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World Forum for Harmonization of Vehicle Regulations**Working Party on Lighting and Light-Signalling****Eighty-fourth session**

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Item 5 of the provisional agenda

UN 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 [48] to the original version of UN Regulation No. 37 (Filament lamps)****Submitted by the Task Force on Substitutes and Retrofits***

The text reproduced below was prepared by the expert from the Task Force on Substitutes and Retrofits (TF SR) with the aim to introduce Light Emitting Diode replacement light sources (LEDr) into this UN Regulation. This proposal supersedes ECE/TRANS/WP.29/GRE/2020/15 and is based on informal document GRE-83-11, presented at the eighty-third session of the Working Party on Lighting and Light-Signalling (GRE). The modifications to the existing text of the UN 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 2021 as outlined in proposed programme budget for 2021 (A/75/6 (Sect.20), para 20.51), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

I. Proposal

Paragraph 1., amend to read:

“ This Regulation applies to filament light sources **and their LED replacement light sources** shown in Annex 1 and intended for use in approved lamps of power-driven vehicles and of their trailers.”

Paragraph 2., amend to read:

“2.1. Definitions

2.1.1. Definition of "*category*"

The term "*category*" is used in this Regulation to describe different basic design of standardised filament light sources, **producing light by incandescent technology, and to describe different basic design of standardised LED replacement light sources, producing light by LED technology.**

Each category has a specific designation, as for example: "H4", "P21W", "T4W", "PY21W" or "RR10W"; **however, a LED replacement light source category has the same designation¹ as its counterpart filament light source category, as for example "H11".**

¹ A LED replacement light source category has the same designation, as it is designed to replace its counterpart filament light source category with equivalent performance; however, it is a distinct category due to another light producing technology being used, described in a separate light source category data sheet shown in Annex 1.

2.1.2. Definition of "*type*"

2.1.2.1. Filament light sources of different⁺² "*types*" are filament light sources within the same **filament light source** category which differ in such essential respects as:

⁺² A selective-yellow bulb or an additional selective-yellow outer bulb, solely intended to change the colour but not the other characteristics of a filament light source emitting white light, does not constitute a change of type of the filament light source.

2.1.2.1.1. Trade name or mark;

(Filament light sources bearing the same trade name or mark but produced by different manufacturers are considered as being of different types. Filament light sources produced by the same manufacturer differing only by the trade name or mark may be considered to be of the same type);

2.1.2.1.2. Bulb design and/or cap design, in so far as these differences affect the optical results;

2.1.2.1.3. Rated voltage;

2.1.2.1.4. Halogen.

2.1.2.2. **LED replacement light sources of different³ "*types*" are LED replacement light sources within the same LED replacement light source category which differ in such essential respects as:**

³ An optional AE device for the LED replacement light source does not constitute a change of type of the LED replacement light source.

2.1.2.2.1. Trade name or mark;

LED replacement light sources bearing the same trade name or mark but produced by different manufacturers are considered as being of different

- types. **LED replacement light sources produced by the same manufacturer differing only by the trade name or mark may be considered to be of the same type;**
- 2.1.2.2.2. Light source design, in so far as these differences affect the optical results;**
- 2.1.2.2.3. Rated voltage;**
- 2.1.2.2.4. High-efficiency;**
- 2.1.2.2.5. Particular electrical polarity;**
- 2.1.2.2.6. Oversize cap.**
- 2.1.2.3. LED replacement light sources and their counterpart filament light sources are considered as being of different types.**
- 2.2. Application for approval
- 2.2.1. Application for approval shall be submitted by the owner of the trade name or mark, or by his duly accredited representative.
- 2.2.2. Every application for approval shall be accompanied (see also paragraph 2.4.2.) by:
- 2.2.2.1. Drawings in triplicate, sufficiently detailed to permit identification of the **light producing technology and of the type;**
- 2.2.2.2. A brief technical description, **which;**
- 2.2.2.2.1. In the case of a filament light source, this shall include the shape of the filament if the relevant light source sheet specifies that a straight or V-shaped filament is allowed;**
- 2.2.2.2.2. In the case of a LED replacement light source, shall include a statement whether the following conditions apply to LED replacement light source:**
- (a) **it is a high-efficiency LED replacement light source,**
- (b) **an AE device is included for applications listed according to paragraph 4.2.2.1.2.,**
- (c) **it has a particular electrical polarity,**
- (d) **it is equipped with an oversize cap;**
- 2.2.2.2.3. In the case of a high-efficiency LED replacement light source, shall include the range of the electrical current at test voltage; this range shall be below the objective minimum value of the electrical current as specified in the data sheet of Annex 1, which does not apply to the high-efficiency LED replacement light source without or with disconnected AE device;**
- 2.2.2.2.4. In the case of AE device(s) is/are included, shall include trade name(s) or mark(s) of the AE device(s), the rated voltage, the maximum wattage and the specific identification code(s), if already granted to other LED replacement light source(s) together with this/these AE device(s).**
- 2.2.2.3. Five samples of each colour which has been applied for;
- 2.2.2.3.1. Five samples of AE device(s) if prescribed by the applicant according to paragraph 2.2.2.2.2;**
- 2.2.2.4. Documents, in the case of LED replacement light sources, showing:**
- 2.2.2.4.1. The information to be displayed on the packaging of LED replacement light sources;**
- 2.2.2.4.2. The instructions to be contained by the packaging of LED replacement light sources if at least one of the conditions in paragraph 2.2.2.2.2. applies; an initial listing as described in paragraph 4.2.2.1 shall be included.**

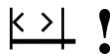
- 2.2.3. In the case of a type of ~~filament~~ light source, or **AE device suitable to a type of LED replacement light source**, differing only by the trade name or mark from a type of **light source, or AE device suitable to a type of LED replacement light source**, that has already been approved it shall be sufficient to submit:
- 2.2.3.1. A declaration by the manufacturer that the type submitted is identical (except in the trade name or mark) and has been produced by the same manufacturer as, the type already approved, the latter being identified by its approval code;
- 2.2.3.2. Two samples bearing the new trade name or mark.
- 2.2.4. The Type Approval Authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.
- 2.3. Inscriptions
- 2.3.1. ~~Filament~~ Light sources submitted for approval shall bear ~~on the cap or bulb~~²⁴:
- ²⁴ ~~In the latter case,~~ The luminous characteristics shall not be adversely affected.
- 2.3.1.1. The trade name or mark of the applicant;
- 2.3.1.2. The rated voltage. However, for ~~filament~~ light sources for which only a 12 V type is standardised and the maximum allowed bulb diameter of which does not exceed 7.5 mm, the rated voltage need not be marked;
- 2.3.1.3. The ~~international~~ designation of the relevant category. The wattage character "W" of this designation need not be marked ~~when~~ **if** the maximum allowed bulb diameter of the ~~filament~~ light source type does not exceed 7.5 mm;
- 2.3.1.4. The rated wattage **in the case of a filament light source**, (in the sequence, high wattage/low wattage filament for dual-filament light sources); this need not be indicated separately if it is part of the ~~international~~ designation of the relevant filament light source category;
- 2.3.1.5. **The character "H⁵" in the case of a high-efficiency LED replacement light source; this mark shall be placed before the truncated circle according to paragraph 2.4.3.1., separated by a single character space.**
- ⁵ This character can be composed of "H" overlapping with "E" or of "F" (Unicode 0370 Hex) connected to "E" (Unicode 0045 Hex).
- 2.3.1.6. A space of sufficient size to accommodate the approval mark;
- 2.3.1.7. **In the case of a LED replacement light sources for which at least one of the conditions in paragraph 2.2.2.2. applies, the following symbol⁶:**



⁶ ISO 7000, symbol 1641

- 2.3.2. The space mentioned in paragraph ~~2.3.1.5~~ **2.3.1.6.** above shall be indicated in the drawings accompanying the application for approval.
- 2.3.3. Halogen filament light sources meeting the requirements of paragraph ~~3.7.~~ **3.3.4.** below shall be marked with a "U".
- 2.3.4. **LED replacement light sources shall be marked with "LEDr".**
- 2.3.5. **The AE device(s) or the cable(s) permanently fixed to the AE device(s), if any, shall bear:**
- 2.3.5.1. **the trade name or mark of the applicant;**
- 2.3.5.2. **the rated voltage and maximum wattage;**

- 2.3.5.3. the specific identification code(s), or if it concerns a new application, a space sufficient to accommodate the specific identification code.
- 2.3.6. The specific identification code of an AE device shall comprise the starting character "Æ"⁷ for "ADDITIONAL ELECTRONICS", followed by the distinguishing number of the country of the approval authority and, separated by a single character space, the approval code of the LED replacement light source, with which the additional electronics device(s) has/have been approved. Annex 3 to this Regulation gives an example of arrangement of a specific identification code.
- ⁷. Unicode 00C6 Hex
- 2.3.7. An AE device may bear more than one specific identification code together with the belonging trade name or mark if all are from the same applicant.
- 2.3.8. LED replacement light sources with a particular electrical polarity that operate in only one position while by design the LED replacement light source or its electrical connector can be inserted in more than one position, shall be marked with the electrical polarity, which is to be connected to the respective terminals of the light source, using the symbols "+" or "—" according to the electrical polarity specification given in the relevant light source category data sheet, placed closely to or on the respective terminal.
- 2.3.9. LED replacement light sources with an oversize cap, of which geometric dimensions of the cap, not relevant for interchangeability, exceed those specified in the relevant cap data sheet of IEC Publication 60061, but which are within maximum allowed deviations as specified in the relevant light source category data sheet, shall be marked with the following symbol⁸, followed by the exclamation mark, separated by a single character space, as follows:



⁸. ISO 7000, symbol 919

- 2.3.10. Inscriptions other than those covered by paragraphs 2.3.1. and 2.4.3. may be affixed, on the condition that they do not adversely affect the luminous characteristics.
- 2.4. Approval
- 2.4.1. If all samples of a type of ~~filament~~ light source which are submitted in pursuance of paragraphs 2.2.2.3. or 2.2.3.2. above meet the requirements of this Regulation, **whereby for LED replacement light sources also the provision in paragraph 3.4.7.1. applies**, approval shall be granted.
- 2.4.2. An approval code shall be assigned to each type approved. This approval code shall consist of Section 3 of the approval number³⁹. The same Contracting Party may not assign the same code to another type of ~~filament~~ light source. Notice of approval or of extension or refusal or withdrawal of approval or production definitively discontinued of a type of ~~filament~~ light source pursuant to this Regulation shall be communicated to the Parties of the Agreement which apply this Regulation by means of a form conforming to the model in Annex 2 to this Regulation and of a drawing, supplied by the applicant for approval in a format not exceeding A4 (210 x 297 mm) and on a scale of at least 2:1. If the applicant so desires, the same approval number (and the same correlating approval code) may be assigned to the filament light source emitting white light and to the filament light source emitting selective-yellow light (see paragraph ~~2.4.2.3. 2.1.2., footnote 2~~).
- ³⁹. 1958 Agreement, Revision 3, Schedule 4 (E/ECE/TRANS/505/Rev.3).
- 2.4.3. To every ~~filament~~ light source conforming to a type approved under this Regulation there shall be affixed in the space referred to in paragraph ~~2.3.1.5.~~

2.3.1.6., in addition to the inscriptions required under paragraph 2.3.1., an ~~international~~ approval mark consisting of:

- 2.4.3.1. A truncated circle surrounding the letter "E" followed by the distinguishing number of the country which has granted approval⁴¹⁰.
- ⁴¹⁰. The distinguish numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to Consolidated Resolution on the Construction of Vehicles (R.E.3) (TRANS/WP.29/78/Rev.6).
- 2.4.3.2. The approval code, placed close to the truncated circle.
- 2.4.4. If the applicant has obtained the same approval number (and the same correlating approval code for several trade names or marks, one or more of them will suffice to meet the requirements of paragraph 2.3.1.1.
- 2.4.5. The marks and inscriptions specified in paragraphs 2.3.1. **2.3.5., 2.3.8., 2.3.9.** and 2.4.3. shall be clearly legible and be indelible.
- 2.4.6. Annex 3 to this Regulation gives ~~an~~ examples of arrangement of the approval mark **and specific identification code.** “

Paragraph 3.2., amend to read:

- “3.2. General specifications
- 3.2.1. Each sample submitted shall conform to the relevant specifications of this Regulation.
- 3.2.2. ~~Filament~~ Light sources shall be so designed as to be and to remain in good working order when in normal use. They shall moreover exhibit no fault in design or manufacture.
- 3.2.3. The filament(s) shall be the only element(s) of the filament light source that generate and emit light when energised.
- The solid state junction(s) and possibly one or more elements for fluorescence-based conversion shall be the only element(s) of the LED replacement light source that generate(s) and emit(s) light when energized.”**

Paragraph 3.3. (former), amend to read:

- “~~3.3. ———— Manufacture~~
- ~~3.3.1.~~**3.2.4.** ~~Filament~~ Light sources ~~bulbs~~ shall exhibit no scores or spots which might impair their efficiency and their optical performance. **This shall be verified for LED replacement light sources when commencing approval testing and when required in the respective paragraphs in this Regulation.**
- ~~3.3.2.~~**3.2.5.** ~~Filament~~ Light sources shall be equipped with standard caps complying with the cap data sheets of IEC Publication 60061, as specified on the individual data sheets of Annex 1.
- 3.2.5.1. LED replacement light sources shall be equipped with a cap of the same cap designation as specified for its counterpart filament light sources with the same category designation.**
- 3.2.5.2. Geometric dimensions of the cap of the LED replacement light source, not relevant for interchangeability, may deviate from those specified in the relevant cap data sheet of IEC Publication 60061 within maximum allowed values if these maximum deviations are specified in the relevant light source category data sheet (oversize cap).**
- ~~3.3.3.~~**3.2.6.** The cap shall be strong and firmly secured to the bulb **of the filament light source.**
- ~~3.3.4.~~**3.2.7.** To ascertain whether ~~filament~~ light sources conform to the requirements of paragraphs ~~3.3.1.~~ **3.2.4.** to ~~3.3.3~~ **3.2.6.** above, a visual inspection, a dimension

check and, where necessary, a trial fitting **into the holder as specified in IEC publication 60061** shall be carried out.“

Insert a new paragraph 3.3., to read:

“3.3. Filament light sources (incandescent technology)”

Paragraphs 3.4. to 3.10, including subparagraphs and references, renumber as paragraphs 3.3.1. to 3.3.7., respectively.

Paragraph 3.3.3.3. (renumbered), amend to read:

“3.3.3.3. The colour of the light emitted shall be measured by the method specified in Annex 5. Each measured value shall lie within the required chromaticity area⁵¹¹. Moreover, in the case of filament light sources emitting white light, the measured values shall not deviate more than 0.020 unit in the x and/or y direction from a point of choice on the Planckian locus (CIE ~~3rd~~ **015 :2018**, 4th edition). Filament light sources for use in light signalling devices shall meet the requirements as specified in paragraph 4.4.2. of IEC Publication 60809, Edition 3.”

⁵¹¹. For conformity of production purposes of amber and red colour only, at least 80 per cent of the measuring results shall lie within the required chromaticity area.

Insert a new paragraph 3.4. to read:

“3.4. LED replacement light sources (LED technology)

3.4.1. Tests

3.4.1.1. LED replacement light sources shall first be aged at their test voltage for at least forty-eight hours. For LED replacement light sources with the counterpart being a dual filament light sources, each function shall be aged separately.

3.4.1.2. Unless otherwise specified, electrical and photometric measurements shall be carried out at the relevant test voltage(s).

3.4.1.3. Electrical measurements as specified in Annex 6 shall be carried out with instruments of at least class 0.2 (0.2 per cent full scale accuracy).

3.4.2. Position and dimensions of light emitting area

3.4.2.1. The position and dimensions of the light emitting area shall conform to the requirements as given on the relevant data sheet of Annex 1.

3.4.2.2. The measurement shall be made after ageing the LED replacement light source according to paragraph 3.4.1.1.

3.4.3. Luminous flux

3.4.3.1. When measured according to the conditions specified in Annex 6, the luminous flux shall be within the limits given on the relevant data sheet of Annex 1.

3.4.3.2. The measurement shall be made after ageing the LED replacement light source according to 3.4.1.1.

3.4.4. Normalized luminous intensity distribution / cumulative luminous flux distribution

3.4.4.1. When measured according to the test conditions specified in Annex 6, the normalized luminous intensity distribution and/or cumulative luminous flux distribution shall be within the limits given on the relevant data sheet of Annex 1.

3.4.4.2. The measurement shall be made after ageing the LED replacement light source according to paragraph 3.4.1.1.

3.4.5. Colour

3.4.5.1. The colour of the light emitted by the LED replacement light sources shall be specified on the relevant data sheet. The definitions of the colour of the light emitted given in Regulation No. 48 and its series of amendments in force at the time of application for type approval shall apply to this regulation.

3.4.5.2. The integral value of the chromaticity coordinates shall lie within the required chromaticity area; this shall be measured by the method specified in Annex 6.

3.4.5.3. In the case of LED replacement light sources emitting white light and for use in forward lighting devices, the colour shall be measured in the same directions as where the luminous intensity distribution is specified in the relevant data sheet, but only where the specified minimum luminous intensity is exceeding 50 cd/klm. The measured values shall lie within the required chromaticity area for white light.

3.4.5.4. In the case of LED replacement light sources emitting white light, the minimum red content of the light shall be such that:

$$k_{\text{red}} = \frac{\int_{\lambda=610\text{nm}}^{780\text{nm}} E_e(\lambda)V(\lambda)d\lambda}{\int_{\lambda=380\text{nm}}^{780\text{nm}} E_e(\lambda)V(\lambda)d\lambda} \geq 0,05$$

where:

$E_e(\lambda)$ (unit: W) is the spectral distribution of the irradiance;

$V(\lambda)$ (unit: 1) is the spectral luminous efficiency;

λ (unit: nm) is the wavelength.

This value k_{red} shall be calculated using intervals of one nanometer.

3.4.5.5. The correlated colour temperature¹² of LED replacement light sources emitting white light shall be no more than 3000 K, unless otherwise defined in the relevant data sheet of Annex 1.

¹² CIE S 017/E: 2020: ILV: International Lighting Vocabulary, or eILV; term 17-23-068

3.4.6. UV-radiation

The UV-radiation of the LED replacement light source shall be such that the LED light source is of the low UV type complying with:

$$k_{\text{UV}} = \frac{\int_{\lambda=250\text{ nm}}^{400\text{ nm}} E_e(\lambda)S(\lambda)d\lambda}{k_m \int_{\lambda=380\text{ nm}} E_e(\lambda)V(\lambda)d\lambda} \leq 10^{-5} \text{ W/lm}$$

where:

$E_e(\lambda)$ (unit: W) is the spectral distribution of the irradiance;

$S(\lambda)$ (unit: 1) is the spectral weighting function;

$V(\lambda)$ (unit: 1) is the spectral luminous efficiency;

λ (unit: nm) is the wavelength

$k_m = 683 \text{ lm/W}$ is the maximum value of the luminous efficacy of radiation.

This value k_{UV} shall be calculated using intervals of one nanometer. The UV-radiation shall be weighted according to the values as indicated in the Table below:

λ	$S(\lambda)$	λ	$S(\lambda)$	λ	$S(\lambda)$
250	0.430	305	0.060	355	0.000 16
255	0.520	310	0.015	360	0.000 13
260	0.650	315	0.003	365	0.000 11
265	0.810	320	0.001	370	0.000 09
270	1.000	325	0.000 50	375	0.000 077
275	0.960	330	0.000 41	380	0.000 064
280	0.880	335	0.000 34	385	0.000 053
285	0.770	340	0.000 28	390	0.000 044
290	0.640	345	0.000 24	395	0.000 036
295	0.540	350	0.000 20	400	0.000 030
300	0.300				

Note: Values according to "IRPA/INIRC Guidelines on limits of exposure to ultraviolet radiation". Wavelengths (in nanometers) chosen are representative; other values should be interpolated.

3.4.7. Electrical characteristics

3.4.7.1. Electrical characteristics shall be tested at least at one sample and, in the case of a high-efficiency LED replacement light source, including and excluding the AE device(s), if any.

3.4.7.2. The electrical current of the LED replacement light source shall be measured at ambient temperature of $(23 \pm 2) ^\circ\text{C}$ 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.

However, in the case of a high efficiency LED replacement light source, measured values of the electrical current shall be within the range(s) specified by the applicant according to paragraph 2.2.2.2.3.; if an AE device is prescribed by the applicant according to paragraph 2.2.2.2.2., measured values of the electrical current shall also be within the limits as specified in the relevant data sheet of Annex 1 with AE device(s) connected.

3.4.7.3. The LED replacement 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.

3.4.7.4. The LED replacement light source shall not emit light when energized for 2 milliseconds or shorter.

3.4.7.5. Modulated light, emitted by the LED replacement light source when operated at a pulse-width modulated (PWM) voltage having an effective value, which is equal to the value of the prescribed test voltage, at frequencies of 100 Hz, 125 Hz, 150 Hz, 175 Hz and 200 Hz and all with a 90% duty cycle¹³, shall not exhibit any frequency components lower than the applied PWM frequency.

¹³ ON time as percentage of the total time of one PWM cycle.

3.4.7.6. If an objective luminous flux value for a dimming mode is specified in the relevant data sheet of Annex 1, this shall be tested.

3.4.8. **Cap temperature**

The cap temperature of the LED replacement light source shall not exceed the maximum cap temperature value indicated in the relevant datasheet of Annex 1. This shall be verified (except for high-efficiency types) by measurement according to the conditions specified in Annex 6. “

Paragraphs 4. to 8., including subparagraphs and references, renumber as paragraphs 5. to paragraph 9., respectively.

Insert a new paragraph 4. to read:

“4. Requirements to the packaging of LED replacement light sources

4.1. Each package shall display the following information:

4.1.1. The trade name or mark of the applicant;

4.1.2. The rated voltage;

4.1.3. The designation of the LED replacement light source category and separated by a single character or line space “LEDr”;

4.1.4. The approval code;

4.2. In the case of LED replacement light sources for which at least one of the conditions in paragraph 2.2.2.2. applies, the following requirements apply:

4.2.1. Each package shall also display the following symbol¹⁴:



¹⁴ ISO 7000, symbol 1641

4.2.2. Each package shall contain instructions in an official language of the 1958 Agreement (i.e. English, French or Russian), supplemented by the corresponding text in the language of the country where it is sold:

4.2.2.1. Providing (a) website address(es) where the applicant shall publish up-to-date listing(s), for which the approval holder is responsible, of lighting and light signalling functions installed on vehicle models, specified by at least brand, type, model, and manufacturing period of the vehicle:

4.2.2.1.1. Stating that this LED replacement light source, including AE device(s), if listed, is suitable (or not) for fitment in these listed applications;

4.2.2.1.2. Providing information for these listed applications, necessary for installation and proper functioning of the LED replacement light source, aimed at the consumer, on the conditions that apply as stated by the applicant according paragraph 2.2.2.2.

4.2.2.2. Referring to professional maintenance or repair shops, if the applicability of the LED replacement light source is unclear;

4.2.2.3. Warning, clearly legible, that if this LED replacement light source is not used in accordance with the instructions with its package and with the instructions provided with the vehicle, this LED replacement light source

may cause a fault in the vehicle’s electrical system and/or pose an operational and/or traffic safety risk;

4.2.3. The applicant shall provide the instructions, as referred to in paragraph 4.2.2., for displaying purposes at the point of sales without opening the package.“

Paragraph 5.1. (renumbered), amend to read:

“5.1. ~~Filament~~ Light sources approved to this Regulation shall be so manufactured as to conform to the type approved by meeting the inscriptions and technical requirements set forth in **this Regulation**, paragraph 3-~~above~~ and Annexes 1 and 3; **in the case of filament light sources also and Annex 4; to this Regulation in the case of LED replacement light sources also Annex 6.”**

Paragraph 5.3.5. (renumbered), amend to read:

“5.3.5. Ensure that for each type of ~~filament~~ light source, at least the tests prescribed in Annex 7 ~~6~~ to this Regulation are carried out;”

Insert a new paragraph 5.3.7. to read:

“5.3.7. Keep record of the information and listings, including the modifications and modification dates, published on its websites as described in paragraph 4.2.2.1.; this is the responsibility of the approval holder.”

Paragraph 6.1. (renumbered), amend to read:

“6.1. The approval granted in respect of a ~~filament~~ light source pursuant to this Regulation may be withdrawn if the requirements are not met or if a ~~filament~~ light source bearing the approval mark does not conform to the type approved.”

Paragraph 9.1. (renumbered), footnote 6, renumber to footnote 15.

Annex 1, amend to read:

“Annex 1

Sheets* for filament light sources and their LED replacement light sources

The sheets of the relevant ~~filament~~ light source category and the group in which this category is listed with restrictions on the use of this category shall apply as incorporated in Resolution ~~[R.E.45]~~ or its subsequent revisions, applicable at the time of application for type approval of the ~~filament~~ light source.”

Annex 2, items 1 to 3, amend to read:

1. Trade name or mark of the ~~filament~~ light source :.....
2. Manufacturer's name for the type of ~~filament~~ light source :
- Manufacturer’s name(s) for the AE device(s)**
3. Manufacturer's name(s) and address(es):..... “

Item 9, amend to read:

- “9. Concise description:.....
- Category of ~~filament~~ light source:

* From [date] onwards, the sheets for filament light sources, the list and groups of filament light source categories with their restrictions on the use and their sheet numbers are incorporated in Resolution ~~[R.E.45]~~ (ECE/TRANS/WP.29/2016/11127)

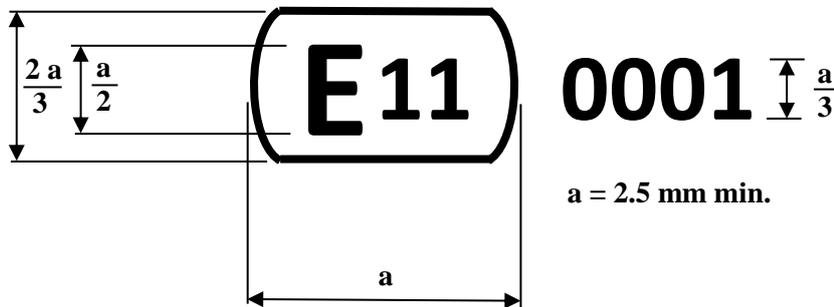
- Light producing technology: incandescent (filament)/ LED²**
- Rated voltage:
- Rated wattage of filament light source:
- Colour of the light emitted: White/selective-yellow/amber/red²
- Colour coating on glass bulb of the filament light source: yes/no²
- Halogen filament light source: yes/no²
- High-Efficiency LED replacement light source: yes/no²**
- AE device(s): yes/no²**
- Specific identification code(s) of AE device(s):.....**
- LED replacement light source with particular electrical polarity: yes/no²**
- LED replacement light source with oversize cap: yes/no²**
- “

Annex 3, amend to read:

“Annex 3

Examples of the arrangement of the approval mark and specific identification code

(See paragraph 2.4.3)



The above approval mark above affixed to a filament light source indicates that the light source has been approved in the United Kingdom (E 11) under the approval code 0001.



The approval mark above affixed to the light source, preceded by the character “HE”, indicates a high-efficiency LED replacement light source that has been approved in the Netherlands (E 4) under the approval code 1953.

Æ E4 1953

The AE device bearing the specific identification code shown above has been approved together with a high-efficiency LED replacement light source approved in The Netherlands (E4) under approval number 1953.”

Annexes 6 to 9, including all references, renumber as Annexes 7 to 10, respectively.

Insert a new Annex 6 to read:

"Annex 6

Method of measurement of electrical, photometrical and thermal characteristics of LED replacement light sources

LED replacement light sources shall be measured in still air at ambient temperature of (23 ± 2) °C, and at an additional ambient temperature if indicated in the relevant data sheet of Annex 1.

1. Luminous flux
 - 1.1. A luminous flux measurement using an integrating method shall be made after 1 minute and after 30 minutes of operation.
 - 1.2. The luminous flux values, as measured after 30 minutes shall comply with the minimum and maximum requirements.

Additionally, unless otherwise specified on the data sheet,

 - (i) Either the luminous flux value measured after 30 minutes shall be in between 100 per cent and 80 per cent of the luminous flux value measured after 1 minute; or
 - (ii) The luminous flux value measured after 1 minute shall comply with the minimum and maximum requirements, and in addition the luminous flux value measured after 30 minutes shall not deviate by more than ± 20 per cent from the luminous flux value measured after 1 minute.
 - 1.3. Measurements have to be carried out at relevant test voltage and at the minimum and maximum values of the relevant voltage range. Unless specified more tightly on the data sheet the following deviation of the luminous flux at the tolerance interval limits shall not be exceeded.

<i>Rated voltage</i>	<i>Min voltage</i>	<i>Max voltage</i>
6	6.0	7.0
12	12.0	14.0
24	24.0	28.0
Corresponding luminous flux tolerance*	$\pm 30\%$	$\pm 15\%$

* The maximum luminous flux deviation at the tolerance limits is calculated by using the measured flux at test voltage as reference. The luminous flux behaviour shall be substantially uniform within the voltage range specified in the table.

2. Normalized luminous intensity/ cumulative luminous flux
 - 2.1. The luminous intensity measurements shall be started after 30 minutes of operation.
 - 2.2. Measurements have to be carried out at relevant test voltage.
 - 2.3. Normalized luminous intensity of a test sample is calculated by dividing the luminous intensity distribution as measured under paragraph 2.1. and 2.2. of this annex by the luminous flux as determined under paragraph 1.2. of this annex.
3. Colour

The colour of the light emitted as measured under the conditions as described paragraph in 1.1. of this annex shall be within the required colour boundaries.

- 4. Power consumption
 - 4.1. A power consumption measurement shall be made under the same conditions as described in paragraph 1.1. of this annex using the requirements of paragraph 3.4.1.3. of this Regulation.
 - 4.2. Power consumption measurements shall be carried out at relevant test voltage and test voltage range, if specified in the relevant data sheet of Annex 1.
 - 4.3. Values obtained shall comply with the minimum and maximum requirements of the relevant data sheet.
- 5. Electrical current
 - 5.1. An electrical current measurement shall be made under the same conditions as described in paragraph 1.1. of this annex using the requirements of paragraph 3.4.1.3. of this Regulation.
 - 5.2. Electrical current measurements shall be carried out at relevant test voltage and test voltage range, if specified in the relevant data sheet of Annex 1.
 - 5.3. Values obtained shall comply with the minimum and maximum requirements of the relevant data sheet.
- 6. Cap temperature
 - 6.1. A cap temperature measurement shall be made under the same conditions as described in paragraph 1.1. of this annex.
 - 6.2. Measurements shall be carried out at relevant test voltage.
 - 6.3. The cap temperature shall be determined at the location indicated in the light source category data sheet."

Annex 7 (renumbered), paragraphs 1., 2., 2.3. (two instances), 2.4. and 2.5. (three instances), delete "filament".

Annex 8 (renumbered),

Table 1, including footnotes, amend to read:

"Table 1
Characteristics

Grouping of characteristics	Grouping* of test records between filament light source types of the same category and of the same light producing technology	Minimum 12 monthly sample per grouping*	Acceptable level of non-compliance per grouping of characteristics (%)
Marking, legibility and durability	All types with the same external dimensions	315	1
Bulb quality	All types with the same bulb	315	±
Colour of the bulb	All types (emitting red and amber light) of the same category and colour technology	20	±

<i>Grouping of characteristics</i>	<i>Grouping* of test records between filament light source types of the same category and of the same light producing technology</i>	<i>Minimum 12 monthly sample per grouping*</i>	<i>Acceptable level of non-compliance per grouping of characteristics (%)</i>
External filament 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 internal elements**	All filament light sources of one type	200	6.5
Initial readings, watts and lumens and for LED replacement light sources also colour **	All filament light sources of one type	200	1
Additional characteristics of filament light sources			
Bulb quality	All types with the same bulb	315	1
Colour of the bulb	All types (emitting red and amber light) of the same category and colour technology	20	1
Colour endurance test	All filament light sources (emitting red, amber and white light) of one colour coating technology	20***	1
Additional characteristics of LED replacement light sources			
Normalised luminous intensity or cumulative luminous flux distribution	All LED replacement light sources of one type	20	6.5
Electrical current****	All LED replacement light sources of one type	20	1
For the notes see below and/or next page			

<p>* The assessment shall in general cover series production filament 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.</p> <p>** In case a filament light source has more than one inner element (filament, shield) the grouping of characteristics (dimensions, watts, lumens) applies to each element separately. In case a LED replacement light source has more than one light output function the grouping of characteristics (dimensions, power, colour and luminous flux) applies to each element and light emitting surface separately.</p> <p>*** Representative distribution over categories of filament light sources using the same colour coating technology and finishing, and that comprises filament light sources of the smallest and the largest diameter of the outer bulb, each at the highest rated wattage.</p> <p>**** LED replacement light sources only.</p>
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“

Table 3, including the introductory text above the table, amend to read:

“Qualifying limits for acceptance based on different numbers of test results for each grouping of characteristics are listed in Table 3 given as maximum number of non-compliance. The limits are based on an acceptable level of 6.5 per cent of non-compliance **for filament light sources and 5 per cent for LED replacement light sources**, assuming an acceptance probability of at least 0.95.

Table 3

<i>Number of filament light sources in records</i>	<i>Qualifying limit</i>	<i>Number of filament light sources in records</i>	<i>Qualifying limit</i>	<i>Number of filament light sources in records</i>	<i>Qualifying limit</i>
– 20	3				
21 – 32	5				
33 – 50	7				
51 – 80	10	500 - 512	44		
81 – 125	14	513 - 526	45	881 – 893	72
126 - 200	21	527 – 540	46	894 - 907	73
201 - 213	22	541 - 553	47	908 - 920	74
214 - 227	23	554 - 567	48	921 - 934	75
228 - 240	24	568 - 580	49	935 - 948	76
241 - 254	25	581 - 594	50	949 - 961	77
255 - 268	26	595 - 608	51	962 - 975	78
269 - 281	27	609 - 621	52	976 - 988	79
282 - 295	28	622 - 635	53	989 - 1,002	80
296 - 308	29	636 - 648	54	1,003 - 1,016	81
309 - 322	30	649 - 662	55	1,017 - 1,029	82
323 - 336	31	663 - 676	56	1,030 - 1,043	83
337 - 349	32	677 - 689	57	1,044 - 1,056	84
350 - 363	33	690 - 703	58	1,057 - 1,070	85
364 - 376	34	704 - 716	59	1,071 - 1,084	86
377 - 390	35	717 - 730	60	1,085 - 1,097	87
391 - 404	36	731 - 744	61	1,098 - 1,111	88
405 - 417	37	745 - 757	62	1,112 - 1,124	89
418 - 431	38	758 - 771	63	1,125 - 1,138	90
432 - 444	39	772 - 784	64	1,139 - 1,152	91
445 - 458	40	785 - 798	65	1,153 - 1,165	92
459 - 472	41	799 - 812	66	1,166 - 1,179	93
473 - 485	42	813 - 825	67	1,180 - 1,192	94
486 - 499	43	826 - 839	68	1,193 - 1,206	95
500 – 512		840 - 852	69	1,207 - 1,220	96
513 – 526	44	853 - 866	70	1,221 - 1,233	97
527 – 540	45	867 - 880	71	1,234 - 1,249	98
	46	881 – 893	72		

“

Annex 9 (renumbered), paragraphs 1., 2. and 4., delete “filament”.

*Annex 10 (renumbered), introductory text and notes * and **, delete “filament”.*

II. Justification

1. This proposal introduces LED replacement light sources (LEDr) in UN Regulation No. 37. It is part of a package together with other proposals which aim to:
 - (a) Exclude the possibility of approval of LED replacement light sources according to UN Regulation No. 128;
 - (b) Introduce a first category of an LED replacement light source H11 (LEDr) into Resolution R.E.5;
 - (c) Inform GRE on the *Equivalence Criteria, Guide for specifying LED replacement light source categories as equivalents for corresponding filament light source categories*, intended for publication on the Working Party on Lighting and Light-Signalling (GRE) website under the section “Documents for reference only”.
2. This revision of the original proposal includes the modifications as proposed in GRE-83-11 concerning high-efficiency LED replacement light sources approval with an additional electronics (AE) device.
 - (a) An AE device, not integrated with but for connection to a LED replacement light source, to augment the electrical current, without changing the other characteristics of the light source, is only needed in combination with a high-efficiency LED replacement light source when applied in a vehicle with a high trigger level of the failure detection or monitoring system. The instructions should specify whether this device will be needed in any of the listed applications.
 - (b) For a high-efficiency LED replacement light source the applicant shall specify a range of the electrical current at test voltage which is below the minimum objective value of the electrical current, as specified in the relevant light source category data sheet, which does not apply to the LED replacement light source without AE device.
3. In response to the comments raised during the eighty-third session of GRE and as a result of the considerations at the fourteenth and sixteenth meetings of TF SR, the following amendments were made:
 - (a) The definitions of “category” and “type” were clarified in 2.1.1. and 2.1.2.
 - (b) In 2.2.2.1. the drawings, which are part of the application for approval, the light producing technology shall also be identifiable.
 - (c) The expression “maximum rated” was twice an error in 2.2.2.2.4. and 2.3.5.2. This was corrected as “the rated voltage” and “maximum wattage”.
 - (d) The mark LEDr should clearly be separated from the category designation to avoid the misunderstanding that “LEDr” is part of the category designation.
 - (e) A mark for LED replacement light sources with an oversize cap, slightly larger than according to the IEC cap sheet but still within the margins as in the light source category data sheet, was inserted in a new paragraph 2.3.9.; the subsequent paragraph was renumbered.
 - (f) The method of colour measurement in 3.4.5.1. and the subsequent paragraph was clear for experts but contradictory in its wording. This has been corrected. Minor editorial changes were made in the two subsequent paragraphs as well as renumbering of these paragraphs and a reference.
 - (g) The provision in 3.4.8. appeared unclear and so it was reworded.
 - (h) In Annex 2, *Communication*, the light producing technology of the category was explicitly inserted.