Transmitted by the experts from
CLCCR, CLEPA and OICA

Informal documents **GRVA-23-41**
23rd GRVA, 22-25 September 2025
Agenda item 8(c)

UN Regulation No. 13 amendment for trailers with dynamo function

Introducing Informal document GRVA-23-11

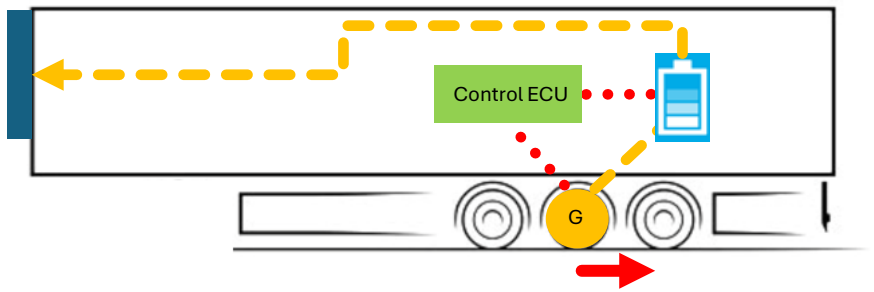
State of work

→ new structure of task force activities

Background and scope

Trailer with dynamo function

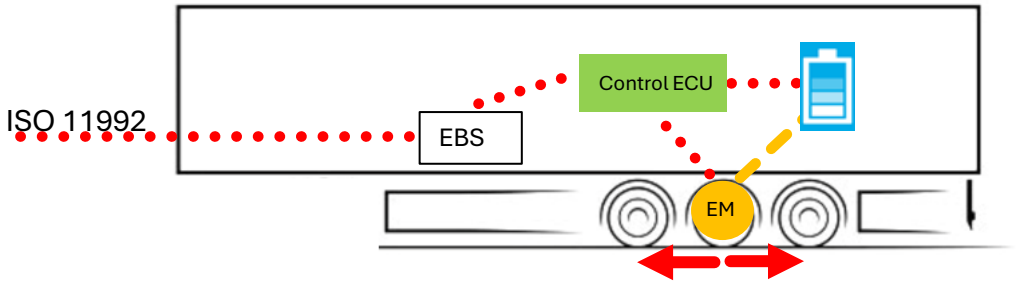
The trailer recuperates energy for trailer users, e.g. a cooling unit (usually energy consumption < 20 kW)



Data communication
Power flow
force

E-axle trailer

Trailer recuperates energy and/or provides propulsion.
Trailer users (cooling unit) may be installed as well.



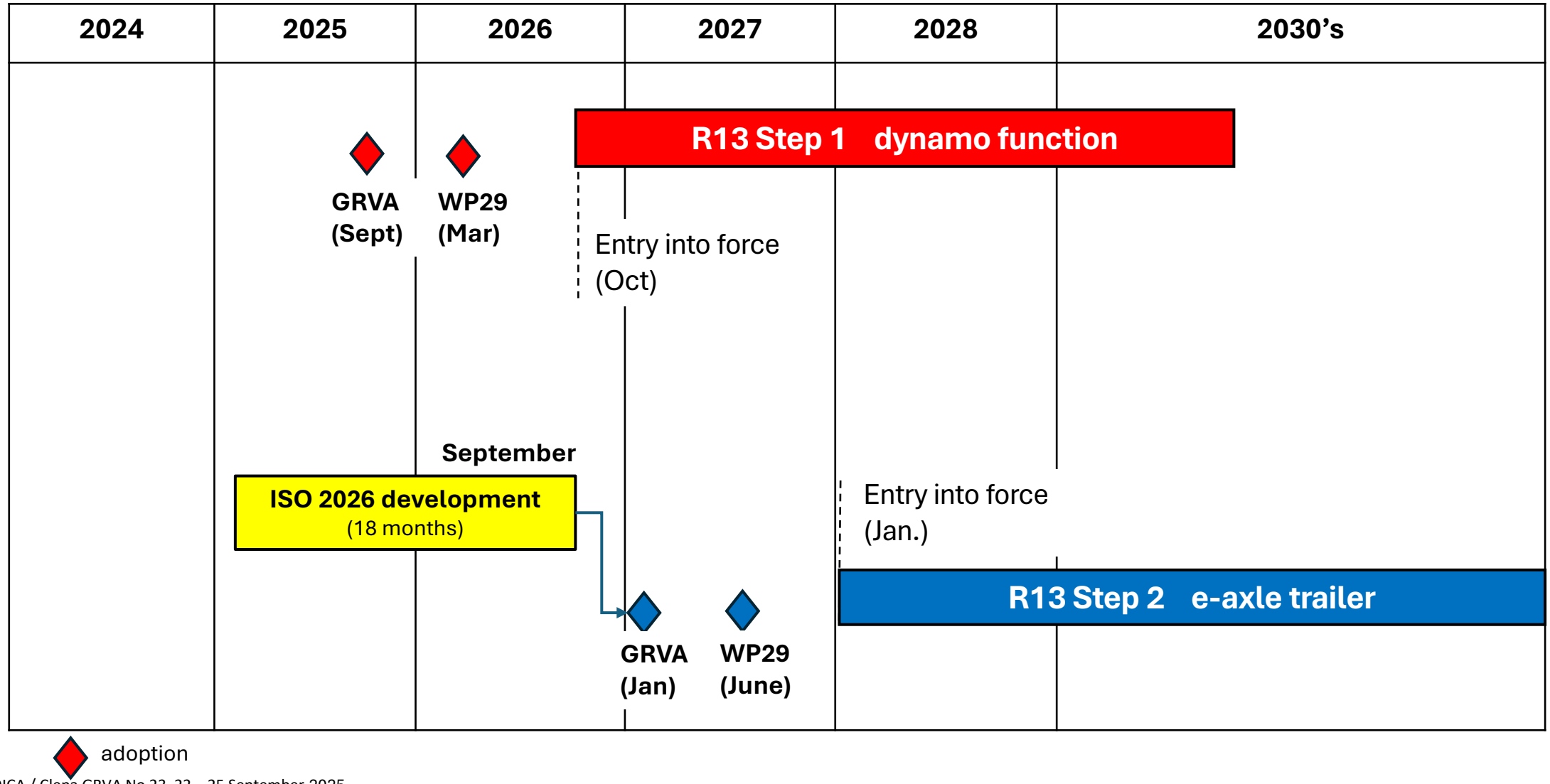
Updated strategy for amendment of UN Reg 13

During a workshop May 20th /21st industry and contracting parties agreed to follow an updated approach:

- **Step 1 “dynamo function”**
  - Limit amendment to Reg 13 to necessary requirements for trailers with dynamo function, only and propose an appropriate informal document for GRVA 22-26 in June 2025
  - Skip technical approach for e-trailer with data communication acc. to ISO 11992-2:2014

- **Step 2 “e-axle trailer”**
  - Require data communication acc. to **ISO 11992-2:2026** for both tractor and trailer, which will enable necessary control of energy recuperation and propulsion of trailer
  - Develop necessary amendments to Reg 13 to ensure safe operation of e-axle trailer

Target Time-plan : regulation step 1 ready 2026



Proposal GRVA-23-11 „dynamo function“

Informal document GRVA-23-11 dynamo function

Superseding GRVA-22-26 (by Clepa) respectively GRVA-2025-15 and GRVA-21-12

Scope and definitions, add new paragraphs

1.2.6. **E-axle trailers with e-axles providing electric propulsion and/or incorporating an electric regenerative braking system.**

Comment: 1.2.6. excludes e-axle trailers with ERB/propulsion until step 2 will be ready

2.57. **“e-axle” means an axle mounted to a vehicle of category O generating electrical energy and/or providing electrical propulsion.**

2.58. **"e-axle trailer" means a trailer of category O that is equipped with at least one e-axle.**

2.59. **“Dynamo function” of an e-axle trailer means the capability of a trailer to provide for the conversion of vehicle kinetic energy into electrical energy without affecting the forces developed by the braking system. A dynamo function is not part of the braking system and not considered as a brake.**

Comment: definitions will fit to all category O trailers and e-axle trailer (propulsion/electric regenerative braking system) as well.

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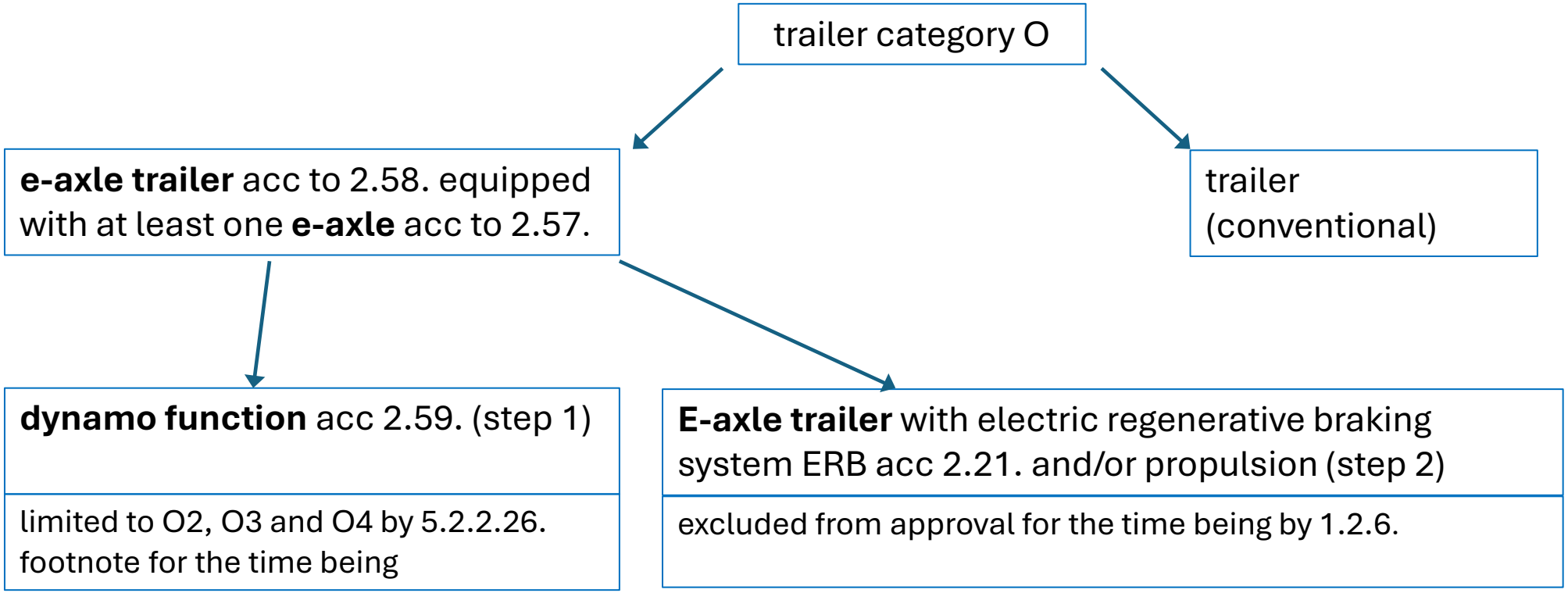
Additional explanation:



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Add new paragraphs

5.2.2.26. **Special additional requirements for dynamo function of e-axle trailers category O** **footnote [21]**

Footnote [21] shall read: **"Until uniform technical provisions have been agreed, trailers of Category O1 shall not be equipped with a dynamo function."**

Comment: footnote limits approval of dynamo function to cat O2, O3 and O4 until step 2 is ready

5.2.2.26.1. **The dynamo function shall not provide a retardation power of more than:**

(a) 22 kW for the complete trailer of Category O3 and/or O4;

(b) 2 kW for the complete trailer of Category O2.

The maximum power shall be checked at the time of type approval using one of the following methods:

Comment: please note, that proposed limits are for retardation power, where the limit of 20 kW discussed for long time is given by the requested electric power of cooling devices in O3 and O4.

The proposed value of 2 kW for O2 trailers is based on the needed energy to supply equipment of caravan trailers or small cooling units for transport of pharmaceuticals.

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(a) Calculating the maximum power of the dynamo from the measurement of the vehicle combination retardation with dynamo function active vs dynamo drivetrain disengaged;

(b) Measuring the power at the transmission shaft or wheel hub;

(c) Measuring the power at the wheel on a roller test bench, or;

(d) Measuring the maximum electric power and demonstrating that the value is below 80 per cent of the retardation power limit.

Additionally, it shall be stated in the owner's manual that, in case of a multiple trailer combination of Category O3 and/or O4, the 22 kW limit applies to the sum of the retardation power of all dynamo function devices of the combination.

Comment: to give the necessary flexibility to manufacturers some different testing methods are proposed. The hint about multiple trailer combinations should give an info to fleet operators about the sum of power of more than one dynamo systems.

5.2.2.26.2. **In case the dynamo function has the capability to generate a braking rate (braking rate = brake force / vertical force) exceeding 0.04 per wheel, it shall be controlled such that it does not cause wheel locking.**

Comment: locking of wheels caused by the dynamo function shall be prevented to ensure stability of trailer: limit brake rate to 0.04 or alternatively a control function to avoid locking is needed

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Add new paragraph

5.2.2.26.3. **The operation of the dynamo function shall be assessed according to Annex 18.**

Comment: functional safety assessment together with the braking functions

5.2.2.26.4. **In case of trailers of Categories O3 or O4, it shall be demonstrated that the vehicle still complies with the requirements of Annexes 13 and 21 when the dynamo function is enabled.**

Comment: both anti-lock and stability control are mandated to O3 and O4 trailers, only. These system shall work with and without the dynamo function.

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Add new paragraph

5.2.2.26.5. **In case of a dynamo function according to paragraph 5.2.2.26.2., a comparison shall be conducted with and without the e-axle trailer dynamo function active, to demonstrate the wheels are prevented from locking and there is no critical impact on the vehicle behaviour. During the tests it shall be possible to lock the wheel(s) by the retardation forces induced by the dynamo function. The comparison shall be conducted:**

(a) With the maximum force of the dynamo function;

(b) In unladen condition, and;

(c) On a straight road with a low friction surface.

If the friction value of the surface is too high and/or braking rate is too low to lock the wheel(s), technical service and vehicle manufacturer shall agree on a way to increase the retardation power or reduce the vertical axle load of the e-axle.

Comment: this is an instruction how to execute the requested comparison with/without dynamo function. To demonstrate, that locking of wheel(s) is avoided by an appropriate control, it must be possible to lock the wheel(s) during the comparison. The given test conditions describe the case when locking of wheel(s) is most probable. However, if wheel locking can not be reached under the given real conditions, technical service and manufacturer shall agree on a way how to do the demonstration.

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Add new paragraph in Annex 2:

14.18. The trailer is equipped with an e-axle having a dynamo function: yes/no

Amend in Annex 4:

1.4.1.2.2. Every test shall be repeated on the unladen vehicle. …
mass declared by the manufacturer in Annex 2 to this Regulation;

In the case of an e-axle trailer the e-axle functions shall not be used during the brake applications.

In the case of a vehicle equipped … the state of charge of the batteries.

add new paragraph in Annex 4, 1.7.1.3.:

1.7.1.3. The dynamo function, if any, shall not be used during the brake applications.

Comment: During testing of the performance of the braking functions acc to Annex 4, the braking system shall not be supported by retardation forces of the e-axle trailer.

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Amend in Annex 5:

2.2.1.2. In the case of an electrical failure of the anti-lock system, integrated or combined endurance braking systems **and/or an e-axle function** shall be switched off automatically. **An e-axle with a dynamo function is excluded from that requirement, if the prevention from locking the wheel(s) is not based on the anti-lock braking system.**

2.2.1.3. The effectiveness of the endurance braking system **and/or an e-axle** shall be controlled by the anti-lock braking system such that the axle(s) braked by the endurance braking system **and/or an e-axle** cannot be locked by that system at speeds above 15 km/h. **An e-axle with a dynamo function is excluded from that requirement, if the prevention from locking the wheel(s) is not based on the anti-lock braking system.** However, this requirement shall not apply to that part of the braking system constituted by the natural engine braking.

Comment: include e-axle function in the requirements of these paragraphs. If the anti-lock system does not control the dynamo function, this is excluded from these requirements.

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Amend in Annex 10:

1.1.1. Where the vehicle is installed with an endurance braking system **and/or a dynamo function** the retarding force shall not be taken into consideration when determining the vehicle performance with respect to the provisions of this annex.

Comment: During testing of the performance of the braking functions acc to Annex 10, the braking system shall not be supported by retardation forces of the e-axle trailer.

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Amend paragraphs in Annex 19:

4.5.1.5. The rolling resistance of the vehicle combination is to be determined by measuring the time taken for the vehicle speed to reduce from 55 to 45 km/h and the distance covered, when tested in the same direction in which the verification test will be carried out and with the engine disconnected and any endurance brak**ing** system **and dynamo function** disengaged.

4.5.1.6. Only the brakes of the axle under test shall be actuated and reach an input pressure at the brake input device of 90 ± 3 per cent (after maximum build up time of 0.7 s) of its asymptotic value. The test shall be carried out with the engine disconnected and any endurance braking system **and dynamo function** disengaged.

Appendix 5 paragraph

2.2. Schematic diagrams of the system configurations installed on the trailers defined in item 2.1. above with consideration given to the following parameters:
Sensor locations
Modulator locations
Lift axles
Steering axles
e-axles
Tube: type - bore size(s) and lengths

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Amend paragraph in Annex 19:

Appendix 7

2.2. Schematic diagrams of the respective configurations installed on the trailers defined in item 2.1. above with consideration given to the following:

(a) Lift axles;

(b) Steering axles;

(c) Anti-lock braking configurations;

(d) e-axles.

Annex 20, paragraph 2.2., amend to read:

3.2.1.3. The number and arrangement of axles i.e. lifting, steering, **e-axles** etc. of the "subject trailer" shall not differ from that of the reference trailer.

Add new paragraph in Annex 21:

1.2.7. In the case of trailers the number and arrangement of e-axles;

Comment: All amendments of Annexes 19, 20 and 21 are administrative amendments.

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