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Working Party on the Construction of Vehicles

Working Party on Lighting and Light-Signalling (GRE)

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agenda item 2.5.)

**PROPOSAL FOR DRAFT AMENDMENTS TO REGULATION No. 37**

(Filament lamps)

Transmitted by the Expert from the Working Party "Brussels 1952" (GTB)

Note: The text reproduced below was prepared by the expert from GTB in order to introduce in the Regulation a definition of "white light" and to insert a method of measurement of the colour of lamps.

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Note: This document is distributed to the Experts on Lighting and Light-Signalling only.

**A. PROPOSAL**

Paragraph 3.6., amend to read:

"3.6. Colour

3.6.1. The colour of the light emitted by the filament lamp shall be white in all directions within the specified test area unless otherwise specified on the relevant data sheet.

3.6.2. The colourimetric characteristics of the light emitted, expressed in CIE trichromatic coordinates, shall lie within the following limits:

finished filament lamps emitting white light:

limit towards blue	:	$x \geq 0.310$
limit towards yellow	:	$x \leq 0.500$
limit towards green	:	$y \leq 0.150 + 0.640 x$
limit towards green	:	$y \geq 0.440$

limit towards purple	:	$y \geq 0.050 + 0.750 x$
limit towards red	:	$y \geq 0.382;$

finished filament lamps emitting selective-yellow light:

limit towards red	:	$y \geq 0.138 + 0.580 x$
limit towards green	:	$y \leq 1.29 x - 0.100$
limit towards white	:	$y \geq -x + 0.966$

( $y \geq -x + 0.940$  and  $y = 0.440$  for front fog lamps)

limit towards spectral value :  $y \leq -x + 0.992;$ "

finished filament lamps emitting amber light:

limit towards red	:	$y \geq 0.398$
limit towards yellow	:	$y \leq 0.429$
limit towards white	:	$z \leq 0.007.$

3.6.3 The colour of the light emitted shall be measured by the method specified in annex 5.

3.6.4. Bulbs of standard (étalon) filament lamps emitting white light shall not alter the CIE trichromatic coordinates of a luminous source having a colour temperature of 2856 K by more than 0.010 units in the x and/or y direction."

Annex 5, amend to read:

"Annex 5

CHECKING THE COLOUR OF FILAMENT LAMPS.

1. General
  - 1.1. Measurements shall be made on finished lamps. Filament lamps with secondary (outer) bulb acting as colour filter shall be handled as filament lamp with primary bulb.
  - 1.2. Tests shall be made at an ambient temperature of  $23^{\circ} \text{C} \pm 5^{\circ} \text{C}$ .
  - 1.3. Tests shall be made at test voltage as specified in the relevant lamp data sheet.
  - 1.4. Filament lamps shall be measured preferably in the normal operating position.
  - 1.5. Before starting a test, the stabilisation of the temperature of the filament lamp shall be obtained by operating at test voltage for 10 minutes.
2. Colour
  - 2.1. Colour tests shall be made with a measuring system that determines CIE trichromatic co-ordinates of the received light with an accuracy of  $\pm 0.002$ .
  - 2.2. The trichromatic coordinates shall be measured with a colourimetric receiver integrating over a right circular cone subtending an angle of maximum  $15^{\circ}$  at the centre of the filament.
  - 2.3. Measuring directions
    - 2.3.1. For filament lamps used in headlamps, measurements shall be made in directions around the filament lamp with the centreline of the receiver aperture located within a (conical) angle  $\pm 30^{\circ}$ , from the plane perpendicular to the lamp axis with the origin in the centre of the filament. In case of filament lamps with two filaments, the centre of the driving beam filament shall be taken.

2.3.2. For filament lamps used in light-signalling devices, measurements shall be made all around the filament lamp with exception of the area claimed or covered by the cap of the filament lamp. In case of filament lamps with two filaments, the centre of the major filament shall be taken."

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## B. JUSTIFICATION

At its forty-third session GRE held a discussion on the problem of coloured filament lamps for headlamps and examined a proposal by the expert from the United Kingdom which concerned the definition of colour in paragraph 3.6.1., footnote 5/ of Regulation No. 37. There was no final decision and it was agreed that GTB would study the subject (TRANS/WP.29/GRE/43, par. 64. and 65.).

GTB held an exchange of views on this question which involved in particular the experts from its Working Group Light Sources. As a preliminary result the following items have been noted:

The proposed precision in footnote 5/ means a very narrow tolerance. Taking into account the differences in filament luminance the light emitted by approved filament lamps would have to be within a restricted area along the black body locus in the CIE chromaticity diagram. The trichromatic coordinates then depend only on filament temperature.

The words "shall not appreciably alter" could be interpreted to mean that the colour of the light emitted by the headlamps is within the white area as defined in the relevant Regulations. This would permit approving filament lamps which emit bluish or yellowish white light as long as this coloration remains in the specified limits.

Therefore a solution could be to amend paragraph 3.6 of Regulation No. 37 by inserting a definition of white light; this would apply to all filament lamps.

It has been recognised that an incorrect coating of filament lamps will introduce variations in colour as a function of viewing direction. This could be resolved by inserting a precise method of measurement in annex 5 of Regulation No. 37.

These considerations have been summarised in the form of an amendment text for Regulation No. 37 which is set out above. It is intended not as a formal proposal but rather as a contribution by GTB in order to arrive at an acceptable solution in the near future.

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