

Proposed alternatives to document GRE-70-17, concerning electronic light source control gear

Note: The text reproduced below was prepared by the expert from IEC for further clarification, after consultation with several experts and in response to discussions on ECE/TRANS/WP.29/GRE/2013/44 and ECE/TRANS/WP.29/GRE/2013/62 and GRE-70-17. The modifications to the existing text of the UN Regulation are marked in bold for new or strikethrough for deleted characters. Proposed alternatives for simplification of GRE-70-17 are marked in red characters.

I. Proposal for Supplement 6 to the 01 series of amendments to Regulation No. 112

Insert a new paragraph 2.1.6., to read:

"2.1.6. Whether electronic light source control gear is part of the headlamp and whether this electronic light source control gear(s) is used for the passing and/or driving beam."

Insert new paragraph 3.7., to read:

"3.7. Electronic light source control gear shall bear the name of the manufacturer and its means of identification, except when it is incorporated with the headlamp body."

Paragraph 5.3., amend to read:

"5.3. The headlamp shall be equipped with:

5.3.1. **Either** filament lamp(s) approved according to Regulation No. 37:

5.3.1.1. Any filament lamp covered by Regulation No. 37 may be used, provided that no restriction on the use is made in Regulation No. 37 and its series of amendments in force at the time of application for type approval.

5.3.1.2. The design of the device shall be such that the filament lamp can be fixed in no other position but the correct one. 6/

5.3.1.3. The filament lamp holder shall conform to the characteristics given in IEC Publication 60061. The holder data sheet relevant to the category of filament lamp used, applies.

5.3.1.4. ~~A means of controlling the voltage at the terminals of the device, within the limits as defined in Regulation No. 48, may, for convenience, be located within the body of the headlamp. However, for the purposes of type approval of the passing and/ or driving beam according to the provisions of this Regulation, such means of voltage control shall not be considered to be part of the headlamp and shall be disconnected during the testing to verify performance according to the requirements of this Regulation.~~

Electronic light source control gear may be part of the headlamp, whether incorporated with the headlamp body or not.

In those cases that electronic light source control gear is part of the headlamp, the following applies:

5.3.1.4.1. The manufacturer shall specify the input and output voltage of such an electronic light source control gear for the conditions under which the passing and/ or driving beam, according to the provisions of this Regulation, is to be approved.

5.3.1.4.2. The requirements in paragraph 6.2.4 (and 6.3.3. if applicable) of this Regulation shall be met at the minimum and the maximum voltage to the electronic light source control gear, as specified according to paragraph 5.3.1.4.1.

This shall be verified for the luminous intensity values calculated by multiplying the luminous intensity values measured at reference luminous flux or calculated according to paragraph 6.1.3.2., by the factors $F_{V_{max}}$ and $F_{V_{min}}$, whereas

either:

(a) $F_{V_{max}} = I_{V_{max}} / I_{ref}$

$$F_{V_{min}} = I_{V_{min}} / I_{ref}$$

$I_{V_{max}}$ is the luminous intensity value measured in 50 R* at the maximum voltage to the **electronic light source** control gear

$I_{V_{min}}$ is the luminous intensity value measured in 50 R* at the minimum voltage to the **electronic light source** control gear

I_{ref} is the luminous intensity value measured in 50 R* at reference luminous flux.

or:

(b) $F_{V_{max}} = (V_{max} / V_{ref})^k$

$$F_{V_{min}} = (V_{min} / V_{ref})^k$$

$$k = 3.5$$

V_{max} is the voltage at the terminals of the light source at the maximum voltage to the **electronic light source** control gear

V_{min} is the voltage at the terminals of the light source at the minimum voltage to the **electronic light source** control gear

V_{ref} is the exact voltage at which the standard filament light source used for the photometric measurements for approval of the headlamp is producing its reference luminous flux.

5.3.1.4.3. The voltage at the terminals of the filament light source shall be not less than 6.0 V (6 Volt-Systems), 12.0 V (12 Volt-Systems) or 24.0 V (24 Volt-Systems) and not larger than 6.75V (6 Volt-Systems), 13.5V (12 Volt-Systems) or 28.V (24 Volt-Systems), plus 3%. This shall be verified by measurements at the minimum and the maximum voltage to the electronic light source control gear, as specified according to paragraph 5.3.1.4.1.

5.3.1.4.4. The use of such an electronic light source control gear shall be noted in item 9. of the communication form in Annex 1.

5.3.2. and/or LED module(s):..."

*/ for right-hand traffic; 50 L in the case of left-hand traffic

Annex 1

Item 9., amend to read:

...Number and specific identification code(s) of electronic light source control gear(s)

Electronic light source control gear: **yes/no 2/**

Total objective luminous flux as described in paragraph 5.9. exceeds 2,000 lumen: yes/no/does not apply²..."

II. Justification

1. It should be noted that the range of allowed voltages to the light source terminals is quite large and even difficult to achieve in practice, because the luminous flux is at the maximum of 13.5V+3% equal to the reference luminous flux plus roughly 20% and minus roughly 30% at the minimum of 12V. This shows the intention of the proposal of stabilisation around the reference luminous flux.

2. The luminous flux of the light source is somewhat depending on the filament lamp that is used. Instead of additional measurements in one test point, a calculation method may be simpler and acceptable for verification. Over a range of 90% up to 110% of test voltage of the light source, a formula can be used to calculate an estimate luminous flux. Possible chemistry effects of a deviating voltage are ignored in this formula.

$$\phi_x / \phi_{ref} = (V_x / V_{ref})^k$$

The value k is depending on the particular design, the use of material and composition of material, power etc. There is no standard value for k available. The table below shows the effect of different known values of k. The voltage V_x to the terminals of the light source is depending on the operating characteristics of the electronic light source control gear.

Calculated data

voltage to the light source			calculated luminous flux re. to reference luminous flux [%]		
	[V]	[%] of 13.2V	k		
			mean value when comparing reference with objective luminous flux in R37	as in some lighting handbooks	as specified by ELMAPS during OVIG
			3.15	3.4	3.5
min	12.00	0.91	0.74	0.73	0.72
		0.92	0.77	0.75	0.75
		0.93	0.80	0.78	0.78
		0.94	0.82	0.81	0.81
		0.95	0.85	0.84	0.84
		0.96	0.88	0.87	0.87
		0.97	0.91	0.90	0.90
		0.98	0.94	0.93	0.93
		0.99	0.97	0.97	0.97
ref flux ~V	13.20	1.00	1.00	1.00	1.00
		1.01	1.03	1.03	1.04
	13.50	1.02	1.06	1.07	1.07
		1.03	1.10	1.11	1.11
		1.04	1.13	1.14	1.15
max	13.91	1.05	1.17	1.18	1.19