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## Economic Commission for Europe

### Inland Transport Committee

### Working Party on the Transport of Dangerous Goods

#### 114th session

Geneva, 6-10 November 2023

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 and hydrogen fuelled vehicles**

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

## **Introduction**

1. This document contains proposals by the informal working group on electrified vehicles. The purpose is to include battery electric vehicles for the vehicle category FL, in addition to the inclusion of category AT in ADR 2023; hydrogen fuel cell vehicles for the categories AT and FL; and hydrogen as fuel for vehicles with an internal combustion engine for vehicle categories AT and FL.

2. Vehicle technology and safety regulations are still evolving, they should not be hindered by provisions in ADR. They have design neutrality and guarantee that vehicles will be safe enough for the carriage of dangerous goods and a fine balancing of wording is therefore necessary. As a consequence some proposed wording is still in square brackets as further fine tuning may be needed. It was decided however to proceed with this document for the 114<sup>th</sup> session of WP.15 to allow for a timely discussion and possibility to adjust if necessary for inclusion in ADR 2025.

3. To aid the discussion a consolidated wording of Chapter 9.2 of ADR will be provided in the form of an informal document (informal document INF.3). A report of the informal working group will follow in due time.

## **Proposal 1**

4. Amend the following lines in the table of 9.2.1.1 (ADR 2023) (deleted wording ~~stricken~~ through, new wording in *italic underlined*):

9.2.4 replace “*PREVENTION OF FIRE RISKS*” by “*VEHICLE PROPULSION SYSTEM*”

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\* A/77/6 (Sect. 20), table 20.6



9.2.4	<b>PREVENTION OF FIRE RISKS VEHICLE PROPULSION SYSTEM</b>					
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9.2.4.3 “Fuel tank and cylinders”: Renumber as 9.2.4.2, include an [“X<sup>k</sup>”] in the column for “AT” and under column “Comments” add [“<sup>k</sup>Applicable to motor vehicles first registered after 31 March 2026”].

9.2.4.3 9.2.4.2	Fuel tanks and cylinders	X	X	[X <sup>k</sup> ]	X	[ <sup>k</sup> Applicable to motor vehicles first registered after 31 March 2026]
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9.2.4.4 renumber as 9.2.4.3 and replace “Engine” by “Internal combustion engine”.

9.2.4.4 9.2.4.3	<i>Engine Internal combustion engine</i>	X	X		X	
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Delete line 9.2.4.5.

9.2.4.5	<del>Exhaust system</del>	<del>X</del>	<del>X</del>		<del>X</del>	
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Renumber the existing 9.2.4.6 as 9.2.4.4 to read:

9.2.4.4	<i>Electric power train</i>					
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Introduce a new line 9.2.4.4.1 to read:

9.2.4.4.1	<i>General provisions</i>			X	X	
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Introduce a new line 9.2.4.4.2 to read:

9.2.4.4.2	<i>Rechargeable electrical energy storage system</i>			[X <sup>k</sup> ]	X	[ <sup>k</sup> Applicable to motor vehicles first registered after 31 March 2026]
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Introduce a new line 9.2.4.4.3 to read:

9.2.4.4.3	<i>Measures against thermal propagation</i>				X	
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Delete line 9.2.4.7.

9.2.4.7	<del>Vehicle endurance braking</del>	<del>X<sup>f</sup></del>	<del>X</del>	<del>X</del>	<del>X</del>	<del><sup>f</sup> Applicable to motor vehicles.....shall be of type IIA.</del>
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Introduce a new line 9.2.4.5 to read:

9.2.4.5	<i>Hydrogen Fuel Cell</i>			X	X	
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Renumber line 9.2.4.8 to 9.2.4.8.6 (Combustion heaters) as 9.2.5 to 9.2.5.6 respectively.

Renumber line 9.2.5 (Speed limiting device) as 9.2.6; renumber line 9.2.6 (Coupling devices...) as 9.2.7; and renumber line 9.2.7 (Prevention of other risks..) as 9.2.8.

## Proposal 2

5. Amend 9.2.2.1 to read (deleted wording ~~stricken~~ through- new wording in *Italic underlined*):

### “9.2.2.1 General provisions

The installation shall be so designed, constructed and protected that it cannot provoke any unintended ignition [*fire*] or short circuit under normal conditions of use of vehicles.

The electrical installation, ~~with the exception of the electric power train in compliance with the technical provisions of UN Regulation No. 100, as amended at least by the 03 series of amendment,~~ shall meet the provisions of 9.2.2.2 to 9.2.2.9 in accordance with the table of 9.2.1.

*The electric power train and the galvanically connected parts in compliance with the technical provisions of UN Regulation No. 100, as amended at least by the 03 series of amendments, need not to comply with the provisions of 9.2.2.2 to 9.2.2.7.*

### Proposal 3

6. Introduce a new note to 9.2.3.1.1 after the paragraph to read:

*“NOTE: Trailers with re-generative braking or electric power train are not allowed.”*

### Proposal 4

7. Introduce a new paragraph 9.2.3.3 with the same text as in 9.2.4.7 (ADR 2023) to read:

“9.2.3.3 Vehicles equipped with endurance braking systems emitting high temperatures placed behind the rear wall of the driver's cab shall be equipped with a thermal shield securely fixed and located between this system and the tank or load so as to avoid any heating, even local, of the tank wall or the load.

In addition, the thermal shield shall protect the braking system against any outflow or leakage, even accidental, of the load. For instance, a protection including a twin-shell shield shall be considered satisfactory.”

### Proposal 5

8. Amend 9.2.4 to read (deleted wording ~~stricken~~ through, new wording in *Italic underlined*):

**9.2.4 Vehicle propulsion system** ~~Prevention of fire risks.~~

### Proposal 6

9. Introduce a new paragraph at the end of 9.2.4.1 to read:

“Hybrid vehicles equipped with an internal combustion engine and electric power train shall comply with the provisions of 9.2.4.2 to 9.2.4.4 and 9.2.4.5.”

### Proposal 7

10. Delete 9.2.4.2 (currently marked as “Deleted”).

### Proposal 8

11. Renumber existing 9.2.4.3 as 9.2.4.2 and amend to read (deleted wording ~~stricken~~ through, new wording in *Italic underlined*):

**“9.2.4.3.2 Fuel tanks and cylinders**

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

The fuel tanks and cylinders supplying the engine, or fuel cell of the vehicle shall meet the following requirements:

- (a) In the event of any leakage under normal conditions of carriage, the liquid fuel or the liquid phase of a gaseous fuel shall drain to the ground and not come into contact with the load or hot parts of the vehicle;
- (b) Fuel tanks for liquid fuels shall meet the requirements of UN Regulation No. 34; fuel tanks containing petrol shall be equipped with an effective flame trap at the filler opening or with a closure enabling the opening to be kept hermetically sealed. ~~Fuel tanks and cylinders for LNG and for CNG respectively shall meet the relevant requirements of UN Regulation No. 110. Fuel tanks for LPG shall meet the relevant requirements of UN Regulation No. 67.~~
- (c) Fuel tanks and cylinders for LNG and for CNG respectively shall meet the relevant requirements of UN Regulation No. 110.
- (d) Fuel tanks for LPG shall meet the relevant requirements of UN Regulation No. 67.
- (e) Fuel tanks and cylinders for hydrogen shall meet the relevant requirements of UN Regulation No. 134, at least series 02 of amendments or for liquid hydrogen containers the technical provisions of GTR 13 Phase 2 part 7.
- (f) The discharge opening(s) of pressure relief devices and/or pressure relief valves of fuel tanks containing gaseous fuels shall be directed away from air intakes, fuel tanks, the load or hot parts of the vehicle and shall not impinge on enclosed areas, other vehicles, exterior-mounted systems with air intake (i.e. air-conditioning systems), engine intakes, electrical storage systems or engine exhaust. Pipes of the fuel system shall not be fixed on the shell containing the load.”

## Proposal 9

12. Renumber existing 9.2.4.4 as 9.2.4.3 and amend the heading and note to read (deleted wording ~~stricken~~ through, new wording in *Italic underlined*):

### **“9.2.4.34 Internal combustion engine Engine**

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

[Rest of the text is unchanged]

## Proposal 10

13. Introduce a new 9.2.4.3.1 and copy-paste, and reorganize the wording of the existing 9.2.4.4 of ADR 2023 to read (deleted wording ~~stricken~~ through, new wording in *Italic underlined*):

“9.2.4.3.1 The engine propelling the vehicle shall be so equipped and situated to avoid any danger to the load through heating or ignition. ~~The use of CNG or LNG as fuel shall be permitted only if the specific components for CNG and LNG are approved according to UN Regulation No. 110<sup>7</sup> and meet the provisions of 9.2.2. The installation on the vehicle shall meet the technical requirements of 9.2.2 and UN Regulation No. 110<sup>7</sup>. The use of LPG as fuel shall be permitted only if the specific components for LPG are approved according to UN Regulation No. 67<sup>8</sup> and meet the provisions of 9.2.2. The installation on the vehicle shall meet the technical requirements of 9.2.2 and UN Regulation No. 67<sup>8</sup>. The use of a fuel shall only be permitted if components are approved and installation meet the provisions of 9.2.2 and the technical requirements of:~~

- (a) UN Regulation No. 110 for CNG or LNG.
- (b) UN Regulation No. 67 for LPG.

(c) UN Regulation No. 134 for compressed hydrogen and the technical provisions of GTR 13 Phase 2 for liquid hydrogen as relevant.

In the case of EX/II and EX/III vehicles the engine shall be of compression-ignition construction using only liquid fuels with a flashpoint above 55 °C. Gases shall not be used.”

## Proposal 11

14. Renumber existing 9.2.4.5 as 9.2.4.3.2.

## Proposal 12

15. Renumber existing 9.2.4.6 as 9.2.4.4 and amend to read (deleted wording ~~stricken~~ through, new wording in *Italic underlined*):

“9.2.4.4.6 *Electric power train*

*NOTE 1: 9.2.4.6 likewise applies to hybrid vehicles that include an electric power train in the mechanical driveline of an internal combustion engine. Electric power trains shall not be used for EX and FL vehicles.*

*NOTE 2: Trailers with re-generative braking or electric power train are not allowed.”*

## Proposal 13

16. Introduce a new 9.2.4.4.1 and copy paste the wording of 9.2.4.6 (ADR 2023) to read (deleted wording ~~stricken~~ through):

“9.2.4.4.1 *General provisions*

The electric power train shall meet the requirements of UN Regulation No. 100, as amended at least by the 03 series of amendments. ~~Measures shall be taken to prevent any danger to the load by heating or ignition.”~~

## Proposal 14

17. Introduce new 9.2.4.4.1.1 and 9.2.4.4.1.2 to read:

“9.2.4.4.1.1 Vehicles with an electric power train shall be equipped with and isolation resistance monitoring system.”

9.2.4.4.1.2 The vehicle shall give external signals in stationary conditions, in addition to the warning to the driver receives in de driver’s cab as required by 6.15.1 of UN Regulation No.100.”

## Proposal 15

18. Introduce a new 9.2.4.4.2 to read:

“9.2.4.4.2 *Rechargeable electrical energy storage system (REESS)*

*NOTE: Other acronyms for REESS are used in other documentation for similar systems (e.g. RESS).*

REESS of vehicles with an electric power train shall be designed and constructed taking into account a risk evaluation according to ISO 6469-1:2019/Amd 1:2022 to establish safety for normal operational conditions. A review shall be carried out by a technical service (e.g. technical service for vehicle approvals according to UN Regulation No. 100).

*NOTE: Normal operational conditions includes the normal, malfunctioning and reasonable foreseeable accidental situations.”*

## Proposal 16

19. Introduce a new 9.2.4.4.3 to read:

“9.2.4.4.3 *Measures against thermal propagation*

REESS containing cells for which thermal propagation cannot be guaranteed to be contained within the REESS, measures shall be taken to prevent danger to the load by heating or ignition. [The design shall consider the need for facilitation of intervention by emergency services to mitigate effects of a thermal propagation.]”

## Proposal 17

20. Introduce new 9.2.4.5 to 9.2.4.5.3 to read:

“**9.2.4.5 *Hydrogen Fuel Cell Vehicles***

9.2.4.5.1 Hydrogen Fuel Cell Vehicles shall comply with the requirements for the electrical power train of 9.2.4.4.

9.2.4.5.2 Hydrogen Fuel cell vehicles shall comply with UN Regulation No. 134 series 02 of amendment. For vehicles using liquid hydrogen the technical requirements of the Global Technical Regulation 13 Phase 2 applies.

9.2.4.5.3 Shut-off devices of hydrogen containers shall close automatically:

- when the vehicle is no longer in driving mode;
- at an impact of 1.5 G against the direction of travel;
- in case of lateral overturning above an angle of 23°.

The shut-off devices may be re-opened by a deliberate action of the driver.”

## Proposal 18

21. Delete 9.2.4.7 (provision replaced by 9.2.3.3).

## Proposal 19

22. Renumber 9.2.4.8 to 9.2.4.8.6 as 9.2.5 to 9.2.5.6 respectively.

## Proposal 20

23. Renumber 9.2.5 and 9.2.6 as 9.2.6 and 9.2.7 respectively.

## Proposal 21

24. Renumber 9.2.7 as 9.2.8 and amend to read (new wording in *Italic underlined*).

“**9.2.8 Prevention of other risks caused by fuels**

9.2.8.1 Fuel systems for engines fuelled by LNG *and liquid hydrogen* shall be so equipped and situated to avoid any danger to the load due to the gas being refrigerated.”

## **Proposal 22**

25. Introduce a new transitional provisions 1.6.5.xy, in case of removal of the square brackets in the table of 9.2.11 for AT, in the line for 9.2.4.2 and 9.2.4.4.2 to read:

“1.6.5.[23] Vehicles first registered (or which entered into service if registration is not mandatory) before 1 April 2026, approved as AT vehicle not in compliance with the provisions of 9.2.4.2 concerning fuel tanks and 9.2.4.4.2 concerning the evaluation of the REESS may continue to be used.”

## **Justification**

26. Justification for the amendments in this document will be given in the report of the informal working group on electrified vehicles.

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