

Review of the SAE proposal for amendments to ECE – R 65

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Item 9 of the provisional agenda

Regulation No. 65 (Special warning lamps)

Proposal for amendments to Regulation No. 65

Submitted by the expert from the Society of Automotive Engineers*

The text reproduced below was prepared by the expert from the Society of Automotive Engineers (SAE) in order to clarify the execution of the design and test requirements for the special warning lamp while allowing for harmonization with the requirements for emergency warning lamps as prescribed by SAE. The modifications to the existing text of the Regulation are marked in bold for new or strikethrough for deleted characters.

Main changes

- Editorial corrections;
- Proposal to amend the definition for the reference axis;
- Proposal to require calibrated photometer;
- Introduction of additional environmental tests;
- Proposal to amend the requirements for amber class T special warning lamps;
- General Items;

Question "Reference Center" / "Geometric Center"

"1.7. *"reference centre of the special warning lamp"* means:

- (a) for a rotating or stationary flashing lamp (Category T), the optical centre of the light source, **which is not required to coincide with its geometric centre; the manufacturer of the special warning lamp of Category T may provide the location of the reference centre. In the absence of such specification of the reference centre by the manufacturer, the geometric centre of the external optical surface may be considered as the optical centre. In case of an array of light sources in the optical system, in the absence of the specification of the reference centre by the manufacturer, the geometric centre of the array shall be considered as the optical centre.**

"1.8. *"reference axis of the special warning lamp"* means:

- (a) for a rotating or stationary flashing lamp (Category T), a vertical axis passing through the reference centre of the lamp, **which is not required to coincide with its geometric centre.**
- (b) for a directional flashing lamp (Category X), a horizontal axis parallel to the median longitudinal plane of the vehicle."

The manufacturer of the special warning lamp shall indicate the position of the special warning lamp in relation to the reference axis.

The question is under discussion in the Working Group Photometry

Question “Measuring directions”

1.9. Measuring directions

1.9.1. The effective intensities of rotating or stationary (category T) lamps shall be determined in the directions within an angle of 360 deg around the reference axis of the special warning lamp:

1.9.1.1. in a horizontal plane perpendicular to the reference axis and passing through the reference centre of the special warning lamp;

1.9.1.2. in cones, the generating lines of which produce with the above-mentioned horizontal plane angles, the values of which are indicated in the table in annex 5 to this Regulation.

Insert a new paragraph 1.9.1.2, to read:

"1.9.1.2. starting at a point where the effective intensity is minimum, in steps no greater than 10°, around the reference axis, after reaching photometric stability as indicated in paragraph 2. of Annex 5 to this Regulation;"

The question is under discussion in the Working Group Photometry

Question "Optical Material"

"Under the conditions of paragraph 7 of this Regulation, the trichromatic co-ordinates of light emitted through the ~~filters~~ **optical material** used for special warning lamps shall lie within the following boundaries:

1. Amber*
 - limit towards green : $y \leq x - 0.120$
 - limit towards red : $y \geq 0.390$
 - limit towards white : $y \geq 0.790 - 0.670 x$
2. Blue
 - limit towards green : $y = 0.065 + 0.805 x$
 - limit towards white : $y = 0.400 - x$
 - limit towards purple : $y = 1.667x - 0.222$
3. Red
 - limit towards purple : $y \geq 0.980 - x$
 - limit towards yellow : ~~$y \leq 0.335$~~ $y \leq 0.335$

The question is under discussion in the Working Group Photometry

Question "Colour measurement"

Colorimetric data shall be measured twice; once at the beginning of the photometric evaluation as required in Annex 5, Section 7. of this Regulation, and next at the end of the same photometric evaluation.

For a special warning lamp whose colour coordinates are measured to be on the border of the colour boundaries to be considered for acceptability, evaluate the colorimetric data taken at the beginning and end of photometric evaluation. The special warning lamp shall be considered acceptable only if the data trend is to move towards the centre of the defined colour areas."

* Corresponds to a specific part of the "yellow" zone of the triangle of CIE colours."

A similar requirement is in Annex 5 (Photometry):

5. For any lamp equipped with non-filament light source(s), the luminous intensities measured after one minute and after 30 minutes of operation shall comply with the minimum and maximum requirements. The luminous intensity distribution after one minute of operation can be calculated by applying the ratio achieved at HV between one minute and 30 minutes of operation."

The question is under discussion in the Working Group Photometry

Question “Water Spray Test”

"A ~~simple~~ **sample** of the special warning lamp, fitted in its normal operating position, with all the drainage apertures open if they exist, shall be subjected to a precipitation of 2.5 mm of water per minute, **as measured using a standard rain gauge**, the water being directed at an angle of 45° and from a nozzle producing a full conical jet.

During the test, the device shall turn on its vertical axis at a rate of 4 turns per minute. **If the water is simultaneously directed to the specimen under test from all directions in the horizontal plane, there is no need to rotate the specimen during the test.**

The question is under discussion in the Working Group Photometry

Question “Calibration”

- "1. Measurements of the photometric characteristics shall be taken at a distance of at least 25 m.

The angular diameter of the photoelectric receiver as seen from the special warning lamp shall be 10 minutes ~~of~~ arc maximum. **The calibration of the photometric receiver shall be established using a traceable calibration standard with a correlated colour temperature of 2856 K.**

The response time of the photometric system shall be adequate to the rising time of the signal to be measured.

The question is under discussion in the Working Group Photometry

Question "Stabilisation"

2. For special warning lamps having one level of intensity (class1), the "by night" level shall apply.

For special warning lamps having two levels of intensity (class 2), measurements shall be carried out for each of the two levels.

The effective luminous intensities in various directions shall be as specified in the table tables below, and shall be measured only after the light output from the special warning lamp has reached photometric stability (deviation of less than ± 5 percent in the last 15 minutes of operation) at each level of intensity."

The question is under discussion in the Working Group Photometry

Question “Characteristic”

- “6.1. The measurement of the flash timing characteristics of a special warning lamp where the light output rotationally changes along the surface of such lamp, shall be made with an adequate distance between the sensor and the lamp, such that the sensor is able to assimilate the light from the total surface of the lamp facing the sensor. The distance of the sensor from the special warning lamp should be adjusted such that the aperture through which the sensor is receiving the light, allows full view of the special warning lamp for the sensor.”**

The question is under discussion in the Working Group Photometry

Question "Characteristic"

"7.1. The frequency, the "ON" time and the "OFF" time shall be as specified in the table below

		Colour blue or amber
		rotating system or flash light sources (category T and X)
Frequency f (Hz)	max.	4 4.0
	min.	≥ 2.0
"ON" time t_H (s)	max.	0.4/ f
"OFF" time t_D (s)	min.	0.1

Documentation of data related to flash characteristic stability over a period of 200 hours of continuous operation shall be provided to show that the flash characteristics stay within the bounds specified within Annex 5 to this Regulation, and not vary by more than 20% of the initial flash rate."

The question is under discussion in the Working Group Photometry

Question "Measurement procedure"

- "8.2. If a special warning lamp contains two or more optical systems, all the optical systems shall work in phase **within** ~~This applies only to~~ each half of a complete "bar" which is designed to extend on the width of the vehicle. **In such a case, for the purpose of measurement of effective intensity, only one half of the "bar" shall be energized so that the light emission from the side not being measured is not added into the side being measured. The timing measurements as described in paragraph 6.1 of this Annex 5 apply to the operating half of the "bar".**"

The question is under discussion in the Working Group Photometry

Question "Change of the requirements for the "Amber" special warning lamps of the Category T"

"7.2. The effective luminous intensities (J_e) within the relevant vertical angles for a special warning lamp (Category T) shall be as specified in the table below:

Category T		Colour			
		blue	amber	red	
Minimum value of the effective luminous intensity J_e , within the specified vertical angles and a horizontal angle of 360° around the reference axis	0°	by day	120	230 240	120
		by night	50	100	50
	$\pm 4^\circ$	by day	60	120	60
		by night	25	50	25
	$\pm 8^\circ$	by day		170	
		by night		70	
Maximum value of the effective luminous intensity J_e	Inside $\pm 2^\circ$	by day	1 700		
		by night	700		
	Inside $\pm 8^\circ$	by day	1 500		
		by night	600		
	Outside the above areas	by day	1 000		
		by night	300		

Is not acceptable for ECE

The reduction from 8° to 4° reduces (halves) the distance, for which the amber special warning lamp must be visible, especially in urban areas, because there is the danger that the vehicle will not be seen in time.

This is a clear safety reason, with regard to the vehicles as site vehicles, heavy and long vehicles, urban services, etc..

The remarks with regard to the $V(\lambda)$ are here not applicable, because with this specification, is a lamp legal, which do not provide any light above 4°!

Question “Brief technical description”

- "2.2.2. a brief technical description stating in particular the light source provided by the manufacturer of the special warning lamp and including, where applicable, the electronic control unit(s), the ballast(s) or the light control gear(s) or the light source module and the light source module specific identification code. **In case the light source is a Light Emitting Diode (LED), the manufacturer’s part number and the applicable binning code shall be documented.**"

Principal matter, which is not a special aspect of Warning Lamps!

The question is under discussion in the Working Group Photometry

Question “Environmental Tests”

1) Optical Material:

"2.2.6. ~~two~~ **two samples of the cover optical material**, provided that the construction of the special warning lamp with exception of the colour of the ~~cover~~ **optical material** remains unchanged and the approval may be extended simultaneously or subsequently for special warning lamps of another colour. In this case, it is sufficient to carry out the photometric and colorimetric tests. **The optical material for the warning lamp shall be pre-qualified for environmental endurance including absence of hazing caused by ultraviolet radiation, when exposed to direct sunlight for a period not less than 3 years. The method to be used for this test is per ISO 877-3:2009 .Plastics -- Methods of exposure to solar radiation -- Part 3: Intensified weathering using concentrated solar radiation.**"

Such a test exists only for head lamps, but not for signalling lamps!

Question “Environmental Tests”

2) Vibration:

"5.1. The special warning lamps must be so designed and constructed that in normal conditions of use, and notwithstanding the vibrations to which they may be subjected in such use, their satisfactory operation remains assured and they retain the characteristics prescribed by this Regulation. **The special warning lamp must be able to withstand, a wide-band random vibration for a duration of 6 hours starting at 10 Hz with a G-Load Power Spectrum Density of $0.1g^2/Hz$ and ending at 250 Hz with a G-Load Power Spectrum Density of $0.00408g^2/Hz$ with an RMS value of 1.81g and a tolerance of ± 3 dB.**

The special warning lamps must be so designed and constructed that the relevant requirements with regard to **internal** voltage higher than 50 V are fulfilled."

Principal matter, which is not a special aspect of Warning Lamps and it is covered by the original paragraph 5.1., in each lighting Regulation!

Question “Environmental Tests”

3) Salt Spray Test:

"5.1.1. The special warning lamp must be able to withstand normal environmental corrosion. For this purpose, the product specimen shall be exposed for a period of 240 hours to a Salt/Fog environment per ASTM B 117 (with amendments) using ASTM D 1193 (with amendments), or ISO 9277 NSS (with amendments) using ISO 3696 (with amendments) Type IV Reagent Grade Water. After the exposure, the specimen shall be gently dipped in clean running water, not warmer than 38°C, to remove salt deposits (without scrubbing) from its surface, and then air dried for a period of 1 hour. After drying, the specimen shall be examined for corrosion which would affect the results of other tests required in this Regulation."

Such a test exists only for retro reflective materials, because there was a special need, but not for signalling lamps!

Such test are applied in the ECE – System, only if there is a special reason for it.

If not specified by special reasons, than it is by application of ISO Standards in agreement between customer and supplier.

This is a general question!

Question “Light source Module”

"5.4. Field Replaceable Light source module"

Paragraph 5.4.1., amend to read:

"5.4.1. The design of the **field replaceable** light source module(s) shall be such that even in darkness the light source module(s) can be fitted in no other position, but the correct one."

Paragraph 5.4.2., amend to read:

5.4.2. The **field replaceable** light source module(s) shall be tamperproof.

Field replaceable Light source Module is in the ECE – System an unknown term. The Regulation uses the term “light source module” and the requirement in R 48 for replacement.

"XENON RELATIVE ~~SPECIAL~~ SPECTRAL DISTRIBUTION"

Annex 7, Paragraph 2.5. amend to read:

"2.5. Criteria governing acceptability

The manufacturer is responsible for carrying out a statistical study of the test results and for defining, in agreement with the competent authority, criteria governing the acceptability of his product in ~~other~~ **order** to meet the specifications laid down for verification of conformity of products in paragraph 9.1. of this Regulation.

The criteria governing the acceptability shall be such that, with a confidence level of 95 per cent, the minimum probability of passing a spot check in accordance with Annex 8 (first sampling) would be 0.95."

Annex 8, Paragraph 2.3. amend to read:

"2.3. Approval withdrawn

Conformity shall be contested and paragraph 10 applied if, following the sampling procedure in Figure 1 of this Annex, the deviations of the measured values of the ~~headlamps~~ **special warning lamp** are:"

Purely editorial!

Thank You for Your Attention!