

Submitted by the expert
from CLEPA



Informal document **GRVA-13-47**
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Provisional agenda item 8(b)

UN R13 and Electro Mechanical Brakes

Introduction and recap

UN Regulation 13 defines:

- **Transmission** means the combination of components comprised between the control and the brake and linking them functionally. *The transmission may be mechanical, hydraulic, pneumatic, electric or mixed.*
- **Control Transmission** - means the combination of the components of the transmission which control the operation of the brakes, including the control function and the necessary reserve(s) of energy.
- **Energy Transmission** - means the combination of the components which supply to the brakes the necessary energy for their function, including the reserve(s) of energy necessary for the operation of the brakes.

→ *The transmission may be mechanical, hydraulic, pneumatic, electric or mixed.*

UN R13 was updated in 1990s to account for an electronic “Control Transmission” but still assumes Pneumatic “Energy Transmission” in the service braking system.

- **Pneumatic Energy limitation is shown in two ways:**

Design Specifications – E.g. Where limits are in kPa.

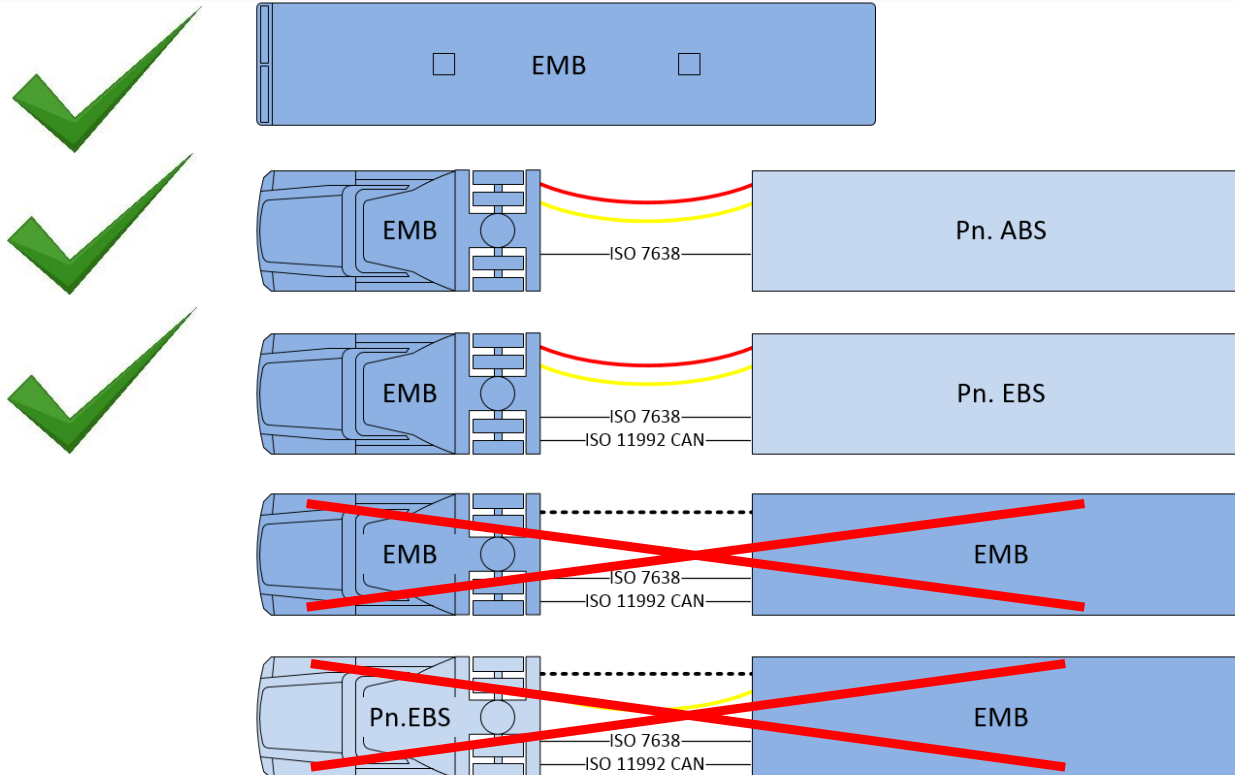
Design Limitations – E.g. Where it is assumed air is the medium.

- **Electro Mechanical Brake Technology** is being developed by the industry using *Electric Energy Transmission* in the service braking system and the UN R13 needs to be updated accordingly.

UN R13 and Electro Mechanical Brakes (EMB)

Amendment scope and motivation

- Motor vehicle with EMB brakes on all axles (not mixed with Pneumatic Or Hydraulic systems)
- Motor vehicle with EMB brakes with “conventional” trailer interface according to UN R13
- Trailers with EMB excluded from scope
- UN R13-H not included but considered, in particular when creating new definitions

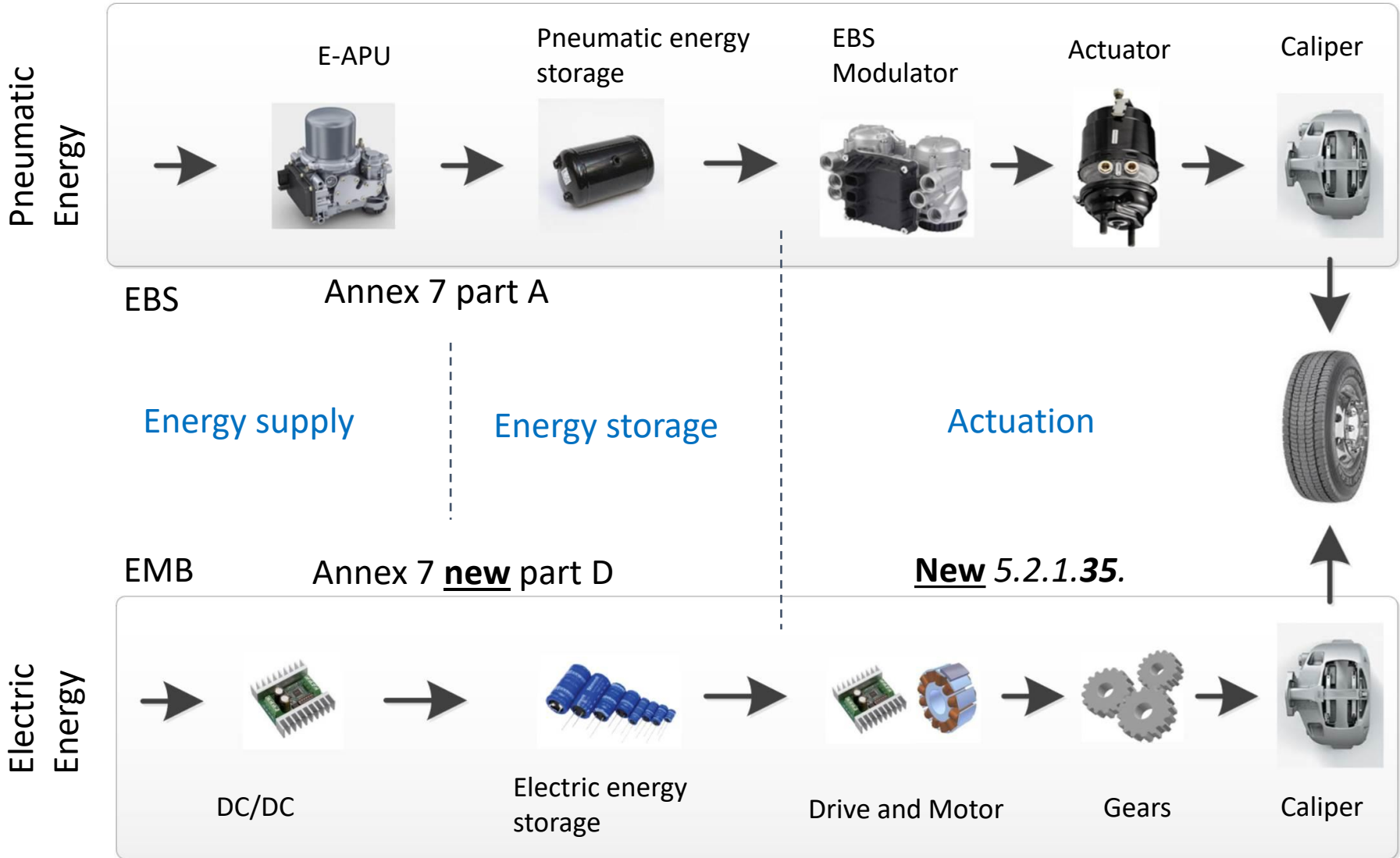


Advantages and possibilities by amending *Electric Energy Transmission* to UN R13

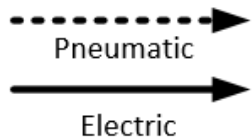
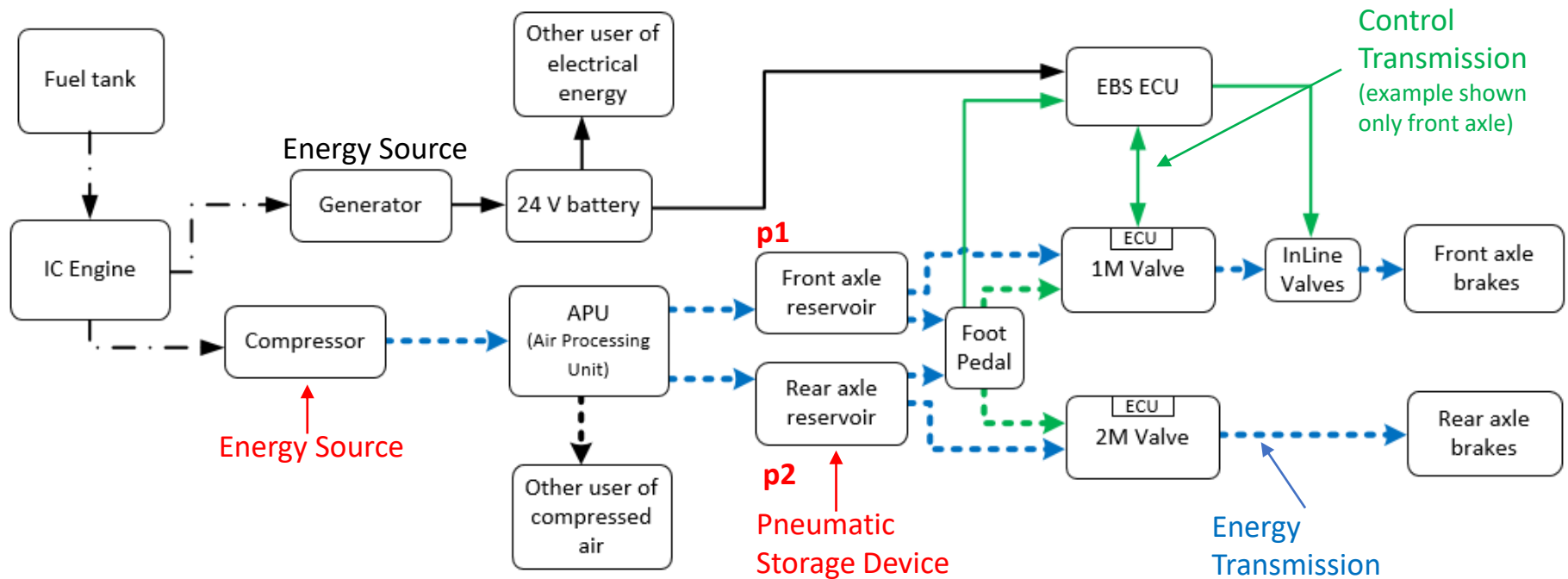
- Improved energy efficiency in EV's (vs. air compressor)
- Improved braking control
- Elimination of noise emissions from pneumatics

UN R13 and Electro Mechanical Brakes (EMB)

Energy Transmission principles (Pneumatic vs. Electric)

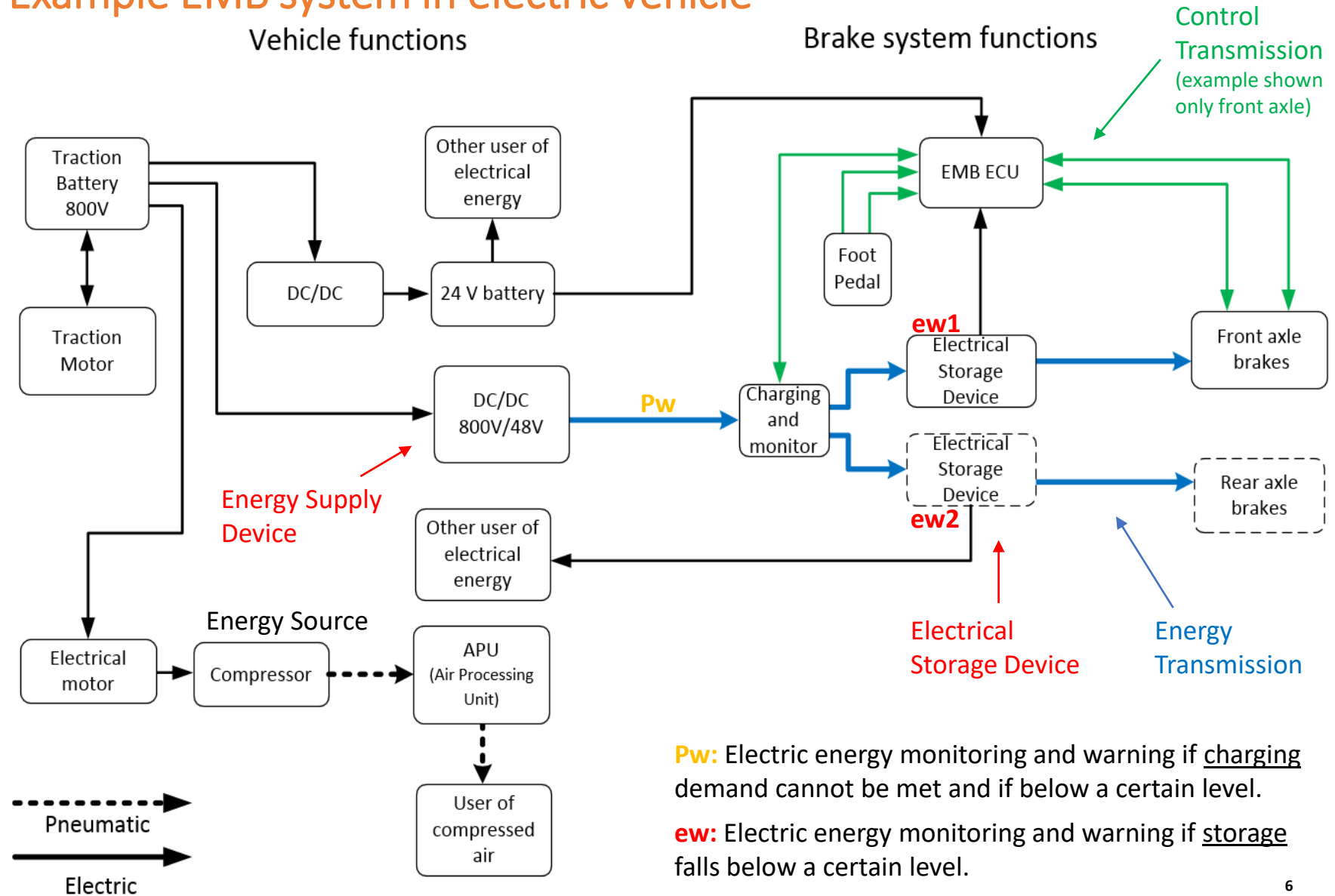


Example EBS system of today in vehicle with combustion engine



p1 and p2: Pneumatic energy monitoring and warning if storage falls below a certain level.

Example EMB system in electric vehicle



Electrical Energy Storage device

Addressing the effect of ageing

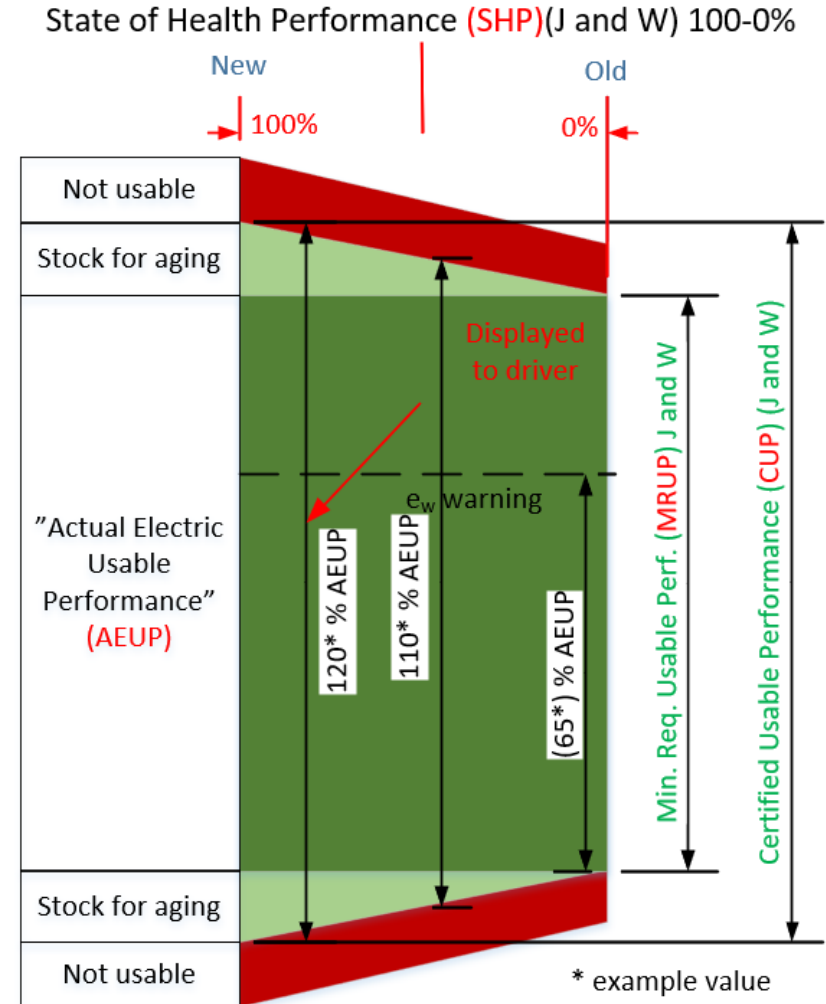
New definitions:

“**Certified Usable Performance (CUP)**” means the performance of an electrical energy storage device available for the [service] braking system determined **at the time of type approval. (J and W)**

“**Minimum Required Usable Performance (MRUP)**” means the minimum performance of an electrical energy storage device [available] for the brake system **to fulfil the requirements of this Regulation. (J and W)**

“**Actual Electric Usable Performance (AEUP)**” is the instantaneous percentage value of Maximum Required Usable Performance at the time.

“**State of Health Performance (SHP)**” is the performance of an electrical energy storage device expressed as a percentage of the CUP value.



Status and open topics still to be discussed

New proposed amendments to Annex 7 (Part D)

- Requirements the ageing effect of electrical energy storage device (e.g. batteries) is taken into account.

Newly added definitions

- Ref. former slide some definitions still in discussion.

New paragraphs still being updated

- 5.2.1.13.x – Energy Storage device(s) and handling of its performance
- 5.2.1.35.x – Special additional requirements for service braking systems with electro-mechanical braking system with electric transmission.

New proposed amendments to Annex 2

- 17 - Additional information in the case of power-driven vehicle equipped with an electro-mechanical braking system ('EMB')

Status and open topics still to be discussed

Weekly meetings since February with both Industry Group representatives and Contracting parties.

Next steps:

- Finalize the still open topics during June
- Prepare for a formal document to be presented in September GRVA.