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Working Party on Lighting and Light-Signalling

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Item 5 of the provisional agenda
UN Regulations on Light Sources and the Consolidated Resolution on the Common Specification of Light Source Categories

Proposal for amendment 9 to the Consolidated Resolution on the common specification of light source categories (R.E.5)

Submitted by the expert from the International Automotive Lighting and Light-Signalling Expert Group (GTB)*

The text reproduced below was prepared by the expert from the International Automotive Lighting and Light-Signalling Expert Group (GTB) with the aim to amend the Consolidated Resolution on the common specification of light source categories (R.E.5) (ECE/TRANS/WP.29/1127) and its subsequent amendments 1 through 8. There are no associated amendments to UN Regulations Nos. 37, 99 or 128. The modifications to the existing text of the Resolution are marked in bold for new or strikethrough for deleted characters.

* In accordance with the programme of work of the Inland Transport Committee for 2022 as outlined in proposed programme budget for 2022 (A/76/6 (Sect.20), para 20.76), 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.

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
…	…	…	…	…
[9]	**[xx.xx.2023]**	**[xxx]**	**[ECE/TRANS/WP.29/2023/xx]**	**Amended detail in sheets:** **H19/1, H19/2, H19/4, H19/5, L1/5** **Amended detail in LED light source sheet LR4/2** **Introduction of new LED light source categories LW6A, LW6B, LY6A and LY6B**

* 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 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		Lx3/1 to 6	
	LR3B		Lx3/1 to 6	
	LW3A	[2]	Lx3/1 to 6	
	LW3B	[2]	Lx3/1 to 6	
	LY3A		Lx3/1 to 6	
	LY3B		Lx3/1 to 6	
	LR4A		LR4/1 to 5	
	LR4B		LR4/1 to 5	
	LR5A		Lx5/1 to 6	
	LR5B		Lx5/1 to 6	
	LW5A	[2]	Lx5/1 to 6	

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)*	
LW5B	[2]	Lx5/1 to 6	
LY5A		Lx5/1 to 6	
LY5B		Lx5/1 to 6	
LR6A		Lx6/1 to 6	
LR6B		Lx6/1 to 6	
LW6A	**[2]**	**Lx6/1 to 6**	
LW6B	**[2]**	**Lx6/1 to 6**	
LY6A		**Lx6/1 to 6**	
LY6B		**Lx6/1 to 6**	

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

[2] Not for use behind red and amber lenses"

Annex 1,

Sheet H19/1, the introductory text above the figures, amend to read:

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

Sheet H19/1, the caption with Figure 2, amend to read:

"Figure 2 - Maximum ~~lamp~~ **filament light source** outline~~s~~[4]"

Sheet H19/2, table, header row , amend to read:

"…

Dimensions in mm	*Filament ~~lamps~~ **light sources** of normal production*	*Standard filament ~~lamps~~ **light sources***
	12 V	*12 V*

…"

Sheet H19/4, table, header row, amend to read:

"…

		Tolerance	
*Reference**	*Dimension***	*Filament ~~lamps~~ **light sources** of normal production*	*Standard filament **light sources***

…"

Sheet H19/5, footnote 3, amend to read:

"…

[3] The light emitted from standard filament ~~lamps~~ **light sources** and from normal production ~~lamps~~ **filament light sources** shall be white.

…"

Annex 3,

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

"Test point values of normalized intensities of normal production and standard ~~lamps~~ **LED light sources**, respectively"

Annex 3, Sheet LR4/2, table 1, footnote 9, amend to read:

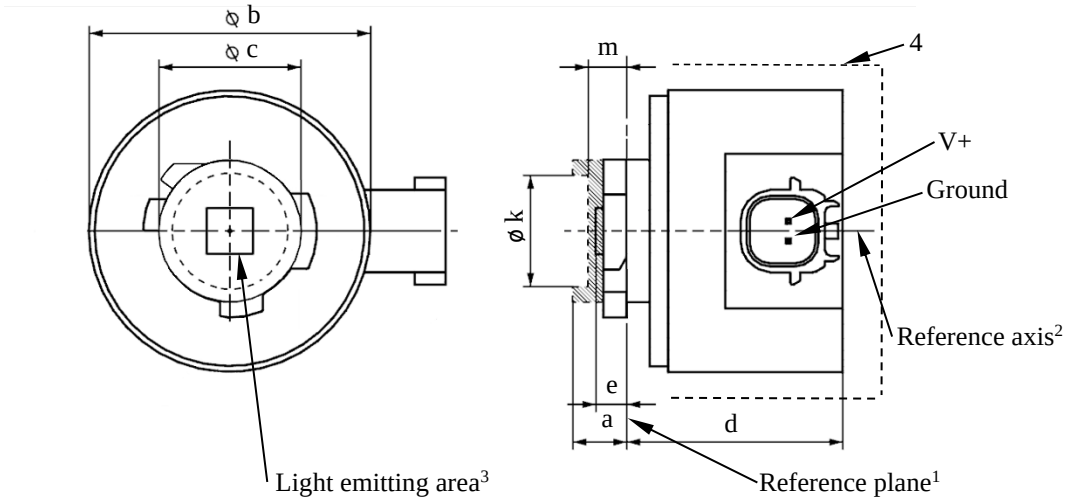
" 9/ Light centre length, both functions are operated at the same time during the measurement; for the method of measurement, see Annex K of IEC Publication 60809, Edition ~~3.3~~ **4**.*"*

Annex 3, Sheets Lx6/1 to 6, amend to read:
(see following pages; one page per sheet)

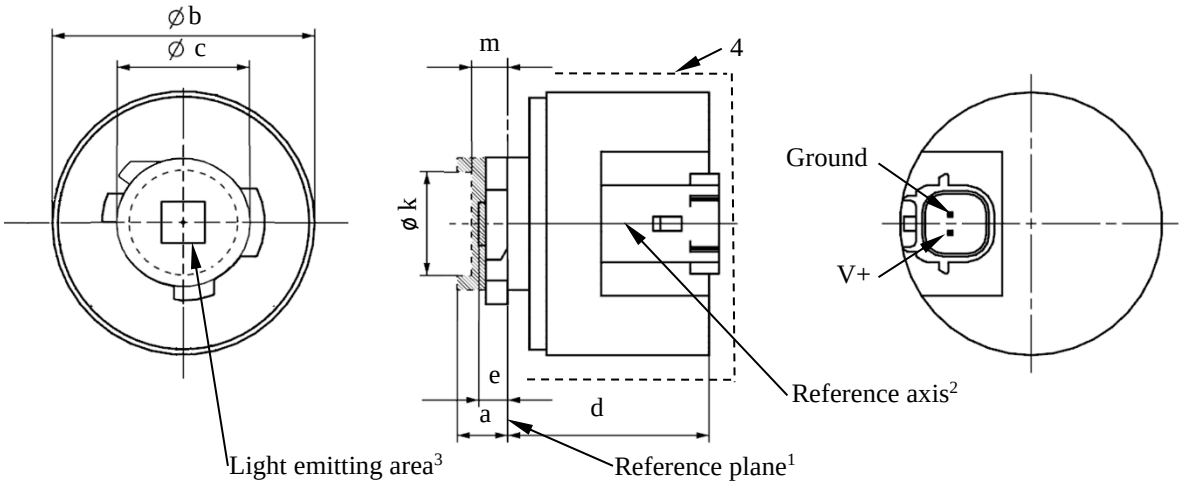
" **Categories LR6A, LR6B, LW6A, LW6B, LY6A, LY6B** **Sheet Lx6/1**

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

Figure 1*
Main Drawing



LR6A, LW6A, LY6A



LR6B, LW6B, LY6B

* Projection method:

For the notes see sheet Lx6/2

Categories LR6A, LR6B, LW6A, LW6B, LY6A, LY6B **Sheet Lx6/2**

Table 1
Essential dimensional, 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 [8/]	mm	3.0 ± 0.30	3.0 ± 0.15
k [9/]	mm	7.5 min.	
m [9/]	mm	4.0 max.	
Cap LR6A, LR6B PGJ18.5d-33 **Cap LW6A, LW6B PGJ18.5d-12** in accordance with IEC Publication 60061 (sheet 7004-185-3) **LY6A, LY6B PGJ18.5d-7**			
Electrical and photometric characteristics			
Rated values	Volts	12	
	Watts LR6A, LR6B	7	
	Watts **LW6A, LW6B**	**7**	
	Watts **LY6A, LY6B**	**7**	
Test voltage	Volts (DC)	13.5	
Objective Values [6]	Watts (at test voltage) LR6A, LR6B	8 max.	
	Watts (at test voltage) **LW6A, LW6B**	**8 max.**	
	Watts (at test voltage) **LY6A, LY6B [10]**	**8 max.**	
	Luminous flux (in lm at test voltage) [5] LR6A, LR6B	180 ± 15%	180 ± 10 % [7]
	Luminous flux (in lm at test voltage) [5] **LW6A, LW6B**	**550 ± 20%**	**550 ± 10%** [7]
	Luminous flux (in lm at test voltage) [5] **LY6A, LY6B [10]**	**440 ± 20%**	**440 ± 10%** [7]
	Luminous flux (in lm at 9 V DC) [5] LR6A, LR6B	40 min.	
	Luminous flux (in lm at 9 V DC) [5] **LW6A, LW6B**	**110 min.**	
	Luminous flux (in lm at 9 V DC) [5] **LY6A, LY6B [10]**	**90 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 light source shall be respected for convection; the connector interface can be neglected.
5/ The emitted light shall be red for LR6A and LR6B**, white for LW6A and LW6B, and amber for LY6A and LY6B**.
6/ After continuous operation for 30 minutes at 23 ± 2.5° C.
7/ The measured value shall be in between 105 per cent and 90 per cent of the value measured after 1 minute.
8/ Light centre length; for the method of measurement, see Annex K of IEC 60809, Edition 4.
9/ The bounded area defined with the dimensions c, k and m defines the maximum outline in relation to the reference system
10/ Operated in flashing mode for 30 minutes (frequency = 1.5 Hz, duty cycle 50 per cent ON, 50 per cent OFF). Measured in the ON-state of flashing mode after 30 minutes of operation.

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).

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 of the light emitting area is checked by the box system defined in Figure 2, which is aligned to the planes C_{90} and C_{180} and shows the projection when viewing along direction $\gamma = 0^{o}$ at e = 3.0 mm (C, γ as defined in Figure 3).
The luminous flux Φ emitted into the viewing direction shall be calculated as given below:

$$\Phi = L \cdot S \cdot \Omega$$

with
S = area to be considered
L = luminance average of area S
Ω = solid angle defined by the entrance aperture of the measurement system

The distribution of luminous flux originating from the LEA as shown in Figure 2 shall fulfil the requirements given in Table 3. All numbers shall be given in % of the total luminous flux emitted into the viewing direction from the bayonet core area, i.e. a circular area with diameter c = 18.5 mm (see Figure 1).

Note: When evaluating the luminous flux distribution emitted from the LEA, reflections and stray light within the measurement equipment shall be reduced as much as possible and if necessary, corrected. More details regarding measurement of light-emitting areas can be found in the publication describing general photometry accuracy guidelines currently prepared by CIE TC2-67

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

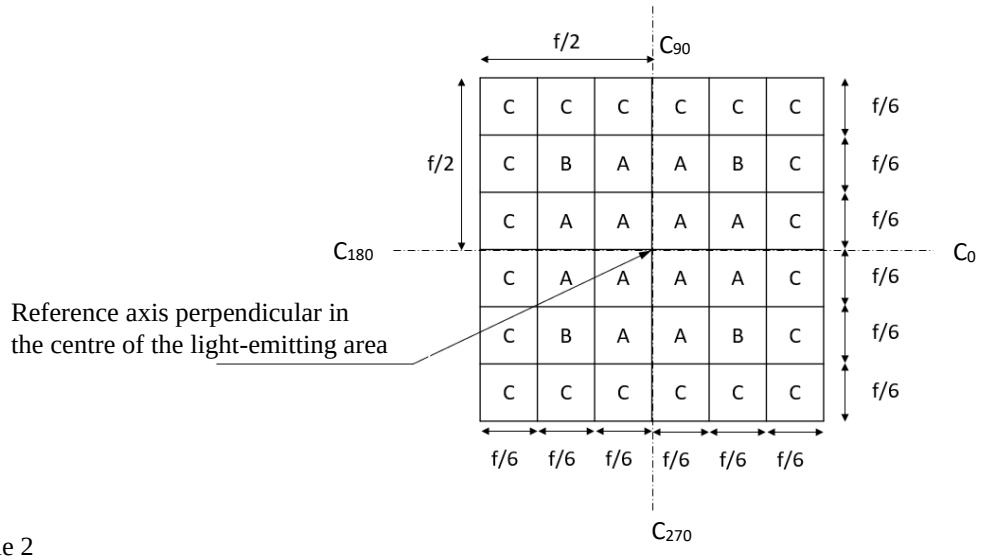


Table 2
Dimensions of the box system in Figure 2

Dimensions in mm	*f*
LED light sources of normal production	4.8
Standard LED light sources	4.8

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

Category	*Area(s)*	*LED light sources of normal production*	*Standard LED light sources*
LR6A, LR6B **LY6A, LY6B**	Each A individually	> 3% < 10 %	> 4% < 10%
	Each B individually	> 3% < 10%	> 3% < 10%
	All A and B together	> 70%	> 75%
	Each C individually	< 2%	< 2%
	All A, B and C together	> 90%	> 90%
LW6A, LW6B	**Each A individually**	**> 3% < 10 %**	**> 3% < 10%**
	Each B individually	**> 3% < 10%**	**> 3% < 10%**
	All A and B together	**> 65%**	**> 70%**
	Each C individually	**< 3%**	**< 3%**
	All A, B and C together	**> 90%**	**> 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 = 3.0 mm 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 axes of the goniometer. The corresponding measurement set-up is described in Figure 3.

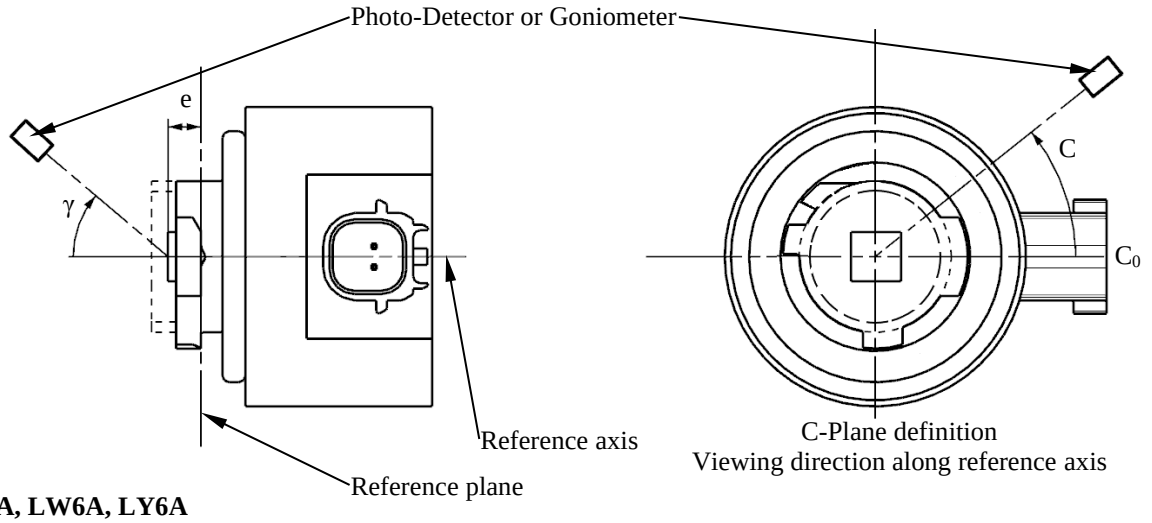
Luminous intensity data is recorded with a standard photo-goniometer. The measurement distance should be chosen appropriately, to make sure that the detector is located in the far field of the light distribution.

The measurements shall be performed in C-planes 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 4.

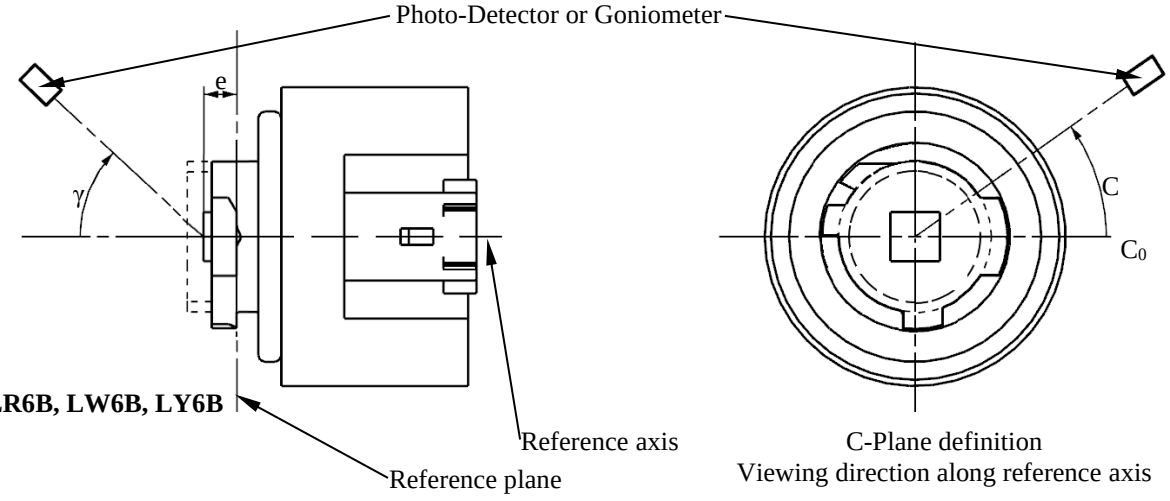
The measured luminous intensity values, normalised to the measured luminous flux of the individual light source under test, shall be converted to normalised luminous intensity values of a 1,000 lm light source. The data shall comply with the tolerance band as defined in Table 4.

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



LR6A, LW6A, LY6A



LR6B, LW6B, LY6B

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

	LED light sources of normal production		*Standard LED light sources*	
Angle γ	*Minimum Intensity in cd /1000 lm*	*Maximum Intensity in cd/1000 lm*	*Minimum Intensity in cd /1000 lm*	*Maximum Intensity in cd /1000 lm*
0°	200	425	250	390
15°	190	415	240	370
30°	170	380	220	335
45°	145	310	180	275
60°	85	245	105	220
75°	0	160	0	150
90°	0	70	0	65

"

II. Justification

1. This document is a consolidation of proposed amendments by experts in GTB to the Consolidated Resolution on the common specification of light source categories (R.E.5) (ECE/TRANS/WP.29/1127) and its subsequent amendments 1 through 8. The amendments cover a number of topics and for clarity the justification for the document is structured to provide the justifications by topic under their respective topic headers.

A. Amendment to introduce new light emitting diode (LED) light source categories LW6A, LW6B, LY6A, and LY6B

2. This proposal introduces new LED light source categories for signalling to accommodate an increasing market demand for LED light sources according to UN Regulation No. 128. The ongoing trends towards style driven DRL lamps, high-performance reversing lamps, and direction indicator lamps, require light sources with higher luminous output to compensate for the lower efficiency of the corresponding optical designs.

3. In general, standardized and replaceable UN Regulation No. 128 LED light sources can serve individual signalling lamp designs with limited development efforts. The proposed categories of high luminous flux mono-function amber and white light sources are based on an established cap concept with an increased and more precise light output, while a new and future-proof specification of the light emitting area (LEA) allows a more reliable description of where the light originates from.

4. For the white light sources, the specifications for the proportion of the total luminous flux in Table 3 were established in accordance with the performance of white light generating LED technology. This means that for the same LEA definition, in some instances specifications for the white light version vary slightly from those of the monochromatic red and amber light versions.

5. The cap/holder system for the new amber and white emitting light sources is based on the IEC PGJ18.5d fit, a family of cap/holders that has already been successfully employed in existing R128 LED light sources. Keys from the PGJ18.5d fit that are not in use so far, have been assigned to the newly proposed categories. Following established LED light source categories, the new amber and white emitting light sources are proposed with an elbow connector at the side — the A version — as well as with a straight connector at the bottom — the B version. The assigned category designations for the white emitting light source are LW6A and LW6B respectively. The assigned category designations for the amber emitting light source are LY6A and LY6B respectively.

B. Amendment of some details of light source category specifications for H19 and L1A/6, L1B/6

6. With the publication of Revision 8 of UN Regulation No. 38, and the subsequent adoption of the Consolidated Resolution on the common specification of light source categories (R.E.5) (ECE/TRANS/WP.29/1127), light source experts and users of light source UN Regulations have been making the correct linkage between the new Resolution and third party documents. As links are established, the content of R.E.5 is continually reviewed.

7. This proposal is to correct a number of minor editorial errors in sheets of filament and LED light sources that were uncovered while making such linkages and which have not been detected before. At the time of the creation of R.E.5, the convention was adopted to use the term “lamp” only when a "device" is meant. Consequently, all category sheets were amended for the consistent use of the term "light source", in texts where previously light sources had been referenced by the term "lamp". However, in some cases the word "lamp" is still used in a text where "light source" should be written.

8. In this document GTB proposes amendments to correct these editorial errors. The category sheets where the term “lamp” is used inconsistently with the agreed R.E.5

terminology, are corrected. The corrected sheets are sheets H19/1, H19/2, H19/4, H19/5, and L1/5.

C. Amendment of the specification of the light source category LR4

9. The UN Regulations related to lighting, and especially those related to light sources, should be reviewed for dated references to International Electrotechnical Commission (IEC) Standards in order to stay up to date with the latest developments. This proposal includes a customary administrative update of an IEC normative reference, as a new edition of IEC Publication 60809 has been published (Edition 4).

10. GTB proposes to amend footnote 9 on sheet LR4/2 of category LR4 to reflect the latest edition of IEC Publication 60809, Edition 4.