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### World Forum for Harmonization of Vehicle Regulations

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

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Item 4 (c) of the provisional agenda

#### **Simplification of lighting and light-signalling UN Regulations: UN Regulation No. 149 (Road illumination devices)**

Item 7 (a) of the provisional agenda

#### **Other UN Regulations:**

**UN Regulation No. 53 (Installation of lighting and light-signalling devices for L<sub>3</sub> vehicles)**

## **Proposal for new amendments to UN Regulation No. 53 and UN Regulation No. 149**

### **Submitted by the expert from the International Motorcycle Manufacturers Association\***

The text reproduced below was prepared by the expert from the International Motorcycle Manufacturers Association (IMMA) with the aim to allow the installation of Adaptive Driving Beams (ADB) on vehicles of category L<sub>3</sub>. This proposal supersedes ECE/TRANS/WP.29/GRE/2020/13 and is based on informal document GRE-82-13, presented at the eighty-second session of the Working Party on Lighting and Light-Signalling (GRE). The original version was updated to ensure its consistency with subsequent discussions and developments. The modifications to the current text of the UN Regulations 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 2020 as outlined in proposed programme budget for 2020 (A/74/6 (part V sect. 20) para 20.37), 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.

## I. Proposal

### A. Proposal for a new Supplement to the 01, 02 and 03 series of amendments of UN Regulation No. 53

*Insert a new paragraph 2.5.20., to read:*

**"2.5.20. "Adaptive Driving-Beam" (or "ADB") means a front lighting system consisting of driving-beam(s) only and type-approved according to UN Regulation No. 149 that adapts its beam pattern to the presence of oncoming and preceding vehicles in order to improve the long-range visibility for the driver without causing discomfort, distraction or glare to other road users.**

**Unless otherwise specified, administrative and technical provisions for the driving-beam function of the adaptive front lighting system (AFS) in UN Regulation No. 149 shall apply to ADB.**

**2.5.20.1. "ADB neutral state" means the state of the ADB when the driving-beam is in the maximum condition of activation."**

*Insert a new paragraph 3.2.6., to read:*

**"3.2.6. Where an ADB is fitted on the vehicle, the applicant shall submit a detailed description providing the following information:**

**3.2.6.1. The technical characteristics relevant to the operation of ADB;**

**3.2.6.2. Special instruction, if any, for the inspection of the light sources and the visual observation of the beam;**

**3.2.6.3. The lamps that are grouped or combined with or reciprocally incorporated in the ADB."**

*Paragraph 5.4., amend to read:*

**"5.4. In the absence of specific instructions, the height and orientation of the lamps shall be verified with the vehicle unladen and placed on a flat horizontal surface, its median longitudinal plane being vertical and the handlebars being in the position corresponding to the straight ahead movement. The tyre pressures shall be those prescribed by the manufacturer for the particular conditions of loading required in this Regulation.**

**In the case where an ADB is installed, with the system in its ADB neutral state."**

*Paragraph 5.13., amend to read:*

**"5.13. Colours of the lights**

**...**

**Adaptive Driving-Beam (ADB): white"**

*Insert a new paragraph 5.15.7., to read:*

**"5.15.7. Adaptive Driving-Beam (ADB) (paragraph 6.16.)"**

*Insert a new paragraph 5.21., to read:*

**"5.21. Where an ADB is fitted, it shall be considered equivalent to the driving-beam headlamp(s)."**

*Paragraph 6.1.3.1.1., amend to read:*

**"6.1.3.1.1. An independent driving lamp may be fitted above or below or to one side of another front lamp: if these lamps are on top of the other the reference centre**

of the driving lamp must be located within the ~~medium~~ **median** longitudinal plane of the vehicle; if these lamps are side by side their reference centre must be symmetrical in relation to the median longitudinal plane of the vehicle."

*Paragraph 6.1.6., amend to read:*

"6.1.6. Electrical connections

**6.1.6.1.** The passing-beam(s) may remain illuminated with the driving-beam(s).

**6.1.6.2.** **The control of the driving-beam headlamp(s) may be automatic regarding their switching ON and OFF, the control signals being produced by a sensor system which is capable of detecting and reacting to each of the following inputs:**

- (a) **Ambient lighting conditions;**
- (b) **The light emitted by the front lighting devices and front light-signalling devices of oncoming vehicles;**
- (c) **The light emitted by the rear light-signalling 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.**

**6.1.6.3.** **It shall always be possible to switch the driving-beam headlamp(s) ON and OFF manually and to manually deactivate the automatic control of the driving-beam headlamp(s). Moreover, the switching OFF, of the driving-beam headlamp(s) and the deactivation of their automatic control, shall be by means of a simple and immediate manual operation; the use of submenus is not allowed."**

*Insert a new paragraph 6.1.7.3., to read:*

**"6.1.7.3.** **If the control of the driving-beam headlamp(s) is automatic, an indication shall be provided to the driver that the automatic control of the driving-beam function is activated. This information shall remain displayed as long as the automatic operation is activated."**

*Insert a new paragraph 6.1.8.3., to read:*

**"6.1.8.3.** **Automatic switching ON and OFF of the driving-beam headlamp(s):**

**6.1.8.3.1.** **The sensor system used to control the automatic switching ON and OFF of the driving-beam headlamp(s) shall comply with the following requirements:**

**6.1.8.3.1.1.** **The boundaries of the minimum fields in which the sensor is able to detect light emitted from other vehicles defined in paragraph 6.1.6.2. above are defined by the angles indicated below.**

**6.1.8.3.1.1.1.** **Horizontal angles: 15 degrees to the left and 15 degrees to the right.**

**Vertical angles: 5 degrees upwards and 2 degrees downwards.**

**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.**

**6.1.8.3.1.2.** **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  $10 \pm 3 \text{ cm}^2$  and a height above a ground of 0.8 m.

To verify compliance with (a) and (b) above, the oncoming and preceding power driven vehicle (or vehicle-trailer combination) shall have position lamps (if applicable) and passing-beam headlamp(s) switched ON.

6.1.8.3.2. The transition from driving-beam to passing-beam and vice versa may be performed automatically and shall not cause discomfort, distraction or glare.

6.1.8.3.3. The overall performance of the automatic control shall be verified by:

6.1.8.3.3.1. Means of simulation or other means of verification accepted by the Type Approval Authority, as provided by the applicant.

6.1.8.3.3.2. A test drive according to paragraph 1 in Annex 9. 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).

6.1.8.3.4. The control of the driving-beam headlamp(s) may be such that the driving-beam headlamp(s) are switched ON automatically only when:

- (a) No vehicles, as mentioned in paragraph 6.1.6.2. above, are detected within the fields and distances according to paragraphs 6.1.8.3.1.1. and 6.1.8.3.1.2.; and
- (b) The detected ambient lighting levels are as prescribed in paragraph 6.1.8.3.5. below.

6.1.8.3.5. In the case where driving-beam headlamp(s) are switched ON automatically, they shall be switched OFF automatically when oncoming or preceding vehicles, as mentioned in paragraph 6.1.6.2. above, are detected within the fields and distances according to paragraphs 6.1.8.3.1.1. and 6.1.8.3.1.2.

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 Type Approval Authority. 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 Type Approval Authority."

*Paragraph 6.2.3.1.4., amend to read:*

"6.2.3.1.4. If installed, additional lighting unit(s) which provide bend lighting, type approved as part of the passing-beam according to UN Regulation No. 113 or 149, shall be installed under the following conditions:

In the case of (a) pair(s) of additional lighting units, they shall be installed so that their reference centre(s) are symmetrical in relation to the median longitudinal plane of the vehicle.

In the case of a single additional lighting unit, its reference centre shall be coincident with the ~~medium~~ median longitudinal plane of the vehicle."

*Paragraph 6.13.4.1.1., amend to read:*

- "6.13.4.1.1. An independent daytime running lamp may be installed above, below or to one side of another front lamp: If these lamps are one above the other, the reference centre of the daytime running lamp shall be located within the ~~medium~~ **median** longitudinal plane of the vehicle; if these lamps are side by side, the edge of the illuminating surface shall not be more than 250 mm from the median longitudinal plane of the vehicle."

*Insert a new paragraph 6.16., to read:*

- 6.16. Adaptive Driving-Beam (ADB) (UN Regulation No. 149)**
- Where not otherwise specified below, the requirements for driving-beam headlamp(s) (paragraph 6.1.) of this Regulation apply to the ADB.**
- 6.16.1. Number**
- 6.16.1.1. One.**
- 6.16.1.2. Installation units shall be one or two.**
- 6.16.2. Arrangement**
- No special requirements.**
- 6.16.3. Position**
- The ADB shall, prior to the subsequent test procedures, be set to the ADB neutral state;**
- 6.16.3.1. In width and height:**
- All dimensions refer to the nearest edge of the apparent surface(s) observed in the direction of the reference axis, of the installation unit(s).**
- 6.16.3.1.1. An independent ADB installation unit may be fitted above or below or to one side of another front lamp: if these lamps are on top of the other the reference centre of the ADB installation unit must be located within the median longitudinal plane of the vehicle; if these lamps are side by side their reference centre must be symmetrical in relation to the median longitudinal plane of the vehicle.**
- 6.16.3.1.2. An ADB installation unit, that is reciprocally incorporated with another front lamp, must be fitted in such a way that its reference centre lies within the median longitudinal plane of the vehicle. However, when the vehicle is also fitted with an independent principal passing-beam headlamp, or a principal passing-beam headlamp that is reciprocally incorporated with a front position lamp alongside the ADB installation unit, their reference centres must be symmetrical in relation to the median longitudinal plane of the vehicle.**
- 6.16.3.1.3. Two ADB installation units of which either one or both are reciprocally incorporated with another front lamp must be fitted in such a way that their reference centres are symmetrical in relation to the median longitudinal plane of the vehicle.**
- 6.16.3.2. In length: at the front of the vehicle. This requirement is regarded as satisfied if the light emitted does not cause discomfort to the driver either directly or indirectly by means of the rear-view mirrors and/or reflective surfaces on the vehicle.**
- 6.16.3.3. In any case, the distance between the edge of the illuminating surface of any independent ADB installation unit and the edge of that of the lamp producing the principal passing-beam must not exceed 200 mm. The distance between the edge of the illuminating surface of any independent ADB installation unit and the ground must be from 500 mm to 1,300 mm.**

- 6.16.3.4.** In the case of two ADB installation units: the distance separating the illuminating surfaces of two ADB installation units must not exceed 200 mm.
- 6.16.4.** **Geometric visibility**  
 The angles of geometric visibility specified in paragraph 6.1.4. of this Regulation, shall be met by at least one of the installation units said function, according to the description of the applicant. Individual installation units may be used to comply with the requirements for different angles.
- 6.16.5.** **Orientation**  
 Towards the front.
- 6.16.6.** **Electrical connections**
- 6.16.6.1.** For changing over from the ADB to the passing-beam all lighting units for the driving-beam shall be de-activated simultaneously.
- 6.16.6.2.** The ADB shall be designed to be adaptive, subject to the provisions in paragraph 6.16.8.1., the control signals being produced by a sensor system which is capable of detecting and reacting to each of the following inputs:
- (a) Ambient lighting conditions;
  - (b) The light emitted by the front lighting devices and front light-signalling devices of oncoming vehicles;
  - (c) The light emitted by the rear light-signalling 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.
- 6.16.6.3.** It shall always be possible to activate and deactivate the ADB manually, and to manually deactivate the automatic control.
- Moreover, the deactivation, of the ADB and of their automatic control, shall be by means of a simple and immediate manual operation; the use of sub-menus is not allowed.
- 6.16.6.4.** The passing-beam(s) may remain switched ON at the same time as the ADB.
- 6.16.6.5.** It shall always be possible for the driver to set the ADB to the ADB neutral state and to return it to its automatic operation.
- 6.16.7.** **Tell-tale:**
- 6.16.7.1.** The provisions of paragraphs 6.1.7. (for the driving-beam headlamp(s)) of this Regulation apply to the respective parts of an ADB.
- 6.16.7.2.** A visual failure tell-tale for ADB is mandatory. It shall be non-flashing. It shall be activated whenever a failure signal is received in accordance with paragraph 4.13. of UN Regulation No. 149. It shall remain activated while the failure is present. It may be cancelled temporarily, but shall be repeated whenever the device which starts and stops the engine is switched ON and OFF.
- 6.16.7.3.** A visual tell-tale shall be provided to indicate to the driver that the adaptation of the driving-beam is activated. This information shall remain displayed as long as the adaptation is activated.
- 6.16.8.** **Other requirements**

**6.16.8.1. Adaptation of the driving-beam**

**6.16.8.1.1. The sensor system used to control the adaptation of the driving-beam, as described in paragraph 6.16.6.2. above, shall comply with the following requirements:**

**6.16.8.1.1.1. The boundaries of the minimum fields in which the sensor is able to detect light emitted from other vehicles as defined in paragraph 6.16.6.2. above are given by the angles indicated in paragraph 6.1.8.3.1.1. of this Regulation.**

**6.16.8.1.1.2. The sensor system sensitivity shall comply with the requirements in paragraph 6.1.8.3.1.2. of this Regulation.**

**6.16.8.1.1.3. The adaptive driving-beam shall be switched OFF when the illuminance produced by ambient lighting conditions exceeds 7,000 lx.**

Compliance with this requirement shall be demonstrated by the applicant, using simulation or other means of verification accepted by the Type Approval Authority. 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 Type Approval Authority.

**6.16.8.1.1.4. The overall performance of the automatic control shall be demonstrated by the applicant by documentation or by other means accepted by the Type Approval Authority. Furthermore, the manufacturer shall provide a documentation package which gives access to the design of "the safety concept" of the system. This "safety concept" is a description of the measures designed into the system, for example within the electronic units, so as to address system integrity and thereby ensure safe operation even in the event of mechanical or electrical failure which could cause any discomfort, distraction or glare, either to the driver or to oncoming and preceding vehicles. This description shall also give a simple explanation of all the control functions of the "system" and the methods employed to achieve the objectives, including a statement of the mechanism(s) by which control is exercised.**

A list of all input and sensed variables shall be provided and the working range of these shall be defined.

The functions of the system and the safety concept, as laid down by the manufacturer, shall be explained. The documentation shall be brief, yet provide evidence that the design and development has had the benefit of expertise from all the system fields which are involved.

For periodic technical inspections, the documentation shall describe how the current operational status of the "system" can be checked.

For Type Approval purposes this documentation shall be taken as the basic reference for the verification process.

**6.16.8.1.1.5. To verify, that the adaptation of the driving-beam does not cause any discomfort, distraction or glare, neither to the driver nor to oncoming and preceding vehicles, the technical service shall perform a test drive according to paragraph 2. in Annex 9. This shall include any situation relevant to the system control on the basis of the applicant's description. The performance of the adaptation of the driving-beam shall be documented and checked against the applicant's description. Any obvious malfunctioning shall be contested (e.g. excessive angular movement or flicker).**

**6.16.8.2. The aggregate maximum intensity of the lighting units that can be energized simultaneously to provide the driving-beam lighting or its**

modes, if any, shall not exceed 430,000 cd, which corresponds to a reference value of 100.

This maximum intensity shall be obtained by adding together the individual reference marks indicated on the installation units that are simultaneously used to provide the driving-beam."

Insert a new Annex 9, to read:

## "Annex 9

### Test drive

1. Test drive specifications for the automatic control of the driving-beam headlamp(s).
- 1.1. The test drive shall be carried out in clear atmosphere<sup>1</sup> and with clean headlamp(s).
- 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	100 ± 20 km/h	80 ± 20 km/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 driving-beam will switch ON and OFF.		X	X
B	Combined oncoming and preceding traffic situations, in a frequency so that the driving-beam will switch ON and OFF.		X	X
C	Active and passive overtaking manoeuvres, in a frequency so that the driving-beam will switch ON and OFF.		X	X
D	Oncoming bicycle, as described in paragraph 6.1.8.3.1.2.			X
E	Combined oncoming and preceding traffic situations	X		

- 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.
2. Test drive specifications for adaptive driving-beam headlamp(s)



- 2.1. The test drive shall be carried out in clear atmosphere<sup>1</sup> and with clean headlamp(s).
- 2.2. The test course shall comprise test sections with traffic conditions, at speed corresponding to the relevant type of road, as described in Table 2 below:

Table 2

Test Section	Traffic conditions	Road type		
		Urban areas	Multi-lane road, e.g. motorway	Country road
	Speed	50 ± 10 km/h	100 ± 20 km/h	80 ± 20 km/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 adaptive driving-beam will react to demonstrate the adaptation process.		X	X
B	Combined oncoming and preceding traffic situations. In a frequency so that the adaptive driving-beam will react to demonstrate the adaptation process.		X	X
C	Active and passive overtaking manoeuvres, in a frequency so that the adaptive driving-beam will react to demonstrate the adaptation process.		X	X
D	Oncoming bicycle, as described in paragraph 6.16.8.1.1.2.			X
E	Combined oncoming and preceding traffic situations	X		

- 2.3. Urban areas shall comprise roads with and without illumination.
- 2.4. 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.
- 2.5. 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 of sections having curves to the left and to the right.
- 2.6. Dense traffic situations shall be taken into account.
- 2.7. For the test sections A and B in the table above the engineers conducting the tests shall evaluate and record the acceptability of the performance of the adaptation process in relation to oncoming and preceding road users. This means that the test engineers shall operate the vehicle being tested and additionally operate the oncoming and preceding vehicles.

<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).

**At the request of the Type Approval Authority, compliance with traffic scenarios other than the ones listed in Table 2 may be demonstrated by the manufacturer by providing sufficient documentation or by other means accepted by the Type Approval Authority."**

## **B. Proposal for an amendment to UN Regulation No. 149**

*Paragraph 1., amend to read:*

"1. Scope

This Regulation applies to the following road illumination devices:

Headlamps emitting a driving-beam and/or an asymmetrical passing-beam for vehicles of categories L, M, N and T

Adaptive front-lighting systems (AFS) for vehicles of categories M and N

**Adaptive Driving-Beam (ADB) for vehicles of category L<sub>3</sub>**

Headlamps emitting a driving-beam and/or a symmetrical passing-beam for vehicles of categories L and T

Front fog lamps for vehicles of categories L<sub>3</sub>, L<sub>4</sub>, L<sub>5</sub>, L<sub>7</sub>, M, N and T

Cornering lamps for vehicles of categories M, N and T."

*Paragraphs 3.2.4. and 3.2.4.1., amend to read:*

"3.2.4. If approval is sought for an AFS which is not intended to be included as part of the approval of a vehicle type according to UN Regulation No. 48 **or if approval is sought for an ADB for vehicles of category L<sub>3</sub> which is not intended to be included as part of the approval of a vehicle type according to UN Regulation No. 53,**

3.2.4.1. The applicant shall submit sufficient documentation to prove the capability of the system to comply with the provisions of paragraph 6.22. of UN Regulation No. 48 **or paragraph 6.16. of UN Regulation No. 53** when correctly installed, and"

*Paragraph 3.2.4.3., Table 1, amend to read:*

Table 1

List of symbols/combinations (full list is provided in Annex 1 "Communication")

<i>Lamp (function)</i>	<i>Symbol</i>
...	...
Adaptive Front lighting System (AFS): driving beam	XR <sup>4</sup>
<b>Adaptive Driving-Beam (ADB) for vehicles of category L<sub>3</sub></b>	<b>ADB</b>
Passing beam headlamp of Class AS (symmetrical)	C-AS
...	...

*Paragraph 3.2.4.4., Table 2, amend to read:*

Table 2  
Series of amendments and change index

<i>Series of amendments to the Regulation</i>	<i>00</i>		
<i>Function (Lamp)</i>	<i>Change Index for the specific function (lamp)</i>		
...	...		
Adaptive Front lighting System (AFS): driving beam	0		
<b>Adaptive Driving-Beam (ADB) for vehicles of category L<sub>3</sub></b>	<b>0</b>		
Passing beam headlamp of Class AS (symmetrical)	0		
...	...		

*Paragraph 4.5.1.8., amend to read:*

"4.5.1.8. **For AFS of classes C, E, V, W, R and for ADB, these systems** shall only be equipped with one or a combination of:"

*Paragraph 4.13., amend to read:*

"4.13. If applicable, the lamp shall be so made that a failure signal in order to comply with the relevant provisions of UN Regulation No. 48 **or UN Regulation No. 53** is provided."

*Paragraph 5.1., amend to read:*

"5.1. Technical requirements concerning driving-beam of the Class A, B, D (GDL), **ADB**, BS, CS, DS or ES (GDL) (symbols "R", "HR", "DR", "XR", "**ADB**", "R-BS", "WR-CS", "WR-DS" or "WR-ES")"

*Paragraph 5.3., amend to read:*

"5.3. Technical requirements concerning adaptive front-lighting systems (AFS) **and concerning adaptive driving-beam (ADB) for vehicles of category L<sub>3</sub>** (symbols "XC", "XCE", "XCV", "XCW", ~~and~~ "XR" **and "ADB"**)"

*Insert a new paragraph 5.3.1.1.1., to read:*

"**5.3.1.1.1. Notwithstanding paragraph 5.3.1.1., ADB for vehicles of category L<sub>3</sub> shall only comply with the requirements set out in paragraph 5.3.3. and its subparagraphs.**"

*Paragraph 5.3.2.8.2., Table 15 footnote \*\*, amend to read;*

"\*\* The photometric requirements for each single measuring point (angular position) of this lighting function apply to half of the sum of the respective measured values from all lighting units of the system applied for this function. **In case of Class ADB for vehicles of category L<sub>3</sub>, this provision does not apply.**

Each of the lines defined in part A of Table 15, in conjunction with the test points as prescribed in part B of Table 15 shall be measured individually corresponding to the signal provided by the signal generator.

In the case where the passing-beam, which meets the requirements of paragraph 5.3.2., is continuously operated in conjunction with the adaptation of the driving-beam, the photometric requirements in Part B of the Table 15 shall not be applied.

**For vehicles of category L<sub>3</sub>, in the case where the passing-beam which meets the requirements of paragraph 5.4.4.3. is continuously operated in conjunction with the adaptation of the driving-beam, the photometric requirements in Part B of the Table 15 shall not be applied.**

*Paragraph 5.3.3.4.1., amend to read:*

"5.3.3.4.1. The lighting unit(s) of the right side and of the left side each provide at least 16,200 cd at the point HV. **In case of ADB for vehicles of category L<sub>3</sub>, each installation unit(s) shall provide at least 16,200 cd at the point HV.**"

*Paragraph 5.3.6.3.2., amend to read:*

"5.3.6.3.2. Adaptive Driving Beam—if applicable:

During adaptation, the driving-beam function shall meet the requirements for all the cases of Right-Hand and/or Left-Hand traffic specified in Part A of Table 32

If the system uses the same functional units for the adaptation of the driving beam only Line 1 and Line 4 of Table 32 have to be measured.

~~In the case where the passing beam, which meets the requirements of 5.3.6.2 is continuously operated in conjunction with the adaptation of the driving beam, the photometric requirements in Part B Table 32 shall not be applied."~~

*Paragraph 5.3.6.3.2., Table 32 footnote \*\*, amend to read;*

"\*\* The photometric requirements for each single measuring point (angular position) of this lighting function apply to half of the sum of the respective measured values from all lighting units of the system applied for this function. **In case of Class ADB for vehicles of category L<sub>3</sub>, this provision does not apply.**

Each of the lines defined in part A of Table 32, in conjunction with the test points as prescribed in part B of Table 32 shall be measured individually corresponding to the signal provided by the signal generator.

In the case where the passing beam, which meets the requirements of paragraph 5.3.6.2., is continuously operated in conjunction with the adaptation of the driving beam, the photometric requirements in Part B of Table 32 shall not be applied.

**For vehicles of category L<sub>3</sub>, in the case where the passing-beam, which meets the requirements of paragraph 5.4.4.3. as specified in Annex 2, is continuously operated in conjunction with the adaptation of the driving-beam, the photometric requirements in Part B of Table 32 shall not be applied."**

*Annex 1, paragraph 9.3., amend to read:*

"9.3. For AFS and ADB – Systems"

*Annex 1, paragraph 9.3.5., amend to read:*

"9.3.5. Whether approval is sought for ~~a system~~ **an AFS or ADB** which is not intended to be included as part of the approval of a vehicle type according to UN Regulation No. 48 **or UN Regulation No. 53: yes/no**"

*Annex 1, insert a new paragraph 9.3.10.6, to read:*

**"9.3.10.6. ADB system intended to be included as part of the approval of a vehicle type of category L<sub>3</sub> according to UN Regulation No. 53: yes/no**"

## II. Justification

1. The proposal for amending UN Regulations Nos. 53 and 149 is aimed at allowing vehicles of category L<sub>3</sub> to be equipped with Adaptive Driving-Beams (ADB), which is already permitted under UN Regulation No. 48 as adaptive main-beam for vehicles of categories M and N.

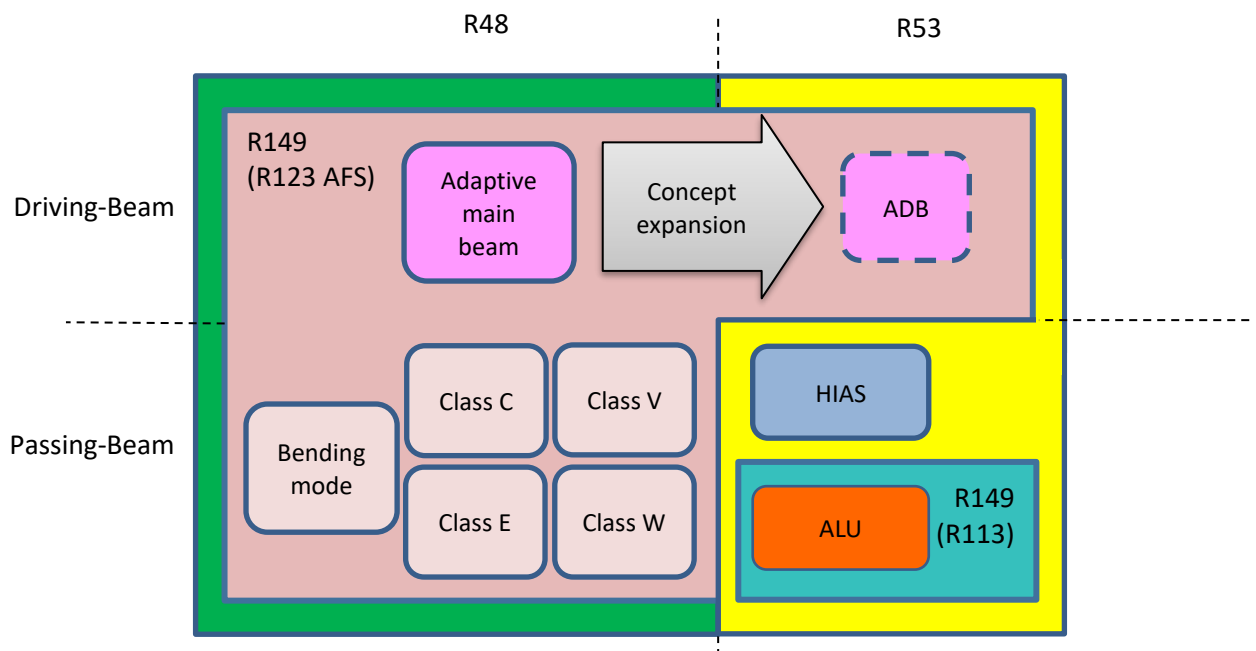
2. Enabling the installation of ADB on motorcycles will contribute to enhancing road safety, not only for motorcycle riders but also for other road users. The adaptation of the driving-beam to the preceding and oncoming traffic will improve the forward visibility of motorcycle riders, without causing discomfort, distraction or glare to other road users.

3. For passing beams, UN Regulation No. 53 currently allows to mount HIAS (horizontal inclination adjustment system) and ALU (additional light sources for bend lighting), which have been proven to enhance forward night-time visibility in case where a motorcycle is running on a curved road, but other advanced features are ready to be introduced also for driving-beams. This proposed amendment introduces the adaptation of the driving-beam pattern for motorcycles as a system consisting of driving beam(s) only, taking the wording of UN Regulation No. 48 on AFS as a reference.

4. The prescriptions in UN Regulation No. 149 for the driving-beam function of the adaptive front lighting system (AFS) for vehicles of category M and N (symbol “XR”) enables the photometric compensation between all lighting units (half of the sum), allowing a lighting unit in one side of the vehicle to perform below the minimum requirements as long as it is compensated by the other side. The independent installation of such lighting unit on a motorcycle should be prevented. For that purpose, this proposal introduces a dedicated new Class of adaptive driving-beam for vehicles of category L<sub>3</sub> in UN Regulation No. 149 (symbol “ADB”), subject to the full photometric requirements laid down in Table 15. The existing minimum photometric requirements when the ADB is activated without passing-beam(s) refer exclusively to AFS passing-beam for vehicles of categories M and N. To allow the compatibility of this requirement, a reference to passing-beams for vehicles of category L<sub>3</sub> is included in the relevant sections.

5. For consistency with UN Regulation No. 53, limiting the installation of ADB to vehicles of category L<sub>3</sub>, it is proposed to specify “ADB for vehicles of category L<sub>3</sub>” in the scope and through the regulation body of UN Regulation No. 149, when necessary.

6. The figure below illustrates the proposed expansion of the application of ADB requirements.



**Figure**  
Scope of application of ADB requirements

7. In addition, the proposal to amend UN Regulation No. 53 is harmonized with UN Regulation No. 48 to also allow the automatic switching ON and OFF of the driving-beam headlamp for vehicles of category L<sub>3</sub>.

8. Editorial corrections to UN Regulation No. 53 identified during the preparation of this document are proposed in paragraphs 6.1.3.1.1., 6.2.3.1.4. and 6.13.4.1.1. In addition, to avoid redundancy, it is proposed to delete from UN Regulation No. 149 the part of paragraph 5.3.6.3.2. duplicating the content of the footnote to Table 32.

9. The amendments to UN Regulation No. 149 contained in this document do not change its level of stringency. Thus, the amendment to UN Regulation No. 149 should be a new Supplement, according to the Guidelines for Transitional Provisions (ECE/TRANS/WP.29/1044/Rev.2, para. 22):

“Subject to the decisions of the World Forum and its subsidiary body, they may result in new series of amendments in the case of a higher stringency of the requirements (e.g. more stringent limit values) or in Supplements in the case the level of stringency of the requirements is not changed ...”.

10. However, the report of the eighty-second session of GRE (ECE/TRANS/WP.29/GRE/82, para. 14) states that:

"According to the mandate of IWG SLR, the requirements in the original series of the three new UN Regulations should be totally identical to the requirements in the device UN Regulations which had been frozen in the course of the simplification process. Therefore, GRE was of the view that eventual discrepancies should be corrected by means of supplements or corrigenda to the original series of the new UN Regulations, while substantial changes should only be introduced by the 01 series of amendments and supplements therein.”.

11. Hence, IMMA would like to ask for GRE guidance on whether this amendment should be a new Supplement to the original series to UN Regulation No. 149 or, considering the above, it should become a new 01 series of amendments.

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