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1958 Agreement:
Consideration of draft amendments to existing UN Regulations submitted by GRVA

Proposal for a Supplement 6 to the 13 series of amendments to UN Regulation No. 13 (Heavy vehicle braking)

Submitted by the Working Party on Automated/Autonomous and Connected Vehicles*

The text reproduced below was adopted by the Working Party on Automated/Autonomous and Connected Vehicles (GRVA) at its twenty-third session (ECE/TRANS/WP.29/GRVA/23, paras. 59, 61 and 63). It is based on: ECE/TRANS/WP.29/GRVA/2025/34 as amended by informal document GRVA-23-07/Rev.2, ECE/TRANS/WP.29/GRVA/2025/46/Rev.1 and informal document GRVA-23-11/Rev.2. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration at their March 2026 sessions.

* In accordance with the programme of work of the Inland Transport Committee for 2026 as outlined in proposed programme budget for 2026 (A/80/6 (Sect. 20), table 20.7), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

Insert a new paragraph 1.2.6., to read:

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

Insert new paragraphs 2.45.- 2.47., to read:

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

2.46. "*e-axle trailer*" means a trailer of category O that is equipped with at least one e-axle (while the trailer is not designed to move on its own).

2.47. "*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.

Insert new paragraph 5.1.4.5.3., to read:

5.1.4.5.3. For vehicles equipped with park lock device:

In the case where such a device is fitted, the manufacturer shall specify on which axle or axles the park lock device acts upon. This information shall be specified on the vehicle in a visible position in indelible form, or made freely available in another way (e.g. handbook, electronic data record).

Paragraph 5.2.1.10., amend to read:

5.2.1.10. The service, secondary and parking braking systems shall act on braking surfaces connected to the wheels through components of adequate strength.

The parking braking system may use a park lock device as an alternative to or in combination with means acting on the braking surfaces for the purpose of fulfilling the static parking brake requirements as defined in Annex 4, paragraph 2.3.1 and 2.3.2. This park lock device shall consist of components of an adequate strength and shall provide equal effectiveness compared to layouts purely acting on the braking surfaces. After complete engagement of the parking braking system, containing a park lock device, it shall be ensured that the affected wheels do not move.

Where braking torque for a particular axle or axles is provided by both a friction braking system and an electrical regenerative braking system of category B, disconnection of the latter source is permitted, providing that the friction braking source remains permanently connected and able to provide the compensation referred to in paragraph 5.2.7.1.2.1. above.

However, in the case of short disconnection transients, incomplete compensation is accepted, but within 1s, this compensation shall have attained at least 75 per cent of its final value.

Nevertheless, in all cases, the permanently connected friction braking source shall ensure that both the service and secondary braking systems continue to operate with the prescribed degree of effectiveness.

Disconnection of the braking surfaces or of the park lock device, as relevant, of the parking braking system shall be permitted only on condition that the disconnection is controlled by the driver from his driving seat or from a remote-control device, by a system incapable of being brought into action by a leak.

The remote-control device mentioned above shall be part of a system fulfilling the technical requirements of an ACSF of Category A as specified in the 02 series of amendments to UN Regulation No. 79 or later series of amendments.

Paragraph 5.2.1.26.2.3., amend to read:

5.2.1.26.2.3. A break in the wiring within the electric transmission, or an electric failure in the control of the parking braking system shall be signalled to the driver by the

yellow warning signal specified in paragraph 5.2.1.29.1.2. When caused by a break in the wiring within the electric control transmission of the parking braking system, this yellow warning signal shall be signalled as soon as the break occurs. In addition, such an electric failure in the control or break in the wiring external to the electronic control unit(s) and excluding the energy supply shall be signalled to the driver by flashing the red warning signal specified in paragraph 5.2.1.29.1.1. as long as the ignition (start) switch is in the "on" (run) position including a period of not less than 10 seconds thereafter and the control is in the "on" (activated) position.

However, if the parking braking system detects correct engagement of the parking brake, the flashing of the red warning signal may be suppressed, and the non-flashing red signal shall be used to indicate "parking brake applied

Where actuation of the parking brake is normally indicated by a separate red warning signal, satisfying all the requirements of 5.2.1.29.3., this signal shall be used to satisfy the above requirement for a red signal.

Insert new paragraph 5.2.1.26.6., to read:

5.2.1.26.6. Special requirements for a Park Lock Device

When the parking braking system, containing a park lock device, has at standstill detected a request to apply the parking braking system, a red warning signal shall flash until the park lock device is completely engaged, unless the parking braking system is preventing further movement of the braked wheels.

Where actuation of the park lock device is normally indicated by a separate red warning signal, satisfying all the requirements of 5.2.1.29.3., this signal shall be used to satisfy the above requirement for a red signal.

Insert new paragraph 5.2.2.26. (and subparagraphs), to read:

5.2.2.26. Special additional requirements for dynamo function of e-axle trailers Category O

Until uniform technical provisions have been agreed, trailers of Category O_1 and O_2 equipped with a dynamo function shall not be approved according to this Regulation.

5.2.2.26.1. The dynamo function shall not provide a retardation power of more than 22 kW for the complete trailer of Category O_3 and/or O_4.

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

(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 O_3 and/or O_4, the 22 kW limit applies to the sum of the retardation power of all dynamo function devices of the combination.

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 and has no critical impact on the vehicle behaviour.

5.2.2.26.3. The operation of the dynamo function shall be assessed according to Annex 18, in particular how the system ensures that the brake rate does not exceed 0.04 or how the wheel(s) are prevented from locking, as applicable.

5.2.2.26.4. In case of trailers of Categories O_3 or O_4, it shall be demonstrated that the vehicle still complies with the requirements of Annexes 13 and 21 when the dynamo function is enabled.

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.

(d) Initial speed of 40 km/h or at a speed where the highest retardation force is generated

If the friction value of the surface is too high and/or braking rate is too low to lock the wheel(s), the 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.

The comparison shall also include tests

(a) With right and left wheel(s) of the vehicle are situated on surfaces with differing coefficients of adhesion

(b) When the e-axle passes from a high to a low value of coefficients of adhesion.

The coefficients of friction shall be chosen in order to demonstrate compliance with paragraph 5.2.2.26.2.

Annex 2, add new paragraph to read:

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

Annex 4, paragraph 1.4.1.2.2., amend to read:

1.4.1.2.2. Every test shall be repeated on the unladen vehicle. In the case of a power-driven vehicle there may be, in addition to the driver, a second person on the front seat who is responsible for noting the results of the test;

In the case of a tractor for a semi-trailer, the unladen tests will be conducted with the vehicle in its solo condition, including a mass representing the fifth wheel. It will also include a mass representing a spare wheel, if this is included in the standard specification of the vehicle;

In the case of a vehicle presented as a bare chassis-cab, a supplementary load may be added to simulate the mass of the body, not exceeding the minimum 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 with an electric regenerative braking system, the requirements depend on the category of this system:

Category A: Any separate electric regenerative braking control which is provided, shall not be used during the Type-0 tests.

Category B: The contribution of the electric regenerative braking system to the braking force generated shall not exceed that minimum level guaranteed by the system design.

This requirement is deemed to be satisfied if the batteries are at one of the following state of charge conditions where state of charge3 is determined by the method set out in Appendix to this annex:

(a) At the maximum charge level as recommended by the manufacturer in the vehicle specification; or

(b) At a level not less than 95 per cent of the full charge level, where the manufacturer has made no specific recommendation; or

(c) At the maximum level which results from automatic charge control on the vehicle, or

(d) When the tests are conducted without a regenerative braking component regardless of the state of charge of the batteries.

Annex 4, insert new paragraph 1.7.1.3. to read:

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

Annex 4, insert a new paragraph 2.2.7., to read:

2.2.7. For each test condition of the secondary braking effectiveness, under the conditions described in paragraph 2.2.5., only one braking control shall be used (e.g. the service braking control, the parking brake control). This requirement does not preclude the use of a different braking control in the unladen and the fully laden condition, as described by the vehicle manufacturer in the relevant section of Annex 2.

Annex 5, paragraph 2.2.1.2., amend to read:

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.

Annex 5, paragraph 2.2.1.3., amend to read:

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.

Annex 10, paragraph 1.1.1., amend to read:

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.

Annex 19, paragraph 4.5.1.5., amend to read:

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 braking system and dynamo function disengaged.

Annex 19, paragraph 4.5.1.6., amend to read:

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.

Annex 19, Appendix 5, paragraph 2.2., amend to read:

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

Annex 19, Appendix 7, paragraph 2.2., amend to read:

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.

Annex 21, insert new paragraph 1.2.7., to read:

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