Submitted by the experts from GTB

Informal document GRE-94-12
(94th GRE, 27-30 April 2026,
agenda item 5)

This paper provides additional information and justification regarding document GRE/2026/15

I. Proposal

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.*	
1 **(**Original**)**	22.06.2017	170	ECE/TRANS/WP.29/2016/111	Based upon Annexes 1 of Regulations: • No. 37, up to and including Supplement 44 • No. 99, up to and including Supplement 11 • No. 128, up to and including Supplement 5
[12]	[11.03.2026]	[198]	[ECE/TRANS/WP.29/2026/41]	Amended details in paragraph 3.1, group 1, group 2, and group 3, concerning phase out of certain light source categories Introduction of new LED replacement light source categories H8, H16 and HB4 Introduction of new LED light source categories LRR8A and LRR8B
[xx]	**[xx.xx.2026]**	**[xxx]**	**[ECE/TRANS/WP.29/2026/xx]**	**Introduction of new LED light source categories L2 and L3**

* 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 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 3.3.,

Group 1, amend to read:

"

Group 1			
LED light source categories without general restrictions:			
Category		*Sheet number(s)*	
L1A/6		L1/1 to 5	
L1B/6		L1/1 to 5	
L2		**L2/1 to 6**	
L3		**L3/1 to 6**	

"

Annex 3,

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

"

Sheet number(s)
C5W/LED/1 to 4
C5W_LEDr/1 to 4
H8_LEDr/1 to 7
H11/LED/1 to 7
H11_LEDr/1 to 7
H16_LEDr/1 to 7
HB4_LEDr/1 to 7
L1/1 to 5
L2/1 to 6
L3/1 to 6
LR1/1 to 5
LW2/1 to 5
Lx3/1 to 6
LR4/1 to 5
Lx5/1 to 6
Lx6/1 to 6
Lx7/1 to 6
LRR8/1 to 6
PY21W/LED/1 to 4
R5W/LED/1 to 4
W5W/LED/1 to 4

"

After sheet L1/5, insert new sheets L2/1 to 6 and L3/1 to 6, 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

Projection method:

Figure 1*

Main Drawing

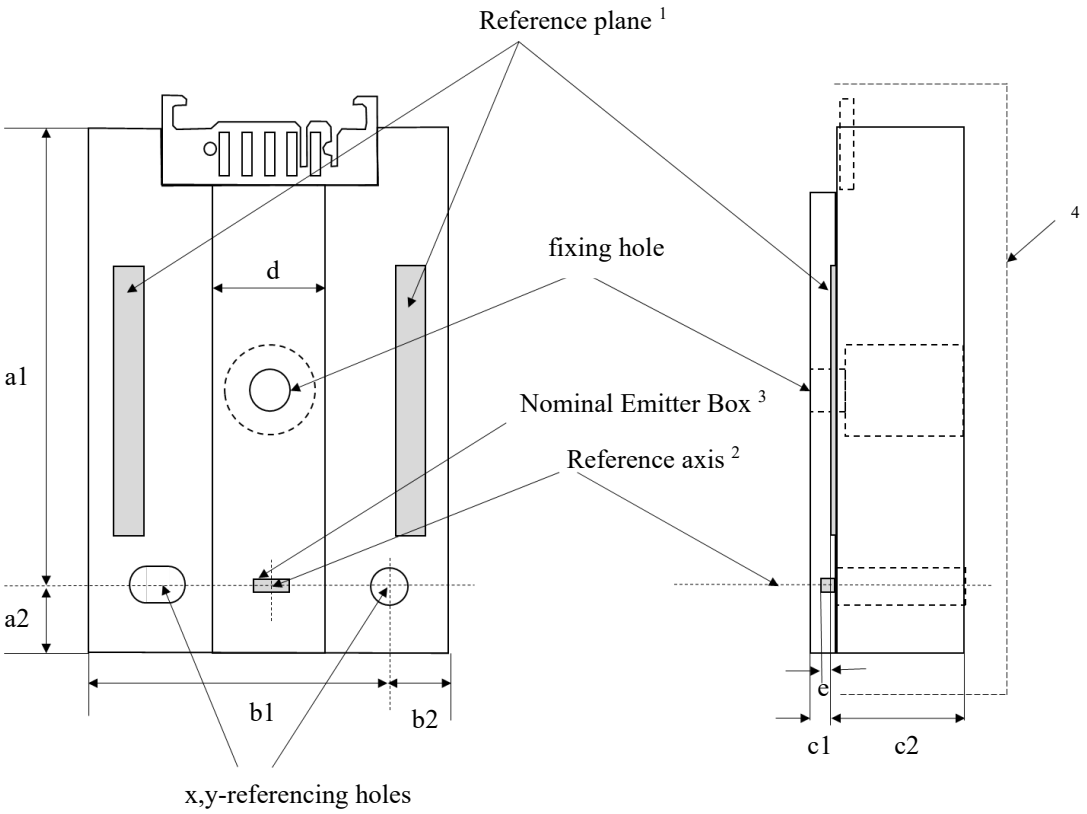
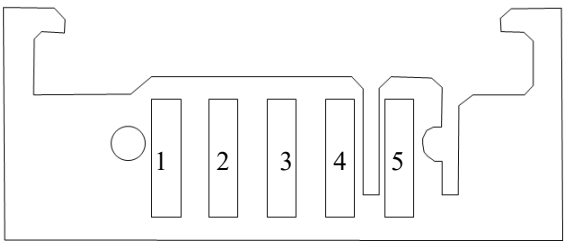


Figure 2*

Electrical connector (contact details)



Contact	Function
1	Bin code resistor, see Table 2
2	Optional [10]
3	Signal Ground
4	LED -
5	LED +

* For the notes see sheet L2/2

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

Dimensions				*Production LED light sources*	*Standard LED light sources*
a1 [9]			mm	46 max.	
a2			mm	12 max.	
b1			mm	33.2 max.	
b2			mm	6.8 max.	
c1 [9]			mm	2.8 max.	
c2			mm	11.2 max.	
d [9]			mm	20 max.	
e			mm	1.1 ± 0.15	1.1 ± 0.15
Cap PAHJ26.4p-1 in accordance with IEC Publication 60061 (sheet 7004-189-1)					
Electrical and photometric characteristics[5]					
Rated Values	Electrical Current		mA	1000	
	Power		W	6.0	
Objective values [6]	Power	at test current	W	6.5 max	
	Luminous Flux	at test current	lm	650 ± 12% [7,8]	650 ± 8% [7,8]
Characteristics of the light-emitting area					
Contrast				200 min.	200 min. 400 max.
f (size of nominal emitter box)			mm	2.6	
g (size of nominal emitter box)			mm	1.5	
f1 (size of light emitting area)			mm	2.25 ± 0.15	
g1 (size of light emitting area)			mm	1.20 ± 0.15	
h			mm	0.25 max	0.20 max
Uniformity $R_{0.1}$ – surface ratio with luminance exceeding 10% of average luminance				85% min.	
Uniformity $R_{0.7}$ – surface ratio with luminance exceeding 70% of average luminance				70% min.	
Maximum luminance gradient $G_{50mm,max}$ on the cut-off generating side according to IEC 60809 Annex L				0.2 min	0.3 min

Notes:

[1] The reference plane is defined by the two z-referencing surfaces, see also the relevant cap sheet of IEC 60061-1.

[2] The reference axis is perpendicular to the reference plane and passes through the middle of the line, which connects the centers of the two x,y-referencing holes.

[3] To be checked by means of the box system in Figure 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] The emitted light shall be white.

[6] After continuous operation for 30 minutes at 50 ± 2.5 °C ambient temperature at test current according to Table 2.

[7] The measured value at 80 ± 2.5 °C ambient temperature shall be in between 100% and 85 % of the value measured at 50°C ambient temperature (both after continuous operation for 30 minutes at test current according to Table 2).

[8] The measured value after continuous operation for 1 minute at 23 ± 2.5 °C ambient temperature shall be in between 100% and 120% of the value measured after 30 minutes operation at 50° C ambient temperature (both at test current according to Table 2).

[9] The electrical connector part is excluded from the maximum specification of a1, c1, and d.

[10] The electrical resistance (versus signal ground) shall be not less than 500 Ohm at all test conditions.

Electrical characteristics, failure condition behaviour:
The elements for visible radiation shall be wired so that the failure of any one of them causes the light source to stop emitting light.

Table 2
Bin code resistor value and electrical test current

Bin Nr.	*Bin Code Resistor in kΩ(±10%) (to signal ground)*	*Electrical Test Current in mA*
Bin 1	1.0	1061
Bin 2	1.5	1030
Bin 3	2.2	1000
Bin 4	3.3	970
Bin 5	4.7	941
Bin 6	6.8	913
Bin 7	10	885
Bin 8	15	859
Bin 9	22	833
Bin 10	33	808
Bin 11	47	784
Bin 12	68	760
Bin 13	100	737

Screen projection requirements:

The following test is intended to define the requirements for the 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, the contrast and the uniformity of the light emitting area are checked by the nominal emitter box system defined in Figure 3, which is aligned to the planes C_{90} (C_{270}) and C_0 (C_{180}) and shows the projection when viewing along direction $\gamma = 0^o$ at e=1.1mm (C, γ as defined in Figure 4).
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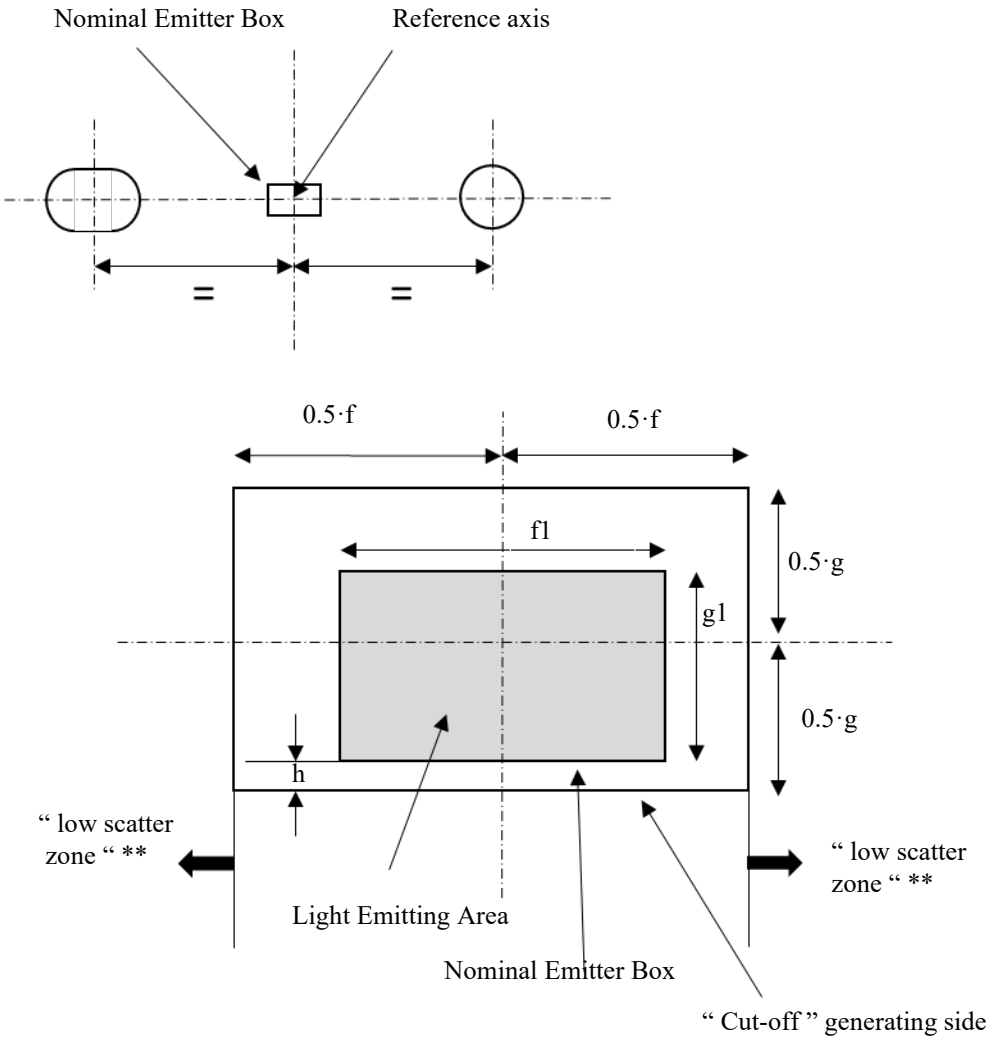
Figure 3

Definition of the nominal emitter box (top) and the light emitting area (bottom) with dimensions as specified in Table 1



** The value of the maximum luminance in the "low scatter zone" expressed as a percentage of the average luminance of the light emitting area shall be not higher than 10 per cent.

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 = 1.1 mm is used as the coordinate system origin.

The light source is mounted on a flat plate with the corresponding mounting 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 axes of the goniometer. The corresponding measurement set-up is described in Figure 4.

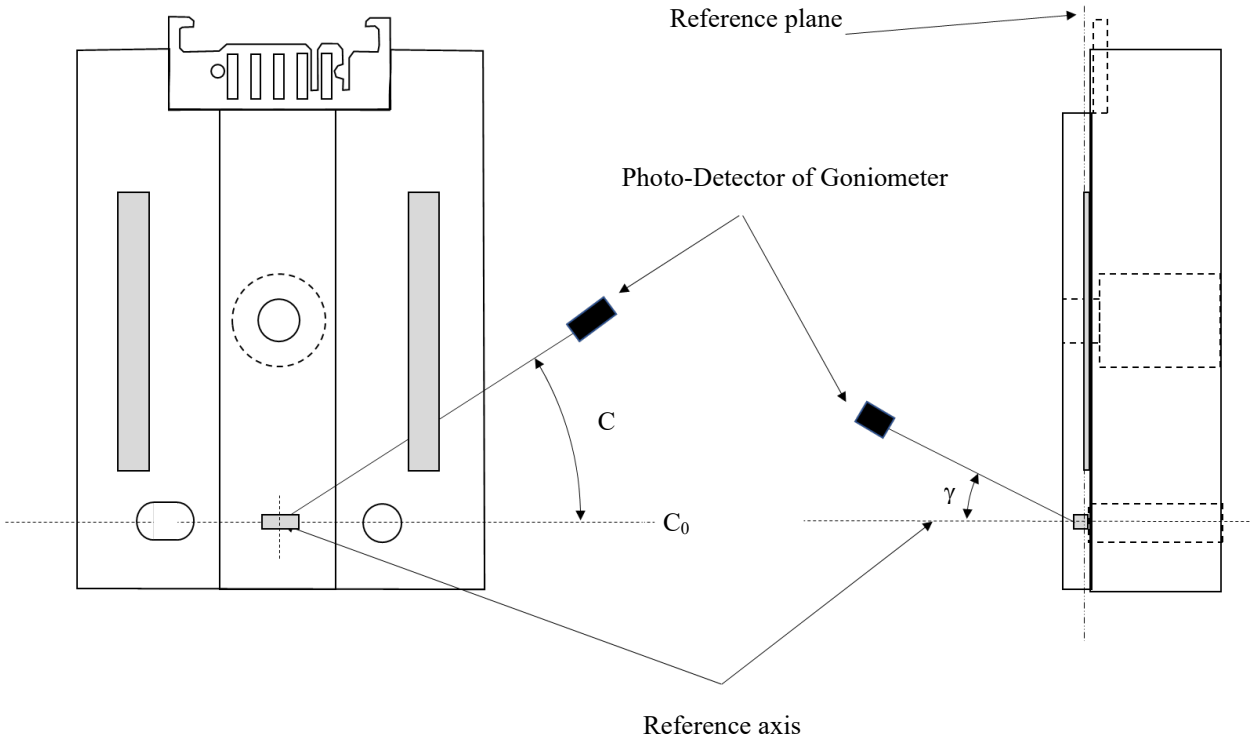
Luminous intensity data is recorded with a standard photo-goniometer. The measurement distance should be chosen appropriately, to make sure that the detector is located in the far field of the light distribution.

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.

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 1,000 lm light source. 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 the measurement of the LED light source.

Figure 4
Set-up to measure the luminous intensity distribution



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.

Table 3
Test point values of normalized intensities of normal production and standard light sources

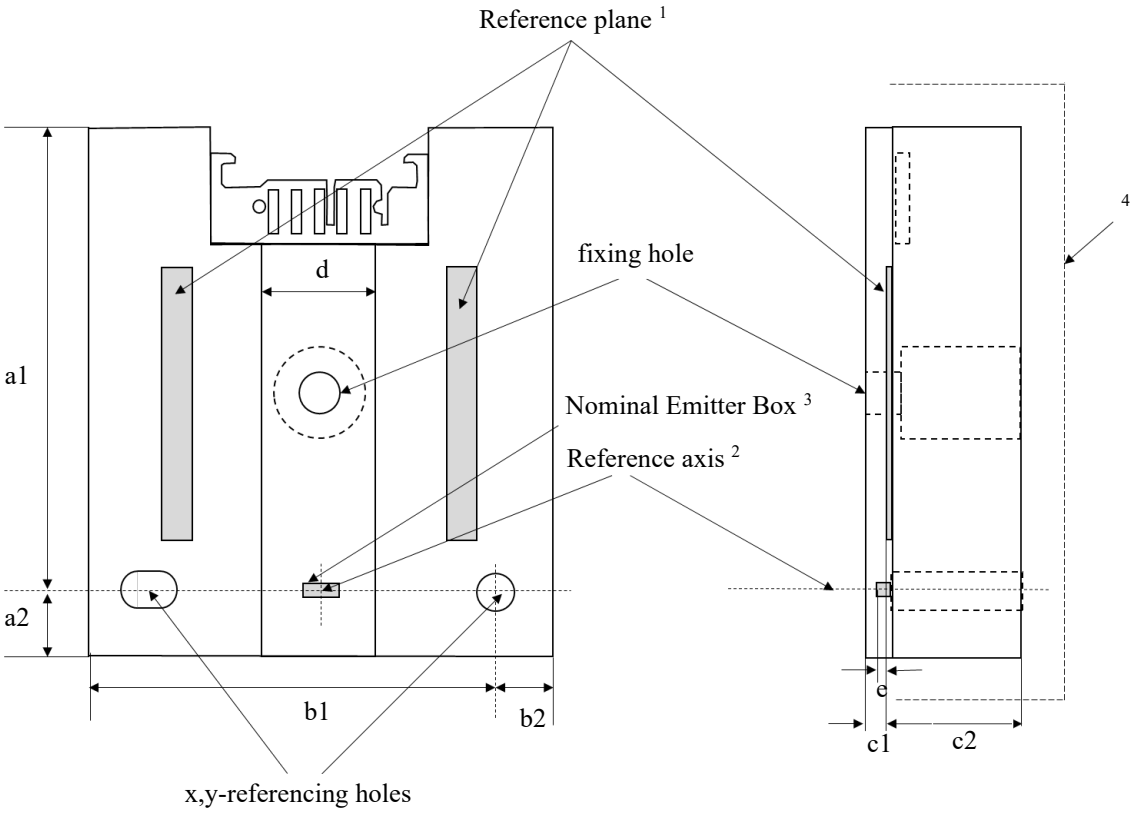
	LED light sources of normal production and standard LED light sources	
Angle γ	*Minimum Intensity in cd/1000 lm*	*Maximum Intensity in cd/1000 lm*
	$C_0 / C_{90} / C_{180} / C_{270}$	$C_0 / C_{90} / C_{180} / C_{270}$
0°	266	389
15°	257	376
30°	228	339
45°	183	281
60°	123	205
70°	70	149
75°	40	116
80°	0	84
90°	0	21

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

Projection method:

Figure 1*

Main Drawing



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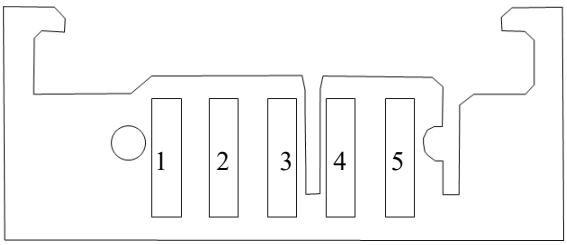

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2	Optional 10
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* For the notes see sheet L3/2

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a2		mm	12 max	
b1		mm	40,7 max	
b2		mm	9,3 max	
c1 [9]		mm	2.8 max.	
c2		mm	15.2 max.	
d [9]		mm	20 max.	
e		mm	1.1 ± 0.15	1.1 ± 0.15
Cap PAHJ31.4p-2 in accordance with IEC Publication 60061 (sheet 7004-189-1)				
Electrical and photometric characteristics[5]				
Rated Values	Electrical Current	mA	1000	
	Power	W	9.0	
Objective values [6]	Power at test current	W	9.5 max	
	Luminous Flux at test current	lm	1000 ± 12% [7,8]	1000 ± 8% [7,8]
Characteristics of the light-emitting area				
Contrast			200 min.	200 min 400 max.
f (size of nominal emitter box)		mm	3.8	
g (size of nominal emitter box)		mm	1.5	
f1 (size of light emitting area)		mm	3.35 ± 0.15	
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h		mm	0.25 max	0.20 max
Uniformity $R_{0.1}$ – surface ratio with luminance exceeding 10% of average luminance			85% min.	
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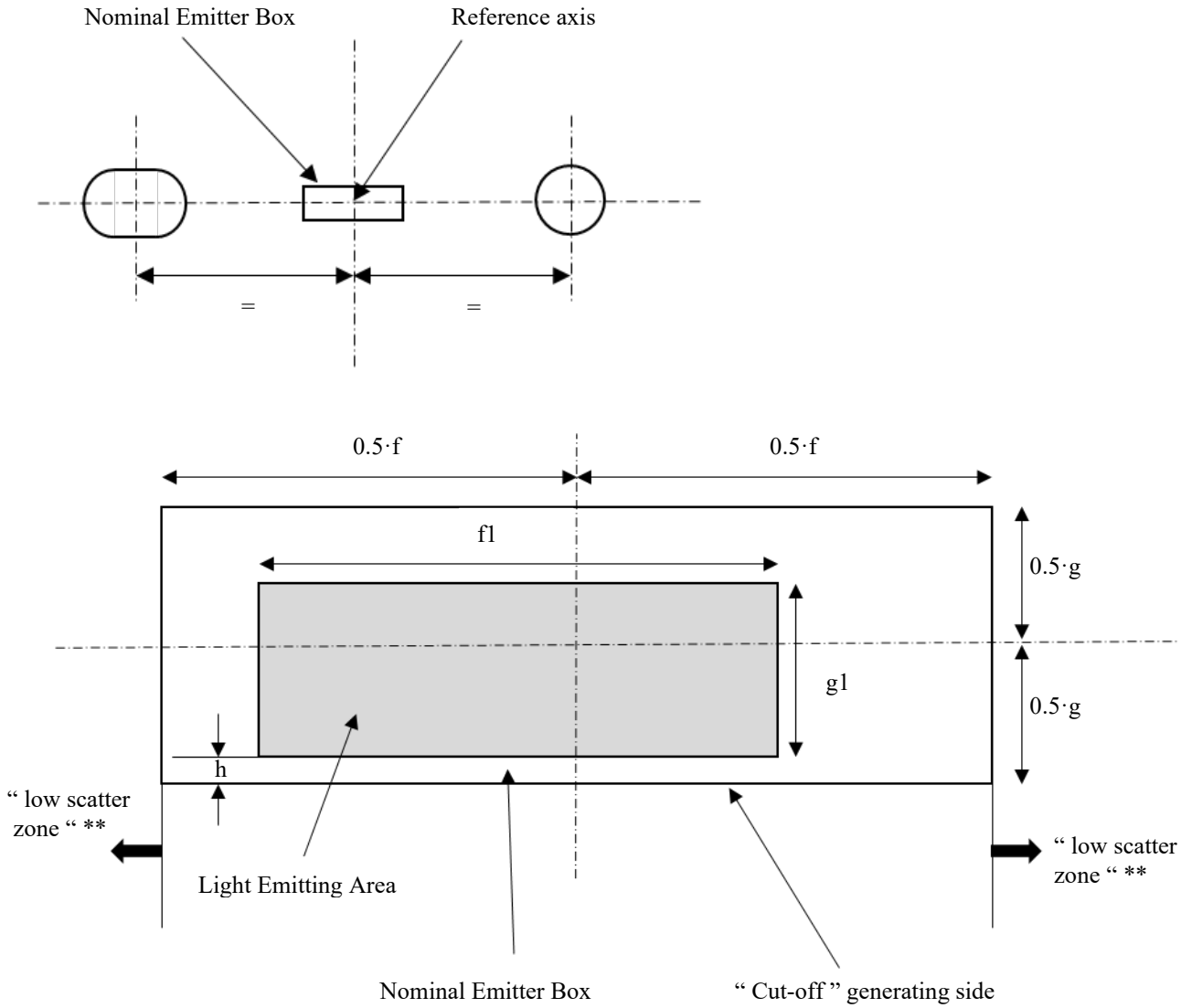

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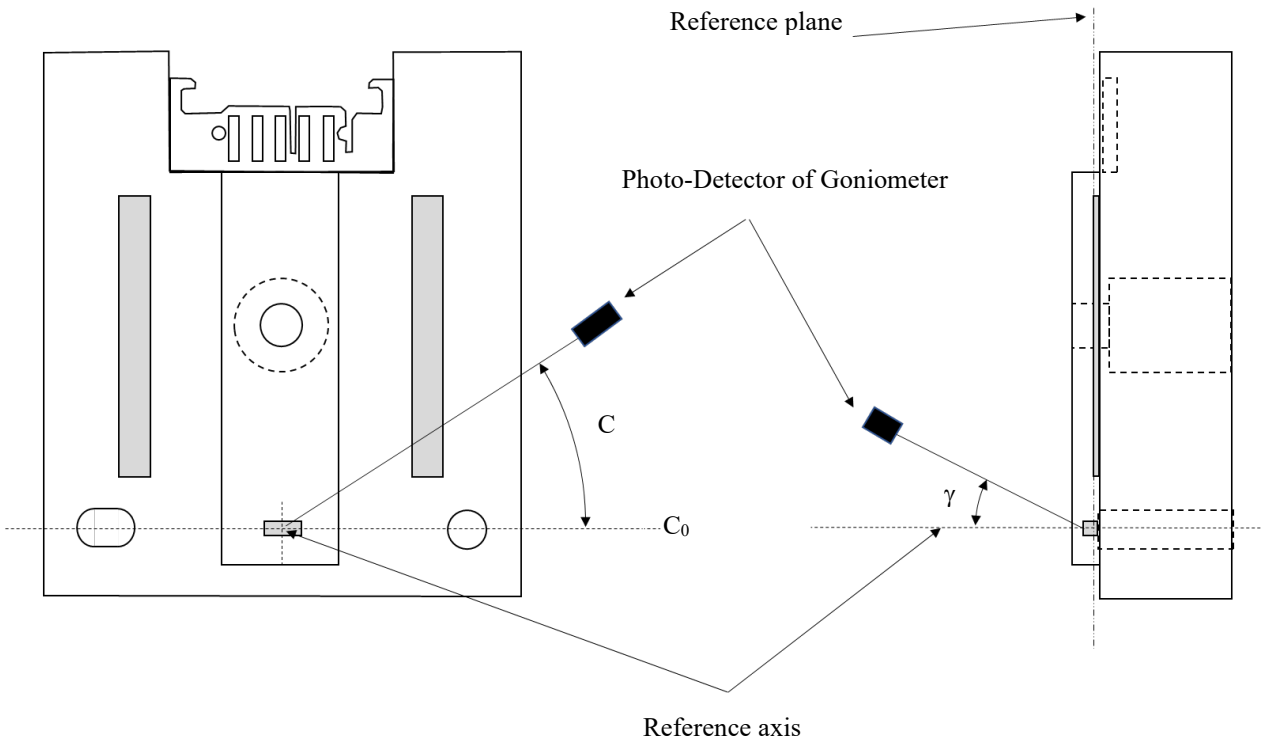

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75°	40	116
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II. Justification

1. UN Regulation No. 128 does not yet include dedicated LED light sources for low beam and high beam applications. This proposal introduces two new LED light source categories in UN Regulation No. 128, with dedicated specifications for low beam and high beam applications.

2. The proposed categories with designations L2 and L3 have a luminous flux of 650 lm and 1,000 lm, respectively. The specifications of these two light sources have been made in accordance with the established guideline for optical interface specification as detailed in document GRE-77-04 (“GTB Guideline for Introduction and Evaluation of LED Light Source Categories intended for Forward Lighting Applications”).

3. The category designations of L2 and L3 find their origin in the following. Thus far, UN Regulation No. 128 includes category L1/6 in Group 1 for forward lighting light sources without general restrictions. The numbers “2” and “3” in the category names signify the next available sequential numerical designations for UN Regulation No. 128 Group 1 categories, and these available designations were assigned sequentially to the two new forward lighting light sources.

4. The proposed categories L2 and L3 are current driven and have an integrated heatsink.

5. A new cap/holder system has been defined in IEC60061-1 to be applied to UN Regulation No. 128 low and high beam light sources. This IEC fit includes a new mechanical interface concept and a new electrical connector interface. Of this family of fits, the IEC PAHJ26.4p-1 fit is applied in the category L2, and the PAHJ31.4p-2 fit is applied in the category L3.