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Item 4.9.20 of the provisional agenda

**1958 Agreement – Consideration of draft amendments
to existing Regulations submitted by GRE**

Proposal for Supplement 4 to Regulation No. 128 (LED light sources)

Submitted by the Working Party on Lighting and Light-Signalling*

The text reproduced below was adopted by the Working Party on Lighting and Light-Signalling (GRE) at its seventy-second session (ECE/TRANS/WP.29/GRE/72, para. 7). It is based on ECE/TRANS/WP.29/GRE/2014/29, as amended by Annex IV to ECE/TRANS/WP.29/GRE/72. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee AC.1 for consideration.

* In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94 and ECE/TRANS/2012/12, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

Paragraph 3.8., the table, amend to read:

"

| λ | S(λ) | λ | S(λ) | λ | S(λ) |
|-----------|----------------|-----------|----------------|-----------|----------------|
| 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 | | | | |

"

Annex I,

The list of categories of LED light sources and their sheet numbers, amend to read:

"

| <u>Category</u> | <u>Sheet number(s)</u> |
|-----------------|------------------------|
| LR1 | LR1/1 to 5 |
| LW2 | LW2/1 to 5 |
| LR3A | LR3/1 to 5 |
| LR3B | LR3/1 to 5 |
| LR4A | LR4/1 to 5 |
| LR4B | LR4/1 to 5 |

"

The list of sheets for LED light sources and their sequence in this annex, amend to read:

"

| <u>Sheet number(s)</u> |
|------------------------|
| LR1/1 to 5 |
| LW2/1 to 5 |
| LR3/1 to 5 |
| LR4/1 to 5 |

"

Sheet LR3/2, the table, amend to read:

"...

| |
|--|
| Cap PGJ18.5d-1 in accordance with IEC Publication 60061 (sheet 7004-185-1) |
|--|

..."

Sheet LR4/2, the table, amend to read:

"...

| |
|--|
| Cap PGJ18.5t-5 in accordance with IEC Publication 60061 (sheet 7004-185-1) |
|--|

..."

After sheet LW2/5, insert new sheets LR3/1 to 5 and LR4/1 to 5, to read (see following pages; one page per sheet):

CATEGORIES LR3A and LR3B

Sheet LR3/1

The drawings are intended only to illustrate the essential dimensions of the LED light source

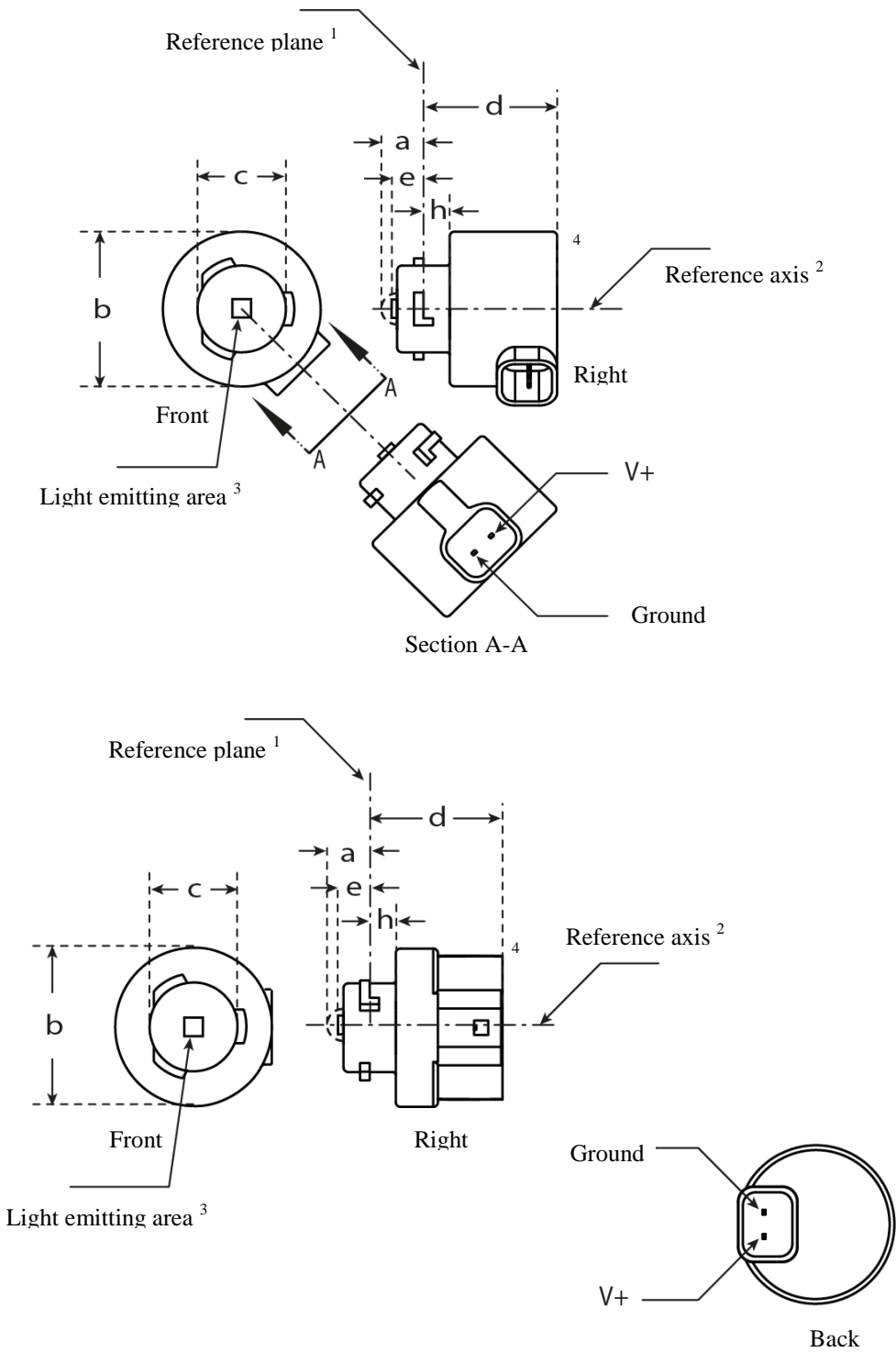


Figure 1*
Main Drawing, LR3A (top) and LR3B (bottom)

For the notes see sheet LR3/2.

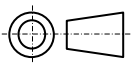
* Projection method: 

Table 1
Essential electrical and photometric characteristics of the LED light source

| Dimensions | | Production LED light sources | Standard LED light sources |
|---|------------------------------------|------------------------------|----------------------------|
| a | mm | 6.0 max. | |
| b | mm | c + 10.0 min. 38.0 max. | |
| c | mm | 18.5 ± 0.1 | |
| d | mm | 28.0 max. | |
| e | mm | 3.0 ± 0.30 | 3.0 ± 0.15 |
| h | mm | 5.5 + 0.0/ - 0.1 | |
| Cap PGJ18t-[xx] in accordance with IEC Publication 60061 (sheet 7004-[xxx]-1) | | | |
| Electrical and photometric characteristics ⁵ | | | |
| Rated values | Volts | 12 | |
| | Watts | 3 | |
| Objective Values ⁶ | Watts (at 13.5 V DC) | 3.5 max. | 3.5 max. |
| | Luminous flux (in lm at 13.5 V DC) | 80 ± 20% ⁷ | 80 ± 10% ⁸ |
| | Luminous flux (in lm at 9 V DC) | 19 min. | |

¹ The reference plane is the plane defined by the contact points of the cap-holder fit.

² The reference axis is perpendicular to the reference plane and passing through the centre of the bayonet core.

³ Light emitting area: to be checked by means of the box system in Figure 2

⁴ A minimum free air space of 5mm around the light source shall be respected for convection.

⁵ The emitted light shall be red.

⁶ After continuous operation for 30 minutes at 23 ± 2.5° C.

⁷ The measured value shall be in between 100 per cent and 70 per cent of the value measured after 1 minute.

⁸ The measured value shall be in between 85 per cent and 75 per cent of the value measured after 1 minute.

Electrical characteristics

In case of LED light source failure (no light emitted) the max. electrical current draw, when operated between 12 V and 14 V, shall be less than 20 mA (open circuit condition).

CATEGORIES LR3A and LR3B

Sheet LR3/3

Screen projection requirements

The following test is intended to define the requirements for the apparent light emitting area of the LED light source and to determine whether the light emitting area is correctly positioned relative to the reference axis and reference plane in order to check compliance with the requirements.

The position of the light emitting area is checked by the box system defined in Figure 2, which is aligned to the planes C90 and C180 and shows the projection when viewing along direction $\gamma=0^\circ$ (C, γ as defined in Figure 3).

The proportion of the total luminous flux emitted into the viewing direction shall be as described in table 3.

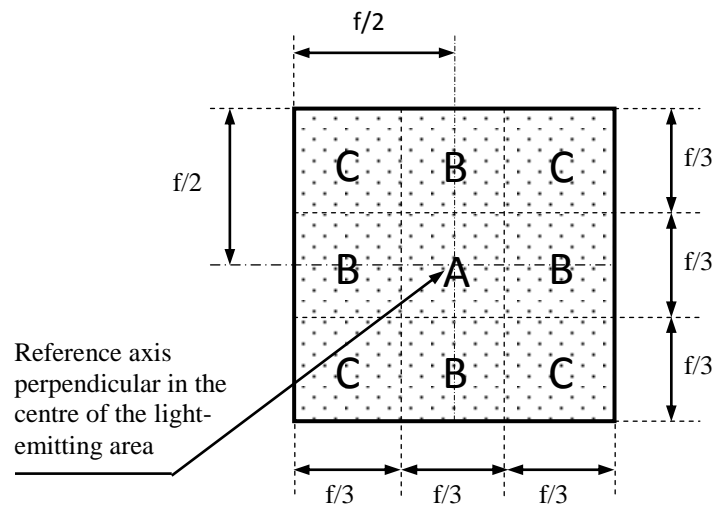


Figure 2

Box definition of the light emitting area with dimensions as specified in table 2

Table 2
Dimensions of the box system in Figure 2

| <i>Dimensions in mm</i> | <i>f</i> |
|--|----------|
| LED light sources of normal production | 3.0 |
| Standard LED light sources | 3.0 |

Table 3
Proportion of the total luminous flux emitted into the viewing direction from the areas specified in figure 2

| <i>Area(s)</i> | <i>LED light sources of normal production</i> | <i>Standard LED light sources</i> |
|-----------------------------|---|-----------------------------------|
| A | $\leq 25\%$ | $\leq 10\%$ |
| Each B individually | $\geq 15\%$ | $\geq 20\%$ |
| Each C individually | - | $\leq 10\%$ |
| A, all B and all C together | $\geq 90\%$ | $\geq 90\%$ |

Normalized luminous intensity distribution

The following test is intended to determine the normalized luminous intensity distribution of the light source in an arbitrary plane containing the reference axis. The intersection of the reference axis and the parallel plane to the reference plane in distance e is used as the coordinate system origin.

The light source is mounted on a flat plate with the corresponding mounting lug features. The plate is mounted to the goniometer table by a bracket, so that the reference axis of the light source lines up with one of the rotating axis of the goniometer. The corresponding measurement set-up is described in Figure 3.

Luminous intensity data is recorded with a standard photo-goniometer. The measurement distance should be chosen appropriately, to make sure that the detector is located in the far field of the light distribution. The measurements shall be performed in C-planes C0/180 and C90/270, which contain the reference axis of the light source. The test points for each plane for multiple polar angles γ are specified in Table 4.

After measurement the data shall be normalized to 1,000 lm according to Paragraph 3.1.11 using the luminous flux of the individual light source under test. The data shall comply with the tolerance band as defined in Table 4.

The drawings are intended only to illustrate the essential set-up for measurement of the LED light source.

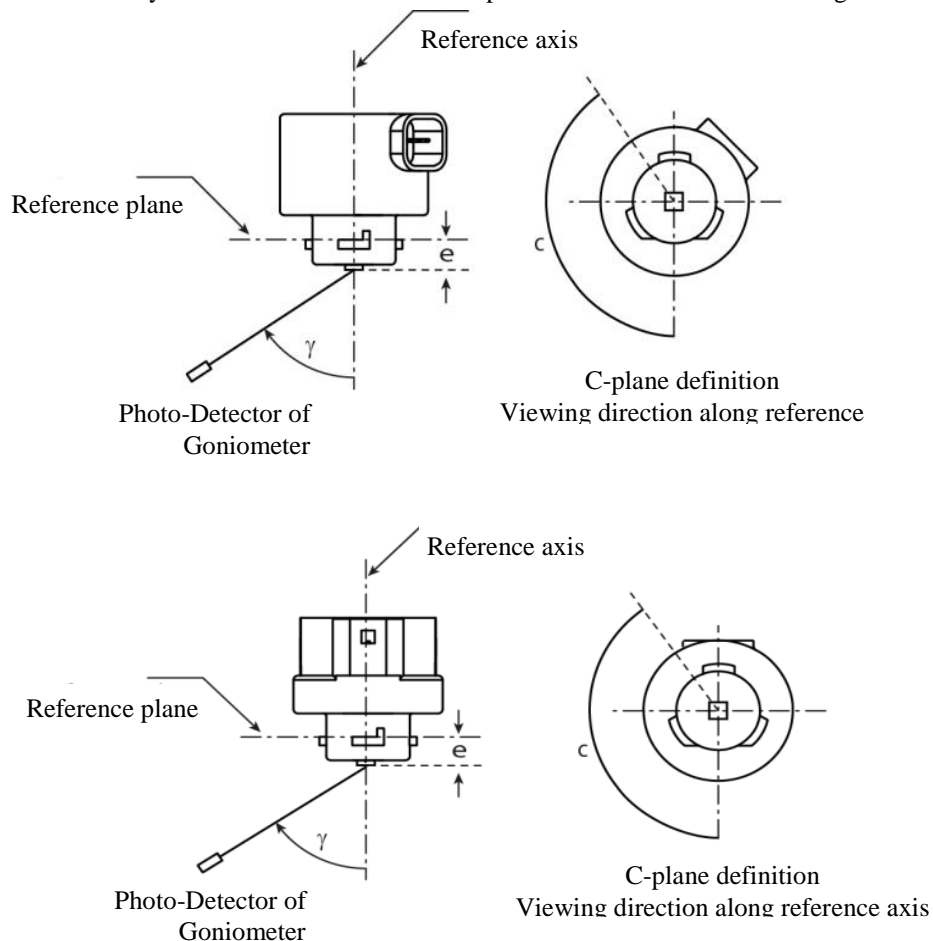


Figure 3
Set-up to measure the luminous intensity distribution, LR3A (top) and LR3B (bottom)

CATEGORIES LR3A and LR3B

Sheet LR3/5

The light pattern as described in Table 4 shall be substantially uniform, i.e. in between two adjacent grid points the relative luminous intensity requirement is calculated by linear interpolation using the two adjacent grid points. In case of doubt this may be checked in addition to verification of the grid points given in table 4.

Table 4

Test point values of normalized intensities of normal production and standard lamps, respectively.

| Angle γ | LED lamps of normal production | | Standard LED lamps | |
|----------------|-------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|
| | Minimum Intensity in cd /1000 lm | Maximum Intensity in cd/1000 lm | Minimum Intensity in cd /1000 lm | Maximum Intensity in cd /1000 lm |
| -90° | 0 | 38 | 0 | 25 |
| -75° | 0 | 160 | 0 | 140 |
| -60° | 98 | 246 | 127 | 220 |
| -45° | 142 | 305 | 181 | 275 |
| -30° | 169 | 352 | 213 | 315 |
| -15° | 192 | 389 | 239 | 340 |
| 0° | 200 | 401 | 248 | 352 |
| 15° | 192 | 389 | 239 | 340 |
| 30° | 169 | 352 | 213 | 315 |
| 45° | 142 | 305 | 181 | 275 |
| 60° | 98 | 246 | 127 | 220 |
| 75° | 0 | 160 | 0 | 140 |
| 90° | 0 | 38 | 0 | 25 |

The drawings are intended only to illustrate the essential dimensions of the LED light source

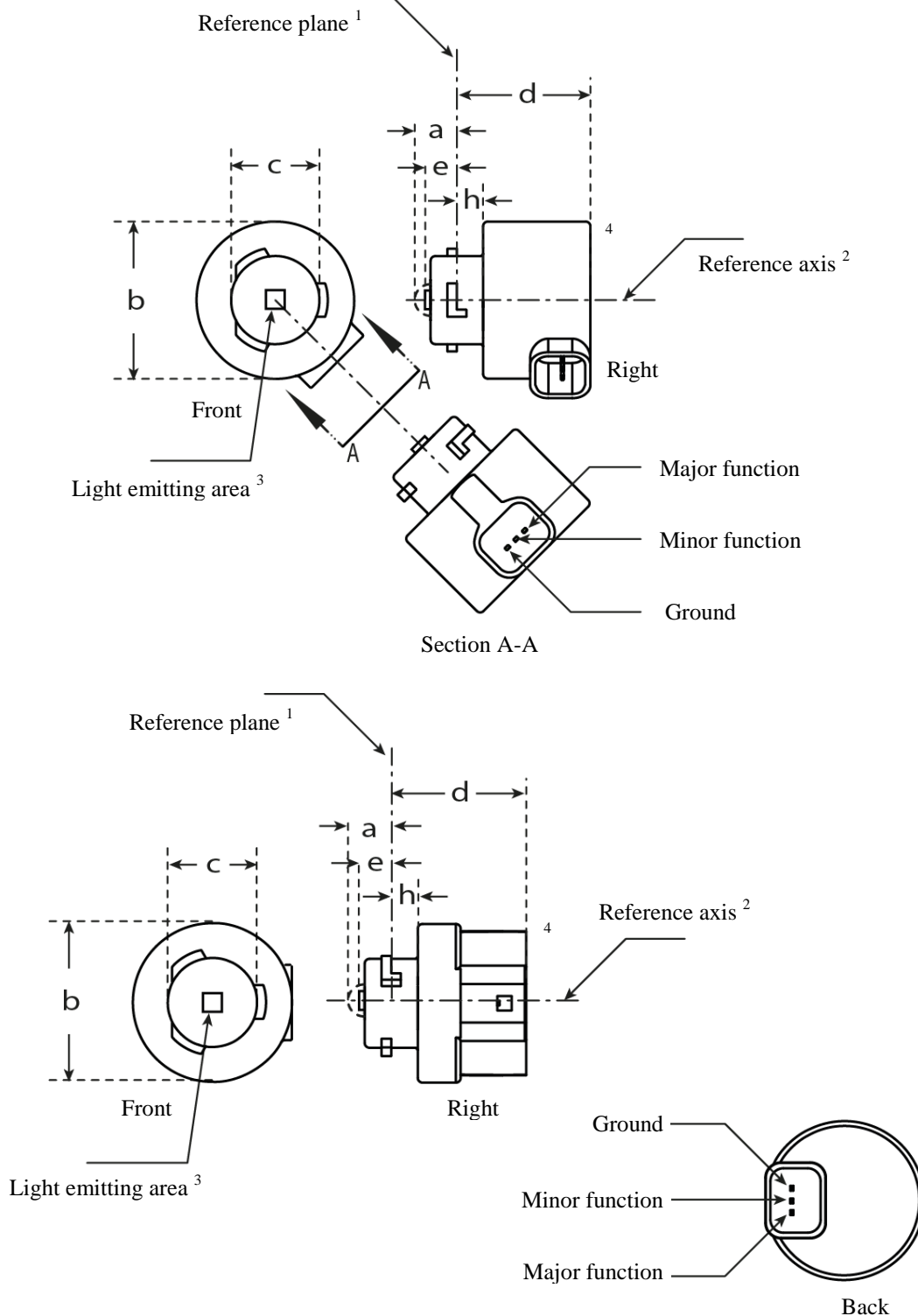


Figure 1*
Main Drawing, LR4A (top) and LR4B (bottom)

For the notes see sheet LR4/2.

* Projection method:

CATEGORIES LR4A and LR4B

Sheet LR4/2

Table 1
Essential electrical and photometric characteristics of the LED light source

| Dimensions | | Production LED light sources | | Standard LED light sources | |
|---|------------------------------------|------------------------------|-----------------------|----------------------------|-----------------------|
| a | mm | 6.0 max. | | | |
| b | mm | c + 10.0 min. 38.0 max. | | | |
| c | mm | 18.5 ± 0.1 | | | |
| d | mm | 28.0 max. | | | |
| e | mm | 3.0 ± 0.30 | | 3.0 ± 0.15 | |
| h | mm | 5.5 + 0.0/ - 0.1 | | | |
| Cap PGJ18t-[yy] in accordance with IEC Publication 60061 (sheet 7004-[xxx]-1) | | | | | |
| Electrical and photometric characteristics ⁵ | | | | | |
| Rated values | | Minor function | Major function | Minor function | Major function |
| | Volts | 12 | | 12 | |
| | Watts | 0.75 | 3 | 0.75 | 3 |
| Objective Values ⁶ | Watts (at 13.5 V DC) | 1.0 max. | 3.5 max. | 1.0 max. | 3.5 max. |
| | Luminous flux (in lm at 13.5 V DC) | 6 ± 20% | 80 ± 20% ⁷ | 6 ± 10% | 80 ± 10% ⁸ |
| | Luminous flux (in lm at 9 V DC) | 1.5 min. | 19 min. | | |

¹ The reference plane is the plane defined by the contact points of the cap-holder fit.

² The reference axis is perpendicular to the reference plane and passing through the centre of the Bayonet core.

³ Light emitting area: to be checked by means of the box system in Figure 2

⁴ A minimum free air space of 5mm around the light source shall be respected for convection.

⁵ The emitted light shall be red.

⁶ After continuous operation for 30 minutes at 23 ± 2.5° C.

⁷ The measured value shall be in between 100 per cent and 70 per cent of the value measured after 1 minute.

⁸ The measured value shall be in between 85 per cent and 75 per cent of the value measured after 1 minute.

Electrical characteristics

In case of LED light source failure (no light emitted) the max. electrical current draw, when operated between 12 V and 14 V, shall be less than 20 mA (open circuit condition).

The major and the minor function shall be operated by separate electrical circuits.

Screen projection requirements

The following test is intended to define the requirements for the apparent light emitting area of the LED light source and to determine whether the light emitting area is correctly positioned relative to the reference axis and reference plane in order to check compliance with the requirements.

The position of the light emitting area is checked by the box system defined in Figure 2, which is aligned to the planes C90 and C180 and shows the projection when viewing along direction $\gamma=0^\circ$ (C, γ as defined in Figure 3).

The proportion of the total luminous flux emitted into the viewing direction shall be as described in table 3.

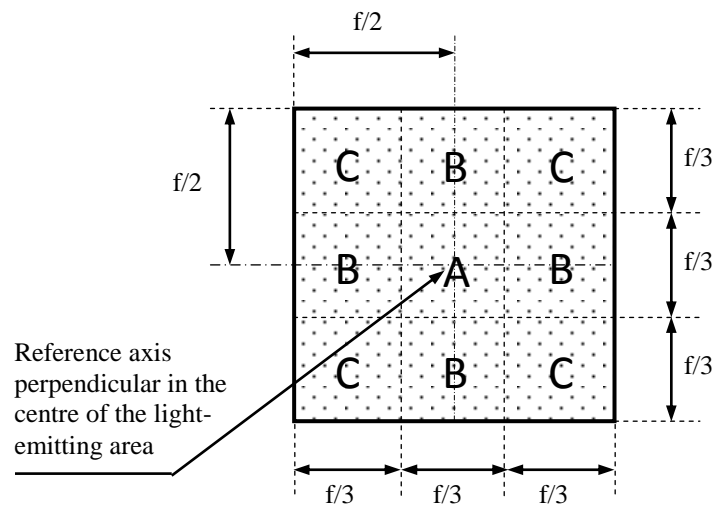


Figure 2

Box definition of the light emitting area with dimensions as specified in table 2

Table 2

Dimensions of the box system in Figure 2

| | |
|--|-----|
| Dimensions in mm | f |
| LED light sources of normal production | 4.5 |
| Standard LED light sources | 4.5 |

Table 3

Proportion of the total luminous flux emitted into the viewing direction from the areas specified in figure 2

| Function | Area(s) | LED light sources of normal production | Standard LED light sources |
|----------|-----------------------------|--|----------------------------|
| Minor | A | $\geq 75\%$ | $\geq 80\%$ |
| Major | A | $\leq 25\%$ | $\leq 10\%$ |
| | Each B individually | $\geq 15\%$ | $\geq 20\%$ |
| | Each C individually | - | $\leq 10\%$ |
| | A, all B and all C together | $\geq 90\%$ | $\geq 90\%$ |

Normalized luminous intensity distribution

The following test is intended to determine the normalized luminous intensity distribution of the light source in an arbitrary plane containing the reference axis. The intersection of the reference axis and the parallel plane to the reference plane in distance e is used as the coordinate system origin.

The light source is mounted on a flat plate with the corresponding mounting lug features. The plate is mounted to the goniometer table by a bracket, so that the reference axis of the light source lines up with one of the rotating axis of the goniometer. The corresponding measurement set-up is described in Figure 3.

Luminous intensity data is recorded with a standard photo-goniometer. The measurement distance should be chosen appropriately, to make sure that the detector is located in the far field of the light distribution. The measurements shall be performed in C-planes C0/180 and C90/270, which contain the reference axis of the light source. The test points for each plane for multiple polar angles γ are specified in Table 4.

After measurement the data shall be normalized to 1000 lm according to Paragraph 3.1.11 using the luminous flux of the individual light source under test. The data shall comply with the tolerance band as defined in Table 4.

The drawings are intended only to illustrate the essential set-up for measurement of the LED light source

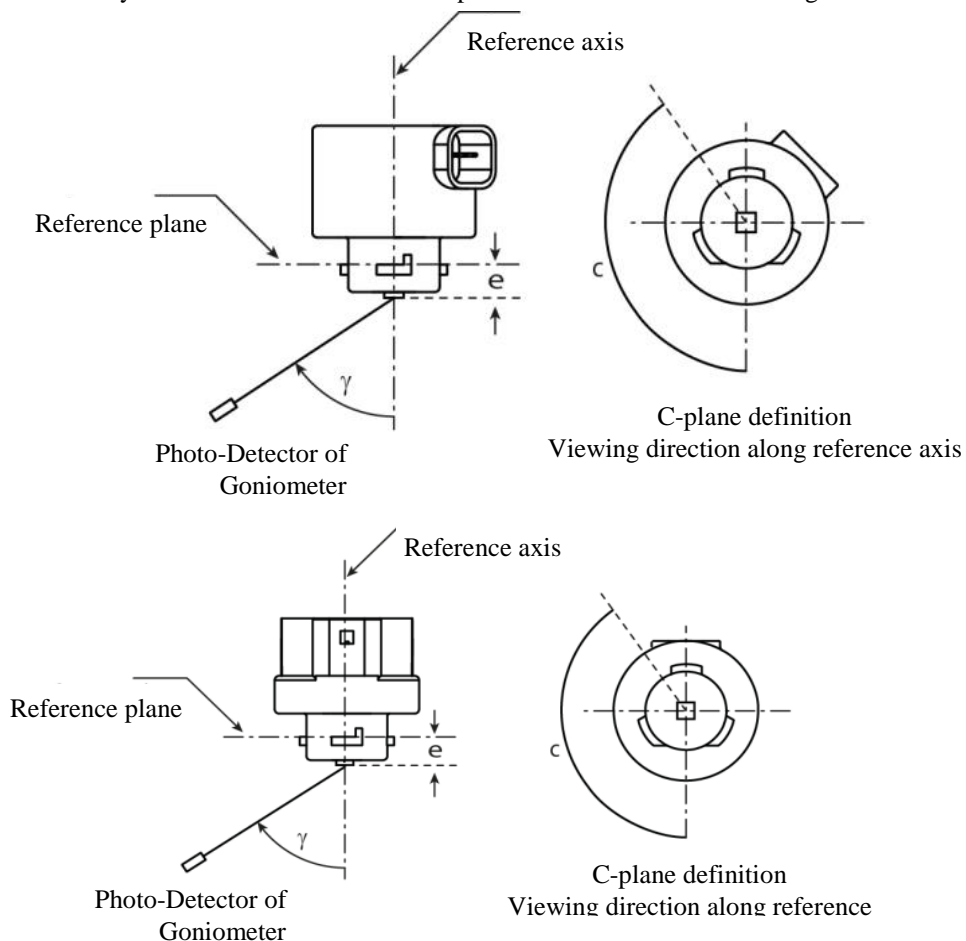


Figure 3

Set-up to measure the luminous intensity distribution, LR4A (top) and LR4B (bottom)

The light pattern as described in Table 4 shall be substantially uniform, i.e. in between two adjacent grid points the relative luminous intensity requirement is calculated by linear interpolation using the two adjacent grid points. In case of doubt this may be checked in addition to verification of the grid points given in Table 4.

Table 4

Test point values of normalized intensities of normal production and standard lamps, respectively. Requirements apply to both, major and minor function.

| Angle γ | <i>LED lamps of normal production</i> | | <i>Standard LED lamps</i> | |
|----------------|--|---|--|---|
| | <i>Minimum Intensity in cd /1000lm</i> | <i>Maximum Intensity in cd/1000lm</i> | <i>Minimum Intensity in cd /1000lm</i> | <i>Maximum Intensity in cd/1000lm</i> |
| -90° | 0 | 38 | 0 | 25 |
| -75° | 0 | 160 | 0 | 140 |
| -60° | 98 | 246 | 127 | 220 |
| -45° | 142 | 305 | 181 | 275 |
| -30° | 169 | 352 | 213 | 315 |
| -15° | 192 | 389 | 239 | 340 |
| 0° | 200 | 401 | 248 | 352 |
| 15° | 192 | 389 | 239 | 340 |
| 30° | 169 | 352 | 213 | 315 |
| 45° | 142 | 305 | 181 | 275 |
| 60° | 98 | 246 | 127 | 220 |
| 75° | 0 | 160 | 0 | 140 |
| 90° | 0 | 38 | 0 | 25 |

Annex 4, paragraph 1.2., amend to read:

"1.2. The luminous flux values, as measured after

- (a) 30 minutes, or
- (b) Stabilisation of temperature T_b

shall comply with the minimum and maximum requirements.

In case of (a), unless otherwise specified on the data sheet, this value shall be in between 100 per cent and 80 per cent of the value measured after 1 minute."
