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### Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

Working Party on Brakes and Running Gear

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Geneva, 21–23 September 2010

Item 3(a) of the provisional agenda

Regulations Nos. 13 and 13-H–Emergency Stop Signal (ESS)

### **Proposal for draft amendments to Regulation No. 13 (Heavy vehicle braking)**

**Submitted by the experts from the International Organization of Motor Vehicle Manufacturers \***

The text reproduced below was prepared by the experts from the International Organization of Motor Vehicle Manufacturers (OICA) to improve the wording of the prescriptions for regenerative braking. The modifications to the existing text of the Regulation are marked in bold for new and strikethrough for deleted characters.

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\* In accordance with the programme of work of the Inland Transport Committee for 2006–2010 (ECE/TRANS/166/Add.1, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

## I. Proposal

Paragraphs 5.2.1.30. to 5.2.1.30.2., amend to read:

- “5.2.1.30. Generation of a braking signal to illuminate stop lamps
- 5.2.1.30.1. Activation of the service braking system by the driver shall generate a signal that will be used to illuminate the stop lamps.
- 5.2.1.30.2. Requirements for vehicles ~~installed with endurance braking systems that~~ **utilize electronic signalling to control initial application of the service braking system, and equipped with endurance braking and/or regenerative braking system of Category A:**

Deceleration by the endurance braking and/or regenerative braking system	
$\leq 1.3 \text{ m/s}^2$	$> 1.3 \text{ m/s}^2$
May generate the signal	Shall generate the signal

”

Paragraphs 5.2.1.30.2.1, should be deleted

Paragraphs 5.2.1.30.2.2. and 5.2.1.30.2.3., renumber as paragraphs 5.2.1.30.3. and 5.2.1.30.4. and amend to read:

“5.2.1.30.2.2.3. In the case of vehicles equipped with a braking system of a specification different to that defined in paragraph ~~5.2.1.30.2.1.~~ **5.2.1.30.2.** above, the operation of the endurance braking system **and/or regenerative braking system of Category A** may generate the signal irrespective of the deceleration produced.

5.2.1.30.2.3.4. The signal shall not be generated when retardation is produced by the natural braking effect of the engine alone.”

Paragraphs 5.2.1.30.3.(former) to 5.2.1.30.5 (former), renumber as paragraphs 5.2.1.30.5. to 5.2.1.30.7.

Paragraph 5.2.1.30.6. (former), should be deleted:

Insert new paragraphs 12.2.8. and 12.2.9., to read:

**12.2.8. As from the official date of entry into force of the Supplement [6] to the 11 series of amendments, no Contracting Party applying this Regulation shall refuse to grant approval under this Regulation as amended by the Supplement [6] to the 11 series of amendments.**

**12.2.9. As from 36 months after the date of entry into force of the Supplement [6] to the 11 series of amendments, Contracting Parties applying this Regulation shall grant approvals only if the vehicle type to be approved meets the requirements of this Regulation as amended by the Supplement [6] to the 11 series of amendments.**

## II. Justification

### History

1. The Working Party on Brakes and Running Gear (GRRF) agreed at its sixty-seventh session on deceleration thresholds to be introduced into Regulation No. 13-H for the generation of the stop lamp signal due of the electric Regenerative Braking System (RBS) of light vehicles (see Annex II to the report ECE/TRANS/WP.29/GRRF/67). At that session, GRRF also agreed in principle that the Electric Regenerative Braking and the Endurance Braking of heavy-duty vehicles should illuminate the stop lamps on a mandatory basis above a certain deceleration threshold and on an optional basis below that same threshold. OICA then committed to provide for the next session a proposal concerning heavy-duty vehicles (Regulation No. 13) based on the revision of Informal document No. GRRF-66-25.

### Technical background

1. Informal document No. GRRF-66-25 (OICA) attempted to align the illumination threshold for regenerative braking of vehicles equipped with electronic signalling to control initial application of braking (EBS) on the value already decided for some years for the endurance braking, namely mandatory illumination at braking rates above  $1.0 \text{ m/s}^2$ . It is presently considered safe that the upper threshold for the endurance braking be raised to the threshold proposed for the Regenerative Braking System (RBS), namely  $1.3 \text{ m/s}^2$ .

2. Graph 1 hereafter outlines the levels of deceleration of the natural braking effect of the engine alone according to the vehicle weight and speed and demonstrates that the value of  $1.3 \text{ m/s}^2$  is reasonable for heavy vehicles.

3. One technical concern of the experts at the sixty-sixth session of GRRF was the necessity that the stop lamps are illuminated at the same deceleration threshold irrespective of the technical means to generate the deceleration, i.e. endurance braking vs. regenerative braking. This is indeed justified because the important information for the driver is the deceleration of the preceding vehicles and not the reason for this deceleration. In addition, those two braking systems, when they use electricity as a vector of energy, usually do not defer very much in their principle: the endurance braking dissipates the electric energy through the production of heat in a resistance, while the Electric Regenerative Braking uses the electric energy to recharge batteries.

4. In vehicles with electric control transmission, commonly known as having electronic braking systems and including a data bus communication system connecting the braking system with the rest of the vehicle control systems, the calibration of the braking system with the actual tyre used on the vehicle is standard practice, therefore an accurate speed measurement is available from which vehicle deceleration can be determined. Vehicles having a different specification of braking system, even though equipped with ABS, do not have the same interfaces or calibration requirements and providing deceleration information on those vehicles implies significant costs. Further in-depth technical justification to the solution adopted by GRRF for those vehicles can be found in Informal document No. GRRF-60-04.

## Proposal

1. The vehicles equipped with a RBS of category B are considered to be beyond the scope of the proposal. They must comply with the requirements of the service braking system because the RBS of category B is per definition part of the service braking system.
2. The vehicles equipped with Endurance braking, EBS and RBS may illuminate the stop lamps below  $1,3 \text{ m/s}^2$  and shall illuminate them above  $1,3 \text{ m/s}^2$ . In this case, it is nonsense to differentiate the endurance braking from the RBS, and the value of  $1,3 \text{ m/s}^2$  permits to avoid a too frequent illumination of the stop lamps.
3. The vehicles equipped with both an Endurance braking and EBS but without RBS may illuminate the stop lamps below  $1,3 \text{ m/s}^2$  and shall illuminate them above  $1,3 \text{ m/s}^2$ . This case is similar to case N°2 because the technical means to generate the deceleration should not influence the deceleration value for the stop lamps illumination.
4. The vehicles equipped with an Endurance braking, without EBS, but with RBS are subject to the technical limitation that the vehicle deceleration is difficult to calculate to the accuracy necessary for defining a mandatory threshold for the illumination of the stop lamps. This family of vehicles is currently covered by paragraph 5.2.1.30.2.2. of Regulation No. 13. The OICA proposal copies the current solution based on the same justification.
5. The vehicles equipped with an Endurance braking, but neither with EBS nor with RBS are subject to the same limitation as the case N°4 above.
6. The vehicles not equipped with an Endurance braking but equipped with both EBS and RBS are similar to the case 2 above and subject to the same provisions (may illuminate the stop lamps below  $1,3 \text{ m/s}^2$  and shall illuminate them above  $1,3 \text{ m/s}^2$ ).
7. The vehicles neither equipped with an Endurance braking nor EBS but equipped with RBS are similar to the case N°4 above and may illuminate the stop lamps irrespective of the deceleration.
8. The vehicles neither equipped with endurance braking, nor with RBS are not in the scope of this paragraph.
9. Vehicles with regenerative braking upon release of the throttle pedal will now have to generate the stop lamp signal. This strengthening of the requirements, while being demanding for the manufacturers, aligns Regulation No. 13 on the provisions of Regulation No. 13-H and permits the electric regenerative braking systems on electric vehicles and hybrid/electric vehicles to substantially improve fuel economy.
10. Some transitional provisions are necessary for the Industry in order to adapt the design of the future production to the strengthening of the requirements mentioned under item 9 above, i.e. passing from a “*shall not generate the signal*” to a “*shall generate the signal*” (for EBS vehicles).

Graph 1  
Deceleration of the natural braking effect of the engine alone in function of the vehicle weight

