GRE Task Force
LED Substitutes / Retrofits (TFSR)

Status report for GRE83

21/10/2020
K. Manz, DE (Chairman)
Ph. Bailey, UK (Vice-Chairman)
Ph. Plathner, IEC (Secretary)
Meetings of TF

- 1st meeting: 2017-12-14, Aachen (report: TFSR-01-11)
- 2nd meeting: 2018-02-06, Bonn (report: TFSR-02-05)
- 3rd meeting: 2018-03-27, Brussels (report: TFSR-03-09)
- 4th meeting: 2018-06-06 Brussels (report: TFSR-04-09)
- 5th meeting: 2018-01-30 Aachen (report: TFSR-05-09)
- 7th meeting: 2019-07-18 Karlsruhe (report: TFSR-07-07)
- 8th meeting: 2019-12-10 Bonn (report: TFSR-08-04)
- 9th meeting: 2020-01-17 by telephone (report: TFSR-09-04)
- 10th meeting: 2020-03-12 in Aachen (report: TFSR-10-05)
- 11th meeting: 2020-05-25 by telephone (report: TFSR-11-06)
- 12th meeting: 2020-07-02 by telephone (report: TFSR-12-05)
- 13th meeting: 2020-09-24 by telephone (report: TFSR-13-09)
- [14th 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
Step 2B → GRE83
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 5th TFSR meeting in Aachen and continued in the 6th and 7th 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
Step 2: LED replacement light sources
Step 2A: Administrative items

• First discussion on “administrative equivalence” in 6th TFSR meeting Paris
• Continued in 7th, 8th, 9th, 10th, 11th, 12th and 13th 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 8th meeting and continued in 9th, 10th, 11th and 12th 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)

Equivalence Document
GRE-83-15

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
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

<table>
<thead>
<tr>
<th>R37 Filament Light Sources</th>
<th>R.E. 5 Light Source Categories</th>
<th>R128 LED Light Sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Scope (incl LED replacements)</td>
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<tr>
<td>2 Administrative Provisions (incl LED replacements)</td>
<td>2 Definitions</td>
<td>2 Administrative Provisions</td>
</tr>
<tr>
<td>3 Technical requirements (incl LED replacements)</td>
<td>LED Replacement light source AE device</td>
<td>3 Technical requirements</td>
</tr>
<tr>
<td>4 Requirements to the packaging of LED replacements</td>
<td>3.1 Filament light sources</td>
<td>4 Requirements to the packaging of LED substitute light sources</td>
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<tr>
<td>5 Conformity of production</td>
<td>3.2 Gas Discharge</td>
<td>5 Conformity of production</td>
</tr>
<tr>
<td>6 Penalties for non-conformity of production</td>
<td>3.3 LED Light sources</td>
<td>6 Penalties for non-conformity of production</td>
</tr>
<tr>
<td>7 Production definitively discontinued</td>
<td>Group 1: no restrictions</td>
<td>7 Production definitively discontinued</td>
</tr>
<tr>
<td>8 Names and addresses ...</td>
<td>Group 2: signalling</td>
<td>8 Names and addresses ...</td>
</tr>
<tr>
<td>9 Transitional provisions</td>
<td>Group 3: [reserved]</td>
<td>Annexes (Exclude LED Replacements)</td>
</tr>
<tr>
<td>Annex 1 (incl ref. to LED replacements in R.E.5)</td>
<td>Group 4: LED substitutes</td>
<td></td>
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<tr>
<td>Annexes (editorial changes plus adding specific LED replacements testing)</td>
<td>Group 5: LED replacements Category sheet H11</td>
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<tr>
<td>Document</td>
<td>Paragraph</td>
<td>Content and reason for the proposed change</td>
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<tr>
<td>R128</td>
<td>Annex 1 Sheets</td>
<td>Excluded: “LED replacement light sources”</td>
</tr>
<tr>
<td>R37</td>
<td>1. Scope of R37 Annex 1. Sheets ref to R.E.5</td>
<td>Added to filament light sources: “their LED replacement light sources”</td>
</tr>
<tr>
<td>R37</td>
<td>2. Admin. 2.1. Definitions 2.1.1. Category</td>
<td>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</td>
</tr>
<tr>
<td>R37</td>
<td>2. Admin. 2.1. Definitions 2.1.2. Type</td>
<td>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</td>
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<td>R37</td>
<td>2.2. Application 2.2.2.2. Documentation</td>
<td>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</td>
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<td>R37</td>
<td>2.3. Inscriptions</td>
<td>Added mark/symbol: LEDr   HE   AE   +/-</td>
</tr>
<tr>
<td>R37</td>
<td>3. Techn. Req. 3.2 General</td>
<td>Generalised for both incandescent filament and LED technology</td>
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<tr>
<td>R37</td>
<td>4. Packaging 4.2.2.1.2.Listed applications</td>
<td>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.</td>
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<tr>
<td>R37</td>
<td>Annex 6</td>
<td>Measurement methods for LEDr</td>
</tr>
<tr>
<td>R37</td>
<td>Annex 8</td>
<td>Added COP parameters for LEDr</td>
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</tbody>
</table>
| 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 |