

**Economic and Social Council**Distr.: General
17 January 2017

Original: English

Economic Commission for Europe**Inland Transport Committee****World Forum for Harmonization of Vehicle Regulations****Working Party on Lighting and Light-Signalling****Seventy-seventh session**

Geneva, 4-7 April 2017

Item 5 of the provisional agenda

Regulations Nos. 37 (Filament lamps), 99 (Gas discharge light sources), 128 (Light emitting diodes light sources) and the Consolidated Resolution on the common specification of light source categories**Proposal for Supplement 7 to the original version of Regulation No. 128 (Light emitting diodes light sources)****Submitted by the expert from the International Automotive Lighting and Light Signalling Expert Group (GTB)***

The text reproduced below was prepared by the expert from GTB to introduce requirements and test specifications for light emitting diodes (LED) substitute light sources. The modifications to the existing text of the Regulation are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2016–2017 (ECE/TRANS/254, para. 159 and ECE/TRANS/2016/28/Add.1, cluster 3.1), 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.

GE.17-00707(E)



* 1 7 0 0 7 0 7 *

Please recycle



I. Proposal

Insert a new paragraph 2.1.2.4., to read:

“2.1.2.4. The correlated* colour temperature, in so far as it concerns LED substitute light sources;

LED substitute light sources of the colour white with a correlated colour temperature exceeding 3000 K or not exceeding 3000 K are considered as being of different types.

*** CIE S 017/E: 2011: ILV: International Lighting Vocabulary, or eILV; term 17-258.“**

Paragraph 2.2.2.2., amend to read:

“2.2.2.2. A brief technical description including the correlated colour temperature of the light emitted in case of a LED substitute light source emitting white light;”

Insert a new paragraph 2.3.1.5., to read:

“2.3.1.5. The marking as indicated in paragraph 2.3.3., if applicable. “

Insert a new paragraph 2.3.3. and renumber the former paragraph 2.3.3., to read:

“2.3.3. LED substitute light sources of the colour white with a correlated colour temperature not exceeding 3000 K shall be marked by a “G”, placed after the LED substitute light source category marking separated by a space.

2.3.4. Inscriptions other than those covered by paragraphs 2.3.1., 2.3.3. and 2.4.4. may be affixed, on the condition that they do not adversely affect the luminous characteristics.”

Insert a new paragraph 3.10., to read:

“3.10. LED substitute light sources - additional requirements

3.10.1. The electrical current of the LED substitute light source shall be measured at ambient temperature of (23 ± 2) °C in still air after 1 minute and after 30 minutes of operation at test voltage.

Measured values of the electrical current shall be within the limits as specified in the relevant data sheet of Annex 1.

3.10.2. The LED substitute light source shall comply with the technical requirements to an electrical/electronic sub-assembly (ESA) as specified by Regulation No. 10 and its series of amendments in force at the time of application for type approval.

3.10.3. The LED substitute light source shall not emit light when activated for 2 milliseconds or shorter.”

Annex 4, introductory part, amend to read:

“Light sources of all categories with integrated ~~heatsink~~ heat sink shall be measured in still air at ambient temperature of (23 ± 2) °C ~~in still air~~, and at an additional ambient temperature if indicated in the relevant light source sheet. For these measurements the minimum free space as defined in the data sheets shall be maintained.

Light sources of all categories with definition of a temperature T_b shall be measured by stabilising the T_b -point at the specific temperature defined on the category data sheet...”

Annex 5, paragraph 1., amend to read:

“1. General

The conformity requirements shall be considered satisfied from a photometric, geometrical, visual and electrical standpoint if the specified tolerances for production LED light sources in the relevant data sheet of Annex 1, ~~and~~ the relevant data sheet for the caps **and in the case of LED substitute light sources the additional requirements to LED substitute light sources in paragraph 3.10.** are met.”

Annex 6, table 1, insert an additional row at the bottom, to read:

“Table 1

Characteristics

<i>Grouping of characteristics</i>	<i>Grouping* of test records between LED light source types</i>	<i>Minimum 12 monthly sample per grouping*</i>	<i>Acceptable level of non-compliance per grouping of characteristics (%)</i>
Marking, legibility and durability	All types with the same external dimensions	315	1
External LED light source dimensions (excluding cap/base)	All types of the same category	200	1
Dimensions of caps and bases	All types of the same category	200	6.5
Dimensions related to light emitting surface and internal elements**	All LED light sources of one type	200	6.5
Initial readings, power, colour and luminous flux**	All LED light sources of one type	200	1
Normalised luminous intensity or cumulative luminous flux distribution	All LED light sources of one type	20	6.5
Electrical current ***	All LED light sources of one type	20	1

* The assessment shall in general cover series production LED light sources from individual factories. A manufacturer may group together records concerning the same type from several factories, provided these operate under the same quality system and quality management.

** In case a LED light source has more than one light output function the grouping of characteristics (dimensions, power, colour and luminous flux) applies to each element separately.

*** **LED substitute light sources only** “

II. Justification

1. An increasing number of LED retrofit light sources is present in the market and sold as replacements for approved light sources. The public is stimulated by governments to use

energy efficient lighting like LEDs and is already getting used to LED retrofits in general lighting applications. However, the public is not aware that automotive LED retrofits in vehicles exterior lamps may bear a safety risk. The public is not aware either that these LED retrofits are not allowed by many jurisdictions.

2. GTB conducted a feasibility study of LED retrofit light sources. The outcome was that, while photometry aspects can be positively matched, electrical and software configurations of vehicles in use are not standardised. Moreover, the installation is subject to national law. Progress on this feasibility study was reported to GRE (GRE-69-41, GRE-70-47, GRE-72-27 and GRE-73-24).

3. As a consequence, GTB no longer pursued LED retrofit light sources intended for installation in lamps on vehicles originally not approved for these light sources. Instead, GTB worked on LED substitute light sources, intended for use in lamps on vehicles approved for using such light sources.

4. A proposal was developed where lamps may be approved with a filament light source and its corresponding LED substitute light source, fitting in the same holder, and providing equivalent photometric performance. Lamps equipped with these LED substitute light sources shall be tested with both the filament lamp and the LED substitute light source. Vehicles equipped with these lamps shall be declared ready for installation of such lamps, in particular in view of failure detection systems.

5. This proposal comprises of:

- A proposal to introduce provisions into Regulation No. 128;
- A proposal to introduce new category sheets C5W/LED, PY21W/LED and R5W/LED based on LED technology into the Consolidated Resolution (R.E.5);
- Equivalence criteria as guidance for specifying sheets for LED substitute light source categories. These guidelines are intended for publication, with the agreement of GRE, on the GRE website under “reference documents”, similar to criteria for new filament light sources for head lighting (GRE-77-04). In addition, these criteria are being prepared for insertion in publication IEC 60810;
- Equivalence reports for the new categories C5W/LED, PY21W/LED and R5W/LED in LED technology (GRE-77-02).

6. Technical explanations:

(a) A distinction is made in types of a correlated colour temperature above or below 3000 K. The higher colour temperature light sources offer better colour matching options with front lighting light sources. The lower colour temperature light sources shall be used in lamps with colour filters, such as direction indicator lamps or stop lamps, to maintain colour quality and luminous intensity of the lamps. Both LED substitute light sources of a correlated colour temperature up to 3000 K and lamps with colour filters shall be marked by a “G”, placed after the LED substitute light source category marking separated by a space.

(b) For failure detection and on-board diagnostics (OBD) systems, the electrical current of filament light sources can be calculated within some margins from the applied voltage and wattage of the filament light source. For LED substitute light sources this is not the case. This is why the electrical current of LED substitute light sources is specified and also subject to Conformity of Production (COP).

(c) LED substitute light sources contain electronics and such electronics should not unintentionally influence or be influenced by the board net. This is a reason to test LED substitute light sources as electrical/electronic sub-assembly (ESA), as specified by

Regulation No. 10. Approval according to Regulation No. 10 is not possible. This is to avoid that light sources are only tested according to Regulation No. 10 and not as a light source, which has occurred in the past.

(d) LED substitute light sources shall not emit light within 2 ms after activation to avoid visible signals on vehicles doing life testing of light sources.

(e) LED technology is temperature sensitive. The performance of filament light sources does not depend on the ambient temperature. Because LED substitute light sources are intended to replace filament light sources, additional higher ambient temperatures are defined for testing of LED substitutes.

7. As is the case for other light sources, additional tests on voluntary basis are described in standards, such as from the International Electrotechnical Commission (IEC) or Society of Automotive Engineers (SAE).

8. The use of LED substitute light sources in lamps and on vehicles, for which such light sources were not foreseen during the original design of the lamp/vehicle, needs to be verified to guarantee the correct operation of both the lamp and the vehicle.

9. For these reasons, in parallel to the introduction of the LED substitute light sources in Regulation No. 128 and in the Consolidated Resolution (R.E.5), the following amendments to the Regulation for the type approval of the lamps and for the type approval of vehicles for their lamp installation are necessary:

- Provisions in lamp Regulations to allow type approval with both the filament light source category as the prime light source and its LED substitute, whereby for COP lamp testing only the use of a filament light source is required;
 - Provisions in installation Regulations to avoid that lamp(s), originally or by extension approved for LED substitute light sources, are installed on a vehicle while this vehicle failure detection and on-board diagnostics systems are not prepared for LED substitute light sources;
 - Proposals for amendments to Regulation No. 48 concern also 03, 04 and 05 series of amendments to offer the possibility to upgrade vehicles with lamps using LED substitute light sources by extension of approval.
-