

# GRE Task Force LED Substitutes / Retrofits (TF SR)

## Status report for GRE83

21/10/2020

K. Manz, DE (Chairman)

Ph. Bailey, UK (Vice-Chairman)

Ph. Plathner, IEC (Secretary)

# Meetings of TF

- 1<sup>st</sup> meeting: 2017-12-14, Aachen (report: TFSR-01-11)
- 2<sup>nd</sup> meeting: 2018-02-06, Bonn (report: TFSR-02-05)
- 3<sup>rd</sup> meeting: 2018-03-27, Brussels (report: TFSR-03-09)
- 4<sup>th</sup> meeting: 2018-06-06 Brussels (report: TFSR-04-09)
- 5<sup>th</sup> meeting: 2018-01-30 Aachen (report: TFSR-05-09)
- 6<sup>th</sup> meeting: 2019-05-15 Paris (report: TFSR-06-06)
- 7<sup>th</sup> meeting: 2019-07-18 Karlsruhe (report: TFSR-07-07)
- 8<sup>th</sup> meeting: 2019-12-10 Bonn (report: TFSR-08-04)
- 9<sup>th</sup> meeting: 2020-01-17 by telephone (report: TFSR-09-04)
- 10<sup>th</sup> meeting: 2020-03-12 in Aachen (report: TFSR-10-05)
- 11<sup>th</sup> meeting: 2020-05-25 by telephone (report: TFSR-11-06)
- 12<sup>th</sup> meeting: 2020-07-02 by telephone (report: TFSR-12-05)
- 13<sup>th</sup> meeting: 2020-09-24 by telephone (report: TFSR-13-09)
- [14<sup>th</sup> meeting: 2020-11-20 (planned, if needed)]

## Two-step approach:

- Step 1: LED Substitutes
  - Step 1A: light signaling applications
  - Step 1B: road illumination applications
- Step 2: LED Replacement (“retrofit”)
  - Step 2A: Administrative items
  - Step 2B: Technical items

Step 1A → entered-into force  
Step 1B }  
Step 2A } → **GRES3**  
Step 2B }

# Step 1A: LED Substitutes for light signaling applications

- Package of documents approved by GRE80
  - R128
  - RE5
  - R148 (LSD)
  - Installation Regulations
- Entered-into-force
  - R128 and RE5 in October 2019
  - Installation Regulations and R148 in May 2020
- GRE Reference Document published
  - GRE-80-02 - (TF SR) Equivalence criteria



# Step 1B: LED Substitutes for road illumination applications

- Detailed discussion started in the 5<sup>th</sup> TFSR meeting in Aachen and continued in the 6<sup>th</sup> and 7<sup>th</sup> TFSR meetings
- Documents submitted to GRE82 :
  - GRE/2019/19 to amend R-149 (RID) → confirmed by GRE82
  - GRE/2019/21 to include H11/LED into RE5 → **GRE82 requested clarification**
  - GRE-82-03 to extend the equivalence criteria documents → confirmed by GRE82
- Documents submitted to GRE83:
  - **GRE/2020/06**: update of GRE/2019/21 to include H11/LED/6 into RE5

**→ GRE83**

# Step 2: LED replacement light sources

## Step 2A: Administrative items

- First discussion on “administrative equivalence” in 6<sup>th</sup> TFSR meeting Paris
- Continued in 7<sup>th</sup>, 8<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup> and 13<sup>th</sup> meeting
- Target:
  - achieve “administrative” equivalence, i.e. by introducing LED replacement light sources into R37
  - ... to allow interchange of R37-approved light source of the same category, independent of the technology used for light generation
- Conclusions (see GRE82 report, item 21 and 22) :
  - Stop activity to include LED “Retrofits” in R128
  - Focus on activity to make R37 performance based and technology neutral
    - By amending the scope of R37 to include also LED replacement light sources

# Step 2: LED replacement light sources:

## Step 2B: Technical items

- Photometric equivalence was taken over from LED substitutes
- Other technical items were addressed in detail and led to
  - additional electrical requirements
  - additional thermal requirements
  - additional mechanical requirements
- Discussions started in 8<sup>th</sup> meeting and continued in 9<sup>th</sup>, 10<sup>th</sup>, 11<sup>th</sup> and 12<sup>th</sup> meeting
  - TFSR-11-02rev1 serves as summary/reference
- Agreement to submit 3 formal documents and supporting informal documents to GRE83 (see next slide)

# The **new** document scope

R37

Filament Light Sources

- By thermal radiation (incandescence)
- **By LED technology (→ GRE/2020/15)**

R99

HID light sources

R128

LED light sources

LED substitute light sources

**Excluding LEDr (→ GRE/2020/17)**

R.E.5 Category sheets

Filament light sources by thermal radiation

**LED replacement light sources incl H11 (→ GRE/2020/16)**

HID light sources

LED light sources, including LED substitute light sources

Equivalence  
Document  
**GRE-83-15**



# Outcome: documents submitted to GRE83

- Proposal for Amendment to R37
  - **GRE/2020/15** (revised by GRE-83-11, related to “Additional Electronics for the high efficiency light source”)
    - Keeping the current requirements for filament light sources
    - introducing additional requirements for LED replacement light sources
    - Taking-over requirements from R128, where relevant
    - Adding specific sections for Documentation, Marking, Testing, User information
  - GRE-83-05: based on GRE/2020/15 with track changes visible (revised by GRE-83-12)
- Proposal for R.E.5, incl H11 (LEDr)
  - **GRE/2020/16** (revised by GRE-83-13, related to the “High Efficiency light source” and “Additional Electronics”)
    - Photometric, Geometric, Electrical, Thermal specification
  - GRE-83-16: Equivalence report for H11 (LEDr)
- Proposal for Amendment to R128
  - **GRE/2020/17**
    - Clarifying that LED replacement light source shall not be approved according R128
- Equivalence Criteria: GRE-83-15
- Additional explanations with regards to “high efficiency (HE) versions” and “additional electronics (AE)”: GRE-83-14



# The necessary changes

## R37 Filament Light Sources

→ GRE/2020/15

- 1 Scope (incl LED replacements)
- 2 Administrative Provisions (incl LED replacements)
- 3 Technical requirements (incl LED replacements)
- 4 Requirements to the packaging of LED replacements
- 5 Conformity of production
- 6 Penalties for non-conformity of production
- 7 Production definitively discontinued
- 8 Names and addresses ...
- 9 Transitional provisions
- Annex 1 (incl ref. to LED replacements in R.E.5)
- Annexes (editorial changes plus adding specific LED replacements testing)

## R.E. 5 Light Source Categories

→ GRE/2020/16


- 1 Scope
- 2 Definitions  
LED Replacement light source  
AE device
- 3.1 Filament light sources
- 3.2 Gas Discharge
- 3.3 LED Light sources
- Group 1: no restrictions
- Group 2: signalling
- Group 3: [reserved]
- Group 4: LED substitutes
- Group 5: LED replacements  
Category sheet H11

## R128 LED Light Sources

→ GRE/2020/17

- 1 Scope
- 2 Administrative Provisions
- 3 Technical requirements
- 4 Requirements to the packaging of LED substitute light sources
- 5 Conformity of production
- 6 Penalties for non-conformity of production
- 7 Production definitively discontinued
- 8 Names and addresses ...
- Annexes (Exclude LED Replacements)

Document	Paragraph	Content and reason for the proposed change
R128	Annex 1 Sheets	Excluded: “LED replacement light sources”
R37	1. Scope of R37 Annex 1. Sheets ref to R.E.5	Added to filament light sources: “their LED replacement light sources”
R37	2. Admin. 2.1. Definitions 2.1.1. Category	Added: “category” of LED replacement light sources to discriminate a different basic design in LED technology. A category in LED technology shall be considered the same as the category in incandescent filament technology with the same category designation; this is to achieve legal compliance of both categories; technical equivalence is defined by the LEDr category datasheet; this is in compliance with the equivalence criteria as described by the equivalence report to GRE
R37	2. Admin. 2.1. Definitions 2.1.2. Type	Added: “high-efficiency” type of LED replacement light source which has lower electrical current (and power consumption) than the default LEDr. For certain applications listed in the instructions/website, the HE LEDr is connected to an additional electronics device (AE device) to augment the electrical current for the correct operation of failure detection and monitoring or OBD systems

Document	Paragraph	Content and reason for the proposed change
R37	2.2. Application 2.2.2.2. Documentation	Added: the applicant shall indicate whether: (1) it is a HE LEDr, (2) a AE device is added; (3) LEDr insertion is depending on +/- voltage polarity; (4) the cap is somewhat bigger. Added: the applicant shall indicate the maximum value of electrical current of the HE LEDr to determine whether it is an HE LEDr and the necessity of an AE device
R37	2.3. Inscriptions	Added mark/symbol: LEDr HE AE +/-
R37	3. Techn. Req. 3.2 General	Generalised for both incandescent filament and LED technology
R37	3.4 Req. LEDr	New: (1) Tests, (2) Position and dimensions of light emitting area, (3) Luminous flux, (4) Normalized luminous intensity distribution / cumulative luminous flux distribution, (5) Colour, (6) UV-radiation, (7) Electrical characteristics, (8) Cap temperature. Almost same as for LED substitute light sources: 1-6 and 7 (ESA req., <2 ms flash). New: 7 (Inc. AE device, PWM, dimming) 8.
R37	4. Packaging 4.2.2.1.2.Listed applications	Almost same as for LED substitute light source; added: LEDr mark No instructions if none of 2.2.2.2. is applicable, otherwise  and instructions to applicable aspects of 2.2.2.2.
R37	Annex 6	Measurement methods for LEDr
R37	Annex 8	Added COP parameters for LEDr

Document	Paragraph	Content and reason for the proposed change
R.E.5	2. Definitions 2.1. General	Added: definitions for LEDr and AE device
R.E.5	Annex 3.3. LED light sources	Added: group 5, LED replacement light sources for filament light sources Added: new category H11 in LED technology