

UNECE approach for LED replacement light sources for filament light sources in R37*

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2019-07-12

*instead of LED retrofits in R128

The approach (legal and technical equivalence)

- The approach is based on
 - the previous discussions on technology neutral
 - performance based requirements and guidance given in the TFSR and at GRE
- No further work on LED “retrofits” into R128
- Open R37 to allow replacement light sources in LED technology
 - Use the photometric equivalence criteria from LED substitute light sources
 - Resolve open issues not fully addressed by LED substitute light sources
- Objective
 - a light source in incandescent technology and a light source in LED technology with the same category designation
 - can be both approved according to R37 and will have the same “legal status”

The **new** document scope

R37

Filament Light Sources

LED replacement light sources

R99

HID light sources

R128

LED light sources

LED substitute light sources

R.E.5 Category sheets

Filament light sources

HID light sources

LED light sources, including:

- LED substitute light sources
- LED replacement light sources

The **new** document scope

R37

Filament Light Sources

- Thermal
- LED

R99

HID light sources

R128

LED light sources

LED substitute light sources

R.E.5 Category sheets

Filament light sources

- Thermal
- LED

HID light sources

LED light sources, including:

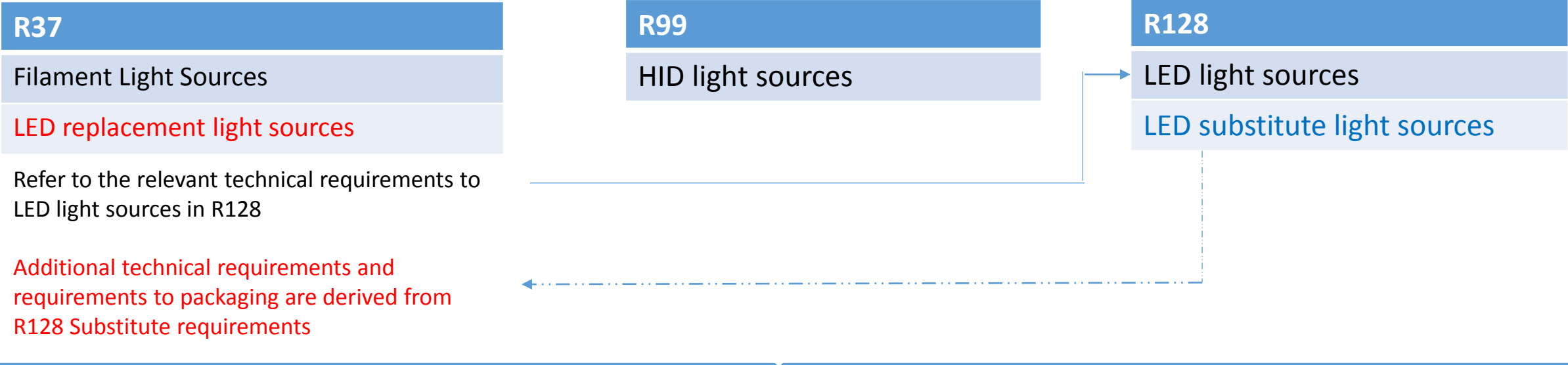
- LED substitute light sources

LED Replacement light sources in R37

- Photometric equivalent to the incandescent filament counterpart
 - Using equivalence criteria from LED substitutes, incl. 3000K limit for white signaling light sources
- Addressing electrical interface for failure detection
 - Majority of functions / cars on the road have no failure detection (DI excluded)
 - Optional „external electronics“ to support correct failure detection
- Addressing PWM operation / dimming
- Addressing thermal mission profiles
- Additional user information and marking

Additional slides provided by the IEC expert as a „first study“

References or duplication



R.E.5 Category sheets
Filament light sources
HID light sources
LED light sources, including:
<ul style="list-style-type: none"> LED substitute light sources LED replacement light sources

Replacement light sources

Searching for the right term and definition

- Original technology
 - Original light source category
 - Substitute light source category
- Alternative technology
 - Comparable light source category as alternative to the original light source category

Term	Oxford Dictionary, ISO/IEC Directives Part 2, suggested as one of the Spelling reference works; https://www.lexico.com/en
Alternative	One of two or more available possibilities
Comparable	Of equivalent quality; worthy of comparison
Corresponding	Analogous or equivalent in character, form, or function; comparable
Counterpart	A person or thing that corresponds to or has the same function as another person or thing in a different place or situation.
Equivalent	A person or thing that is equal to or corresponds with another in value, amount, function, meaning, etc.
Interchangeable	Put each of (two things) in the other's place; (of a thing) be able to be exchanged with another
Original	Present or existing from the beginning; first or earliest
Replacement	Replace: Take the place of.; Provide a substitute for (something that is broken, old, or inoperative); Fill the role of (someone or something) with a substitute.; Put (something) back in a previous place or position
Retrofit	Add (a component or accessory) to something that did not have it when manufactured.
Substitute	A person or thing acting or serving in place of another.

R.E.5

3.3. LED light sources

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Group 5	
LED replacement light source categories* only for use in lamps approved with light source(s) of their counterpart light source category	
Category	Sheet number(s)
PY21W	PY21W/LED/1 to 4

* Not for use in conformity of production control of lamps.

R.E.5

Annex 3, Sheets for LED light sources

- Cap
 - The LED replacement light source category
 - the same cap as its counterpart filament light source category
- Electrical current
 - Specify compatibility with the counterpart filament light source for failure detection, if present
 - Specify values in two PWM voltage ranges if the counterpart filament light source category might be used for dual level operation (e.g. P21W for stop/tail)

R128

1. Scope

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

Annex 1

Sheets¹ for LED light sources

The sheets of the relevant LED 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.5 or its subsequent revisions, applicable at the time of application for type approval of the LED light source; however, the sheets of LED replacement light sources in the LED light source categories' group 5 of R.E.5 are excluded from this annex.

R37

Title of the Regulation

Uniform provisions concerning the approval of filament lamps* **light sources and their LED replacement light sources** for use in approved lamps of power-driven vehicles and of their trailers

* This should be corrected only at the front page

R37

1. Scope

- 1.1. This Regulation applies to filament light sources shown in Annex 1 and intended for use in approved lamps of power-driven vehicles and of their trailers.
- 1.2. This Regulation applies to LED replacement light sources shown in Annex 1,
 - (a) having a counterpart filament light source with the same category designation shown in Annex 1,
 - (b) intended for use in lamps of power-driven vehicles and of their trailers approved for this counterpart filament light source, and
 - (c) keeping the characteristics of these lamps when used in these lamps.*

* See R115, LPG systems

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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.4]~~ R.E.5 or its subsequent revisions, applicable at the time of application for type approval of the ~~filament~~ light source.

R37

2. Administrative provisions

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 and to describe different basic design of their counterpart LED replacement light sources, if any. Each category has a specific designation, as for example: "H4", "P21W", "T4W", "PY21W" or "RR10W". The designation of a LED replacement light source category is the same as of its counterpart filament light source category, as for example "PY21W".

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2.3.1.5. In the case of LED replacement light sources, the following symbol :



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2.3.4. LED replacement light sources shall be marked “(LED)”. This mark shall be placed after the designation of the relevant LED replacement light source category separated by a single space, e.g. “P21W (LED)”.

R37

3. Technical requirements

3.1. Filament light sources

3.1.1. Definitions

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3.2. LED replacement light sources

3.2.1. The LED replacement light source shall, in addition to the technical requirements of this Regulation, also conform to the relevant* technical requirements for LED light sources of the latest version of Regulation No. 128;

3.2.2. The LED replacement light source shall be equipped with a cap of the same cap designation as its counterpart filament light source as defined in the relevant data sheet of Annex 1;

3.2.3. 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

To consider additional test points for

- PWM operation e.g. for dual level operation
- Higher ambient temperature values

* list numbers of relevant paragraphs

R37

- 3.2.4. 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.
- 3.2.5. The LED replacement light source shall not emit light when activated for 2 milliseconds or shorter.
- 3.2.6. The LED replacement light source including its electrical or electronic controls not integrated with the LED replacement light source, if any, shall allow the proper functioning of monitoring and failure detection systems used as for their counterpart filament light sources.
- 3.2.7. The correlated colour temperature of LED replacement light sources emitting white light shall be no more than 3000 K, unless otherwise defined in the relevant data sheet in Annex 1.