**Economic Commission for Europe**

Inland Transport Committee

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

**116th session**
Geneva, 5-8 November 2024
Item 5 (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 Electrified Vehicles.

## Transmitted by the Chair of the Informal Working Group *

### *Introduction*

1. As agreed at the April 2024 session of WP.15, the Informal Working Group on Electrified Vehicles (IWG-EV) remained active on a low level to deal with Battery Electric Vehicles (BEV) and Hydrogen Fuelled Vehicles (H2ICE and HFCV) for the category 'EX" and to deal with any issues arising from the introduction of BEV, H2ICE and HFCV in ADR 2025.

2. It needs to be reminded that from the start the IWG-EV dealt with Heavy Duty Vehicles where the technology and general safety regulations were still under development with limited practical experience. To counter this, two main subgroups worked in parallel, a group dealing with the safety expectations of users and a group dealing with the hazards resulting from the (components/assemblies) new technology. In a second stage the two groups merged to arrive at necessary safety features as introduced in ADR 2025. During the running of the Informal Working Group vehicle regulations developed further. It was decided to make reference to the latest versions of the regulations and in doing so limit additional requirements in ADR, originally felt necessary, to a minimum.

### *Activities of the Informal Working Group*

3. The Informal Working group met twice between the May and November 2024 session of WP.15 on July 24th and October 11th. In this period the Sub-group EX had a kick-off meeting and the Sub-group truck manufacturers met every two weeks. The Sub-groups Users, Hydrogen and Trailer and body builders were dormant.

*Sub-group on EX vehicles*

4. Heating up of the explosives is one of the main safety hazards for EX vehicles. It was discussed before that considering the limited number of experts on explosives, to work together with the working group on explosives under the TDG. Considering the specific expertise on vehicles it was decided to work under the mandate of the IWG-EV. Working together means that it is a global group with all the complexities of experts in the different time zones in the world.
At the kick-off session a presentation was given by the Chair of the IW-EV on the need to have a feature to de-energize the electrical system for EX vehicles, and on the hazards and safety features. After a short discussion the group decided to dive deeper into the event of a battery fire. The Sub-group met twice on May 15th, July 17th and a third session was scheduled for the 16th of October. A separate folder is available on the wiki space for documents of the IWG-EV.

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

*SubGroup Truck-Manufactures*

5. Several topics on the new requirements in ADR 2025 were under discussion. These were in particular reference to the series 2 of amendments of UN Regulation No. 134, the external alarm in case of an imminent thermal propagation in the battery, and an interpretation when the valves on hydrogen containers should be closed.

## *Interpretation issues arising, to be discussion and decided upon by WP.15.*

*Closing the shut-off valves on hydrogen containers in an event of a collision; correction to document 2024/15.*

6. It was noted that the impact force agreed upon for ADR 2025, to close the shut-off valves on the hydrogen containers in case of a collision was too low. An improved value is given in document 2024/15. However, in the final drafting of document 2024/15 a change was made from "impact" to "deceleration". In this it was overlooked that also the wording "against the direction of travel" should have been changed to "in the direction off travel". It is advised to include this correction to document 2024/15.

*Application of the 02 series of amendment of UN Regulation No. 134.*

7. Shortly after the April 2024 WP.15 session it was realized that the 02 series were official in force on the 14th of June 2024. Amendments included in the 02 series were more severe environmental testing of container valves, increased fire tests of the containers and improved protection of container valves. It was said that testing and approving would take a longer time with a result that hydrogen fuelled vehicles cannot be delivered from the entry into force of ADR 2025. An exact time when compliance to UN Regulation No. 134 series 02 can be expected may run op to the end of 2025 or later.

8. The wording used in the various parts of 9.2 differs. The reference to UN Regulation No. 134 appears three times in 9.2:

> 9.2.4.2 (Fuel container): *"The fuel tanks and cylinders supplying the engine or fuel cell of the vehicle shall meet the following requirements: (e) Fuel tanks and cylinders for hydrogen shall meet the relevant requirements of UN Regulation No. 134, as amended at least by the 02 series of amendments, or for liquid…"*
> 9.2.4.3.1 (Internal combustion engine): *"…the provisions of 9.2.2 and the technical requirements of: (c) UN Regulation No. 134 for compressed hydrogen…."*
> 9.2.4.5.2 (Hydrogen Fuel Cell Vehicle): *"Hydrogen fuel cell vehicles shall comply with UN Regulation No. 134, as amended at least by the 02 series of amendments. For vehicles using liquid hydrogen…".*

It may be interpreted that where "relevant requirements" or compliance with UN Regulation No. 134, as amended at least by 02 series." is required, also the transitional measures in the said regulation would apply. This would allow the registration of vehicles under ADR 2025 based on the 01 series of amendments.
WP.15 is requested to take position on this interpretation.

*External warning signal (9.2.4.4.1 last sentence).*

9. A timely external warning of a thermal propagation (effects outside of the REESS or battery housing) was felt to be important even when the driver would be outside of the vehicle. Questions arrive if the warning should be available all times, even in zones where explosive atmospheres exist and also when parked overnight, when the driver is not direct in the vicinity of the vehicle.
The background is that the signal for the alarm originates from the battery management system, and that this system is not available all the time.
As this item was an important measure to mitigate effects of a thermal runaway in the risk evaluation of the users group it was decided to have an additional meeting of the combined users-truck manufacturers group before the WP.15 session in November.

*Meaning of stationary in regard to the automatic closing of hydrogen shut-off valves.*

10. Confusion exists on the first indent of 9.2.4.5.3 “when the vehicle is no longer in driving mode”. An important safety issue is that shut-off valves of gaseous fuel containers close when the vehicle is not in use. For vehicles with internal combustion engines the closing is related to the stopping of the engine (key-off). However, for fuel cell vehicles the stopping of the engine or motor is when the vehicle comes to a standstill may not close the shut off valves. To guarantee safety and a proper closing the wording “no longer in driving mode” was felt to be clear enough. However, in vehicle regulations it seems that “active driving possible mode” seems to be the fashion. In this case the vehicle may be in standstill but will move when the handbrake is released, or the accelerator pedal is pressed.

11. The background here is that when the vehicle is stopped functioning the normal shut-down procedure can take place to protect the fuel cell for damage especially in cold climates (freezing of process (water). As future work, it may also be noted that the fuel cell may be used to charge the battery when at standstill and that the last line of 9.4.5.3 need amendment to clarify this for the ADR 2027 version.

12. It may be discussed if the outcome of the above discussion could be part of the interpretation section on the UNECE website.