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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****Seventy-fifth session**

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Item 7 (o) of the provisional agenda

Other Regulations - Regulation No. 112 (Headlamps emitting an asymmetrical passing-beam)**Proposal for Supplement 7 to the 01 series of amendments to Regulation No. 112 (Headlamps emitting an asymmetrical passing-beam)****Submitted by the expert from Poland***

The text reproduced below was prepared by the expert from Poland to introduce a new optional “Class B1” headlamp. It is based on Informal document GRE-74-11 and incorporate comments received during and after the seventy-fourth session of GRE. The photometric requirements for Class B1 are based on average real performance of the present Class B (halogen or light-emitting diodes (LED)). The proposal has no additional design restrictions like the luminous flux of light source. The modifications to the existing text of the Regulation are marked in bold for new characters.

* In accordance with the programme of work of the Inland Transport Committee for 2014–2018 (ECE/TRANS/240, para. 105 and ECE/TRANS/2014/26, 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

Paragraph 1.4., amend to read:

“1.4. Headlamps of different "Classes" (A or B or **B1**) mean headlamps identified by particular photometric provisions.”

Paragraph 2.1.4., amend to read:

“2.1.4. Whether it concerns a Class A or B or **B1** headlamp;”

Paragraphs 4.2.2.3., 4.2.2.4. and 4.2.2.5., replace "Class B headlamp" with "Class B and **B1** headlamp".

Paragraph 5.3.2.3., amend to read:

“5.3.2.3. **For the class B headlamps** the total objective luminous flux of all LED modules producing the principal passing-beam and measured as described in paragraph 5. of Annex 10 shall be equal or greater than 1,000 lumens.”

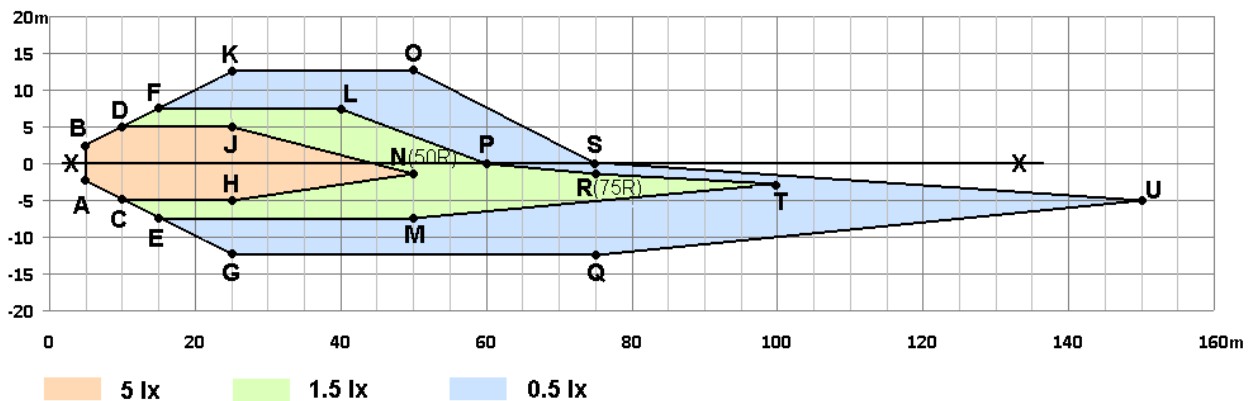
Paragraph 6.2.4., renumber as 6.2.4.1.

Add a new paragraph 6.2.4.2., to read:

“6.2.4.2. **The passing-beam of Class B1 shall meet the luminous intensities described as follows:**

For right hand traffic, the luminous intensities shall be such that the vertical illumination defined for a direction parallel to a line connecting the headlamp centre and a given point on the road surface will be equal or greater than the values described on Figure 2 and in the tables below.

Figure 2
Class B1 luminous intensities test points



Note: Vertical illumination at the road surface to be recalculated for luminous intensities for single headlamp. Side: + Left , -Right; 0,0 – headlamp position at 0.75 m above road surface.

Co-ordinates of points limiting requirements for areas.

<i>Point</i>	<i>Side position (m)</i>	<i>Beyond headlamp (m)</i>	<i>Height (m)</i>
Headlamp centre	0	0	0.75
A	-2.5	5	0
B	2.5	5	0
C	-5	10	0
D	5	10	0
E	-7.5	15	0
F	7.5	15	0
G	-12.5	25	0
H	-5	25	0
J	5	25	0
K	12.5	25	0
L	7.5	40	0
M	-7.5	50	0
N(50R)	-1.5	50	0
O	12.5	50	0
P	0	60	0
Q	-12.5	75	0
R(75R)	-1.5	75	0
S	0	75	0
T	-3	100	0
U	-5	150	0

Required vertical illumination at the road surface

<i>Area restricted by points</i>	<i>Minimum required value (lux)</i>
A, C, H, N, J, D, B, A	5.0
C, E, M, T, R, P, L, F, D, J, N, H, C	1.5
E, G, Q, U, S, O, K, F, L, P, R, T, M, E	0.5

At any point and area, the value of 50 lux shall not be exceeded.

For left hand traffic, all points and values should be mirrored with respect to the X-X line.

It is allowed to fulfill the above requirements for a pair of headlamps intended for the same vehicle but under the condition that the sum of measured values is at least twice the above required values. Moreover, the left headlamp shall meet at least the requirements for a single headlamp from 1.5 m right to the left and the right headlamp shall meet at least the requirements for a single headlamp from 1.5 m left to the right, as defined above.

In any direction the luminous intensity of light emitted by single headlamp cannot be more than 50,000 cd.

Measurements might be done by standard photogoniometric equipment in the spherical coordinate measuring system as described in Annex 3.

For measurement purposes, the recalculation of the vertical illumination at the road surface to luminous intensities in the angular system according to Figure A in Annex 3 should be done. The position of the optical centre of the headlamp should be taken as 0.75 m above point 0,0 on the road surface (see Figure 2 above).

Before measurements, the cut-off shall be aimed according to paragraph 6.2.2., with the exception of paragraph 6.2.2.3.

Luminous intensities mapping the illumination at all the points in the tables above (points A to U) shall be measured.

For measurements of the other points and the areas described above (luminous intensities mapping the illumination at the road surface), the random procedure may be used for reducing the number of measurements. Such a random procedure should provide reliable results and cannot be influenced by anybody, including the technical service or the applicant. The angular resolution of goniophotometer measurements should reflect the uniform density of measuring points on the whole equivalent road surface as presented in Figure 2 above. At least one random measurement should be done for the area representing each rectangle 1 m in width and 5 m in length of the prescribed road surface area. Any visible inhomogeneity on the vertical screen illuminated by headlamp should be additionally verified by measurements of the darkest and the brightest visible points and areas as well as for any other doubts.

Any equivalent measuring method may be used under conditions that guarantee the results as described above and below.

Moreover the passing-beam shall meet the luminous intensities at the test points referred to in the tables below and in Annex 3, Figure B (or mirrored about the VV line for left-hand traffic):

<i>Headlamps for RH Traffic*</i>								
<i>Test point designation</i>	<i>Test point angular coordinates - Degrees</i>						<i>Required luminous intensity cd</i>	
							<i>Max</i>	
B 50 L	0.57U, 3.43L						350	
BR	1.0 U, 2.5R						1,750	
Any point in zone III (bounded by the following coordinates in degrees)						625		
8 L	8 L	8 R	8 R	6 R	1.5 R		V-V	4 L
1 U	4 U	4 U	2 U	1.5 U	1.5 U		H-H	H-H

Note: In the table:

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

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

Letter U means the point is located above HH line

* For left-hand traffic, the letter R shall be replaced by letter L and vice versa.

<i>Headlamps for RH traffic*</i>		
<i>Test point</i>	<i>Angular coordinates, degrees</i>	<i>Required luminous intensity, cd</i> <i>Min</i>
1	4U, 8L	Points 1+2+3 190
2	4U, 0	
3	4U, 8R	
4	2U, 4L	Points 4+5+6 375
5	2U, 0	
6	2U, 4R	
7	0, 8L	65
8	0, 4L	125

”

Annex 2, replace "Class B headlamp" with "Class B and B1 headlamp".

II. Justification

1. The 1,000 lm luminous flux required for LED modules is a substitute to the flux required for halogen light sources (Regulation No. 37) used in passing beam headlamps. For LED headlamps, the optical design can significantly differ from incandescent lamps. Additionally, there are more general relations between the light source luminous flux, light source geometrical size, diameter (size) of optical unit, focal distance, flux efficiency and, finally, the precision of the light beam focusing (quality of the far field road illumination). All these design factors cannot be effectively controlled by the present prescriptions of Regulation No. 112. For the early paraboloidal design, the above relations were more or less fixed and, for this reason, very simplified screen requirements (as for the current Class A and B) were defined. For modern optical design and light sources (LED, laser), these simplifications are not valid. The present minimum photometric requirements of Regulation No. 112 are rather minimalistic at fare distances and this is important for safety. However, the average real 1,000 lm (and more) halogen headlights allow for much better road illumination than this minimum.

2. This proposal introduces optional performance based requirements which are equivalent to present Class B headlamps (average halogen quality) and are technology independent. A reasonable performance criterion is the minimum road illumination. For many years, it has been used for objective assessment of road illumination quality (e.g. the International Commission on Illumination (CIE) TC4-45 method). Recalculations from the photogoniometric angular intensity system to the road surface are well known and commonly used. The proposed criterion is very easy to recalculate (map) for the system while measurements will be done identically as before.