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## Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

**191st session**

Geneva, 14–16 November 2023

Item 4.8.18 of the provisional agenda

**1958 Agreement:**

**Consideration of draft amendments to existing**

**UN Regulations submitted by GRSP**

### **Proposal for Supplement 4 to the 01 series of amendments to UN Regulation No. 135 (Pole side impact)**

**Submitted by the Working Party on Passive Safety \***

The text reproduced below was adopted by the Working Party on Passive Safety (GRSP) at its seventy-third session (ECE/TRANS/WP.29/GRSP/73 para. 38). It is based on ECE/TRANS/WP.29/GRSP/2023/24 as amended by annex IX to the report. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration at their November 2023 sessions.

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\* In accordance with the programme of work of the Inland Transport Committee for 2023 as outlined in proposed programme budget for 2023 (A/77/6 (Sect. 20), table 20.6), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.



*Paragraphs 2.3. and 2.4., amend to read:*

- "2.3. "Compressed hydrogen storage system (CHSS)" means a system designed to store compressed hydrogen fuel for a hydrogen-fuelled vehicle and composed of a container, container attachments (if any), and all primary closure devices required to isolate the stored hydrogen from the remainder of the fuel system and the environment.
- 2.4. "Container (for hydrogen storage)" means the pressure-bearing component on the vehicle that stores the primary volume of hydrogen fuel in a single chamber or in multiple permanently interconnected chambers."

*Insert new paragraph 2.4.1., to read:*

- "2.4.1. "Container Attachments" mean non-pressure bearing parts attached to the container that provide additional support and/or protection to the container and that may be only temporarily removed for maintenance and/or inspection only with the use of tools."

*Paragraph 2.10., amend to read:*

- "2.10. "Hydrogen-fuelled vehicle" means any motor vehicle that uses compressed gaseous hydrogen as a fuel to propel the vehicle, including fuel cell and internal combustion engine vehicles. Hydrogen fuel for the vehicles is specified in ISO 14687:2019 and SAE J2719\_202003.

*Paragraph 2.14., amend to read:*

- "2.14. Passenger compartment
- 2.14.1 "Passenger compartment with regard to occupant protection" means the space for occupant accommodation, bounded by the roof, floor, side walls, doors, outside glazing, front bulkhead and the plane of the rear compartment bulkhead or the plane of the rear-seat back support.
- 2.14.2. "Passenger compartment for hydrogen safety assessment" means the space for occupant accommodation, bounded by the roof, floor, side walls, doors, outside glazing, front bulkhead and rear bulkhead, or back door. "

*Paragraph 2.20, amend to read:*

- "2.20. "Shut-off valve (for hydrogen-fuelled vehicles)" means a valve between the container and the vehicle fuel system that must default to the "closed" position when not connected to a power source."

*Paragraph 2.26, amend to read:*

- "2.26. "Vehicle type" means a category of vehicles, the design characteristics of which do not differ in such essential respects, in so far as they have an adverse effect on the result of the impact test prescribed in this Regulation, as:
- (a) The type of protective system(s);
  - (b) The type of front seat(s);
  - (c) The vehicle width;
  - (d) The wheelbase and overall length of the vehicle;
  - (e) The structure, dimensions, lines and materials of the side walls of the passenger compartment, including any optional arrangements or interior fittings within or about the side walls of the passenger compartment;
  - (f) The type of door latches and hinges;
  - (g) The type of fuel system(s);
  - (h) The unladen vehicle mass and the rated cargo and luggage mass;
  - (i) The sitting of the engine (front, rear or centre);

*Annex 6, paragraph 2.1.*, amend to read:

- "2.1. "Enclosed spaces" means the special volumes within the vehicle (or the vehicle outline across openings) that are external to the hydrogen system (storage system, fuel cell system, internal combustion engine (ICE) and fuel flow management system)."

*Annex 6, paragraph 3.1.4.*, amend to read:

- "3.1.4. The main stop valve and shut-off valves for hydrogen gas, located in the downstream hydrogen gas piping, are in the normal driving condition kept open immediately prior to the impact."

*Annex 6, paragraphs 4.2. and 4.3.*, amend to read:

- "4.2. The initial mass of hydrogen in the storage system can be calculated as follows:

$$P_o' = P_o \times 288 / (273 + T_o)$$

$$\rho_o' = -0.0027 \times (P_o')^2 + 0.75 \times P_o' + 1.07$$

$$M_o = \rho_o' \times V_{CHSS}$$

- 4.3. Correspondingly, the final mass of hydrogen in the storage system,  $M_f$ , at the end of the time interval,  $\Delta t$ , can be calculated as follows:

$$P_f' = P_f \times 288 / (273 + T_f)$$

$$\rho_f' = -0.0027 \times (P_f')^2 + 0.75 \times P_f' + 1.07$$

$$M_f = \rho_f' \times V_{CHSS}$$

where  $P_f$  is the measured final pressure (MPa) at the end of the time interval, and  $T_f$  is the measured final temperature (°C)."