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Working Party on Lighting and Light-Signalling

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Item 5(b) of the provisional agenda

COLLECTIVE AMENDMENTS

Collective amendments on colour specifications

Proposal for draft collective amendments to Regulations Nos. 3, 27, 48, 69, 70 and 104

Submitted by the experts from the Czech Republic and the European Association of Automotive Suppliers */

The text reproduced below was prepared by the experts from the Czech Republic and the European Association of Automotive Suppliers (CLEPA) in order to introduce into the above-mentioned Regulations collective amendments regarding colour specifications for the retro reflective and fluorescent materials specified in the Regulations in object. The proposal is based on two documents without symbol (informal documents Nos. GRE-59-12 and GRE-59-43), distributed during the fifty-ninth GRE session (see report ECE/TRANS/WP.29/GRE/59, paras. 28 and 29). The modifications to the existing text of the Regulations are marked in bold or strikethrough characters. The reference(s) to further footnote(s) will be renumbered accordingly.

*/ 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

A.1. REGULATION No. 3 (Retro-reflecting devices for power-driven vehicles and their trailers)

Insert a new paragraph 2.15., to read:

"**2.15.** "**Colour of the reflected light of the device**" **The definitions of the colour of the reflected light are given in paragraph 2.29. of Regulation No. 48.**"

Paragraph 5.2., amend to read:

"5.2. If the approval granted in respect of a retro-reflecting device is extended to other such devices differing only in colour, the two samples in any other colour submitted in conformity with paragraph 3.1.4. of this Regulation shall be required to meet only the colorimetric specifications ~~(Annex 6)~~, the other tests ...."

Annex 4,

Paragraph 2., amend to read:

"2. After verification of the general specifications (paragraph 6 of the Regulation) and the specifications of shape and dimensions (Annex 5), the ten samples shall be subjected to the heat resistance test described in Annex 10 to this Regulation and at least one hour after this test examined as to their colorimetric characteristics ~~(Annex 6)~~ and CIL..."

Paragraph 3.1., amend to read:

"3.1. a colour which satisfies the conditions laid down in ~~Annex 6~~ **paragraph 2.29. of Regulation No. 48 for clear, red or amber retro-reflecting devices**. This shall be ..."

Annex 6,

Insert new paragraph 2., to read:

"**2. For checking the colorimetric characteristics, paragraph 2.29. of Regulation No. 48 applies.**"

Paragraphs 2. and 3. (former), to be deleted.

Annex 14,

Paragraph 2., amend to read:

"2. … and one hour minimum after this test examined as to their colorimetric characteristics ~~(Annex 6)~~ and CIL ..."

Paragraph 4.1., amend to read:

"4.1. A colour which satisfies the conditions laid down in ~~Annex 6~~ **Regulation No. 48, paragraph 2.29**. This shall be ..."

A.2. REGULATION No. 27 (Advance-warning triangle)

Insert a new paragraph 2.9., to read:

"**2.9. "Colour of the reflected/fluorescent light of the device." The definitions of the colour of the reflected/fluorescent light are given in paragraphs 2.29. and 2.31. of Regulation No. 48.**"

Paragraph 7.2.1.2., amend to read:

"7.2.1.2. When the retro-reflecting device is illuminated by the CIE standard illuminant A, with an angle of divergence of 1/3° and an illumination angle V = H = 0°, or, if this produces a colourless surface reflection, an angle V = ± 5°, H = 0°, the trichromatic co-ordinates of the red reflected luminous flux shall be within **the limits according to paragraph 2.29. of Regulation No. 48.**"

Annex 5,

Paragraph 2.1.1., amend to read:

"2.1.1. … within the colour limits defined in paragraph ~~7.2.1.2. of this Regulation~~ **2.29. of Regulation No. 48.**"

A.3. REGULATION No. 48 (Installation of lighting and light-signalling devices) (The following text is based upon Supplement 01 to the 04 series of amendments).

Insert new paragraphs 2.30. to 2.32.1. and footnote 4/, to read:

"**2.30. Night-time Colour of the light retro-reflected from a device excluding retro-reflective tires according to Regulation No. 88**

2.30.1. "White" means the chromaticity coordinates (x,y) 4/ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

W_{12}	**Blue Boundary:**	**y=0.843 - 1.182x**
W_{23}	**Violet Boundary:**	**y=0.489x + 0.146**
W_{34}	**Yellow Boundary:**	**y=0.968 - 1.010x**
W_{41}	**Green Boundary:**	**y=1.442x - 0.136**

with intersection points:

	x	y
W_1	**0.373**	**0.402**
W_2	**0.417**	**0.350**
W_3	**0.548**	**0.414**
W_4	**0.450**	**0.513**

2.30.2. "Yellow" means the chromaticity coordinates (x,y) 4/ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

Y_{12}	**Green Boundary:**	**y=x - 0.040**
Y_{23}	**The Spectral Locus**	
Y_{34}	**Red Boundary:**	**y=0.20x + 0.268**
Y_{41}	**White Boundary:**	**y=0.970 - x**

with intersection points:

	x	y
Y_1	**0.505**	**0.465**
Y_2	**0.520**	**0.480**
Y_3	**0.610**	**0.390**
Y_4	**0.585**	**0.385**

2.30.3. "Amber" means the chromaticity coordinates (x,y) 4/ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

A_{12}	**Green Boundary:**	**y=1.417x - 0.347**
A_{23}	**The Spectral Locus**	
A_{34}	**Red Boundary:**	**y=0.390**
A_{41}	**White Boundary:**	**y=0.790 - 0.670x**

4/ CIE Publication 15.2, 1986, Colorimetry, the CIE 1931 standard colorimetric observer.

with intersection points:

	x	y
A_1	**0.545**	**0.425**
A_2	**0.557**	**0.442**
A_3	**0.609**	**0.390**
A_4	**0.597**	**0.390**

2.30.4. **"Red" means the chromaticity coordinates (x,y) 4/ of the light reflected that lie inside the chromaticity areas defined by the boundaries:**

R_{12}	**Yellow Boundary:**	**y=0.335**
R_{23}	**The Spectral Locus**	
R_{34}	**The Purple Line**	
R_{41}	**Purple Boundary:**	**y=x + 0.978**

with intersection points:

	x	y
R_1	**0.643**	**0.335**
R_2	**0.665**	**0.335**
R_3	**0.735**	**0.265**
R_4	**0.720**	**0.258**

2.31. **Day-time Colour of the light reflected from a device**

2.31.1. **"White" means the chromaticity coordinates (x,y) 4/ of the light reflected that lie inside the chromaticity areas defined by the boundaries:**

W_{12}	**Violet Boundary**	**y =0.300 + x**
W_{23}	**Yellow Boundary**	**y =0.740 – x**
W_{34}	**Green Boundary**	**y =x + 0,050**
W_{41}	**Blue Boudary**	**y =0.570 – x**

with intersection points:

	x	y
W_1	**0,300**	**0,270**
W_2	**0,385**	**0,355**
W_3	**0,345**	**0,395**
W_4	**0,260**	**0,310**

2.31.2. **"Yellow" means the chromaticity coordinates (x,y) 4/ of the light reflected that lie inside the chromaticity areas defined by the boundaries:**

Y_{12}	**Red Boundary**	**y = 0.534 x + 0.163**
Y_{23}	**White Boundary**	**y = 0.910 - x**
Y_{34}	**Green Boundary**	**y =1.342 x - 0.090**
Y_{41}	**The Spectral Locus**	

with intersection points:

	x	y
Y_1	**0.545**	**0.454**
Y_2	**0.487**	**0.423**
Y_3	**0.427**	**0.483**
Y_4	**0.465**	**0.534**

2.31.3. "Red" means the chromaticity coordinates (x,y) 4/ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

R_{12}	**Red Boundary**	**y = 0.346 – 0.053 x**
R_{23}	**Purple Boundary**	**y = 0.910 – x**
R_{34}	**Yellow Boundary**	**y = 0.350**
R_{41}	**The Spectral Locus**	

with intersection points:

	x	y
R_1	**0,690**	**0,310**
R_2	**0,595**	**0,315**
R_3	**0,560**	**0,350**
R_4	**0,650**	**0,350**

2.32. Day-time Colour of the fluorescent a device

2.32.1. "Red" means the chromaticity coordinates (x,y) 4/ of the light reflected that lie inside the chromaticity areas defined by the boundaries:

FR_{12}	**Red Boundary**	**y = 0.346 – 0.053 x**
FR_{23}	**Purple Boundary**	**y = 0.910 – x**
FR_{34}	**Yellow Boundary**	**y = 0.315 + 0.047 x**
FR_{41}	**The Spectral Locus**	

with intersection points:

	x	y
FR_1	**0,690**	**0,310**
FR_2	**0,595**	**0,315**
FR_3	**0,569**	**0,341**
FR_4	**0,655**	**0,345**

"

A.4. REGULATION No. 69 (Rear-marking plates for slow-moving vehicles and their trailers)

Insert a new paragraph 2.4.4., to read:

"**2.4.4. "Colour of the reflected light of the device." The definitions of the colour of the reflected light are given in paragraph 2.29. and 2.30. of Regulation No. 48.**"

Paragraph 2.5., amend to read:

"2.5. Fluorescence

2.5.1. When certain substances are brought near…….than ordinary colours."

Insert a new paragraph 2.5.2., to read:

"2.5.2. **"Colour of the fluorescent light of the device." The definitions of the colour of the fluorescent light are given in paragraph 2.31. of Regulation No. 48.**"

Annex 6,

Paragraph 2.1., amend to read:

"2.1. When measured with a spectrophotometer in accordance with the provisions of CIE document No. 15 (1971) and illuminated with the CIE Standard illuminant D_{65} at an angle of 45º to the normal and viewed along the normal (45/0 geometry), the colour of the material in new condition shall be **within the limits according to paragraph 2.30. of Regulation No.48.**"

Insert a new paragraph 2.1.1., to read:

"**2.1.1. Luminance factor for red colour shall be ≥ 0,03.**"

Paragraph 2.2., amend to read:

"2.2. When illuminated by the CIE Standard Illuminant A at an entrance angle $\beta1 = \beta2 = 0º$ or, if this produces a colourless surface reflection, an angle $\beta1 = \pm 5º$, $\beta2 = 0º$, and measured at an observation angle of 20', the colour of the material in new condition shall be **within the limits according to paragraph 2.29. of the Regulation No. 48.**"

Paragraph 3.1., amend to read:

"3.1. When measured with a spectrophotometer in accordance with the provisions of CIE document No. 15 (1971) and illuminated polychromatically with the CIE Standard Illuminant D_{65} at an angle 45º to the normal and viewed along the normal (geometry 45/0), the colour of the material in new condition shall be **within the limits**

according to paragraph 2.31. of the Regulation No. 48."

Insert a new paragraph 3.1.1., to read:

"**3.1.1. Luminance factor shall be ≥ 0,03.**"

Annex 8,

Paragraph 1.3., amend to read:

"1.3. Colour fastness – The colours of the exposed specimen shall still meet the requirements specified in Annex 6~~, tables 1, 2 and 3~~."

A.5. REGULATION No. 70 (Rear-marking plates for heavy and long vehicles)

Insert a new paragraph 2.4.4., to read:

"**2.4.4. "Colour of the reflected light of the device." The definitions of the colour of the reflected light are given in paragraph 2.29. and 2.30. of Regulation No. 48.**"

Paragraph 2.5., amend to read:

"2.5. Fluorescence

2.5.1. When certain substances are brought near…….than ordinary colours."

Insert a new paragraph 2.5.2., to read:

"**2.5.2. "Colour of the fluorescent light of the device." The definitions of the colour of the fluorescent light are given in paragraph 2.31. of Regulation No. 48.**"

Annex 6,

Paragraph 2.1., amend to read:

"2.1. When measured with a spectrophotometer in accordance with the provisions of CIE document No. 15 (1971) and illuminated with the CIE Standard illuminant D_{65} at an angle of 45º to the normal and viewed along the normal (45/0 geometry), the colour of the material in new condition shall be **within the limits according to paragraph 2.30. of Regulation No. 48.**"

Insert a new paragraph 2.1.1., to read:

"**2.1.1. Luminance factor for yellow colour shall be ≥ 0,16. For red colour shall be ≥ 0,03.**"

Paragraph 2.2., amend to read:

"2.2. When illuminated by the CIE Standard Illuminant A at an entrance angle $\beta1 = \beta2 = 0^{o}$ or, if this produces a colourless surface reflection, an angle $\beta1 = \pm 5^{o}$, $\beta2 = 0^{o}$, and measured at an observation angle of 20', the colour of the material in new condition shall be **within the limits according to paragraph 2.29. of Regulation No. 48.**"

Paragraph 3.1., amend to read:

"3.1. When measured with a spectrophotometer in accordance with the provisions of CIE document No. 15 (1971) and illuminated polychromatically with the CIE Standard Illuminant D_{65} at an angle 45^{o} to the normal and viewed along the normal (geometry 45/0), the colour of the material in new condition shall be **within the limits according to paragraph 2.31. of Regulation No. 48.**"

Insert a new paragraph 3.1.1., to read:

"**3.1.1. " Luminance factor for red colour shall be ≥ 0,30.**"

Annex 8,

Paragraph 1.3., amend to read:

"1.3. Colour fastness – The colours of the exposed specimen shall still meet the requirements specified in Annex 6~~, tables 1, 2 and 3~~."

A.6. REGULATION No. 104 (Retro-reflective markings for heavy and long vehicles and their trailers)

Insert a new paragraph 2.4.5., to read:

"**2.4.5. "Colour of the reflected light of the device." The definitions of the colour of the reflected light are given in paragraphs 2.29. of Regulation No. 48.**"

Annex 6,

Paragraph 2., amend to read:

"2. When illuminated by the CIE Standard Illuminant A at an entrance angle $\beta1 = \beta2 = 0^{o}$ or, if this produces a colourless surface reflection, an angle $\beta1 = \pm 5^{o}$, $\beta2 = 0^{o}$, and measured at an observation angle of ~~$\alpha =$~~ 20', the colour of the material in new condition shall be within **the limits according to paragraph 2.29. of Regulation No.48.**"

Annex 8,

Paragraph 1.3., amend to read:

"1.3. Colour fastness – The colours of the exposed specimen shall still meet the requirements specified in annex 6~~, tables 1 and 2~~."

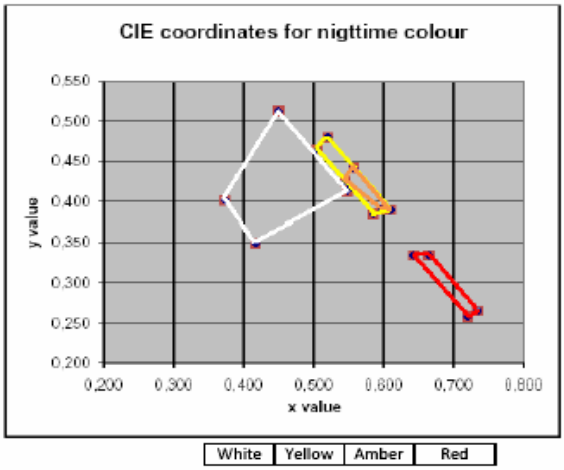
B. JUSTIFICATION

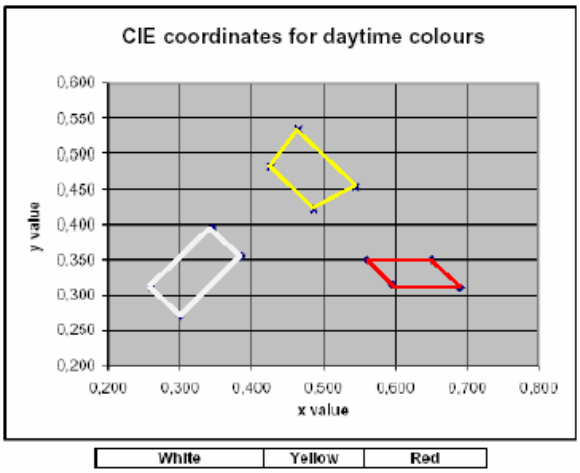
During the fifty-eighth session of GRE the Chairman asked the expert of the Czech Republic to prepare the following proposal with the aim of completing that tabled by the expert from the United Kingdom (ECE/TRANS/WP.29/GRE/2007/62). CLEPA offered its support for the preparation of this proposal. While ECE/TRANS/WP.29/GRE/2007/62 integrates all colorimetric coordinates of active lamps into Regulation No. 48, the current proposal is aimed at completing them with those of passive retro-reflective devices.

The colorimetric coordinates, as defined in this proposal, come from the present data contained in the Regulations of passive devices, in particular ECE Regulations No. 3, 27, 69, 70 and 104, and consolidate the requirements for white, yellow, amber and red colours in case of night-time reflected light; white, yellow and red colours in case of daytime reflected light and the requirements for red colour in case of daytime fluorescence emitted colour.

This proposal is aimed at unifying the colorimetric coordinates of the passive light devices and to place them all in Regulation No. 48, in accordance with paragraph 2.28. of ECE/TRANS/WP.29/GRE/2007/62. It introduces amendments to the individual Regulations in object, as well as new paragraphs 2.29. for night-time visibility conditions, 2.30. for daytime conditions of standard colours and 2.31. for daytime conditions of fluorescent colours into Regulation No. 48.

The drawings below represent the final colorimetric coordinates for both conditions as defined in this proposal:




CIE coordinates for daytime colours
0,600
0,550
0,500
0,450
0,400
0,350
0,300
0,250
0,200
y value
0,200
0,300
0,400
0,500
0,600
0,700
0,800
x value
White
Yellow
Red

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