Submitted by the expert from the
European Association of Automotive Suppliers (CLEPA)

Informal document GRVA-15-49
15th GRVA, 23-27 January 2023
Agenda item 8(b)

Status report Electro Mechanical Brakes (UN Regulation No. 13)

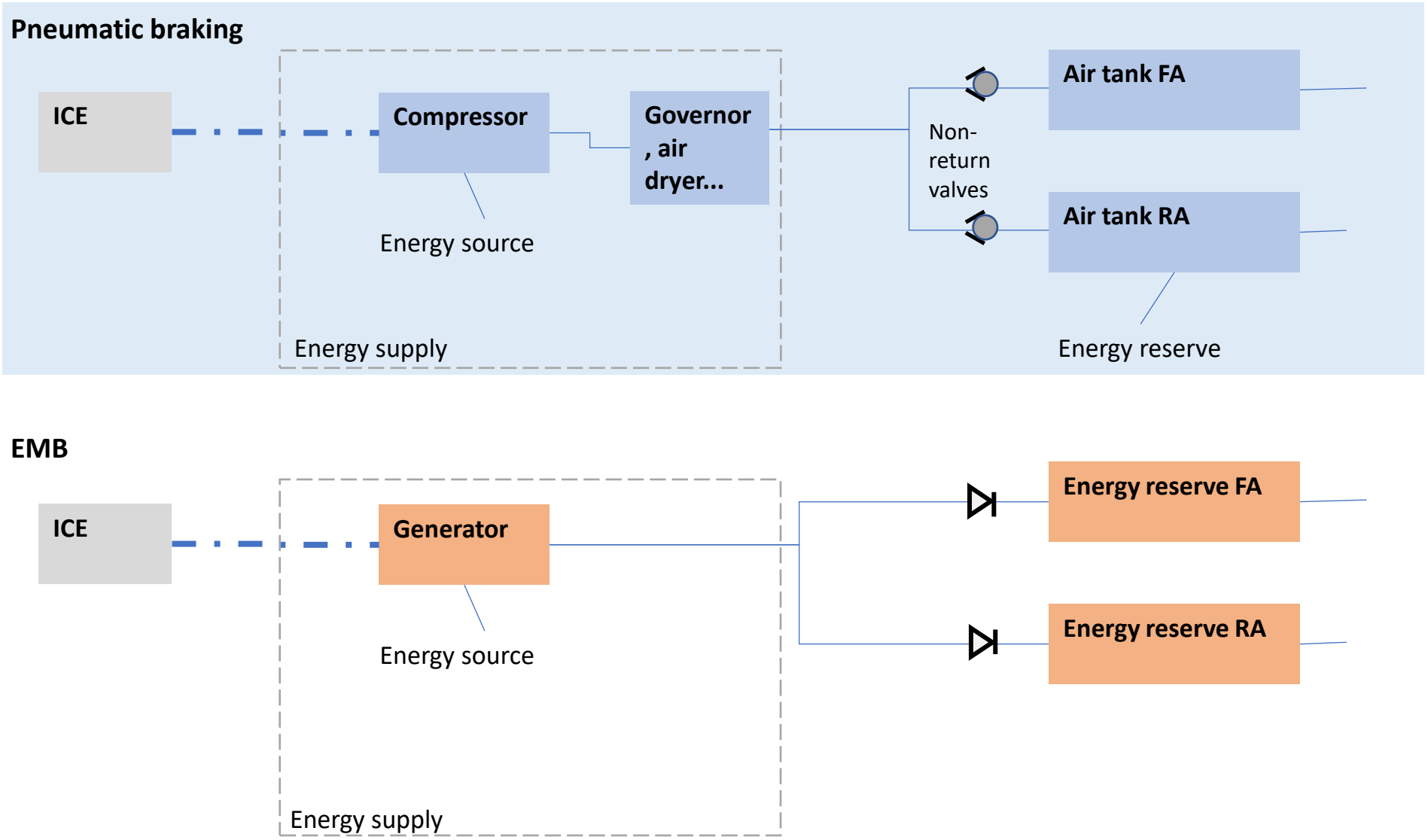
Purpose and scope

- Electric transmission:
    - Current regulation only addresses electric control transmission
    - The **purpose** of the EMB amendment is to address electric energy transmission in the regulation
- In a first step, the **scope** is limited to EMB on the motor vehicle; the trailer remains as today

Main challenges

- Same safety level as with current technologies
- Account for new technology, while avoiding design restrictions
- Keep the requirements performance-oriented
- Avoid unwanted side-effects on existing regulation
- Keep R13 and R13H definitions and principles aligned
- Some technical/regulatory challenges:
    - Effect of ageing and temperature on the performance of the electrical energy reserves
    - Ensure a minimum performance level at the time warnings are displayed to the driver

Layouts (examples)



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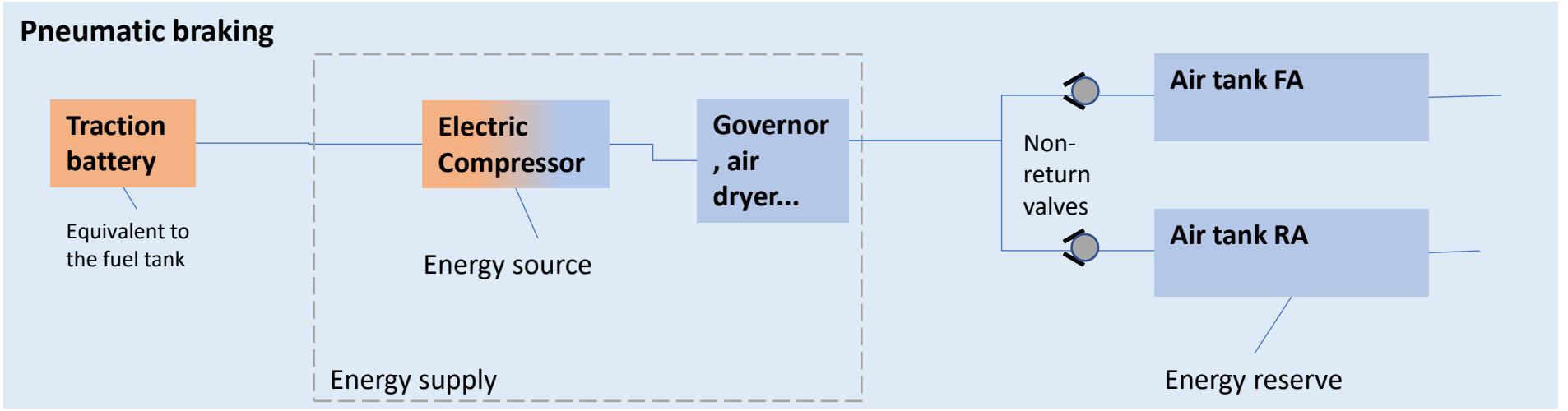
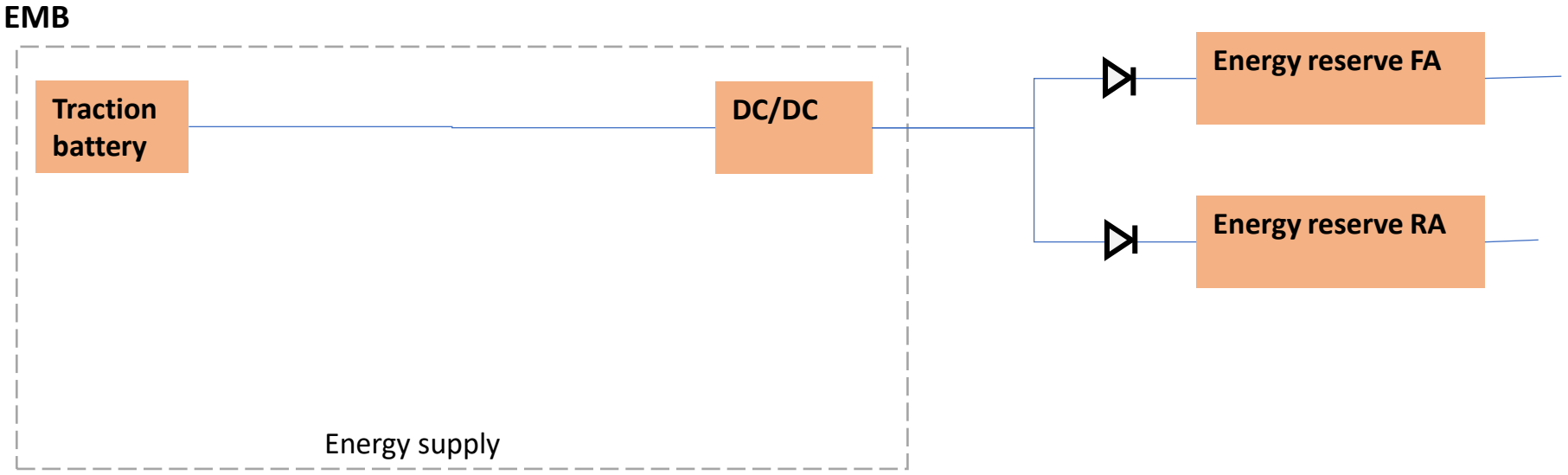




Electrical Energy Storage device

Addressing the effect of ageing

New definitions:

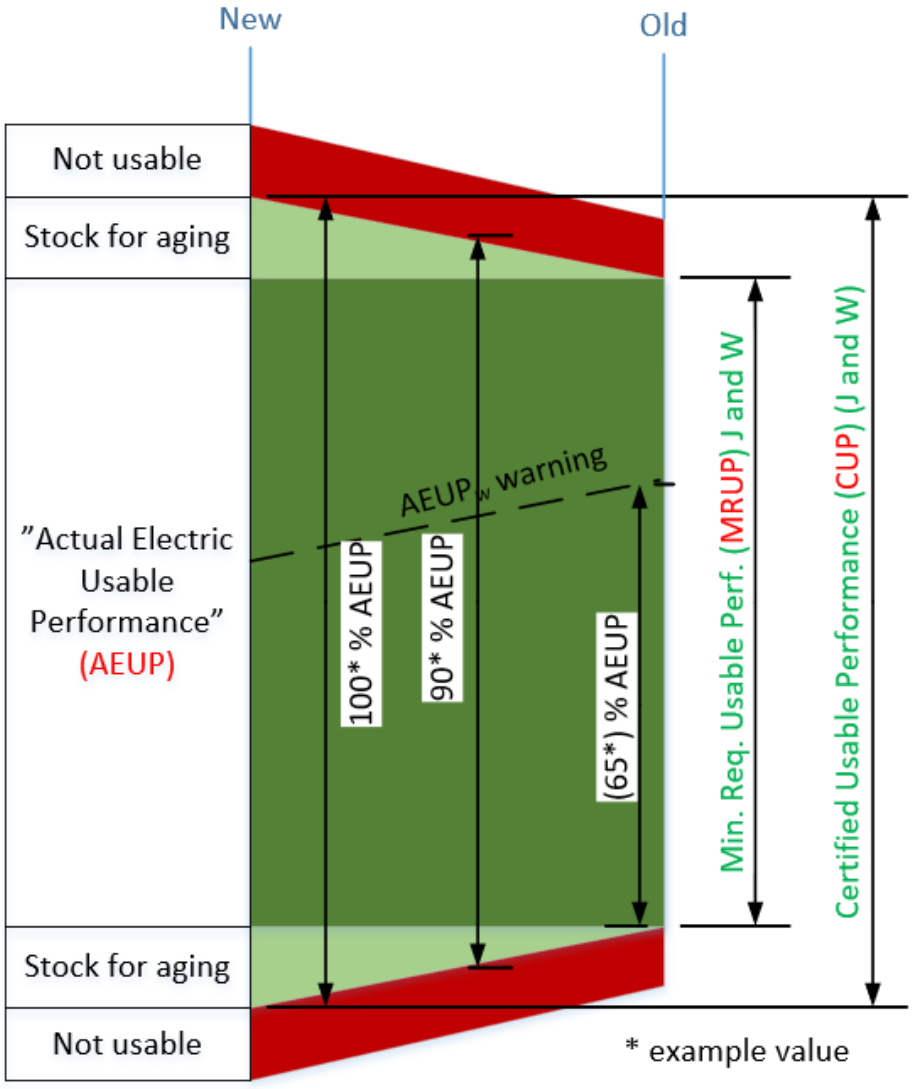
"*Certified Usable Performance (CUP)*" means the maximum usable performance of an electrical energy storage device available for an electro-mechanical braking system determined at the time of type approval.

"*Minimum Required Usable Performance (MRUP)*" means the minimum usable performance of an electrical energy storage device available for an electro-mechanical braking system to fulfil the relevant requirements of this Regulation.

"*Actual Electric Usable Performance (AEUP)*" is the level of energy stored in an electrical energy storage device, as well as its available power, at a given time. It is defined as a percentage of the CUP value.

New proposal

The ***"usable performance***" means the portion of the performance of an electrical energy storage device that is actually available to the supplied system (e.g. the system may not use the maximum theoretical performance).



Status of the work / Next steps

- Finalize the still open topics during winter and spring:
  - Review of the different concepts, e.g.
    - to create new definitions of energy source, energy supply and energy reserves
    - How to deal with the effect of ageing and temperature on the performance
    - Warning to driver
  - Freeze the concepts
  - Review and simplify the draft text accordingly

- Prepare for an informal document to be presented at 16th GRVA in May.

- Present a formal document to 17th GRVA in September.

Organization

- Weekly meetings since February 2022 with Industry Group representatives.

- **Open meetings every two weeks** (on Thursdays 16.00-17.30 CET)

  → Interested stakeholders are welcome to participate

  → Contact CLEPA to join

Backup slides

UN R13 and Electro Mechanical Brakes (EMB)

Introduction and recap

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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.

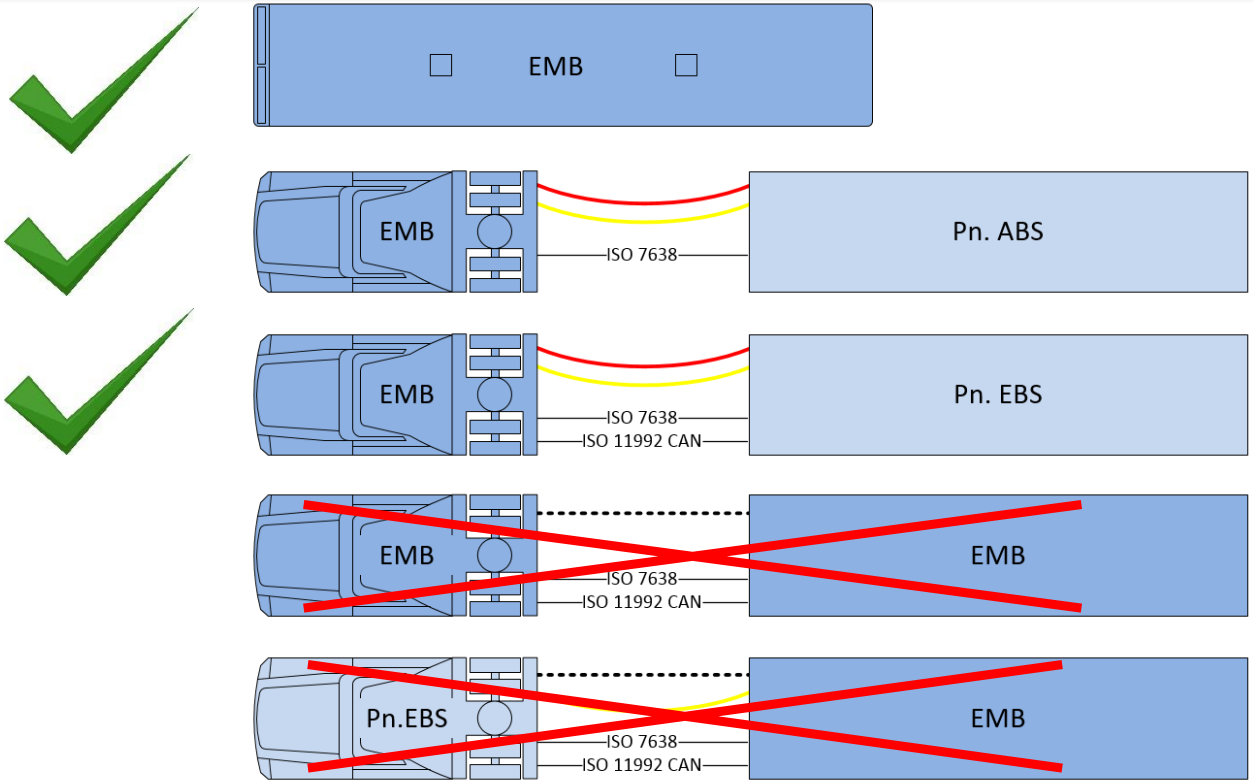
  Design Limitations – E.g. Where it is assumed air is the medium.

- **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 current 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)

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Pneumatic Energy

E-APU

Pneumatic energy storage

EBS Modulator

Actuator

Caliper

EBS

Annex 7 part A

Energy supply

Energy storage

Actuation

EMB

Annex 7 **new** part D

New *5.2.1.**35**.*

Electric Energy

DC/DC

Electric energy storage

Drive and Motor

Gears

Caliper