

# **LED Replacement Light Sources Equivalence Report for H11 LEDr (12V and 24V)**

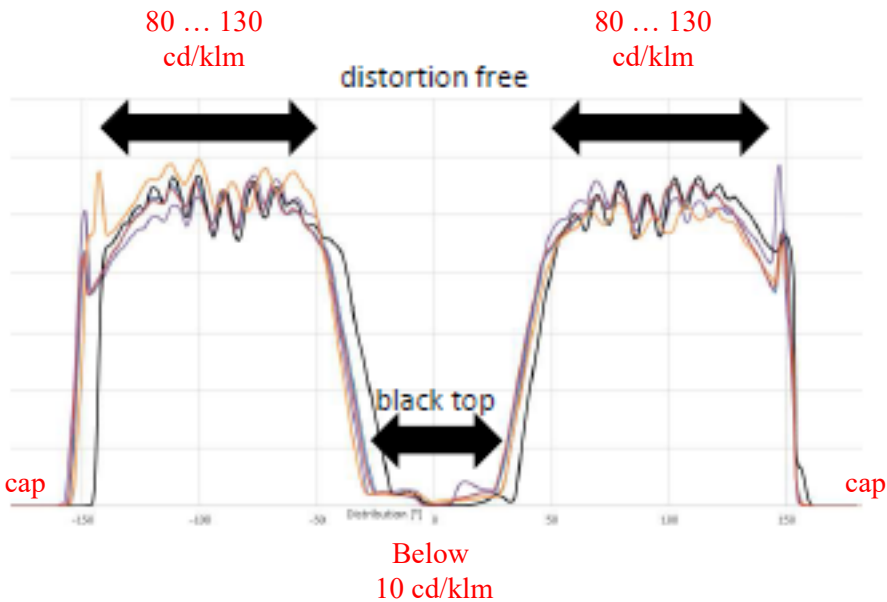
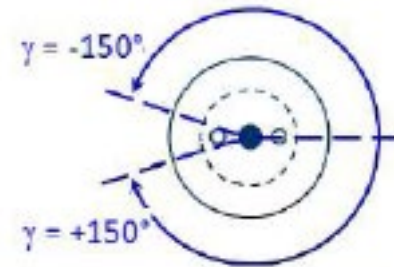
In support of document ECE/TRANS/WP.29/GRE/2020/16

Equivalence Requirements according GRE-83-15

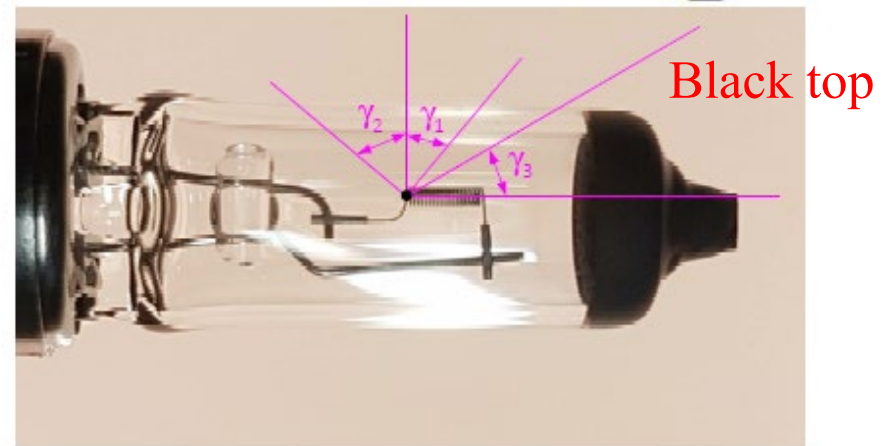
# Checklist for Equivalence of Parameters H11 LEDr (12V and 24V)

| <u>Parameters</u>   | <u>Check</u>                        |
|---|-------------------------------------|
| 3.1. Parameters with the same values                                    |                                     |
| 3.1.1. Cap  | ✓                                   |
| 3.1.2. Maximum lamp outline dimensions                                  | ✓                                   |
| 3.1.3. Electrical connector   | ✓                                   |
| 3.1.4. Test voltage   | ✓                                   |
| 3.1.5. Objective luminous flux  | ✓                                   |
| 3.1.6. Colour of emitted light  | ✓                                   |
| 3.1.7. Light centre length  | ✓                                   |
| 3.1.8. Distortion free zone   | see page 3 ✓                        |
| 3.2. Parameters with similar values                                     |                                     |
| 3.2.1. Normalized luminous intensity distribution                       | see page 3 ✓                        |
| 3.2.2. Size and position of the light-emitting-area                     | see page 4 ✓                        |
| 3.2.3. Homogeneity of the light-emitting-area                           | see page 4 ✓                        |
| 3.2.4. Contrast of the light emitting area                              | see page 5 ✓                        |
| 3.3. Parameters with different values                                   |                                     |
| 3.3.1. Electrical power consumption                                     | 21 W max (HE) / 27 W min ✓          |
| 3.3.2. Dependency of the luminous flux on the applied voltage           | +/- 10% (12V – 14V) ✓               |
| 3.3.3. Dependency of the luminous flux on elevated ambient temperatures | > 75% @60C ✓                        |
| 3.3.4. Cap temperature  | 120°C max, see page 6 ✓             |
| 3.3.5. The spectral content   | n/a                                 |
| 3.4. Additional parameters  |                                     |
| 3.4.1. Thermal run-up behaviour   | ✓                                   |
| 3.4.2.1 PWM operation to stabilize the applied voltage                  | ✓                                   |
| 3.4.2.2 PWM operation to dim light sources                              | n/a                                 |
| 3.4.3 Polarity  | ✓                                   |
| Requirements regarding failure detection                                |                                     |
| 4.1 Failure detection   | 2000mA min, see page 7 ✓            |
| 4.2 Failure behaviour   | max 100 mA (12V), max 50 mA (24V) ✓ |

# Normalised Intensity Distribution H11 LEDr



Distortion  
free



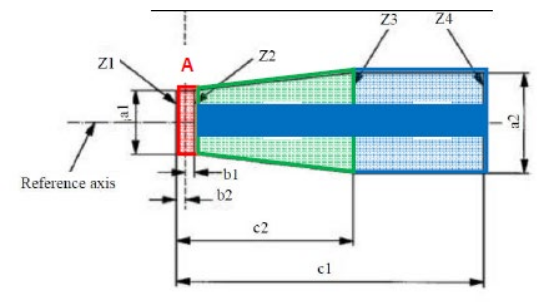
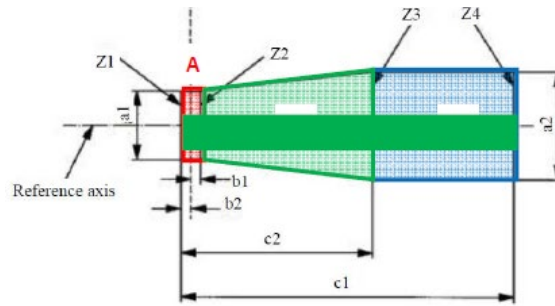
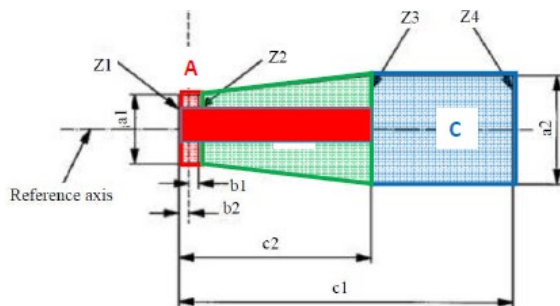
→ Table 3 Part 1, 2 and 3

# Size, Position and Homogeneity of the Light-Emitting-Area H11 LEDr

Maximum for part A:  $\max. > \frac{A}{A+B+C} = \frac{b1+b2}{c2} = \frac{0,2+0,2}{4,0} = 0,1$

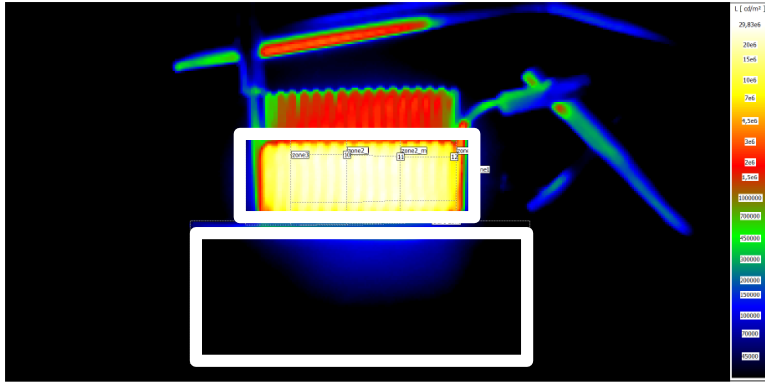
Minimum for part B:  $\min. < \frac{B}{A+B+C} = \frac{c2-b1-b2}{c1} = \frac{4,0-0,2-0,2}{5,0} = 0,72$

Maximum for part C:  $\max. > \frac{C}{A+B+C} = \frac{c1-c2}{c1-b1-b2} = \frac{5,0-4,0}{5,0-0,2-0,2} = 0,22$

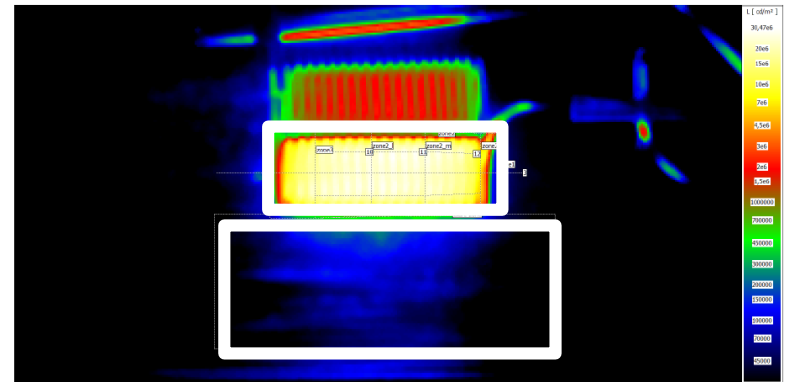


Same box dimensions as for H11 filament

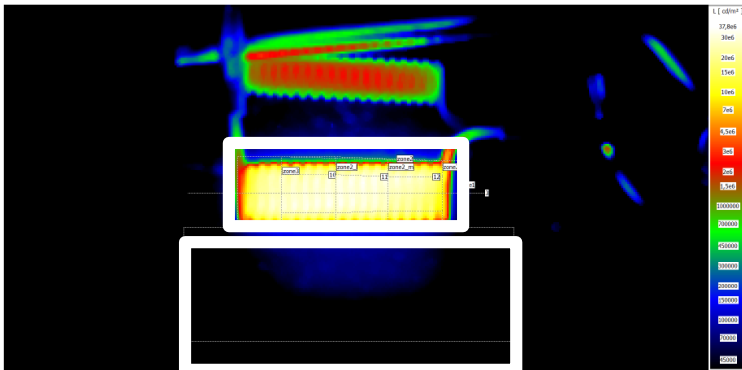
# Contrast H11 LEDr



#1



#3

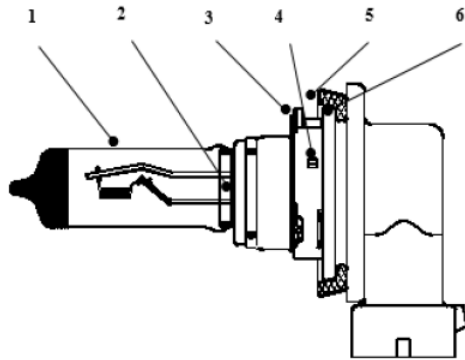


#2

All H11 filament: Contrast  $> 80 : 1$   
→ H11 LEDr: Contrast  $> 100 : 1$

# Cap temperature measurement on a H11 filament lamp

## Measurement point:



- MP1: bulb above the filament
- MP2: pinch at the flap
- MP3: reference lug
- MP4: reference diameter
- MP5: sealing ring above
- MP6: cap

## Measurement condition:

### Lamp:

H11 12V 55W 64211L+

### Mode of operation:

Free-burning

Burning position of the lamp:  $p\ 0^\circ$

Ambient temperature:  $25^\circ\text{C}$

### Measurement voltage:

At 13,2V and maximal power from 62,0W

### Measurement method:

Thermo couple NiCr/Ni

Test result:

MP4 =  $150^\circ\text{C}$

# Failure detection compatibility – low beam detection threshold

In order to find the correct minimum current/power level for the H11 LEDr, that is necessary to be compatible with failure detection systems of the vehicles (if present), measurements on a selection of the top selling European cars have been done.

Here a summary of measured threshold currents and a proposed RE5 requirement for the “default” version

| Vehicle   | Low beam Detection threshold |
|---|------------------------------|
| #1  | 540 mA                       |
| #2  | 1700 mA                      |
| #3  | 800 mA                       |
| #4  | 1600 mA                      |
| #5  | 450 mA                       |
| #6  | n/a                          |
| #7  | n/a                          |
| <b>Maximum value found</b>                          | <b>1700 mA</b>               |
| Typical LED current („HE“ version)                  | 1300 mA                      |
| Proposed minimum current draw for „default“ version | 2000 mA                      |