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Working Party on Lighting and Light-Signalling

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Geneva, 30 March - 3 April 2009

Item 5(f) of the provisional agenda

COLLECTIVE AMENDMENTS

Regulations Nos. 19, 48, 98, 112 and 123

Proposal for draft 01 series of amendments to Regulation No. 98
(Headlamps with gas-discharge light sources)

Submitted by the expert 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 change the basis for the photometric requirements from 12.0 V to 13.2 V. The modifications to the existing text of the Regulation, including draft Supplement 12 and draft Corrigendum 2 to Supplement 9 to Regulation No. 98, are marked in bold or strikethrough characters.

*/ 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 performance of vehicles. The present document is submitted in conformity with that mandate.

A. PROPOSAL

The list of contents, amend to read:

"13. Transitional provisions..... "

The list of Annexes, amend to read:

"Annex 3: ~~Measuring screens~~The Spherical Coordinate Measuring System and Test Point Locations"

Paragraph 4.2.3.1., amend to read:

"4.2.3.1. On headlamps meeting the requirements of this Regulation which are so designed that the passing beam shall not be lit simultaneously with that of any other lighting function with which it may be reciprocally incorporated: an oblique stroke (/) shall be placed behind ~~passing lamp~~ symbol **indicating the headlamp producing the passing beam** in the approval mark."

Paragraph 5.4.2., amend to read:

Paragraph 5.4.2., amend to read:

"5.4.2. Following the application of this (these) measure(s) the following requirements regarding ~~illumination~~ **the luminous intensity of the headlamp** shall be met: with the adjustment left unchanged compared to that for the original traffic direction:

5.4.2.1. Passing beam designed for right-hand traffic and adapted to left-hand traffic:

at 0.86D-1.72L at least ~~5 lux~~ **2500 cd**
at 0.57U-3.43R not more than ~~1.4 lux~~ **845 cd**

5.4.2.2. Passing beam designed for left-hand traffic and adapted to right-hand traffic:

at 0.86D-1.72R at least ~~5 lux~~ **2500 cd**
at 0.57U-3.43L not more than ~~1.4 lux~~ **845 cd** "

Paragraph 5.5.2., amend to read:

"5.5.2. In the case of failure the ~~illumination~~ **the luminous intensity of the headlamp** above the line H-H shall not exceed the values of a passing beam according to paragraph 6.2.6.; in addition, on headlamps designed to provide a passing and/or a driving beam to become a bend lighting, a ~~minimum illumination~~ **luminous intensity** of at least ~~5 lux~~ **3125 cd** shall be fulfilled in test point 25 V (VV line, D 75 cm)."

Paragraph 6.1.2., amend to read:

"6.1.2. **The luminous intensity produced by the headlamp shall be measured at 25 m distance by means of a photoelectric cell having a useful area comprised within a square of 65 mm side. The point HV is the centre-point of the coordinate system with a vertical polar axis. Line h is the horizontal through HV (see Annex 3 to this Regulation).**"

Paragraph 6.1.3., amend to read:

"6.1.3. The headlamp or distributed lighting systems shall be deemed satisfactory if the photometric requirements set in the present paragraph 6. are met with one light source, which has been aged during at least 15 cycles, in accordance with Annex 4, paragraph 4. of Regulation No. 99.

Where the gas-discharge light source is approved according to Regulation No. 99 it shall be a standard (étalon) light-source and its luminous flux may differ from the objective luminous flux specified in Regulation No. 99. In this case, the ~~illuminances~~ **luminous intensities** shall be corrected accordingly.

The above correction does not apply to distributed lighting systems using a non-replaceable gas-discharge light source or to headlamps with the ballast(s) totally or partially integrated.

Where the gas-discharge light source is not approved according to Regulation No. 99 it shall be a production non-replaceable light source."

Paragraph 6.1.7., amend to read:

"6.1.7. Four seconds after ignition of a headlamp that has not been operated for 30 minutes or more:

6.1.7.1. At least ~~60 lux~~ **37500 cd** shall be attained at point HV, for a headlamp producing driving beam only.

6.1.7.2. At least ~~40 lux~~ **6250 cd** shall be attained at point 50V for headlamps producing passing beam only or alternately passing and driving beam functions as described in paragraph 5.4. of this Regulation.

6.1.7.3. In either case the power supply shall be sufficient to secure the required rise of the high current pulse."

Paragraph 6.2.2., amend to read:

"6.2.2. **The headlamp shall be visually aimed by means of the "cut-off" (see figure 1) as follows. The aiming shall be carried out using a flat vertical screen set up at a distance of 10 m or 25 m (as indicated in section 9 of Annex 1) forward of the headlamp and at right angles to the H-V axis as shown in Annex 3 to this Regulation. The screen shall be sufficiently wide to allow examination and**

adjustment of the "cut-off" of the passing beam over at least 5° on either side of the V-V line."

Paragraph 6.2.2.1., amend to read:

"6.2.2.1. for vertical adjustment: the horizontal part of the "cut-off" is moved upward from below line B and adjusted to its nominal position one per cent (~~25 cm~~ **0.57 degrees**) below the H-H line;
..."

Paragraph 6.2.2.2., amend to read:

"6.2.2.2.
...
(c) the kink of "elbow" should be ~~primarily on~~ **located in the vicinity of** the V-V line.
..."

Paragraph 6.2.3., amend to read:

"6.2.3. When so aimed, the headlamp needs, if its approval is sought solely for a passing beam, to comply only with the requirements referred to in paragraphs 6.2.4. and 6.2.5. below; if it is intended to provide both a passing beam and a driving beam, it shall comply with the requirements set out in paragraphs 6.2.4. to 6.2.6. ~~The values specified for Segment II in paragraph 6.2.5. do not apply to Annex 3, Screen 2."~~

Paragraph 6.2.4.4., amend to read:

"6.2.4.4. The voltage applied to the terminals of the ballast(s) is:

either: **13.5 13.2 V ± 0.1** for 12 V systems
or: otherwise specified (See Annex 7)"

Paragraph 6.2.5. and the table, amend to read:

"6.2.5. After more than 10 minutes after ignition the ~~illuminaees~~ **luminous intensities at the test points referred to in the table below and in annex 3 figure B** (or mirrored about the VV line for left-hand traffic) shall meet the following requirements

Note: In the table:

Letter L means that the point or segment is located on the left of VV line.

Letter R means that the point or segment is located on the right of VV line.

Letter U means the point or segment is located above HH line.

Letter D means the point or segment is located below HH line

*/ The ~~illumination~~ **luminous intensities** values at points 14 through 19 shall be such that:

$$14 + 15 + 16 \geq 0.3 \text{ lux } \mathbf{187 \text{ cd}}$$

$$17 + 18 + 19 \geq 0.6 \text{ lux } \mathbf{375 \text{ cd}}$$

Points or segments	Designation	Luminous Intensity (cd)		Horizontal Angle (Degrees)	Vertical Angle (Degrees)						
		Max	Min								
Any point in zone A (bounded by the following coordinates in degrees)		625									
8L	8L					8R	8R	6R	1.5R	V-V	4L
1U	4U					4U	2U	1.5U	1.5U	H-H	H-H
1	HV	625		0	0						
2	B 50 L	312.5		3.43 L	0.57 U						
3	75 R		12500	1.15 R	0.57 D						
4	50 L	12500		3.43 L	0.86 D						
5	25 L1	18750		3.43 L	1.72 D						
6	50 V		7500	0	0.86 D						
7	50 R		12500	1.72 R	0.86 D						
8	25 L2		2500	9 L	1.72 D						
9	25 R1		2500	9 R	1.72 D						
10	25 L3		1250	15 L	1.72 D						
11	25 R2		1250	15 R	1.72 D						
12	15 L		625	20L	2.86 D						
13	15 R		625	20R	2.86 D						
14			<u>*/</u>	8L	4 U						
15			<u>*/</u>	0	4 U						
16			<u>*/</u>	8 R	4 U						
17			<u>*/</u>	4 L	2 U						
18			<u>*/</u>	0	2 U						
19			<u>*/</u>	4 R	2 U						
20			62.5	8 R	0						
21			125	4 L	0						
A to B	Segment I		3750	5.15 L to 5.15 R	0.86 D						
C - D		1685		2.5 R	1 U						
E to F	Segment III and under	12500		9.37 L to 8.53 R	4.23 D						
	E max R	43750		Right of VV line	Above 1.72 D						
	E max L	31250		Left of VV line							

Paragraph 6.3.1., amend to read:

"6.3.1. In the case of a headlamp designed to provide a driving beam and a passing beam, measurements of the ~~illumination produced on the screen by~~ **luminous intensity of the** driving beam shall be taken with the same headlamp alignment as for measurements under paragraph 6.2.5. above; in the case of a headlamp providing a driving beam only, it shall be so adjusted that the area of maximum ~~illumination~~ **luminous intensity** is centred on the point of intersection of lines H-H and V-V; such a headlamp needs meet only the requirements referred to in paragraph 6.3. Test voltages are the same as in paragraph 6.2.4.4."

Paragraphs 6.3.3. to 6.3.3.2., amend to read:

"6.3.3. Referring to Annex 3 Figure C, and the table below, the luminous intensity distribution of the driving beam shall meet the following requirements.

Test Point	Angular Coordinates Degrees	Required luminous intensity cd	
		Max	Min
H-5L	0.0 , 5.0 L		6250
H-2.5L	0.0 , 2.5 L		25000
H-2.5R	0.0 , 2.5 R		25000
H-5R	0.0 , 5.0 R		6250

6.3.3.1. The point of intersection (HV) of lines HH and VV shall be situated within the isolux representing **80 per cent of maximum luminous intensity. This maximum value (I_M) shall not be less than 43750 cd.**

6.3.3.2 **The maximum value (I_M) shall in no circumstances exceed 215,000 cd.** ~~The reference mark referred to in paragraph 4.2.2.7. above shall be obtained by means of the formula:~~

$$\text{Reference mark} = 0.146 E_{\max}$$

~~This value shall be rounded off to the value: 17.5 20 25 27.5 30 37.5 40.~~

Paragraph 6.3.3.3., to be deleted.

Insert a new paragraph 6.3.4., to read:

"6.3.4. The reference mark (I'_M) of the maximum luminous intensity, referred to in paragraph 6.3.3.2. above, shall be obtained by the ratio:

$$I'_M = I_M/4300$$

This value shall be rounded off to the value 7.5 - 10 - 12.5 - 17.5 - 20 - 25 - 27.5 - 30 - 37.5 - 40 - 45 - 50."

Paragraph 6.4., to be deleted.

Paragraphs 6.5. and 6.5.1.(former), renumber as paragraph 6.4. and 6.4.1.

Paragraph 6.5.2.(former), renumber as paragraph 6.4.2. and amend to read:

"6.4.2. Additional tests are made after the reflector has been tilted vertically upwards by the angle quoted in paragraph 2.1.4. or 2 degrees, whichever is smaller, by means of the headlamp aiming devices. The headlamp is then re-aimed downwards (by means of the goniometer), and the photometric specifications must be met at the following points:

Principal passing beam : HV and 75 R (75 L respectively);
driving beam : $\mathbf{E I_M}$ and point HV (percentage of $\mathbf{E I_M}$).

If the aiming devices do not allow a continuous movement, the position nearest to 2 degrees is chosen."

Paragraph 6.5.3.(former), renumber as paragraph 6.4.3.

Insert new paragraph 13, to read:

"13. TRANSITIONAL PROVISIONS

13.1. From the date of entry into force of the 01 series of amendments to this Regulation no Contracting Party applying it shall refuse to grant approvals under this Regulation as amended by the 01 series of amendments.

13.2. As from 36 months after the date of entry into force of the 01 series of amendments, Contracting Parties applying this Regulation shall grant approvals only if the headlamp meets the requirements of this Regulation as amended by the 01 series of amendments.

13.3. Existing approvals for headlamps already granted under this Regulation before the date of entry into force of the 01 series of amendments shall remain valid indefinitely."

Annex 2.

The first paragraph, amend to read:

"The headlamp bearing the approval mark shown above is a headlamp approved in the Netherlands (E4), under approval number 2439, meeting the requirements of this Regulation in its original form (00). The passing beam is designed for right-hand traffic only.

The figure 30 indicates that the maximum luminous intensity of the driving beam is between **116437** and **136687** candelas.

Note: The approval number and additional symbols shall be placed close to the circle and either above or below the letter 'E', or to the right or left of that letter. The digits of the approval number shall be on the same side of the letter 'E' and face in the same direction.

The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols."

Figure 11, the note, amend to read:

Note: The four examples shown above correspond to a lighting device bearing an approval mark relating to:

A front position lamp approved in accordance with the 01 series of amendments to Regulation No. 7, for left-hand installation;

A headlamp with a gas discharge passing beam designed for right-hand and left-hand traffic and a gas discharge driving beam with a maximum intensity comprised between **86,250 and 101,250 candelas** (as indicated by the number 30), approved in accordance with this Regulation in its original form and incorporating a lens of plastic material;

A front fog lamp approved in accordance with the 02 series of amendments to Regulation No. 19 and incorporating a lens of plastic material;

A front direction indicator lamp of category 1a approved in accordance with the 01 series of amendments to Regulation No. 6."

Figure 12, the text of example 1, amend to read:

"The above example corresponds to the marking of a lens intended to be used in different types of headlamps namely:

Either:

a headlamp with a passing beam designed for both traffic systems and a driving beam with a maximum luminous intensity comprised between **70875 and 91125** candelas (as indicated by the number 20) approved in the Netherlands (E4) in accordance with the requirements of Regulation No. 8 as amended by the 04 series of amendments, and

a front position lamp approved in accordance with the 01 series of amendments to Regulation No. 7,

Or:

A headlamp with a gas discharge passing beam and a driving beam with a maximum luminous intensity comprised between **116437 and 136687** candelas (as indicated by the number 30), designed for both traffic systems and approved in the Netherlands in accordance with the requirements of this Regulation in its original form, which is reciprocally incorporated with the same front position lamp as above,

Or:

even either of the above-mentioned headlamps approved as a single lamp.”

Figure 12, the text of example 2, amend to read:

"The above example corresponds to the marking of a lens of plastic material and used in an assembly of two headlamps approved in the Netherlands (E4) under approval number 81151, consisting of:

a headlamp emitting a halogen passing beam designed for both traffic systems and a halogen driving beam with a maximum luminous intensity between x and y candelas, meeting the requirements of Regulation No. 8 and,

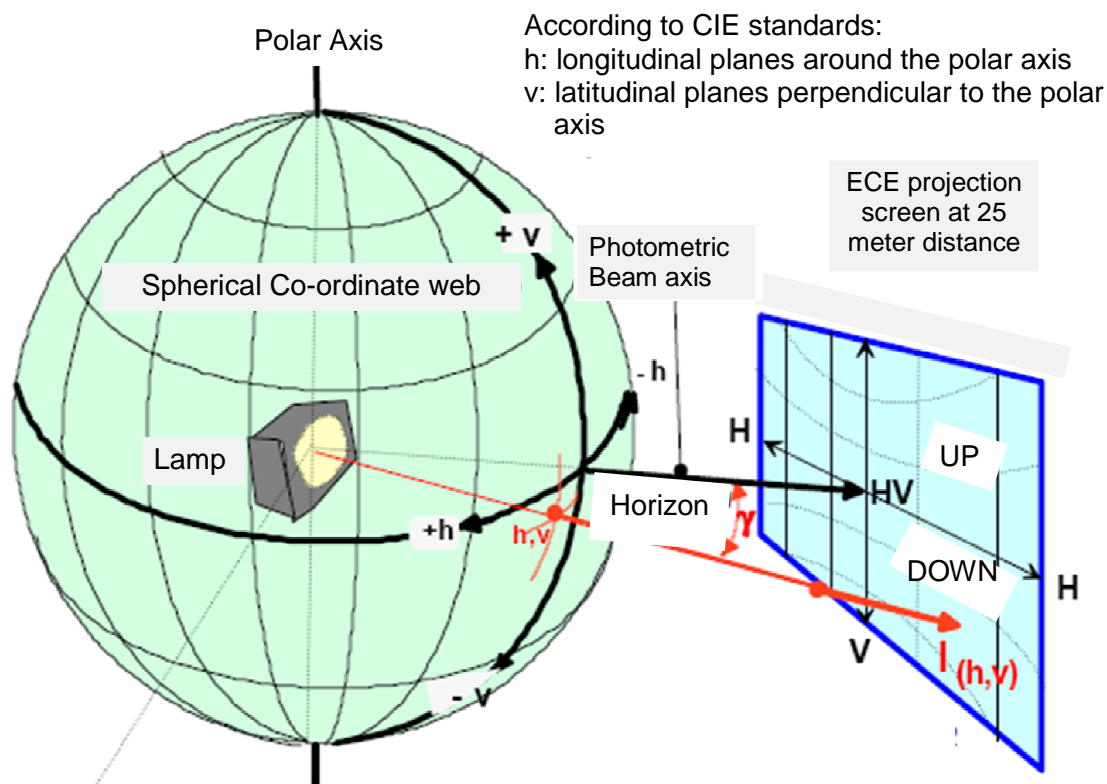
a headlamp emitting a gas discharge driving beam with a maximum luminous intensity comprised between w and z candelas, meeting the requirements of this Regulation in its original form, the maximum luminous intensities of the driving beam contributors as a whole being comprised between **116437 and 136687** candelas as shown by the number 30."

Annex 3, amend to read:

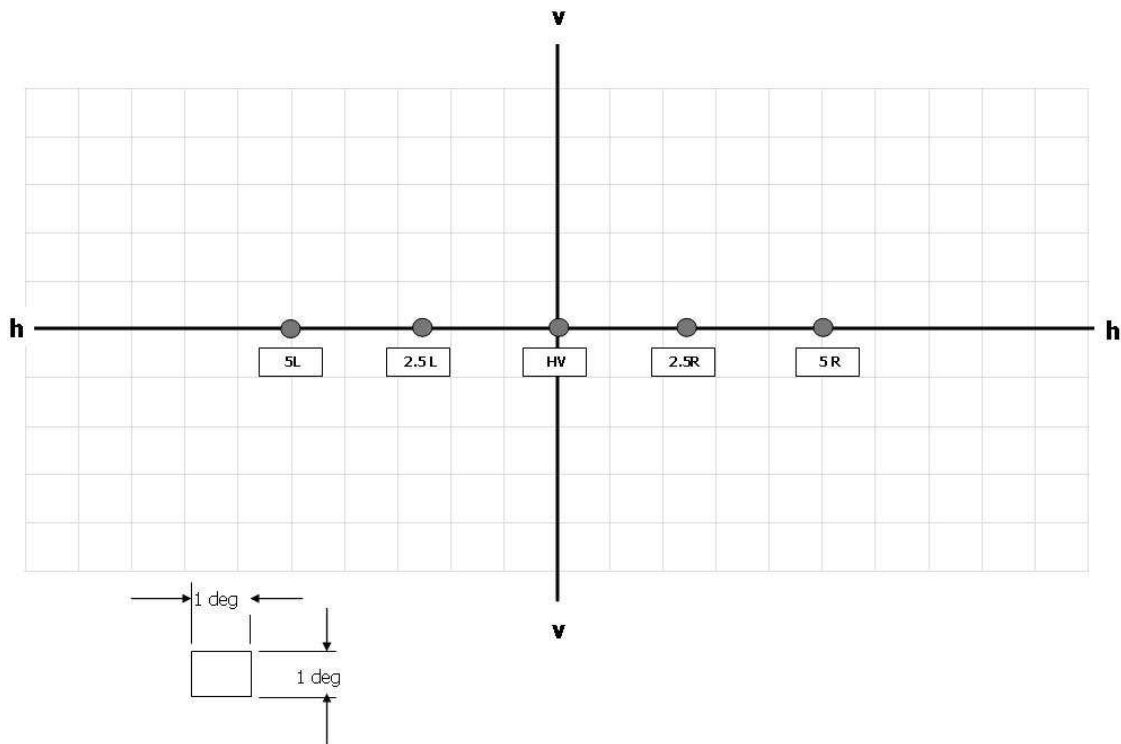
"Annex 3

**SPHERICAL COORDINATE MEASURING SYSTEM
AND TEST POINT LOCATIONS**

Figure A: Spherical Coordinate Measuring System



$$E_{25m} = I_{(h,v)} \times \cos \gamma / r^2$$



h-h : horizontal plane) passing through
 v-v : vertical plane) focus of headlamp

Annex 4,

First paragraph, amend to read:

"TESTS FOR STABILITY ...IN OPERATION

TEST ON COMPLETE HEADLAMPS

Once the photometric values have been measured according to the prescriptions of this Regulation, in the point for E_{max} I_{max} for driving beam and in points HV, 50 R and B 50 L for passing beam (or HV, 50 L, B 50 R for headlamps designed for left-hand traffic) a complete headlamp sample shall be tested for stability of photometric performance in operation. "Complete headlamp" shall be understood to mean the complete lamp itself including ballast(s) and those surrounding body parts and lamps which could influence its thermal dissipation."

Paragraph 1.1.2.2., amend to read:

"1.1.1.2. Test voltage

The test voltage for the ballast and for LED module(s), if applicable, is ~~13.5~~ **13.2** ± 0.1 volts for 12 V network system, or otherwise specified in the application for approval. If there are reciprocally incorporated filament lamps, the voltage producing the reference flux shall be used."

Paragraph 1.1.2.2., amend to read:

"1.1.2.2. Photometric test:

To comply with the requirements of this Regulation, the photometric values shall be verified in the following points:

Passing beam:

50 R - B 50 L - HV for headlamps designed for right-hand traffic
50 L - B 50 R - HV for headlamps designed for left-hand traffic.

Driving beam: Point of ~~E~~_{max} **I** _{max}

Another aiming may be carried out to allow for any deformation of the headlamp base due to heat (the change of the position of the cut-off line is covered in paragraph 2. of this annex).

A 10 per cent discrepancy between the photometric characteristics and the values measured prior to the test is permissible including the tolerances of the photometric procedure."

Paragraph 1.2.1.2., amend to read:

"1.2.1.2. Application of the test mixture to the headlamp:

The test mixture shall be uniformly applied to the entire light-emitting surface of the headlamp and then left to dry. This procedure shall be repeated until the illuminating value has dropped to 15-20 per cent of the values measured for each following point under the conditions described in this annex:

Point of E_{\max} in passing beam/driving beam and in driving beam only,

50 R and 50 V 1/ for a ~~passing lamp~~ **headlamp producing only a passing beam**, designed for right-hand traffic,

50 L and 50 V 6/ for a ~~passing lamp~~ **headlamp producing only a passing beam**, designed for left-hand traffic."

Paragraph 2, amend to read:

"2. TEST FOR CHANGE IN VERTICAL POSITION OF THE CUT-OFF LINE UNDER THE INFLUENCE OF HEAT

This test consists of verifying that the vertical drift of the cut-off line under the influence of heat does not exceed a specified value for an operating ~~passing lamp~~ **headlamp producing a passing beam**.

The headlamp tested in accordance with paragraph 1. shall be subjected to the test described in paragraph 2.1., without being removed from or readjusted in relation to its test fixture.

If the headlamp has a moving reflector, only the position closest to the average vertical angular stroke is chosen for this test."

Annex 5, paragraph 2.1.2.1., amend to read:

"2.1.2.1. Method

Photometric measurements shall be carried out on the samples before and after the test.

These measurements shall be made using a standard lamp, at the following points:

B 50 L and 50 R for the passing beam ~~of a passing lamp or a passing/driving lamp~~(B 50 R and 50 L in the case of headlamps intended for left-hand traffic);

E_{max} **Imax route** for the driving beam ~~of a driving lamp or a passing/driving lamp~~."

Annex 8:

Paragraph 1.2., amend to read:

"1.2. With respect to photometric performance, the conformity of mass-produced headlamps shall not be contested if, when testing photometric performance of any headlamp chosen at random and measured at ~~13.5~~**13.2** V \pm 0.1 V or as otherwise specified and:"

Paragraph 1.2.1., amend to read:

"1.2.1. no illuminance value, if measured and corrected according to paragraph 1.2. above, deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation. **For values B 50 L (or R) and in Zone A, the maximum unfavourable deviation may be respectively:**

B 50 L (or R): 1/

~~0.2-1x~~ **170 cd** equivalent 20 per cent

~~0.3 lx~~ **255 cd** equivalent 30 per cent

Zone A

~~0.3 lx~~ **255 cd** equivalent 20 per cent

~~0.45 lx~~ **380 cd** equivalent 30 per cent”

Paragraph 1.2.2.1., amend to read:

"1.2.2.1. for the passing beam, the values prescribed in this Regulation are met at HV (with a tolerance of + ~~0.2 lx~~ **170cd**) and related to that aiming at one point ~~of each area delimited on the measuring screen (at 25 m) by a circle 15 cm in radius~~ **within a circle of 0.35 degrees** around points B 50 L (or R) 1/ (with a tolerance of ~~0.1 lx~~ **85cd**), 75 R (or L), 50 V, 25 R1, 25 L2, and on segment I;"

Paragraph 1.2.2.1., amend to read:

"1.2.2.2. and if, for the driving beam, HV being situated within the isolux line $0.75 E_{\max} I_{\max}$, a tolerance of + 20 per cent for maximum values and -20 per cent for minimum values is observed for the photometric values at any measuring point specified in paragraph 6.3. of this Regulation."

Paragraph 2.4. and footnote 3/, amend to read:

"2.4. Measured and recorded photometric characteristics

The sampled headlamps shall be subjected to photometric measurements at the points provided for in the Regulation, the reading being limited to points $E_{\max} I_{\max}$, HV 2/, HL, HR 3/ in the case of the driving beam, and to points B 50 L (or R) 1/, HV, 50 V, 75 R (or L) and 25 L2 (or R2) in the case of the passing beam (see figure in Annex 3).

...

3/ HL and HR: points on "hh" located at ~~1.125 m~~ **2.5 degrees** to the left and to the right of point HV respectively."

Annex 9,

Paragraph 1.2., amend to read:

"1.2. With respect to photometric performance, the conformity of mass-produced headlamps shall not be contested if, when testing photometric performance of any headlamp chosen at random and measured at ~~13.5~~**13.2V** ± 0.1 V or as otherwise specified and:
..."

Paragraph 1.2.1., amend to read:

"1.2.1. no measured value deviates unfavourably by more than 20 per cent from the values prescribed in this Regulation.

In the glare zone the maximum deviation may be respectively:

B 50 L (or R): <u>1/</u>	0.2 lx 170 cd equivalent 20 per cent
	0.3 lx 255 cd equivalent 30 per cent

Zone A	0.3 lx 255 cd equivalent 20 per cent
	0.45 lx 380 cd equivalent 30 per cent"

Paragraph 1.2.2.1., amend to read:

"1.2.2.1. for the passing beam, the values prescribed in this Regulation are met at HV (with a tolerance of + ~~0.2 lx~~ **170 cd**) and related to that aiming at one point of ~~each area delimited on the measuring screen (at 25 m) by a circle 15 cm in radius~~ **within a circle of 0.35 degrees** around points B 50 L (or R) 1/ (with a tolerance of ~~0.1 lx~~ **85 cd**), 75 R (or L), 50 V, 25 R1, 25 L2, and on segment I;"

Paragraph 1.2.2.1., amend to read:

"1.2.2.2. and if, for the driving beam, HV being situated within the isolux line $0.75 E_{\max} I_{\max}$, a tolerance of + 20 per cent for maximum values and -20 per cent for minimum values is observed for the photometric values at any measuring point specified in paragraph 6.3. of this Regulation. The reference mark is disregarded."

B. JUSTIFICATION

At its fifty-seventh session, the Working Party on Lighting and Light-Signalling (GRE) accepted a proposal tabled by the expert from GTB (ECE/TRANS/WP.29/GRE/2006/36) to specify the luminous flux of Regulation No. 37 light sources at approximately 13.2 volts instead of 12 volts. Having introduced these changes into Regulation No. 37, it is now appropriate to amend the photometric provisions of Regulation No. 98 accordingly.

Additionally, the opportunity has been taken to introduce the following changes:

- (a) Revision of the photometric tables to specify luminous intensity requirements based upon the spherical coordinate system. There is also a change to the "C-D" passing beam test point in conjunction with the new zone A taken from Regulation No. 123 to avoid glare in the preceding driver's mirrors;
- (b) Revision of Annex 3 detailing the locations of the test points and zones using the spherical coordinate system;
- (c) Revision of Annex 3 to align the passing beam cut-off shape to the new provisions introduced into the Regulation by supplement 9. This cut-off shape is identical to that adopted by Regulation No. 123.

The result of this work, along with similar amendments also being proposed to Regulations Nos. 112 and 123, is an alignment of the passing beam cut-off shape and photometric requirements of all the current headlamp regulations. Additionally, it is no longer necessary to use modifying factors to account for the various light source technologies such as Gas Discharge and LED.

These proposed amendments to the photometric requirements do not affect the validity of lamps type approved to earlier versions of this regulation. However, it is necessary to introduce transitional provisions to allow for the changes to be made to the procedures in the photometric laboratories to accommodate the revised photometric tables and measurement protocols.
