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1958 Agreement

Proposal for amendments to the Consolidated Resolution

on the common specification of light source categories (R.E.5)

Proposal for amendment 6 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-third session (ECE/TRANS/WP.29/GRE/83, paras. 17 and 19). It is based on ECE/TRANS/WP.29/GRE/2020/6 and ECE/TRANS/WP.29/GRE/2020/22. 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 March 2021 sessions.

* In accordance with the programme of work of the Inland Transport Committee for 2020 as outlined in proposed programme budget for 2020 (A/74/6 (part V sect. 20) para 20.37), 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.

** This document was scheduled for publication after the standard publication date owing to circumstances beyond the submitter's control.



The Status table, amend to read:

"Status table

This consolidated version of this Resolution contains all provisions and amendments adopted so far by the World Forum for Harmonization of Vehicle Regulations (WP.29) and is valid from the date as indicated in the following table until the date on which the next revision of this Resolution becomes valid:

Version of the Resolution	Date * as from which the version is valid	Adopted by WP.29		Clarification
		Session No.	Amendment document No.	
...
6	2021-03-09	183	ECE/TRANS/WP.29/2021/51	<p>Amended details concerning measuring luminous flux and internal shield in paragraph 3.1, and sheets H4/2, H15/1, H15/5, H17/1, H17/6, H19/1, H19/5, HS1/2</p> <p>Amend the definition for light centre and associated amended detail in sheet LR4/2</p> <p>Introduction of use restriction for LED light source categories LW2, LW3, and LW5</p> <p>Amended detail in filament light source sheets H7/3, H8/3, H11/3, H14/2, H16/3, H18/3, H19/2, H20/3, H27W/1, P21/5W/2, S1/S2/1 and WY21W/1</p> <p>Amended detail in LED light source sheets L1/2, L1/4, L1/5, LR1/2, LR1/4, LW2/1, Lx3/1, Lx3/2, Lx3/5, LR4/1, LR4/2, LR4/4, Lx5/1, Lx5/2 and Lx5/5</p> <p>Introduction of a new LED substitute light source category H11/LED/6</p>

* This date is the date of adoption of the amendment to the Resolution by WP.29 or the date of entering into force of an amendment to UN Regulation No. 37, 99 or 128 adopted by AC.1 as a package with the amendment to the Resolution in the same session of WP.29.

"

Paragraph 2.2.3., amend to read:

"2.2.3. "Light centre" means a point that represents the apparent (virtual) origin of the light emitted."

Paragraph 3.1., note *, amend to read:

"* Tables, Electrical and Photometric characteristics:

Voltage is expressed in V;

Wattage is expressed in W;

Luminous flux is expressed in lm.

In a case of a category of filament light source where more than one value of reference luminous flux is specified, the value at approximately 12 V or 13.2 V for a lighting device and 13.5 V for a light-signalling device shall be applied unless otherwise specified by the regulation used for the device. "

Paragraph 3.1., notes *⁴ and *⁵, amend to read:

"*⁴ Not for use in UN Regulation No. 112 headlamps and not for use in headlamps of Class A and Class B of UN Regulation No. 149.

*5 Not for use in headlamps other than UN Regulation No. 113 class C and UN Regulation No. 149 Class CS headlamps."

Paragraph 3.3.,

Group 2, amend to read:

"

Group 2			
LED light source categories only for use in signalling lamps, cornering lamps, reversing lamps and rear registration plate lamps:			
	Category		Sheet number(s)
	LR1		LR1/1 to 5
	LW2	2	LW2/1 to 5
	LR3A		L3/1 to 6
	LR3B		L3/1 to 6
	LW3A	2	L3/1 to 6
	LW3B	2	L3/1 to 6
	LY3A		L3/1 to 6
	LY3B		L3/1 to 6
	LR4A		LR4/1 to 5
	LR4B		LR4/1 to 5
	LR5A		L5/1 to 6
	LR5B		L5/1 to 6
	LW5A	2	L5/1 to 6
	LW5B	2	L5/1 to 6
	LY5A		L5/1 to 6
	LY5B		L5/1 to 6

¹ Not for use in conformity of production control of lamps.

² Not for use behind red and amber lenses"

Group 4, amend to read:

"

Group 4			
LED substitute light source categories ¹ only for use in lamps approved with filament light source(s) of its counterpart light source category			
	Category	Counterpart filament light source category	Sheet number(s)
	C5W/LEDK ²	C5W	C5W/LED/1 to 4
	H11/LED/6	H11	H11/LED/1 to 7
	PY21W/LED	PY21W	PY21W/LED/1 to 4
	R5W/LED	R5W	R5W/LED/1 to 4
	W5W/LEDK ²	W5W	W5W/LED/1 to 4
	WY5W/LED	WY5W	W5W/LED/1 to 4

"

Annex 1,

Sheet H4/2, table, amend to read:

"

Dimensions in mm		Filament light sources of normal production				Standard filament light source		
		12 V		24 V		12 V		
e		28.5 +0.35/-0.25		29.0 ± 0.35		28.5 + 0.20 / -0.00		
p		28.95		29.25		28.95		
α		max. 40°				max. 40°		
Cap P43t in accordance with IEC Publication 60061 (sheet 7004-39-6)								
Electrical and photometric characteristics								
Rated values		Volts	12 ^{6/}		24 ^{6/}		12 ^{6/}	
		Watts	60	55	75	70	60	55
Test voltage		Volts	13.2		28.0		13.2	
Objective values	Watts	75 max.	68 max.	85 max.	80 max.	75 max.	68 max.	
	Luminous flux	1,650	1,000	1,900	1,200			
	± %	15						
Measuring flux ^{7/} lm		-	1,000	-	1,200			
Reference luminous flux at approximately				12 V		1,250	750	
				13.2 V		1,650	1,000	

"

Sheet H7/3, table, amend to read:

"...

Dimensions in mm	Filament light sources of normal production		Standard filament light source
	12 V	24 V	12 V
...
...
g ^{12/}	0.5 min.		0.5 min.
...

"

Sheet H8/3, table, amend to read:

"...

<i>Dimensions in mm</i>	<i>Filament light sources of normal production</i>	<i>Standard filament light source</i>
	<i>12 V</i>	<i>12 V</i>
...
...
g	0.5 min.	0.5 min.
...

"

Sheet H11/3, table, amend to read:

"...

Dimensions in mm	Filament light sources of normal production		Standard filament light source
	12 V	24 V	12 V
...
...
g	0.5 min.		0.5 min.
...

"

Sheet H14/2, figures 3, 4 and 5, amend to read:

"

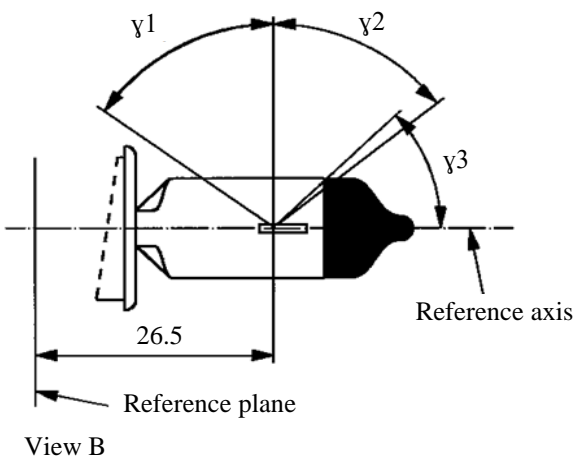


Figure 3 – Distortion free area^{4/} and black top^{5/}

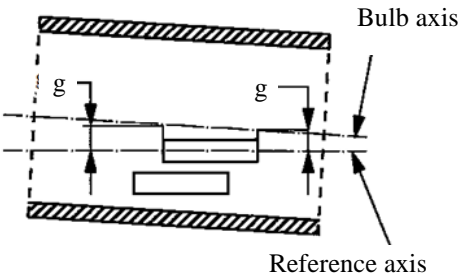
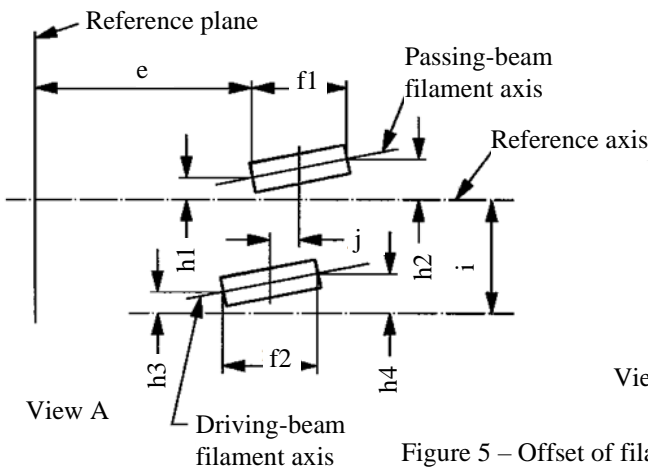
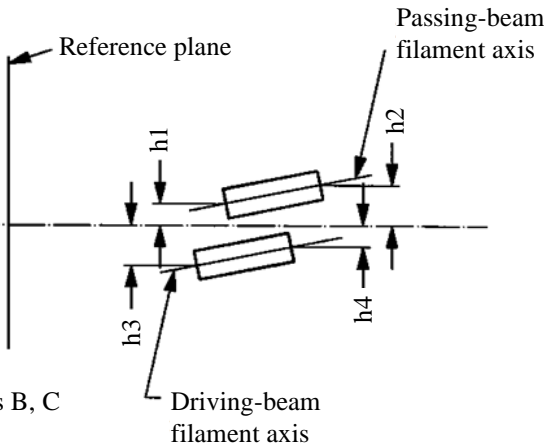


Figure 4 – Bulb eccentricity^{6/}



View A



Views B, C

Figure 5 – Offset of filament axis^{7/}
(for standard filament light sources only)

"

Sheet H15/1, figure 1, amend to read (insert an arrow to the inner shield labelled with a footnote 14):

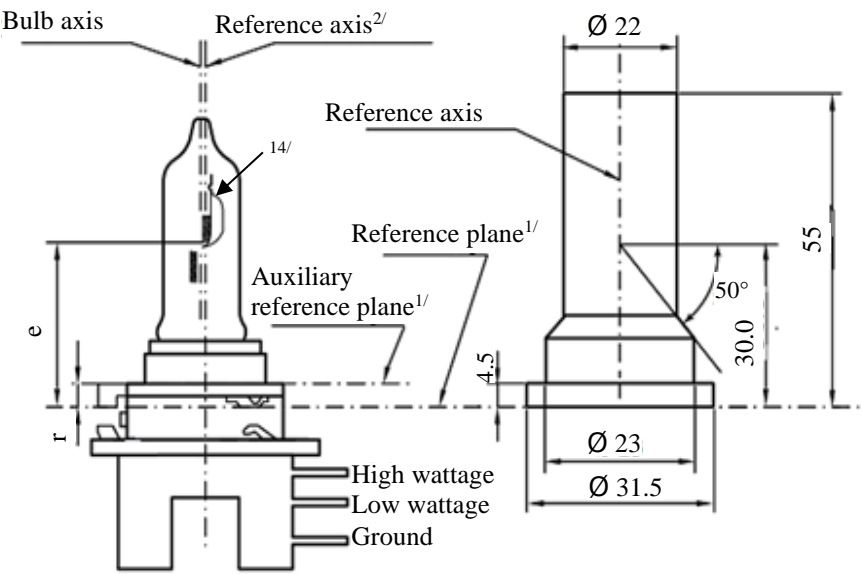


Figure 1 – Main drawing

Figure 3 - Maximum filament light source outlines^{3/}

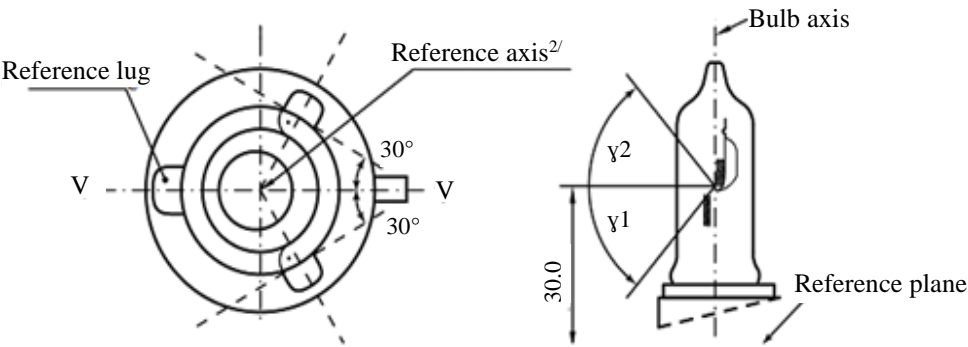


Figure 2 – Definition of reference axis^{7/}

Figure 4 - Distortion free area^{4/}

Sheet H15/5, insert a new footnote 14:

"...
^{14/} Internal shield, not intended for producing the cut-off-line."

Sheet H16/3, table, amend to read:

"...

Dimensions in mm	Filament light sources of normal production	Standard filament light source
	12 V	12 V
...
...
g	0.5 min.	0.5 min.
...

Sheet H17/1, figure 1, amend to read (insert an arrow to the inner shield labelled with a new footnote 13):

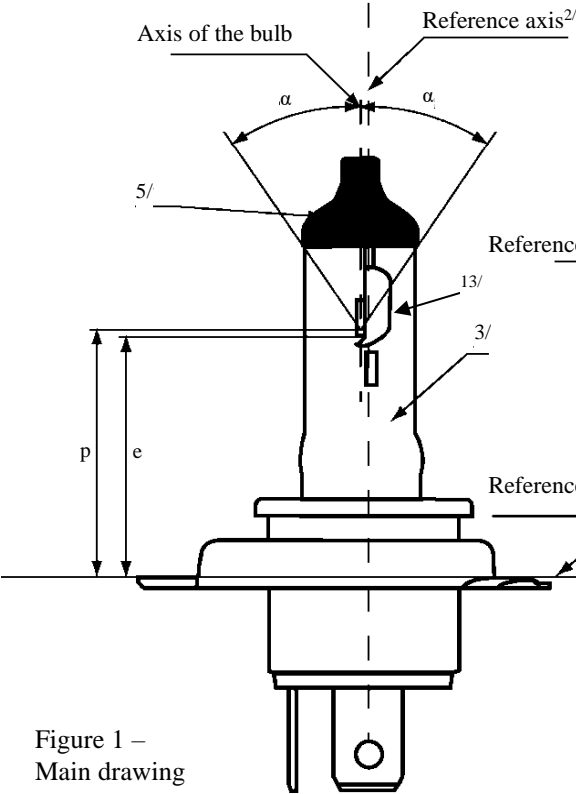
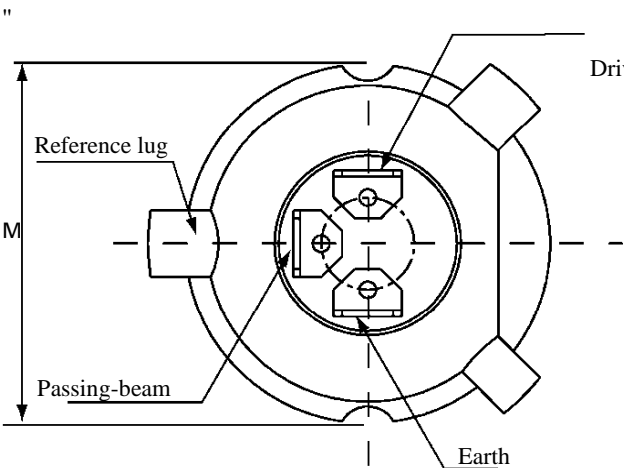


Figure 1 –
Main drawing

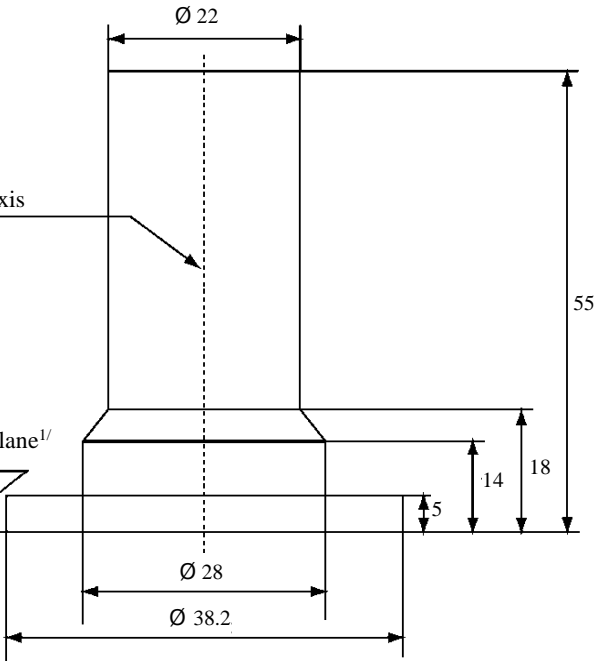


Figure 2 - Maximum filament light source outlines^{4/}

"

Sheet H17/6, insert a new footnote 13:

"...

13/ Internal shield, not intended for producing the cut-off-line."

Sheet H18/3, table, amend to read:

"...

	Filaments light sources of normal production	Standard filament light source
	12 V	12 V
...

...
g ^{12/}	0.5 min.	0.5 min.
...

"

Sheet H19/1, figure 1, amend to read insert an arrow to the inner shield labelled with a new footnote 13):

"

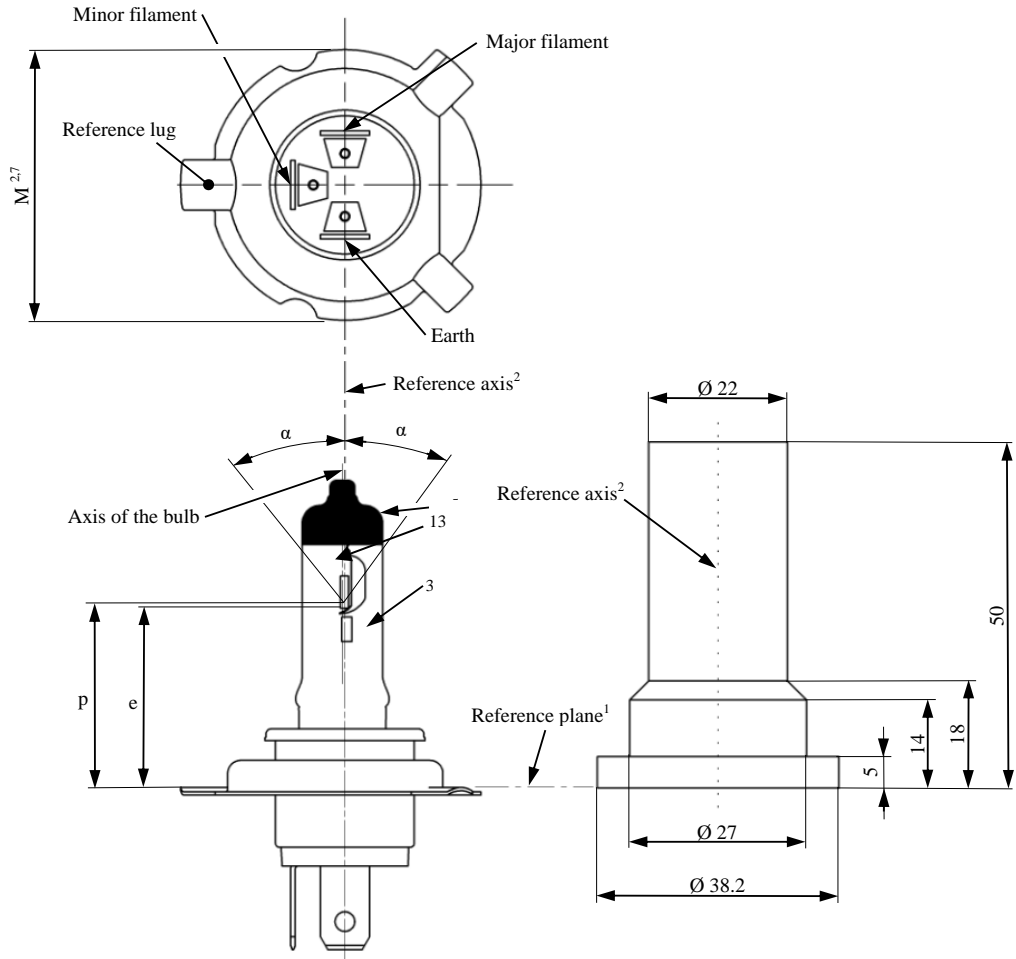


Figure 1
Main drawing

Figure 2
Maximum lamp outlines⁴

"

Sheet H19/2, table, amend to read:

" ...

Dimensions in mm		Filament lamps of normal production	Standard filament lamps
		12 V	12 V
e		28.5 + 0.35 / - 0.15	28.5 + 0.20 / - 0.0
p		28.95	28.95
α		max. 45°	max. 45°
Cap PU43t-3 in accordance with IEC Publication 60061 (sheet 7004-171-2)			
Electrical and photometric characteristics			
Rated values	Volts	12 ⁶	12 ⁶

	Watts	60	55	60	55
Test voltage	Volts	13.2	13.2	13.2	13.2
Objective values	Watts	72 max	68 max.	72 max.	68 max.
	Luminous flux	1,750 ± 10%	1,200 ± 10%		
Reference luminous flux at approximately			13.2 V	1,750	1,200

"

Sheet H19/5, insert a new footnote 13:

" ...

¹³ Internal shield, not intended for producing the cut-off-line."

Sheet H20/3, table, amend to read:

"

...	
	
...	
Objective values		Watts	75 max.	75 max.
		Luminous flux	1,250 ± 10 %	
Reference luminous flux at approximately			12 V	900
			13.2 V	1,250
...

"

Sheet H21W/2, insert a page break after paragraph 3.2. and start sheet H27W/1 at the next page.

Sheet HS1/2, table, amend to read:

"

Dimensions in mm		Filament light sources of normal production				Standard filament light source		
		6 V		12 V		12 V		
e		28.5 + 0.45 / -0.25				28.5 + 0.20 / -0.00		
p		28.95				28.95		
α		max. 40°				max. 40°		
Cap PX43t in accordance with IEC Publication 60061 (sheet 7004-34-2)								
Electrical and photometric characteristics								
Rated values		Volts	6 ^{6/}		12 ^{6/}		12 ^{6/}	
		Watts	35	35	35	35	35	35
Test voltage		Volts	6.3		13.2		13.2	
	Watts	35	35	35	35	35	35	

Dimensions in mm		Filament light sources of normal production				Standard filament light source	
		6 V		12 V		12 V	
Objective values	± %	5				5	
	Luminous flux	700	440	825	525		
	± %	15					
Measuring flux ^{7/} lm		-		-	525		
Reference luminous flux at approximately					12 V	700	450
					13.2 V	825	525

"

Sheet P21/5W/1, insert a page break after the table and start sheet P21/5W/1 at the next page.

Sheet S1/S2/1, the introductory text above the figures, amend to read:

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

Sheet WY21W/1, table, amend to read:

" ...

Dimensions in mm	Filament light sources of normal production			Standard filament light source
	Min.	Nom.	Max.	
e		29.0 ^{3/}		29.0 ± 0.3
f			7.5	7.5 + 0 / -2
Lateral deviation ^{1/}			^{3/}	0.5 max.
...

"

Annex 3,

List of sheets for LED light sources and their sequence, amend to read:

"

Sheet number(s)

C5W/LED/1 to 4

H11/LED/1 to 7

L1/1 to 5

LR1/1 to 5

LW2/1 to 5

Lx3/1 to 6

LR4/1 to 5

Lx5/1 to 6

PY21W/LED/1 to 4

R5W/LED/1 to 4

W5W/LED/1 to 4

"

Sheet L1/2, table 1, amend to read:

"

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	18.60			
d	mm	28.0 max.			
e	mm	3.00 ± 0.30		3.00 ± 0.10	
h ⁸	mm	4.88			
k ⁹	mm	7 min.			
m ⁹	mm	4.5 max.			
Cap PGJ18.5d-29 in accordance with IEC Publication 60061 (sheet 7004-185-42) ¹⁰					
Electrical and photometric characteristics ⁵					
Rated Values	Voltage (in Volts)		12		
	Power (in Watts)		4.0		
Test voltage	Volts (DC)		13.2	13.5	13.2 13.5
Objective values ⁶	Power (in Watts) at test voltage		6.0 max		
	Luminous Flux (in lumen) at test voltage		350 ± 20%	355 ± 20%	350 ± 10% ⁷ 355 ± 10%
	Luminous Flux (in lumen) at 9V DC		70 min.		
Characteristics of the light-emitting area					
Contrast		200 min.		200 min. 400 max.	
Size of light emitting area in relation to size of nominal emitter box ³		75% min.		75% min.	
Uniformity R _{0.1} – surface ratio with luminance exceeding 10% of average luminance		75% min.		85% min.	
Uniformity R _{0.7} – surface ratio with luminance exceeding 70% of average luminance		55% min.		65% min.	
Specific thermal test conditions					
Maximum test temperature		65 °C		65 °C	

"

Sheet L1/4, the introductory text above Figure 4, amend to read:

"...

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 upper edge of the box 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 4.

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 C_0 , C_{90} , C_{180} and C_{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 3.

After measurement the data shall be normalized to 1000 lm according to paragraph 2.4.4. using the luminous flux of the individual light source under test. The data shall comply with the tolerance band as defined in Table 3.

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

Sheet L1/5, the text above table 3, amend to read:

"The light pattern 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."

Sheet L1/5, table 3, title, amend to read:

"Test point values of normalized intensities of normal production and standard light sources, respectively"

Sheet LR1/2, table, amend to read:

"...

Dimensions in mm		Tolerance			
		LED light sources of normal production		Standard LED light source	
e ^{3/ 7/}	24.0	0.2		0.1	
Cap PGJ21t-1 in accordance with IEC Publication 60061 (sheet 7004-165-1)					
Electrical and photometric characteristics ^{5/}					
Rated values		Minor function	Major function	Minor function	Major function
	Volts	12		12	
Test voltage	Volts (DC)	13.5		13.5	
Objective Values ^{6/}	Watts (at test voltage)	0.75 max.	3.5 max. 1.4 min.	0.75 max.	3.5 max. 1.4 min.
	Luminous flux (in lm at test voltage)			3.5 ± 10%	47 ± 10%
	Luminous flux (in lm at 10-16 V DC)	3.5 ± 20%	47 ± 20%		

"

Sheet LR1/4, penultimate paragraph, amend to read:

"After measurement the data shall be normalized to 1,000 lm according to paragraph 2.4.4. using the luminous flux of the individual light source under test. The data shall comply with the tolerance band as defined in Table 3.

..."

Sheet LW2/1, table, amend to read:

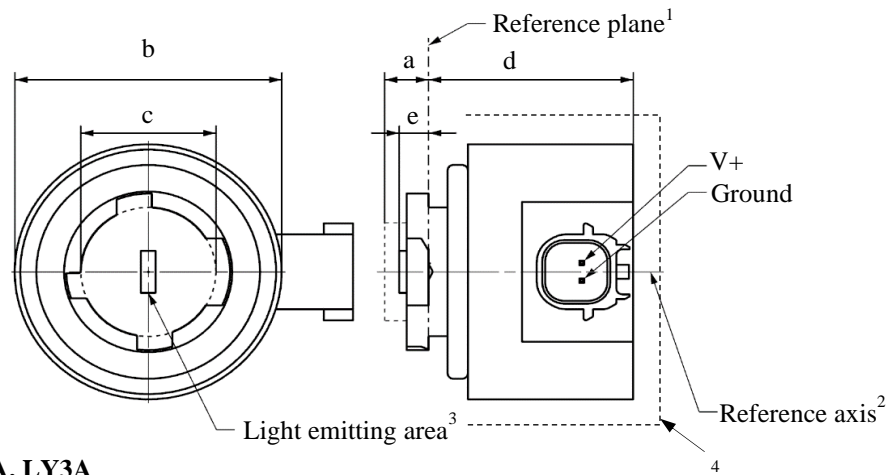
"...

Dimensions in mm		Tolerances			
		LED light sources of normal production		Standard LED light sources	
e ^{8/}	26.4	0.2		0.1	
Cap PGJY50 in accordance with IEC Publication 60061 (sheet 7004-182-1)					
Electrical and photometric characteristics ^{5/}					
Rated values		Minor function	Major function	Minor function	Major function
	Volts	12		12	
Test voltage	Volts (DC)	13.5		13.5	
Objective Values ^{6/ 7/}	Watts (at test voltage)	1 max.	12 max. 4 min.	1 max.	12 max. 4 min.
	Luminous flux (in lm at test voltage)			50 ± 10%	725 ± 10%
	Luminous flux (in lm at 10-16 V DC)	50 ± 15%	725 ± 15%		
Corresponding base temperature T _b in °C		30 ± 2	55 ± 2	30 ± 0.5	55 ± 0.5

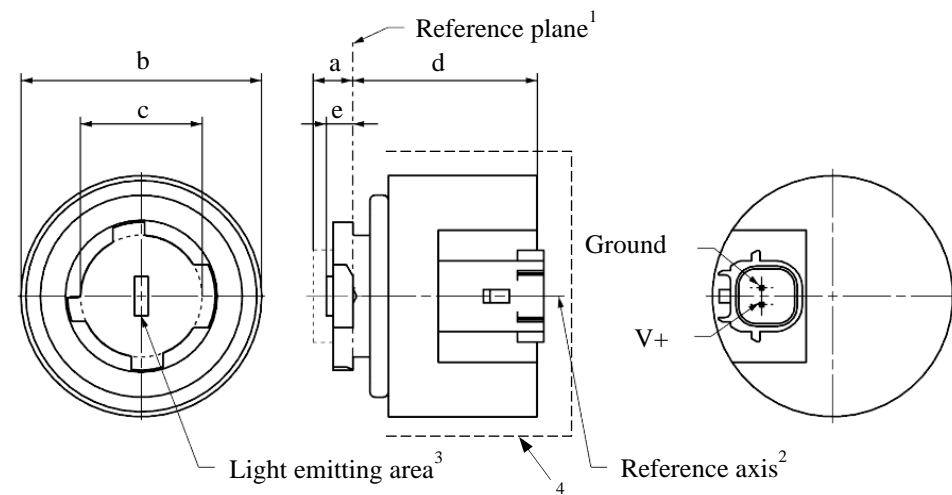
"

Sheet Lx3/1, figure 1, amend to read:

"



LR3A, LW3A, LY3A



LR3B, LW3B, LY3B

Sheet Lx3/2, table 1 and footnote 4, amend to read:

".....

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 ^{13/}		mm	3.0 ± 0.30		3.0 ± 0.15	
Cap	LR3A, LR3B	PGJ18.5d-1	in accordance with IEC Publication 60061 (sheet 7004-185-2)			
	LW3A, LW3B	PGJ18.5d-24				
	LY3A, LY3B	PGJ18.5d-15				
Electrical and photometric characteristics						
Rated values	Volts		12			
		LR3A, LR3B	3			
	Watts	LW3A, LW3B	4			
		LY3A, LY3B				

Test voltage	Volts (DC)		13.5		
Objective Values ⁸	Watts (at test voltage)		LR3A, LR3B	3.5 max.	
			LW3A, LW3B	5 max.	
		12	LY3A, LY3B		
	Luminous flux (in lm at test voltage)	5	LR3A, LR3B	$80 \pm 20\%^9$	$80 \pm 10\%^{10}$
		6	LW3A, LW3B	$250 \pm 20\%$	$250 \pm 10\%^{11}$
		7, 12	LY3A, LY3B	$150 \pm 20\%^9$	$150 \pm 10\%^{10}$
	Luminous flux (in lm at 9 V DC)	5	LR3A, LR3B	19 min	
		6	LW3A, LW3B	50 min.	
		7, 12	LY3A, LY3B	30 min	

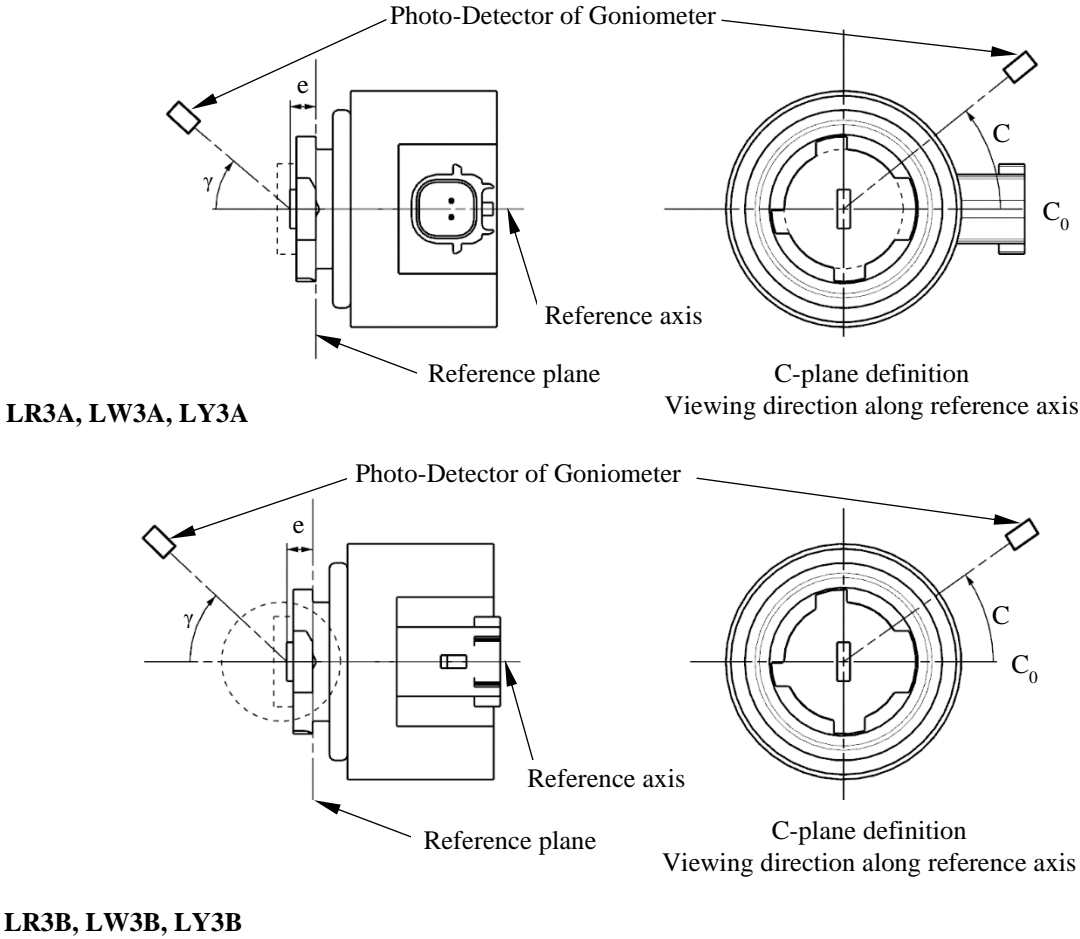
- 1/ ...
2/ ...
3/ ...
4/ A minimum free air space of 5 mm around the light source shall be respected for convection; the connector interface can be neglected.
5/ ...
6/ ...
..."

Sheet Lx3/5, fifth indent, amend to read:

" After measurement the data shall be normalized to 1,000 lm according to paragraph 2.4.4. using the luminous flux of the individual light source under test. The data shall comply with the tolerance band as defined in Tables 4a and 4b...."

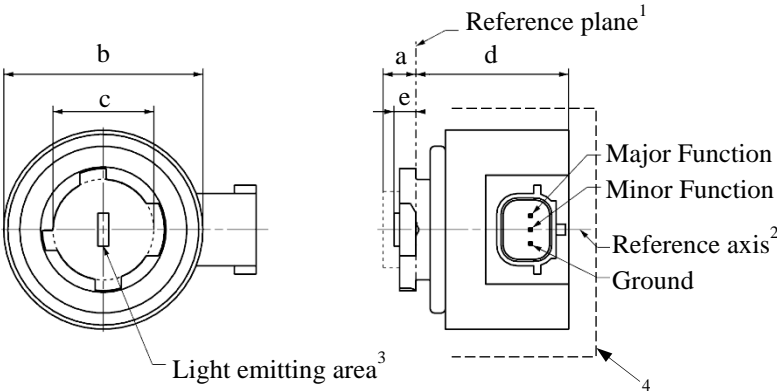
Sheet Lx3/5, figure 3, amend to read:

"

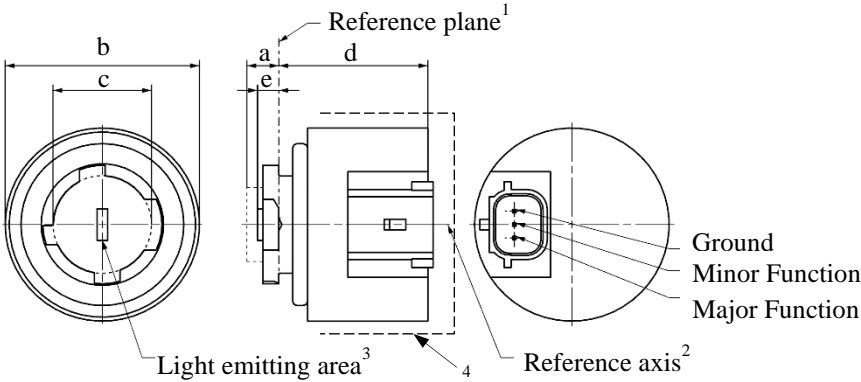


"

Sheet LR4/1, figure 1, amend to read:



LR4A



LR4B

"

Sheet LR4/2, table 1 and footnotes 4 and 9, amend to read:

"...

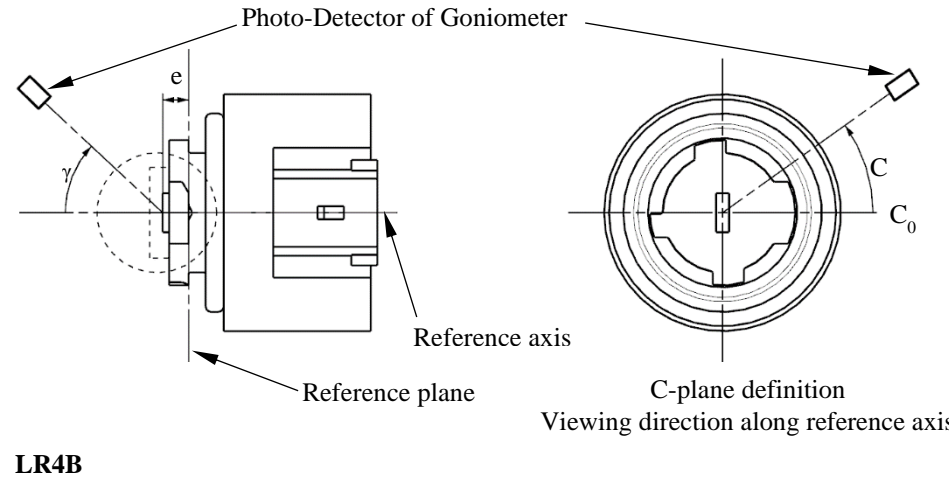
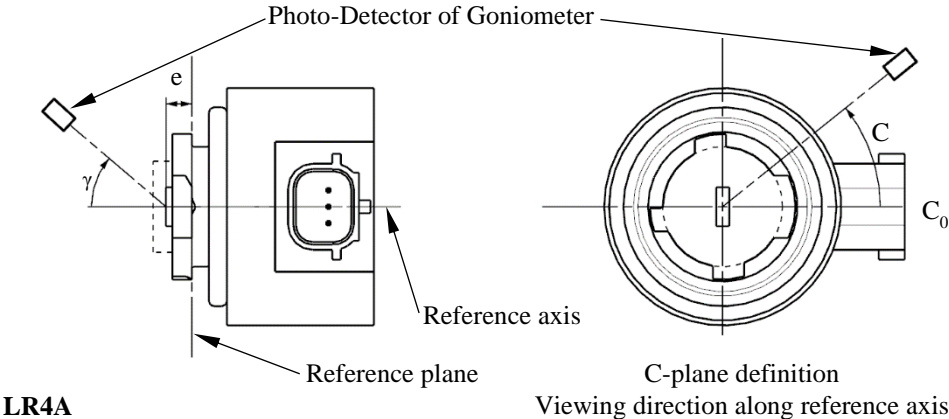
Dimensions		Production LED light sources		Standard LED light sources	
a	mm	6.0 max.			
b	mm	c + 10.0 min. 38.0 max.			
c	mm	18.5 ± 0.1			
d	mm	28.0 max.			
e ^{9/}	mm	3.0 ± 0.30		3.0 ± 0.15	
Cap PGJ18.5t-5 in accordance with IEC Publication 60061 (sheet 7004-185-2)					
Electrical and photometric characteristics ⁵					
Rated values		Minor function	Major function	Minor function	Major function
	Volts	12		12	
	Watts	0.75	3	0.75	3
Test voltage	Volts (DC)	13.5		13.5	
Objective Values ⁶	Watts (at test voltage)	1.0 max.	3.5 max.	1.0 max.	3.5 max.
	Luminous flux (in lm at test voltage)	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 5 mm around the LED light source shall be respected for convection; the connector interface can be neglected.
- 5/ The emitted light shall be red.
- 6/ After continuous operation for 30 minutes at $23 \pm 2.5^\circ \text{C}$.
- 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.
- 9/ Light centre length, both functions are operated at the same time during the measurement; for the method of measurement, see Annex K of IEC Publication 60809, Edition 3.3.
- 10/ The measured value shall be in between 100 per cent and 80 per cent of the value measured after 1 minute"

Sheet LR4/4, fifth indent, amend to read:

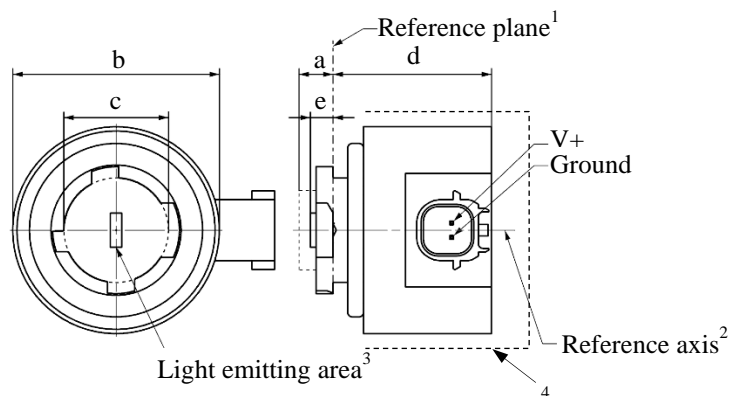
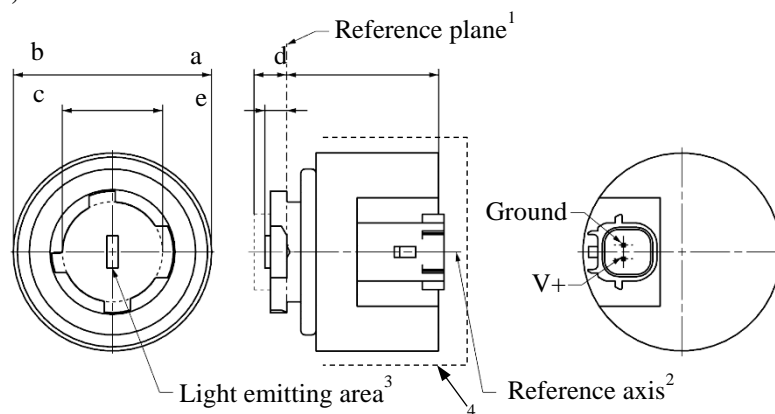
" After measurement the data shall be normalized to 1,000 lm according to paragraph 2.4.4. using the luminous flux of the individual light source under test. The data shall comply with the tolerance band as defined in Table 4."

Sheet LR4/4, figure 3, amend to read:



Sheet Lx5/1, figure 1, amend to read:

"

**LR5A, LW5A, LY5A****LR5B, LW5B, LY5B**

Sheet Lx5/2, table 1 and footnote 4, amend to read:

"...

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 ^{11/}		mm	3.0 ± 0.30		3.0 ± 0.15	
Cap	LR5A, LR5B	PGJ18.5d-10	in accordance with IEC Publication 60061 (sheet 7004-185-42)			
	LW5A, LW5B	PGJ18.5d-28				
	LY5A, LY5B	PGJ18.5d-19				
Electrical and photometric characteristics						
Rated values	Volts		12			
		LR5A, LR5B	3			
	Watts	LW5A, LW5B LY5A, LY5B	6			
Test voltage	Volts (DC)		13.5			
Objective Values ⁸	Watts	LR5A, LR5B	3.5 max.			
	(at test voltage)	LW5A, LW5B	8 max.			

		10	LY5A, LY5B		
Luminous flux (in lm at test voltage)	5	LR5A, LR5B	120 ± 15%	120 ± 5% ⁹	
	6	LW5A, LW5B	350 ± 20%	350 ± 10% ⁹	
	7, 10	LY5A, LY5B	280 ± 20%	280 ± 10% ⁹	
Luminous flux (in lm at 9 V DC)	5	LR5A, LR5B	28 min.		
	6	LW5A, LW5B	65 min.		
	7, 10	LY5A, LY5B	55 min.		

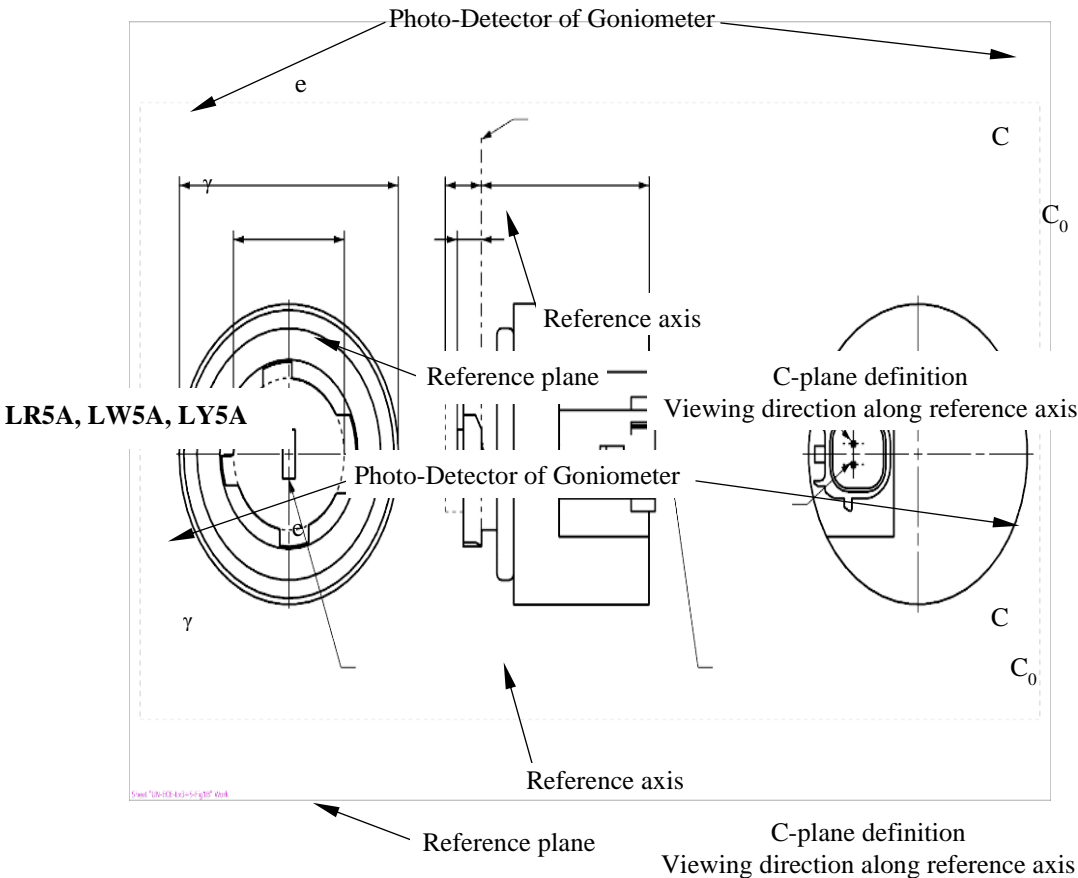
- 1/ ...
2/ ...
3/ ...
4/ A minimum free air space of 5 mm around the light source shall be respected for convection; the connector interface can be neglected.
5/ ...
6/ ...
... "

Sheet Lx5/5, fifth indent, amend to read:

" After measurement the data shall be normalized to 1,000 lm according to paragraph 2.4.4. using the luminous flux of the individual light source under test. The data shall comply with the tolerance band as defined in Table 4...."

Sheet Lx5/5, figure 3, amend to read:

"



LR5B, LW5B, LY5B

"

After sheet C5W/LED/4, insert new sheets H11/LED/1 to 7, to read:
(see following pages; one page per sheet)

"

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

Figure 1

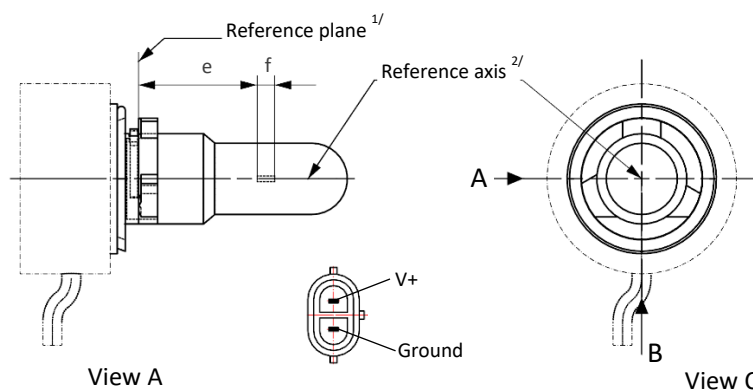
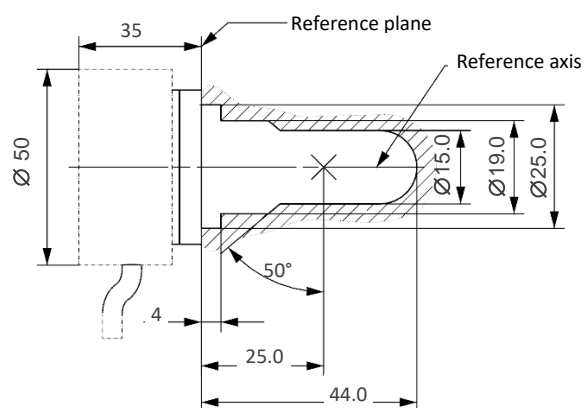
Main drawing

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.

Category H11/LED/6

Sheet H11/LED/2

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

Dimensions in mm			LED light sources of normal production		Standard LED light sources
			12V	24V	
e ^{2/}			25.0 nom.		
f ^{2/}			4.5 nom		
Contrast ^{6/}			100 min.		
Elevated ambient air temperature ^{3/}			60°C for H11/LED/6		
Cap H11/LED/6 PGJX19-2 in accordance with IEC Publication 60061 (sheet 7004-110A-1)					
Electrical and photometric characteristics			4/	5/	4/
Rated values		Volts	12	24	12
		Watts	18	18	18
Test voltage		Volts (DC)	13.2	28.0	13.2
Objective values	Power	Watts	21 max.	21 max.	21 max.
	Electrical current	mA	350 min. 1750 max. (at 9-16 V DC)	175 min. 875 max. (at 16-32 V DC)	350 min. 1750 max. (at 9-16 V DC)
	Luminous flux ^{1/} (at test voltage)	lm	1,350 ± 10%	1,350 ± 10%	1,350 ± 10 %
	Luminous flux ^{1/}	lm	270 min. (at 9 V DC)	150 min. (at 16 V DC)	270 min. (at 9 V DC)

^{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/LED/3

^{3/} 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)

^{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/LED/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.

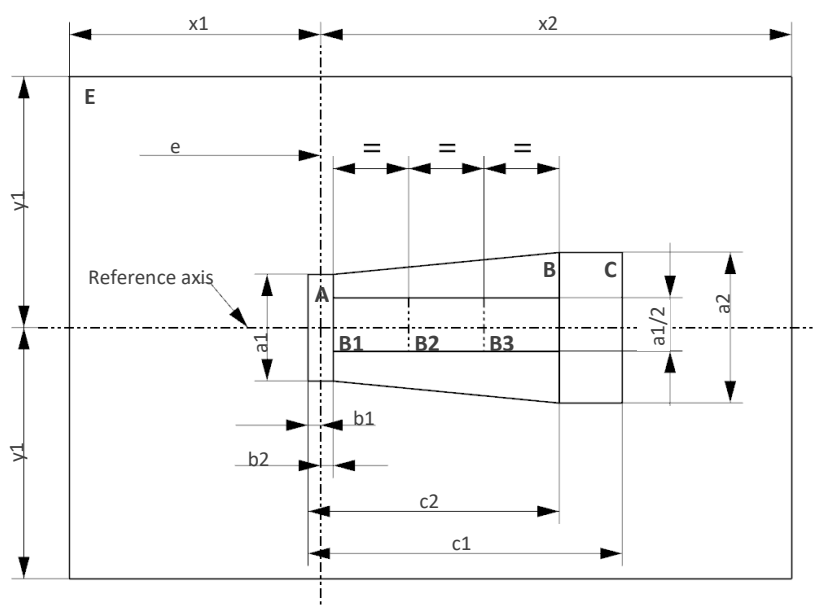
The position of the light emitting area is checked by a box system defined in Figure 4 when operated at test voltage, which shows the projections when viewing from B (see sheet H11/LED/1, Figure 1) and from A and –A (see sheet H11/LED/1, Figure 1), i.e. along the C-planes C_0 , C_{90} and C_{270} (as 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%
(for standard light sources a minimum of 95% applies)
- 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 %
(for standard light sources a minimum of 75% and a maximum of 85% applies)
- 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/LED/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)

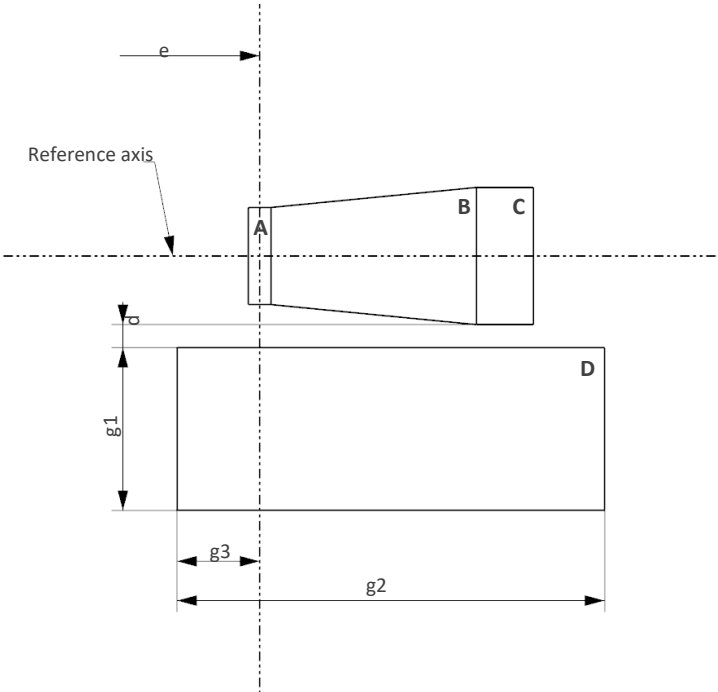


Table 2
Dimensions of the box definitions in Figure 4 and Figure 5

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		

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.

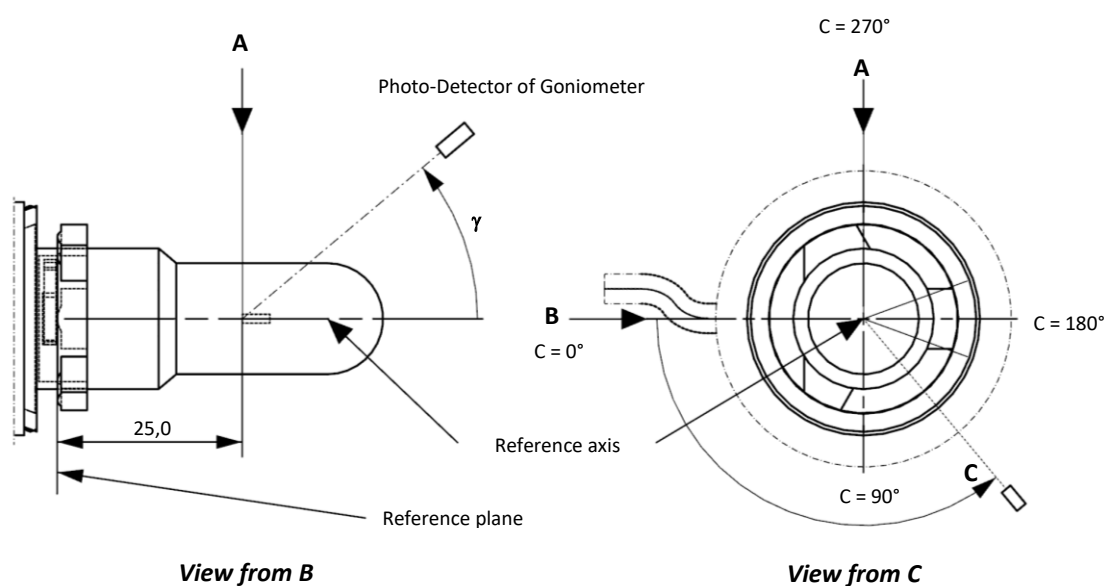
Luminous intensity data is recorded with a standard photo-goniometer. The measurement distance should be chosen appropriately in order to make sure that the detector is located in the far field of the light distribution.

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)

<i>LED light source of normal production and standard LED light source</i>		
	<i>Minimum intensity (cd/klm)</i>	<i>Maximum intensity (cd/klm)</i>
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)

<i>LED light source of normal production and standard LED light source</i>		
	<i>Minimum intensity (cd/klm)</i>	<i>Maximum intensity (cd/klm)</i>
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)

	<i>LED light source of normal production and standard LED light source</i>	
γ	<i>Minimum intensity (cd/klm)</i>	<i>Maximum intensity (cd/klm)</i>
<i>C-plane</i>	$\gamma = 90^\circ$	$\gamma = 90^\circ$
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 ₃₃₀	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 C₁₅₀ and C₂₁₀) 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 C₁₈₀-plane."