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### Economic Commission for Europe

#### Inland Transport Committee

#### World Forum for Harmonization of Vehicle Regulations

#### Working Party on Lighting and Light-Signalling

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Item 5(d) of the provisional agenda

**Collective amendments – Regulations Nos. 48 and 123**

### **Proposal for Supplement 7 the 04 series of amendments to Regulation No. 48 (Installation of lighting and Light- signalling devices)**

#### **Submitted by the experts from the Working Party “Brussels” 1952\***

The text reproduced below was prepared by the expert from the Working Party “Brussels 1952” (GTB) in order to introduce provisions for the automatic activation and deactivation of the main beam. The modifications to the existing text of the Regulation, including Supplement 6 to the 04 series of amendments, are marked in bold for new or 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.

## 1. Proposal

*Insert a new paragraph 6.1.7.1. to 6.1.7.2., to read:*

**“6.1.7.1. The control of the main-beam headlamps may be automatic regarding their activation and deactivation, the control signals being produced by a sensor system which is capable of detecting and reacting to each of the following inputs:**

**ambient lighting conditions;**

**the light emitted by the front lighting devices and front light-signalling devices of oncoming vehicles;**

**the light reflected from front retro-reflecting devices of oncoming vehicles;**

**the light emitted by the rear light-signalling devices of preceding vehicles;**

**the light reflected from rear retro- reflecting devices of preceding vehicles.**

**Additional sensor functions to improve performance are allowed.**

**For the purpose of this paragraph, “vehicles” means vehicles of categories L, M, N, O, T, as well as bicycles, such vehicles being equipped with retro-reflectors, with lighting and light-signalling devices, which are switched ON.**

**6.1.7.2. It shall always be possible to switch the main-beam headlamps ON and OFF manually and to manually switch off the automatic control of the main beam head lamps.”**

*Paragraphs 6.1.7.1. to 6.1.7.4. (former), renumber as paragraphs 6.1.7.3. to 6.1.7.6.*

*Insert new paragraph 6.1.8.1., to read:*

**“6.1.8.1. If the control of the main-beam headlamps is automatic as described in paragraph 6.1.7.1. above an indication shall be provided to the driver that the automatic control of the main-beam function is activated. This information shall remain displayed as long as the automatic operation is activated.”**

*Insert new paragraphs 6.1.9.3. to 6.1.9.3.5., to read:*

**“6.1.9.3. Automatic activation and deactivation of the main-beam headlamps:**

**6.1.9.3.1. The sensor system used to control the automatic activation and deactivation of the main-beam headlamps, as described in paragraph 6.1.7.1., shall comply with the following requirements:**

**6.1.9.3.1.1. The boundaries of the minimum fields in which the sensor is able to detect light emitted or retro reflected from other vehicles defined in paragraph 6.1.7.1. are defined by the angles indicated below.**

**6.1.9.3.1.1.1. Horizontal angles: 15° to the left and 15° to the right.**

**Vertical angles:**

Upward angle	5°		
Mounting height of the sensor (centre of sensor aperture above the ground)	Less than 2 m	Between 1.5 m and 2.5 m	Greater than 2.0 m
Downward angle	2°	2° to 5°	5°

These angles are measured from the centre of the sensor aperture relative to a horizontal straight line through its centre and parallel to the longitudinal median plane of the vehicle.

- 6.1.9.3.1.2.** The sensor system shall be able to detect on a straight level road:
- (a) an oncoming power driven vehicle at a distance extending to at least 400 m;
  - (b) a preceding power driven vehicle or a vehicle-trailers combination at a distance extending to at least 100 m;
  - (c) an oncoming bicycle at a distance extending to at least 75 m, its illumination represented by a white lamp with a luminous intensity of 150 cd with a light emitting area of 10cm<sup>2</sup> +/- 3cm<sup>2</sup> and a height above a ground of 0.8 m.
- 6.1.9.3.2.** The transition from main-beam to dipped-beam and vice versa according to the conditions indicated in paragraph 6.1.7.1. above may be performed automatically and shall not cause discomfort, distraction or glare.
- 6.1.9.3.3.** The overall performance of the automatic control shall be verified by:
- 6.1.9.3.3.1.** means of simulation or other means of verification accepted by the authority responsible for type approval testing, as provided by the applicant.
  - 6.1.9.3.3.2.** a test drive according to paragraph 1 in Annex 13. The performance of the automatic control shall be documented and checked against the applicant's description. Any obvious malfunctioning shall be contested (e. g. excessive angular movement or flicker).
- 6.1.9.3.4.** The control of the main-beam headlamps may be such that the main-beam headlamps are only switched ON automatically, but only when:
- (a) no vehicles, as mentioned in paragraph 6.1.7.1. above, are detected within the fields and distances according to paragraphs 6.1.9.3.1.1. and 6.1.9.3.1.2.;
- and
- (b) the detected ambient lighting levels are as prescribed in paragraph 6.1.9.3.5. below.
- 6.1.9.3.5.** In the case where main-beam headlamps are switched ON automatically, they shall be switched OFF automatically when oncoming or preceding vehicles, as mentioned in paragraph 6.1.7.1. above, are detected within the fields and distances according to paragraphs 6.1.9.3.1.1. and 6.1.9.3.1.2.

Moreover, they shall be switched OFF automatically when the illuminance produced by ambient lighting conditions exceeds 7000 lx.

Compliance with this requirement shall be demonstrated by the applicant, using simulation or other means of verification accepted by the authority responsible for type approval. If necessary the illuminance shall be measured on a horizontal surface, with a cosine corrected sensor on the same height as the mounting position of the sensor on the vehicle. This may be demonstrated by the manufacturer by sufficient documentation or by other means accepted by the authority responsible for type approval.”

Insert a new Annex 12, to read:

“Annex 12

Test Drive

Test drive specifications for the automatic control of the main-beam headlamps

- 1.1. The test drive shall be carried out in clear atmosphere <sup>1</sup> and with clean head-lamps
- 1.2. The test course shall comprise test sections with traffic conditions, at speed corresponding to the relevant type of road, as described in table 1 below:

Table 1

Test Section	Traffic conditions	Road type		
		Urban areas	Multi lane road, e.g. Motorway	Country road
	Speed	50 ± 10 km/h	100 ± 20km/h	80 ± 20km/h
	Average percentage of the full test course length	10 per cent	20 per cent	70 per cent
A	Single oncoming vehicle or single preceding vehicle in a frequency so that the main beam will switch ON and OFF.		X	X
B	Combined oncoming and preceding traffic situations, in a frequency so that the main beam will switch ON and OFF.		X	X

<sup>1</sup> Good visibility (meteorological optical range MOR > 2,000 m defined according to WMO, Guide to Meteorological Instruments and Methods of Observation, Sixth Edition, ISBN: 92-63-16008-2, pp 1. 9. 1/ 1. 9. 11, Geneva 1996).

<i>Test Section</i>	<i>Traffic conditions</i>	<i>Road type</i>		
		<i>Urban areas</i>	<i>Multi lane road, e.g. Motorway</i>	<i>Country road</i>
	<b>Speed</b>	<b>50 ± 10 km/h</b>	<b>100 ± 20km/h</b>	<b>80 ± 20km/h</b>
	<b>Average percentage of the full test course length</b>	<b>10 per cent</b>	<b>20 per cent</b>	<b>70 per cent</b>
<b>C</b>	<b>Active and passive overtaking manoeuvres, in a frequency so that the main beam will switch ON and OFF.</b>		<b>X</b>	<b>X</b>
<b>D</b>	<b>Oncoming bicycle, as described in paragraph 6.1.9.3.1.2.</b>			<b>X</b>
<b>E</b>	<b>Combined oncoming and preceding traffic situations</b>	<b>X</b>		

- 1.3. Urban areas shall comprise roads with and without illumination.
- 1.4. Country roads shall comprise sections having two lanes and sections having four or more lanes and shall include junctions, hills and/or slopes, dips and winding roads.
- 1.5. Multi-lane roads (e.g. motorways) and country roads shall comprise sections having straight level parts with a length of more than 600 m. Additionally they shall comprise sections having curves to the left and to the right.
- 1.6. Dense traffic situations shall be taken into account.”

## II. Justification

1. Systems capable of automatically activating and deactivating the main beam using sensors to detect the presence of other power driven vehicles have been developed to assist the driver. A recent research conducted by the light laboratory (L-LAB) shows that drivers have a reluctance to operate the main-beam and frequently select the dipped beam too early with the consequence that forward vision is restricted. Automatic operation of the main-beam can help to overcome this problem but, at all times, the driver remains responsible for deciding whether it is appropriate to operate the main-beam and if necessary to switch the main beam on or off manually.

2. Due to a lack of clarity and consistency in the interpretation of the current provisions of Regulation No. 48, some administrations have already granted type approvals for vehicles equipped with automatic activation and deactivation of the main-beam and experience has shown that these systems are operating successfully. In addition to

introducing the necessary provisions into the Regulation, the objective of this proposal is to ensure that different interpretations are avoided.

A detailed review of the work undertaken by GTB in collaboration with Working Party on Lighting and Light-Signalling (GRE) experts to develop the required provisions is available in as Informal document GRE-64-01.

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