United Nations ECE/TRANS/WP.29/2021/145

Economic and Social Council

Distr.: General
7 September 2021

Original: English

Economic Commission for Europe

Inland Transport Committee

World Forum for Harmonization of Vehicle Regulations

185th session
Geneva, 23-25 November 2021
Item 4.15.1 of the provisional agenda
1958 Agreement:
Proposal for amendments to the Consolidated Resolution on the common specification of light source categories (R.E.5)

Proposal for amendment 7 to the Consolidated Resolution on the common specification of light source categories (R.E.5)

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 eighty-fourth session (ECE/TRANS/WP.29/GRE/84, para. 20). It is based on ECE/TRANS/WP.29/GRE/2020/16/Rev.1 as amended by informal document GRE-84-32 and ECE/TRANS/WP.29/GRE/2021/3. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration at their November 2021 sessions.

* In accordance with the programme of work of the Inland Transport Committee for 2021 as outlined in proposed programme budget for 2021 (A/75/6 (part V sect. 20) para 20.51), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

The Status table, insert a new row at the bottom to read:

"

…	…	…	…	…
Amendment 7 to the Original Version	[xx.xx.2022]	185	ECE/TRANS/WP.29/2021/145	Introduction of a new LED replacement light source category H11 as a package with Supplement 48 to the 03 series of amendments to UN Regulation No. 37

"

Insert a new subparagraph 2.1.1.3.2., to read:

"2.1.1.3.2. "*LED replacement light source*" means a LED light source designed to replace in a device a counterpart light source with the same category designation, producing light by another light generating technology."

Paragraph 2.1.4., renumber to 2.1.5.

Insert a new paragraph 2.1.4., to read:

"2.1.4. *"AE device"* means an additional electronics device not integrated with, but designed to connect to, a high-efficiency LED replacement light source with the purpose to augment the electrical current without changing the other characteristics of this light source."

Paragraph 3.1., title, amend to read:

"3.1. Filament light sources (incandescent technology)"

Paragraph 3.3., insert a new Group 5, to read:

Group 5	
LED replacement light source categories[3, 4] only for use in lamps approved with filament light source(s) with the same category designation	
Category	*Sheet number(s)*
C5W	C5W_LEDr/1 to 4
H11	H11_LEDr/1 to 7

[3] not for use in type approval of lamps

[4] not for use in conformity of production control of lamps"

Annex 1, title, amend to read:

"Sheets for filament light sources (incandescent technology)"

Annex 3, introductory table, amend to read:

*"*List of sheets for LED light sources and their sequence in this annex:

Sheet number(s)
C5W/LED/1 to 4
C5W_LEDr/1 to 4
H11/LED/1 to 7
H11_LEDr/1 to 7
L1/1 to 5
LR1/1 to 5
LW2/1 to 5
L3/1 to 6
LR4/1 to 5
L5/1 to 6
PY21W/LED/1 to 4

Sheet number(s)
R5W/LED/1 to 4
W5W/LED/1 to 4

"

After sheet C5W1/LED/4, insert new sheets C5W_LEDr/1 to 4, to read:

(see the following pages; one page per sheet)

Category C5W **Sheet C5W_LEDr/1**

The drawings are intended only to illustrate the essential dimensions (in mm) of the LED light source.

Figure 1
Main drawing

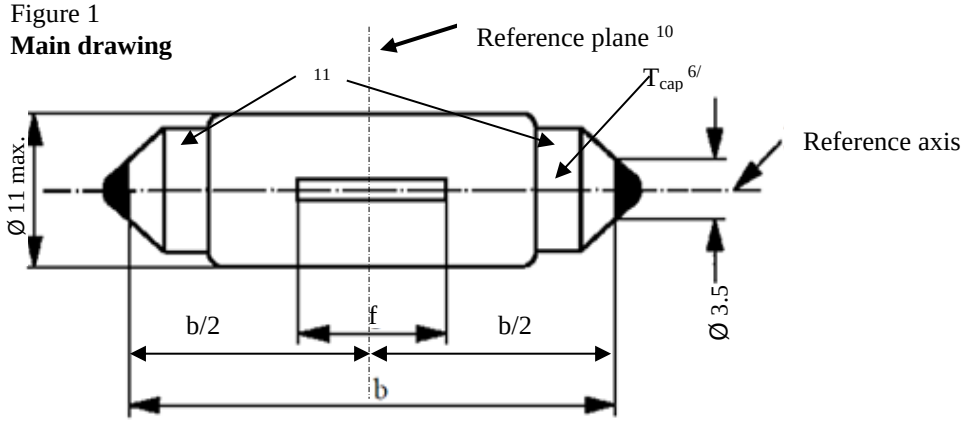


Table 1
Essential electrical and photometrical characteristics of the LED light source

Dimensions in mm			*LED light sources of normal production*
b 1/			35.0 ± 1.0
f 2/			9.0 nom.
Elevated ambient air temperature 4/			50°C
Cap SV8.5 in accordance with IEC Publication 60061 (sheet 7004-81-4)			
Electrical and photometric characteristics 5/			
Rated values		Volts	12
		Watts	3 9/
Test voltage (DC)		Volts	13.5
Objective values	Power 7/	Watts	2.5 min.8/ 5.5 max. 9/
	Electrical current 7/ at 12-14 V DC	mA	150 min. 8/
	Luminous flux 3/	lm	45 ± 20 %
	Luminous flux 3/ at 9V DC	lm	9 min.
	Cap temperature T_{cap}	°C	75 max. 8/

1 This dimension corresponds to a distance between two apertures of 3.5 mm diameter each bearing against one of the caps.

2 To be checked by a "box system", see Figure 2.

3 The light emitted shall be white, without a correlated colour temperature restriction.

4 The luminous flux measured at the elevated ambient air temperature shall be at least 70% of the objective luminous flux (both measured at test voltage).

5 In case of a failure of any of the light emitting elements (open circuit failure), the LED light source shall either still comply to the requirements concerning luminous flux and luminous intensity distribution or stop emitting light whereby in the latter case the electrical current draw, when operated between 12 V and 14 V, shall be less than 10 mA.

6 Measurement point for cap temperature T_{cap}

7 Including AE device, if any

8 Not applicable for high-efficiency type (if no AE device is specified)

9 For high-efficiency type 1W rated value and 2W max. objective value applies

10 The reference plane is perpendicular to the reference axis and passing through the centre of the light source as defined by the dimension b/2

11 Position of polarity marking, in case of particular electrical polarity

Category C5W **Sheet C5W_LEDr/2**

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 means of a box system defined by the projections when viewing along the direction $\gamma = 0°$ (top view)**,** $\gamma = 90°$ (front view)**,** $\gamma = 180°$ (bottom view)**,** $\gamma = 270°$ (rear view) in the plane C_0 (C, γ as defined in Figure 3).

The proportion of the total luminous flux emitted into these viewing directions from the area(s) as defined in figure 2:

- A, B and C together shall be 70 per cent or more;
- B shall be 20 per cent or more;
- A and C shall each be 15 per cent or more.

These values shall be calculated as percentage of the total luminous flux emitted into the viewing direction from the maximum light source outline, i.e. a rectangle of length *b* = 36.0 mm and a height of 11 mm, aligned symmetrically to the reference axis and reference plane (see Figure 1).

Figure 2
Box definition of the light emitting area

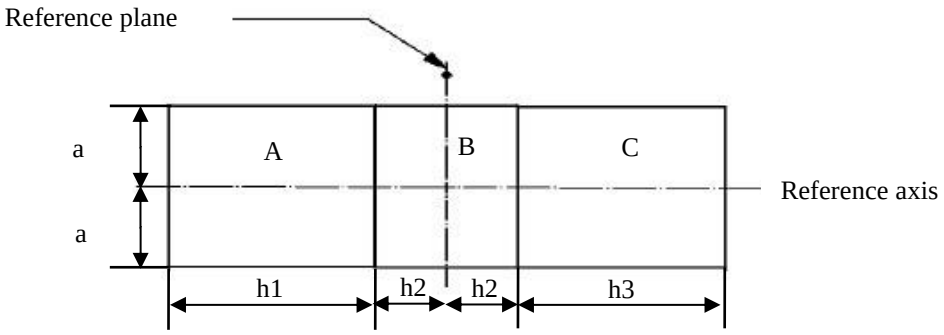


Table 2
Dimensions of the box system in Figure 2

Dimension (mm)	*a*	*h1, h3*	*h2*
All views (as specified above)	2.5	6	2

Category C5W **Sheet C5W_LEDr/3**

Normalized luminous intensity distribution

The following test is intended to determine the normalized luminous intensity distribution of the light source in the C-planes as described in figure 3. The intersection of the reference axis and the reference plane is used as the coordinate system origin.

The light source is mounted on a flat plate with the corresponding holder features. The plate is fixed 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.

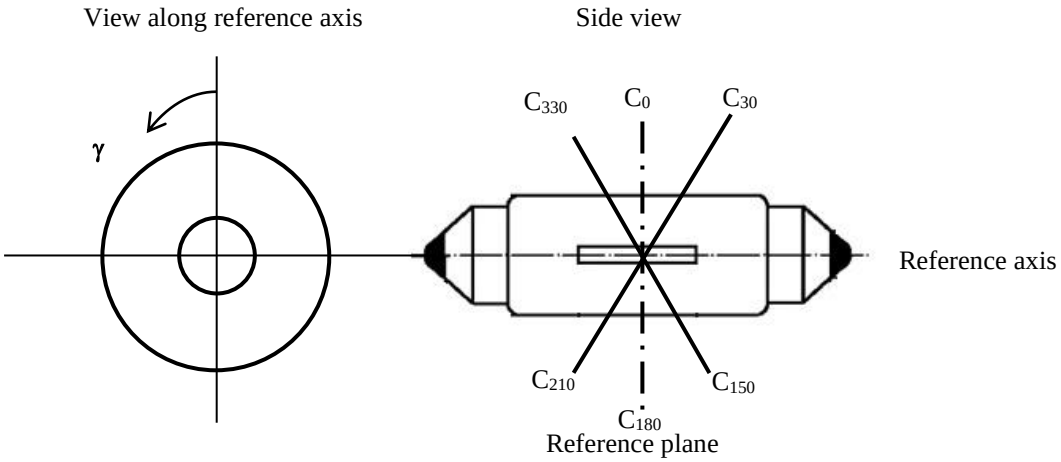
Luminous intensity data is recorded with a standard photo-goniometer. The measurement distance should be chosen appropriately in order to make sure that the detector is located in the far field of the light distribution.

The measurements shall be performed in C-planes, where C_0 (C_{180}) shall be the reference plane of the light source. The C-planes to be measured shall be those specified in Table 3. The test points for each plane and multiple polar angles γ are specified in Table 3.

The measured luminous intensity values, normalised to the measured luminous flux of the individual light source under test, shall be converted to normalised luminous intensity values of a 1000 lm light source. These data shall comply with the tolerance band as defined in Table 3.

Figure 3
Setup to measure the luminous intensity distribution

(Definition of C-Planes and angle γ)



C-planes: See CIE publication 70-1987, "The measurement of absolute intensity distributions".

Category C5W **Sheet C5W_LEDr/4**

Table 3
Test point values of normalized intensity in the planes C_0, C_{30}, C_{150}, C_{180}, C_{210}, C_{330}

	LED light source of normal production	
γ	*Minimum intensity in cd /1000 lm*	*Maximum intensity in cd /1000 lm*
0°	60	140
30°	60	140
60°	60	140
90°	60	140
120°	60	140
150°	60	140

The luminous intensity distribution as described in Table 3 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 3.

After sheet H11/LED/7, insert new sheets H11_LEDr/1 to 7, to read:
(see the following pages; one page per sheet)

Category H11 **Sheet H11_LEDr/1**

The drawings are intended only to illustrate the essential dimensions (in mm) of the LED light source.

Figure 1
Main drawings

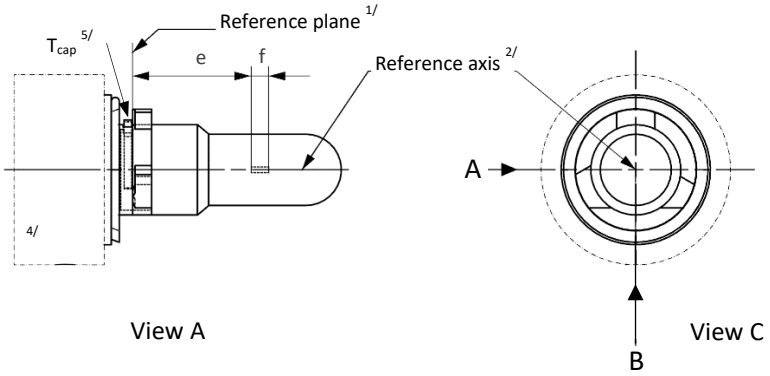
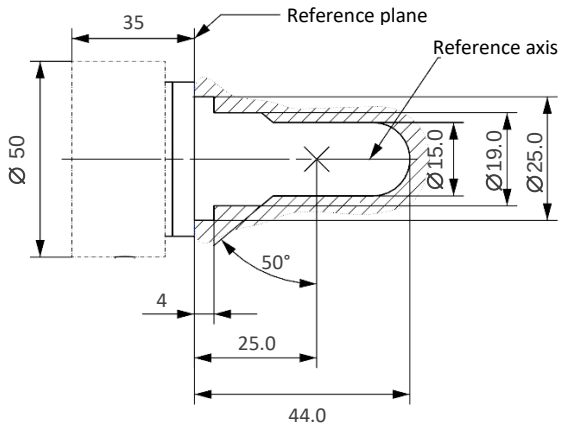


Figure 2
Maximum LED light source outline 3/



1/ The reference plane is the plane formed by the underside of the bevelled lead-in flange of the cap.
2/ The reference axis is perpendicular to the reference plane and passing through the centre of the 19 mm cap diameter.
3/ The LED light source shall not exceed the envelope as indicated in Figure 2.
4/ The light source shall function in either voltage polarity.
5/ Measurement point for cap temperature T_{cap}

Category H11 **Sheet H11_LEDr/2**

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

Dimensions in mm			*LED light sources of normal production*	
e [2/]			25.0 nom.	
f [2/]			4.5 nom.	
Contrast [6/]			100 min.	
Elevated ambient air temperature [3/]			60°C	
Cap H11 PGJ19-2 [9/]			in accordance with IEC Publication 60061 (sheet 7004-110-3)	
Electrical and photometric characteristics			*[4/]*	*[5/]*
Rated values		Volts	12	24
		Watts	27 [11/]	27 [11/]
Test voltage (DC)		Volts (DC)	13.2	28.0
Objective values	Power [8/]	Watts	27 min. [10/] 62 max. [11/]	27 min. [10/] 62 max. [11/]
	Cap temperature T_{cap}	°C	120 max. [10/]	120 max. [10/]
	Electrical current [8/]	mA	2000 min. [10/] (at 12-14 V DC)	1000 min. [10/] (at 24-28 V DC)
	Luminous flux [1/] [3/]	lm	1,350 ± 10%	
	Luminous flux deviation [7/] (voltage range limits)	lm	±10% (at 12V) ±10% (at 14V)	±10% (at 24V) ±10% (at 28V)

[1/] The light emitted shall be white without a correlated colour temperature restriction.
[2/] To be checked by means of a "box system", sheet H11 LEDr/3
[3/] The luminous flux measured at the elevated ambient air temperature shall be at least 75% of the objective luminous flux (both measured at test voltage)
[4/] In case of a failure of any of the light emitting elements (open circuit failure), the LED light source shall either still comply to the requirements concerning luminous flux and luminous intensity distribution or stop emitting light whereby, in the latter case, the electrical current draw, when operated between 12 V and 14 V, shall be less than 100 mA
[5/] In case of a failure of any of the light emitting elements (open circuit failure), the LED light source shall either still comply to the requirements concerning luminous flux and luminous intensity distribution or stop emitting light whereby, in the latter case, the electrical current draw, when operated between 24 V and 28 V, shall be less than 50 mA
[6/] The contrast is the proportion of luminous flux originating from two different areas, see details in sheet H11 LEDr/3
[7/] The maximum luminous flux deviation at the tolerance limits is calculated by using the measured flux at test voltage as reference. The luminous flux behaviour shall be substantially uniform within the specified voltage range.
[8/] Including AE device, if any
[9/] The maximum specifications of parameters G and K are excluded, but the maximum outline dimensions in Figure 2 apply
[10/] Not applicable for high-efficiency type (if no AE device is specified)
[11/] For high-efficiency type 18W rated value and 21W max. objective value applies

Category H11 **Sheet H11_LEDr/3**

Screen projection requirements

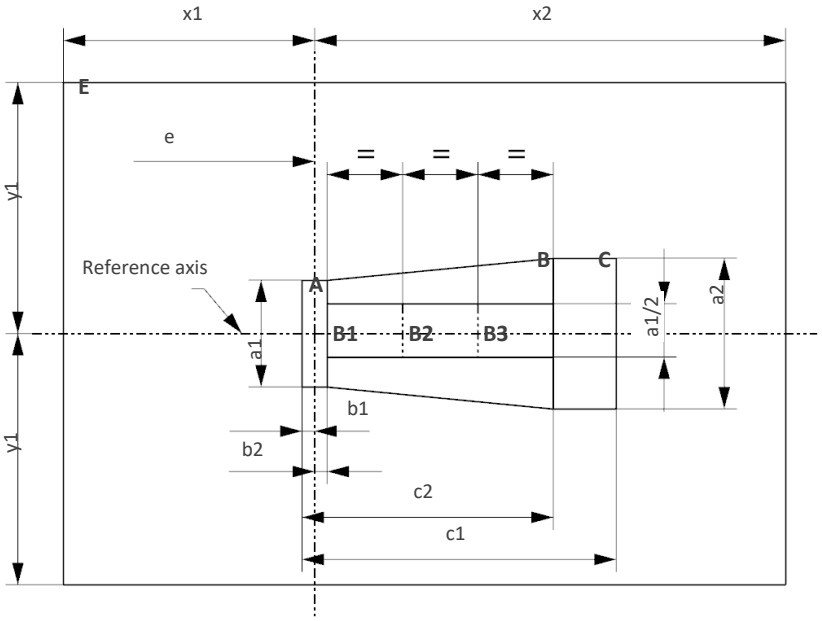
The following test is intended to define the requirements for the apparent light emitting area of the LED light source and to determine whether the light emitting area is correctly positioned relative to the reference axis and reference plane in order to check compliance with the requirements.

The position of the light emitting area is checked by a box system defined in Figure 4 when operated at test voltage, which shows the projections when viewing from B (see sheet H11 LEDr/1, Figure 1) and from A and –A (see sheet H11 LEDr/1, Figure 1), i.e. along the C-planes C_0, C_{90} and C_{270} (as defined in Figure 6).

The proportion of the total luminous flux emitted into these viewing directions from the area(s) as defined in Figure 4:

- Total box area: (A+B+C) / E shall be not less than 90%
- Area A: A / (A+B+C) shall be not more than 10%
- Areas B_1, B_2 and B_3: B_1/B, B_2/B, B_3/B shall each be not less than 15%
- Area B: B / (A+B+C) shall be not less than 72 %
- Area C: C / (A+B+C) shall be not more than 22%

Figure 4
Box definition of the light emitting area (dimensions given in Table 2)



The contrast is checked by a box system defined in Figure 5 when operated at test voltage, which shows the projections when viewing from A and –A (see sheet H11 LEDr/1, Figure 1), i.e. along the C-planes C_{90} and C_{270} (as defined in Figure 6).

The contrast is the proportion of the total luminous flux values emitted into these viewing directions from the corresponding areas (A+B+C) and D. The value of the contrast (A+B+C) / D shall be within the limits given in Table 1 (see Figure 5 for the definition of the area D).

Figure 5
Box definition of the area D (dimensions given in Table 2)

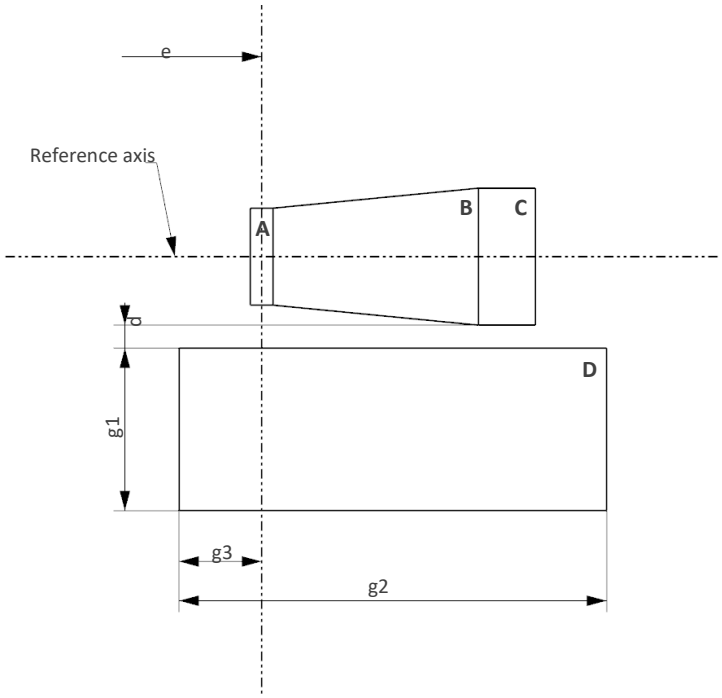


Table 2
Dimensions of the box definitions in Figure 4 and Figure 5

All views (as specified above)	*Dimensions in mm*	*All views (as specified above)*	*Dimensions in mm*
a1	1.7	x1	25
a2	1.9	x2	19
b1	0.2	y1	12.5
b2	0.2	g1	2.85
c1	5.0	g2	7.5
c2	4.0	g3	1.45
d	0.4		

Category H11 **Sheet H11_LEDr/5**

Normalized luminous intensity distribution

The following test is intended to determine the normalized luminous intensity distribution of the light source in the C-planes as described in Figure 6 when operated at test voltage. The intersection of the reference axis and the plane parallel to the reference plane at distance e = 25.0 mm is used as the coordinate system origin.

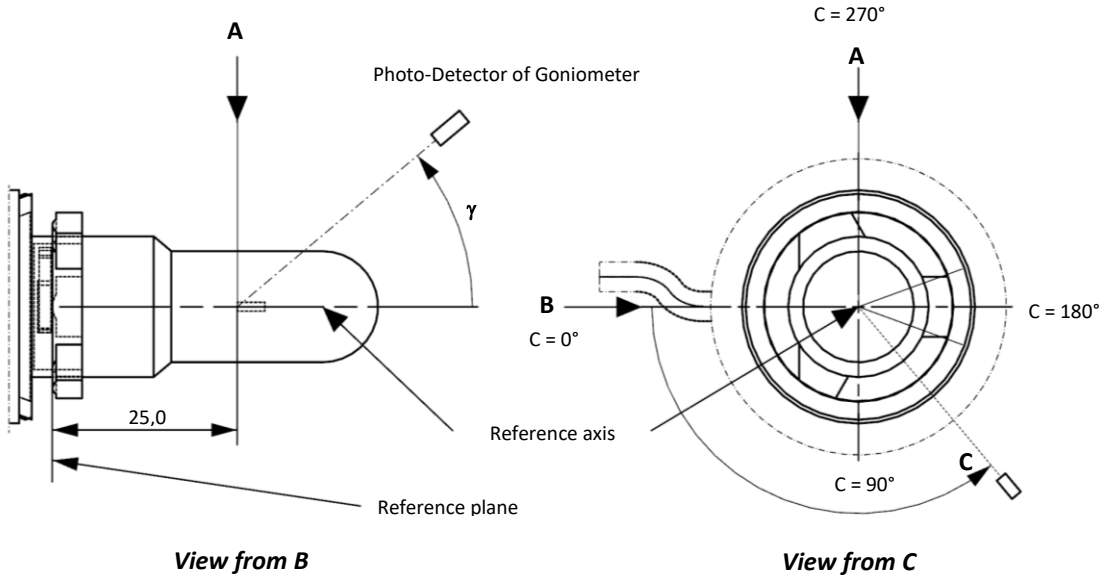
The light source is mounted on a flat plate with the corresponding holder features. The plate is fixed to the goniometer table by a bracket, so that the reference axis of the light source lines up with one of the rotating axis of the goniometer. The corresponding measurement set-up is described in Figure 6.

Luminous intensity data is recorded with a standard photo-goniometer. The measurement distance should be chosen appropriately in order to make sure that the detector is located in the far field of the light distribution.

The measurements shall be performed in C-planes for which the line of intersection coincides with the reference axis of the light source. The test points for each plane and polar angles γ are specified in Table 3.

The measured luminous intensity values, normalised to the measured luminous flux of the individual light source under test, shall be converted to normalised luminous intensity values of a 1000 lm light source. These data shall comply with the limits as defined in Table 3.

Figure 6
Setup to measure the luminous intensity distribution and the definition of C-Planes and angle γ



C-planes: see CIE publication 70-1987, "The measurement of absolute intensity distributions".

Table 3 – Part 1
Test point values of normalized intensity (Black top area)

LED light source of normal production		
	Minimum intensity (cd/klm)	*Maximum intensity (cd/klm)*
γ	C_0, C_{90}, C_{180}, C_{270}	C_0, C_{90}, C_{180}, C_{270}
0°	n/a	10
10°	n/a	10
20°	n/a	10
30°	n/a	10

The light pattern as described in Table 3 – part 1 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 3 – part 1.

Note: The angular range in Table 3 – Part 1 is equivalent to the black top of its counterpart H11 filament light source specified by γ_3 in sheet H11/3.

Table 3 – Part 2
Test point values of normalized intensity (Distortion free area)

	LED light source of normal production	
	Minimum intensity (cd/klm)	*Maximum intensity (cd/klm)*
γ	C_0, C_{90}, C_{270}	C_0, C_{90}, C_{270}
50°	80	130
60°	80	130
70°	80	130
80°	80	130
90°	80	130
100°	80	130
110°	80	130
120°	80	130
130°	80	130
140°	80	130

The light pattern as described in Table 3 – part 2 (excluding the section between C_{90} and C_{270}) 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 3 – part 2.

Note: The angular range in Table 3 – Part 2 is equivalent to the distortion free area of its counterpart H11 filament light source specified by γ_2 and γ_1 in sheet H11/3.

Table 3 – Part 3
Test point values of normalized intensity (Shading area of the lead-in wire of the counterpart filament light source)

	LED light source of normal production	
	Minimum intensity (cd/klm)	*Maximum intensity (cd/klm)*
C-plane	$\gamma = 90°$	$\gamma = 90°$
C_0	80	130
C_{30}	80	130
C_{60}	80	130
C_{90}	80	130
C_{120}	80	130
C_{150}	80	130
C_{180}	n/a	n/a
C_{210}	80	130
C_{240}	80	130
C_{270}	80	130
C_{300}	80	130
C_{330}	80	130
C_{360} (= $C_{0)}$	80	130

The light pattern as described in Table 3 – part 3 (excluding the section between C_{150} and C_{210}) 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 3 – part 3.

Note: Due to the shading area created by the lead-in wire of its counterpart H11 filament light source (opposite to the metal-free zone; see Figure 4 on sheet H11/2) there is no requirement in the C_{180}-plane."