

UN R13 and Electro Mechanical Brakes

ECE-R13 and Electro Mechanical Brakes (EMB)

Overview of changes made to Informal Document GRVA-09-05

With respect to **GRVA-09-05**, changes were made in the following paragraphs:

- 2.31.
- 2.51.
- Correction in Justification of paragraph 5.1.4.5.1.
- PTI paragraph 5.1.4.5.3. (with new Justification)
- 5.1.4.6.2.1.
- 5.1.4.6.2.1 & 5.1.4.6.2.2 & 5.1.4.6.2.3 (word “wheel” deleted)
- Proposal for deletion of paragraph 1.2.11. of Annex 4 withdrawn
- Note, that paragraph 2.4.1 of Annex 7, Part D is still under discussion

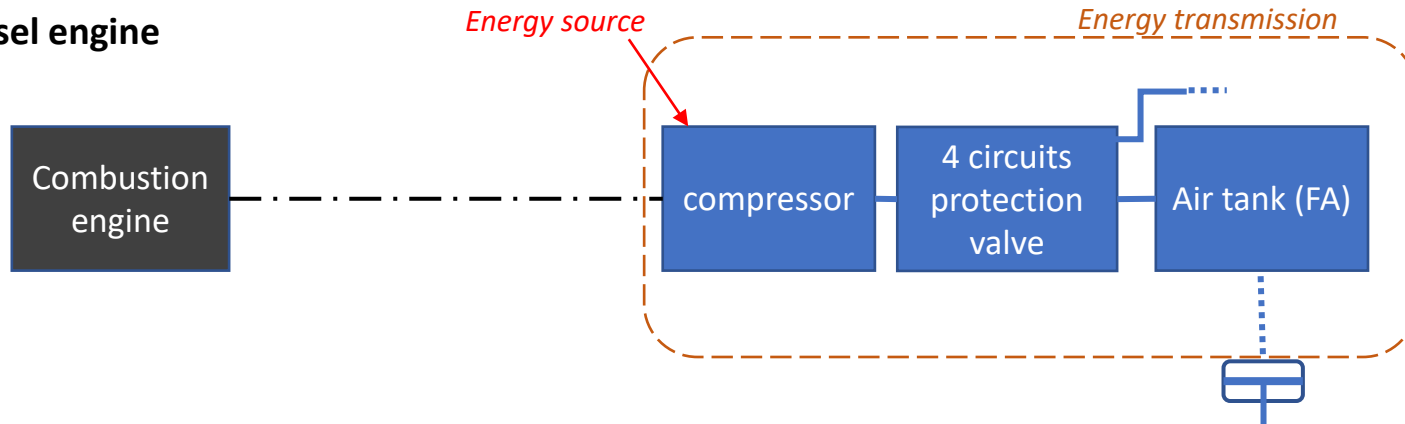
Explanation to Paragraph 2.51

EBS

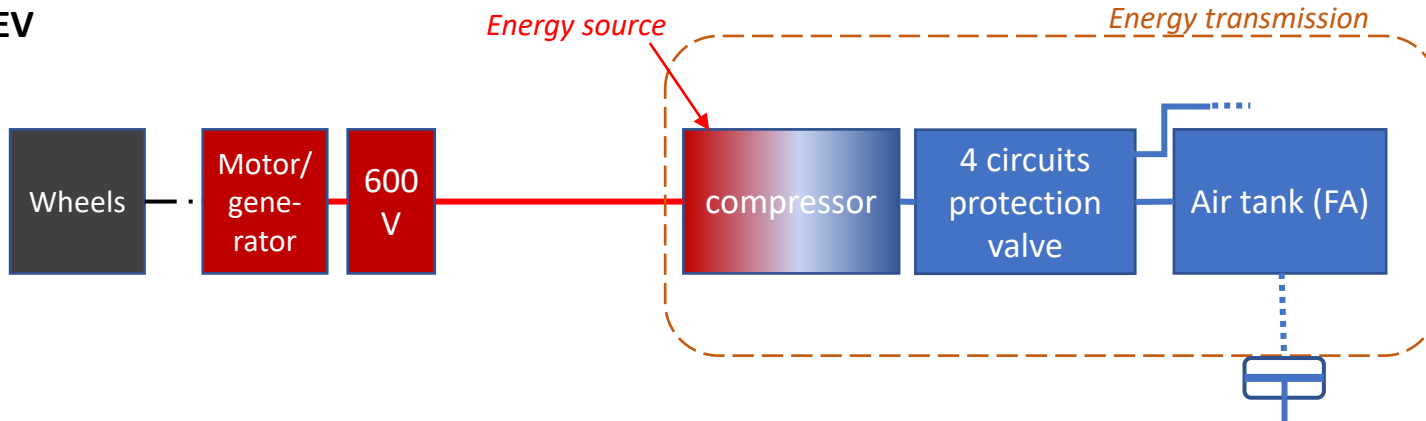
Vehicles with pneumatic braking do have an 'energy source'

(Layout Examples)

Diesel engine



BEV



2.49. "Energy source" means a device that both generates and provides energy required for the braking system.

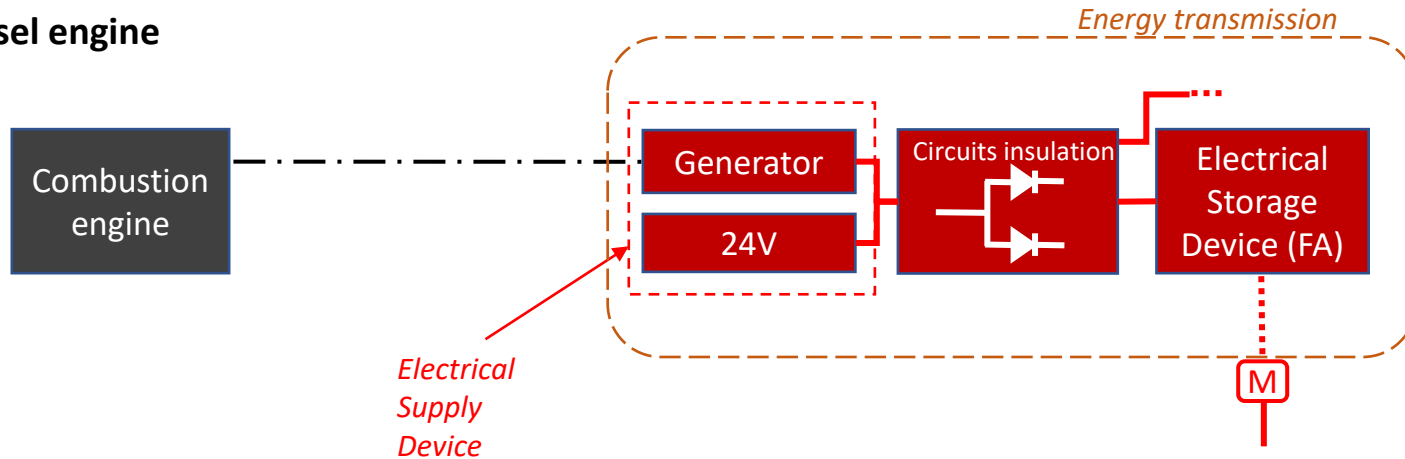
Explanation to Paragraph 2.51

EMB

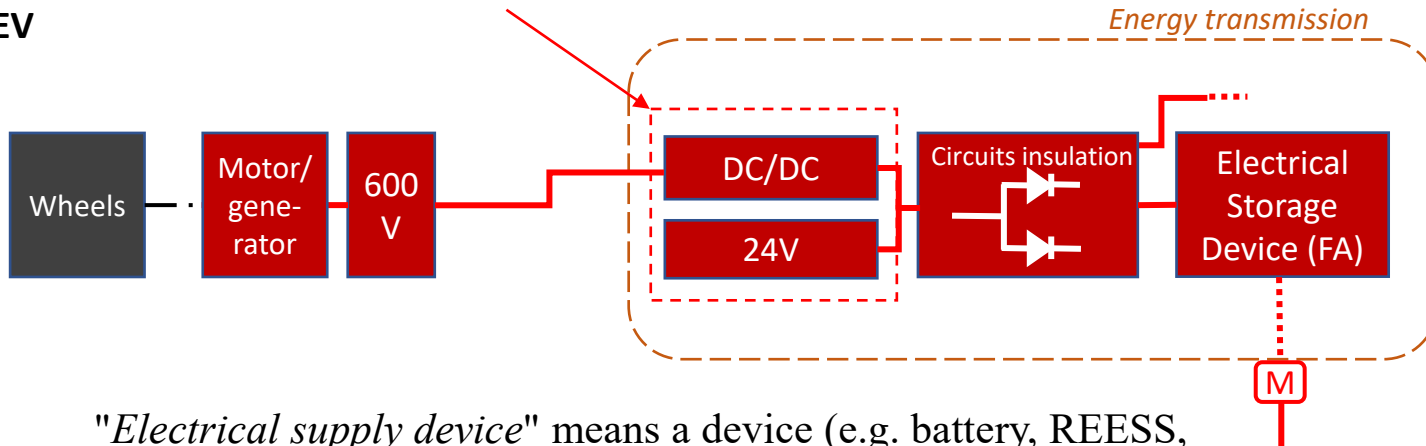
*Vehicles with an EMB can have an 'energy source',
But it is called an 'electrical supply device'*

(Layout Examples)

Diesel engine



BEV



2.51. "Electrical supply device" means a device (e.g. battery, REESS, DC/DC converter, generator, fuel-cell or a combination of those components) that supplies electrical energy to the braking system's electrical energy storage device(s).

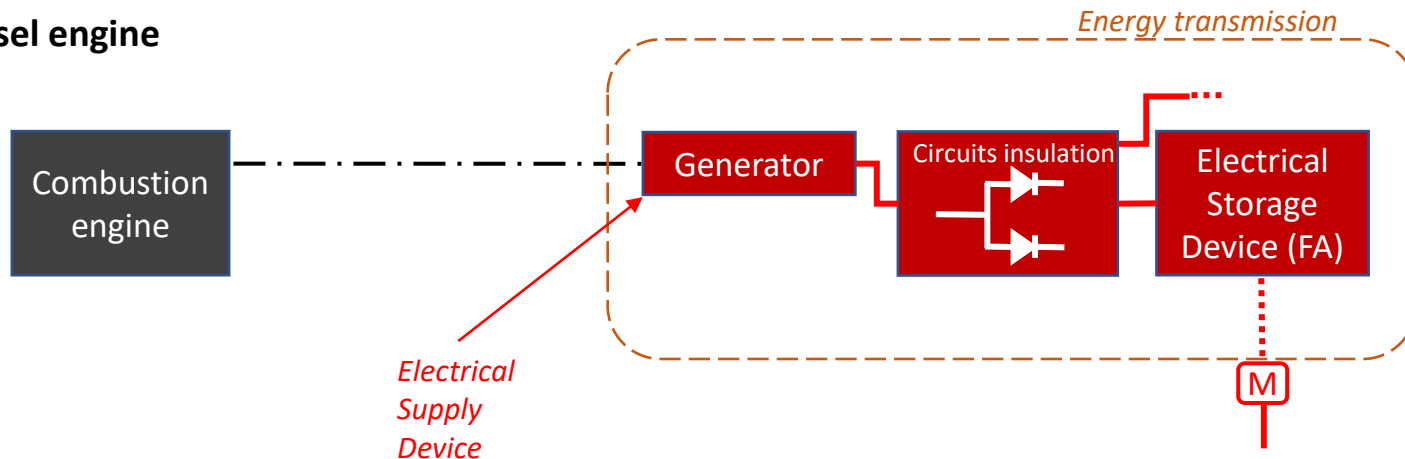
Explanation to Paragraph 2.51

EMB

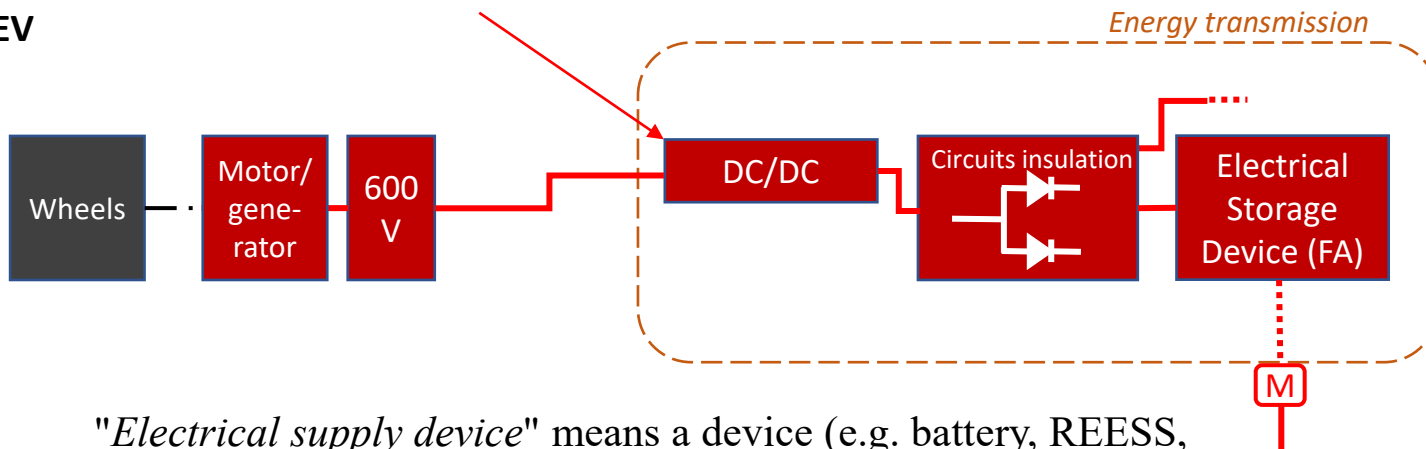
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(Layout Examples)

Diesel engine



BEV



2.51. "Electrical supply device" means a device (e.g. battery, REESS, DC/DC converter, generator, fuel-cell or a combination of those components) that supplies electrical energy to the braking system's electrical energy storage device(s).

PTI update

R13 (current)	R13 (EMB) (changes to GRVA/2020/21 are shown in purple)	Justifications
5.1.4. Provisions for the periodic technical inspection of braking systems 5.1.4.1. It shall be possible to assess the wear condition of the components of the service brake that are subject to wear e.g. friction linings and drums/discs (in the case of drums or discs, wear assessment may not necessarily be carried out at the time of periodic technical inspection). The method by which this may be realized is defined in paragraphs 5.2.1.11.2 and 5.2.2.8.2. of this Regulation.	<i>No need for change</i>	
5.1.4.2. For the purpose of determining the in-use braking forces of each axle of the vehicle, with a compressed-air braking system, air pressure test connections are required: [...] 5.1.4.3. The accessibility of required pressure test connections shall not be obstructed by modifications and assembly of accessories or the vehicle body.	<i>No need for change</i>	These requirements are not applicable to EMB, for the same reasons why they are not applicable to hydraulic braking systems. It is indeed not possible to practically measure, as on a (low pressure) pneumatic circuit, the electrical demand of an EMB or the high pressure of an hydraulic brake.
5.1.4.4. It shall be possible to generate maximum braking forces under static conditions on a rolling road or roller brake tester.	<i>No need for change</i>	
5.1.4.5. Data for braking systems: 5.1.4.5.1. The data of the compressed-air braking system for the functional and efficiency test shall be specified at the vehicle in a visible position in indelible form, or made freely available in another way (e.g. handbook, electronic data record).	5.1.4.5. Data for braking systems: 5.1.4.5.1. The data of the compressed-air or electro-mechanical braking system for the functional and efficiency test shall be specified at the vehicle in a visible position in indelible form, or made freely available in another way (e.g. handbook, electronic data record).	

PTI update

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<p>5.1.4.5.2. For vehicles equipped with compressed-air braking systems at least the following data are required:</p> <p>Pneumatic characteristic data:</p> <table border="1" data-bbox="144 425 666 545"> <tr> <td>Compressor/unloader valve¹</td> <td>Min. cut-out pressure =kPa</td> <td>Min. cut-in pressure =kPa</td> </tr> <tr> <td>Four-circuit protection valve</td> <td colspan="2">Static closing pressure =kPa</td> </tr> <tr> <td>Trailer control valve or relay² emergency valve, as appropriate</td> <td colspan="2">Corresponding delivery pressure for a control pressure of 150 kPa =kPa</td> </tr> <tr> <td>Minimum design pressure in the service braking system for calculation^{1,3}</td> <td colspan="2"></td> </tr> </table> <table border="1" data-bbox="144 559 666 664"> <tr> <td></td> <td colspan="3">Axle(s)</td> </tr> <tr> <td>Brake cylinder type⁴ Service / Parking</td> <td>/</td> <td>/</td> <td>/</td> </tr> <tr> <td>Maximum stroke⁴ s_{max} = mm</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Lever length⁴ = mm</td> <td></td> <td></td> <td></td> </tr> </table> <p>Notes:</p> <ol style="list-style-type: none"> ¹ Not applicable for trailers. ² Not applicable for vehicles with electronic control of braking systems. ³ When different from minimum cut-in pressure. ⁴ Only applicable for trailers. 	Compressor/unloader valve ¹	Min. cut-out pressure =kPa	Min. cut-in pressure =kPa	Four-circuit protection valve	Static closing pressure =kPa		Trailer control valve or relay ² emergency valve, as appropriate	Corresponding delivery pressure for a control pressure of 150 kPa =kPa		Minimum design pressure in the service braking system for calculation ^{1,3}				Axle(s)			Brake cylinder type ⁴ Service / Parking	/	/	/	Maximum stroke ⁴ s _{max} = mm				Lever length ⁴ = mm				<p>5.1.4.5.2: <i>no need for change</i></p> <p><i>Replace 5.1.4.5.3 of GRVA/2020/21 by:</i></p> <p>5.1.4.5.3. For power-driven vehicles equipped with electro-mechanical braking systems the vehicle manufacturer shall describe, at the time of type approval, the procedure by which it can be checked that the warning signals e_w and P_w (respectively defined in 2.47. and 2.48.) are operational and fulfil the requirements of this regulation. The procedure may be initiated e.g. by triggering an internal self-check routine that may include external actions by the operator.</p>	<p>14 In the case of conventional vehicles, the proper functioning of the compressed-air braking systems can be practically checked. E.g, the pressure in the air reservoirs can be reduced (by e.g. venting or successive brake applications with the engine stopped) and increased. By external tools the respective pressures can be measured and the reaction of the braking system (e.g. display of warning signals) can be observed.</p> <p>However, in the case of EMB vehicles, without having a direct access to the electrical energy storage device and electrical supply device and having no means to manipulate the energy level of these devices during a periodical technical inspection (PTI), a procedure similar to conventional vehicles with pneumatic braking systems is not possible.</p> <p>15 Therefore, for checking the braking system during PTI, a procedure is proposed by which it can be checked that the warning signals e_w and P_w are operational and fulfil the requirements of this regulation.</p> <p>This means checking that</p> <ol style="list-style-type: none"> a) the warning signals e_w and P_w are not defect and will illuminate when required (i.e. are operational) b) the warning signals illuminate correctly as required by paragraphs 5.2.1.35.7 and 5.2.1.35.8 respectively (i.e. fulfil the requirements of this regulation). <p>16 This may be done by a visual check of the warning signals on the dashboard, after a specific checking procedure (e.g. a specific static test routine) was initiated during PTI (for example by service brake application(s) by the operator.</p>
Compressor/unloader valve ¹	Min. cut-out pressure =kPa	Min. cut-in pressure =kPa																												
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5/23/2021	Presentation Title																													

PTI update

R13 (current)	R13 (EMB) (changes to GRVA/2020/21 are shown in purple)	Justifications
	<p>5.1.4.6.2. Reference braking forces for electro-mechanical braking system using a roller brake tester shall be defined according to the following requirements.</p> <p>5.1.4.6.2.1. It shall be possible on the vehicle to evaluate the relationship between the wheel brake demand value(s) (e.g. as a percent value, voltage, etc.) and the required minimum measured braking force on a roller brake tester. The vehicle manufacturer shall describe the method by which this can be realized, and make this information available freely by e.g. handbook, electronic data record etc. The method by which this can be realized shall be declared by the vehicle manufacturer.</p>	<p>18. For an electro-mechanical braking system, the relationship between the brake actuator pressure and the braking force does not exist. Instead of the 'brake actuator pressure' the parameter 'wheel brake demand value' is used in determining the reference braking forces during a roller brake tester.</p> <p>19. The manufacturer shall declare the relationship between the braking forces and the wheel brake demand value e.g. as a percent value or a voltage value.</p> <p>20. During the periodical inspection, it shall be possible for the tester to monitor the wheel brake demand value on the vehicle itself. This may be done e.g. by showing this value by a display on the dashboard in the cab.</p> <p>21. Apart from the different parameter 'wheel brake demand value' instead of 'brake actuator pressure' and the deletion of the category O vehicles, the requirements of the new inserted paragraph 5.1.4.6.2. relating to electro-mechanical braking systems are the same as for compressed-air braking systems.</p>