renumbered 9.2.4.8 to read (deleted wording stricken through):

***“Combustion and electrical heaters”***

10. Amend the renumbered 9.2.4.8.1 to read as follows (new wording underlined). Footnote 8 is renumbered as 9.

“9.2.4.8.1 Combustion and electrical heaters shall comply with the relevant technical requirements of UN Regulation No. 122<sup>9</sup>, as amended, in accordance with the dates of application specified therein and the provisions of 9.2.4.8.2 to 9.2.4.8.6 applicable according to the table in 9.2.1.”

11. Amend the renumbered 9.2.4.8.5 to read (new wording underlined):

“9.2.4.8.1 The combustion heater, or electrical heater [for the drivers cab,] shall be switched on manually. Programming devices shall be prohibited.”

## Annex II

### Additional/modifying proposals to the amendments in Annex I for the introduction of Battery Electric Vehicles for the category FL

1. (Modification of paragraph 1 of Annex I) In the table of 9.2.1.1 introduce a new 9.2.4.6 and renumber the current 9.2.4.6 and 9.2.4.7 and 9.2.4.7.1 to 9.2.4.7.6 as 9.2.4.7 and 9.2.4.8 and 9.2.4.8.1 to 9.2.4.8.6 respectively:

				(AT)	(FL)
9.2.4.6	<u>Electric drive system</u>				
9.2.4.6.1				X	
9.2.4.6.2					X

2. In the table of 9.2.1.1 amend the line for the renumbered 9.2.4.8.6 to read:

9.2.4.8.6		X	X	X <sup>y</sup>	X <sup>y</sup>	<sup>y</sup> Applicable to motor vehicles equipped after 30 June 2023. If the date of equipping is not available the date of first registration of the vehicle shall be used instead.
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3. (Modification to paragraph 7 of Annex I) Introduce a new subsection 9.2.4.6 to read:

**“9.2.4.6      *Electric drive system***

*NOTE: 9.2.4.6 likewise applies to hybrid vehicles that include an electric drive system in the mechanical driveline of an internal combustion engine. Electric drive systems shall not be used for EX vehicles. [Electric drive shall only be used on FL tractors for semi-trailers.]*

9.2.4.6.1      The electric drive system shall meet the requirements of UN Regulation No. 100<sup>8</sup>. Measures shall be taken to prevent any danger to the load by heating or ignition.

9.2.4.6.2      The electric drive system shall be provided with a battery master switch for breaking the electrical circuits shall be placed as close to the battery as possible. A control device to facilitate the disconnecting and reconnecting functions of the switch shall be installed in the driver's cab. It shall be readily accessible to the driver and be distinctively marked. It shall be protected against inadvertent operation by either adding a protective cover, by using a dual movement control device or by other suitable means. Additional control devices may be installed provided they are distinctively marked and protected against inadvertent operation. If the control device(s) are electrically operated, the circuits of the control device(s) are subject to the requirements of 9.2.2.9.

Batteries positioned near the outer side contour of the vehicle shall be so placed in protective housings, constructed as to offer protection against mechanical impact. Measures shall be taken to protect the load in case of a battery fire. Batteries to provide energy for traction shall not be fitted to trailers.”

Footnote 8 reads:

<sup>8</sup>      *UN Regulation No. 100 (Uniform provisions concerning the approval of vehicles with regard to specific requirements for the electric power train). ”*

In Chapter 9.2, renumber subsequent footnotes accordingly.

4. Amend 9.2.4.8.3 (b) to read (new wording underlined):

“(b) Stopping of the vehicle engine or active drive mode of electric vehicles; in this case the heating device may be restarted manually by the driver;”

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