## Supporting presentation for GRVA-07-73

## Requirements

#### 5.1.2.4.1 and 5.1.2.4.2 ("normal" type-IIA)

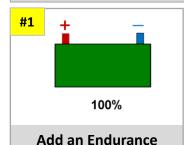
- 12 minutes, 30km/h, 7%
- Without using brakes

#### **Technical** solutions

### (examples)

The minimum energy and power guaranteed by the system design is enough to pass Type-IIA.

#2



<100% Secure X kWh in the batteries X kWh = Type-IIA energy \* (\* minus dissipated energy, i.e. losses)

**Brake** (e.g. a cooled resistor)

Hybrid solution: secure "less than X kWh" in the batteries and use a supplementary retardation means (which is only able to provide a "fraction" of a Type-IIA)

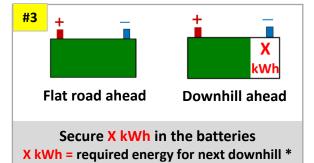
## **Proposed modifications**

• Proposal from Czech Republic: "The condition of the vehicle batteries at the start of the test, shall be such that the braking force contribution provided by the electric regenerative braking system does not exceed the minimum guaranteed by the system design."

# Alternatives for BEVs

5.1.2.4.3 "Account for road topology"

The minimum guaranteed by the design depends on road topology



that can be reached by the vehicle

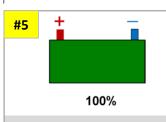
Hybrid solution: use a supplementary retardation means (which is not able to pass Type-IIA alone)

Limit the required "X kWh" to type IIA energy

Submitted by the expert of OICA

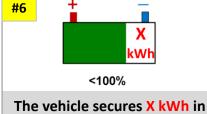
Informal document GRVA-07-75 7th GRVA, 21-25 September 2020 Agenda item 8(c)

5.1.2.4.4 1.8.2.4 (a) Annex 4 - 1.8.2.4 (a) Type-IIA with endurance Type-II with brakes Hot-stop 5 m/s<sup>2</sup> brake ("power" test only) 5.2.1.29.7 - Brake estimator Warn the driver with yellow signal if performance is below:  $3.3 \text{ m/s}^2 (N3),$  $3.75 \text{m/s}^2 (M3)$ 



The vehicle does not secure energy in the batteries.

**Brakes alone passes** "type II with hot stop 5 m/s<sup>2</sup>"



(use "red" signal if performance is below secondary brake perfo)

> the batteries (x kWh not enough to pass type-IIA)

Brakes passes "type II with hot stop 5 m/s<sup>2</sup>" with the help of regenerative braking (and/or of a supplementary retardation means when available)

- Increase slope from 6% to 7%
- Add text from Czech Republic

• Inform driver prior to the time when the braking force of the electric regenerative braking can no longer be provided (e.g. when the battery is fully loaded)