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Regulation No. 112 (Headlamps emitting an asymmetrical passing beam)

Proposal for amendment to Regulation No. 112

Submitted by the experts from China*

The text reproduced below was prepared by the experts from China in order to improve the test of resistance to atmospheric agents of automotive lamp lenses or lenses material. The modifications to the existing text of the Regulation No. 112 are marked in bold characters.

* In accordance with the programme of work of the Inland Transport Committee for 2010–2014 (ECE/TRANS/208, para. 106, ECE/TRANS/2010/8, 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 2.2.1. of Annex 6, amend to read:

"2.2.1. Resistance to atmospheric agents

Three new samples (lenses or samples of material) shall be exposed to radiation from a source having a spectral energy distribution similar to ~~that of a black body at a temperature between 5,500 K and 6,000 K.~~ **daylight spectral energy distribution described in CIE Publication No. 85:1989, Table 4.** Appropriate filters shall be placed between the source and the samples so as to reduce as far as possible radiations with wave lengths smaller than 295 nm and greater than 2,500 nm, **and the minimum and maximum levels of the relative spectral irradiance in the UV wavelength range are given in Table 1.** The samples shall be exposed to ~~an energetic illumination of $1,200 \text{ W/m}^2 \pm 200 \text{ W/m}^2$~~ **a light source with irradiance of 0.68 W/m^2 at 340 nm** for a period such that ~~the luminous energy that they receive is equal to $4,500 \text{ MJ/m}^2 \pm 200 \text{ MJ/m}^2$~~ **the radiation energy that they receive is equal to $2,550 \text{ kJ/m}^2$.** Within the enclosure, the temperature measured on the black panel placed on a level with the samples shall be $50^\circ\text{C} \pm 5^\circ\text{C}$. In order to ensure a regular exposure, ~~the samples shall revolve around the source of radiation at a speed between 1 and 5 r/min~~ **the irradiance at any position in the area used for specimen exposure shall be at least 80 per cent of the maximum irradiance.**

The samples shall be sprayed with distilled water of conductivity lower than 1 mS/m at a temperature of $23^\circ\text{C} \pm 5^\circ\text{C}$, in accordance with the following cycle:

Spraying: 5 minutes; drying: 25 minutes.

Table 1
Relative spectral irradiance of xenon-arc lamps with daylight filters

<i>Spectral passband</i> (λ =wavelength in nm)	<i>Minimum</i> %	<i>CIE No. 85:1989, Table 4</i> %	<i>Maximum</i> %
$\lambda < 290$			0.15
$290 \leq \lambda < 320$	2.6	5.4	7.9
$320 < \lambda \leq 360$	28.2	38.2	39.8
$360 < \lambda \leq 400$	54.2	56.4	67.5

II. Justification

1. The original requirement used in Regulation No. 112 is based on the old technique: The technique on weathering test has improved a lot in the last ten years..

2. The spectral energy distribution of sun light is much more accurately described in CIE Publication No. 85:1989, Table 4^[1]. We recommend using it to replace 'that of a black body at a temperature between 5,500 K and 6,000 K' to describe spectral energy distribution.

3. For the degradation of polymer material, the influence of Ultra Violet (UV) range of sunlight with short wavelength is much more severe than visible and Infrared (IR) range of sunlight with long wavelength. Generally, only the shortest and longest wave length of light source is described. Therefore, we recommend to include in the regulation the UV table from 'CIE Publication No. 85:1989, Table 4' with minimum and maximum range'. This table is similar to the one in ISO 4892-2:2006^[2].

4. Regarding the irradiance description, since short UV is more severe than visible and IR light, exposure of the sample under 50 W/m² of UV or IR light for 1000 hours will have a totally different result. It would be more accurate to base the irradiance of the light source on UV version instead of total irradiance/illumination. Therefore, we recommend fixing "irradiance of 0.68W/m² at 340nm" and modifying the description of the exposure period from "4,500 MJ/m² ± 200 MJ/m²" to "2,550 kJ/m²" accordingly.

5. We recommend deleting "In order to ensure a regular exposure, the samples shall revolve around the source of radiation at a speed between 1 and 5 r/min", since it is a hardware based description, and it sets a limit for test equipment. Instead, we recommend using a performance based description, which is also accepted by ISO 4892-2:2006^[2]. 'The irradiance at any position in the area used for specimen exposure shall be at least 80 per cent of the maximum irradiance.' There are several international standards on automotive and plastics that have been changed from hardware based to performance based description in the same way, for example, ISO 4892-2:2006, SAE J2527-2004 (which replaces SAE J1960-2004^[4]) have deleted the specification on sample rotation according to old standards ISO 4892-2:1994^[3], SAE J1960-2004^[4].

References:

[1] CIE Publication No. 85:1989, Table 4

[2] ISO 4892-2:2006 Plastics - Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps

[3] ISO 4892-2:1994 Plastics - Methods of exposure to laboratory light sources – Part 2: Xenon-arc sources

[4] SAE J1960 Accelerated exposure of automotive exterior materials using a controlled irradiance water-cooled xenon arc apparatus

[5] SAE J2527 Performance based standard for accelerated exposure of automotive exterior materials using a controlled irradiance xenon-arc apparatus
