

INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 2
AMENDEMENT 2

Lamps for road vehicles –
Performance requirements

Lampes pour véhicules routiers –
Prescriptions de performances

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WithDRAWN



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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FOREWORD

This amendment has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

The text of this amendment is based on the following documents:

FDIS	Report on voting
34A/1629/FDIS	34A/1646/RVD

Full information on the voting for the approval of this amendment can be found in the report on voting indicated in the above table.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

1 Scope

Replace the existing first paragraph by the following:

This International Standard is applicable to lamps (filament lamps, discharge lamps and LED light sources) to be used in headlamps, fog-lamps and signalling lamps for road vehicles. It is especially applicable to those lamps which are listed in IEC 60809. However, the standard may also be used for other lamps falling under the scope of this standard.

Renumber the existing note as Note 1.

Add the following new Notes 2 and 3:

NOTE 2 This standard does not apply to luminaires.

NOTE 3 In this standard, the term LED light source is used, in other standards the term LED lamps may be used to describe similar products.

2 Normative references

Add the following references to the existing list:

CISPR 25, *Vehicles, boats and internal combustion engines – Radio disturbance characteristics – Limits and methods of measurement for the protection of on-board receivers*

IEC 60061-1, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Lamp caps*

IEC 60068-2-14, *Environmental testing – Part 2–14: Tests – Test N: Change of temperature*

UN/ECE Regulation No. 128, *Uniform provisions concerning the approval of light emitting diode (LED) light sources for use in approved lamp units on power-driven vehicles and their trailers*

3 Terms and definitions

3.2 characteristic life

Replace, after the term defined, "T" by "T (or T_0)".

3.4 lumen maintenance

Add the following two examples after the definition:

Example 1 L_{70} is the time in hours to 70 % lumen maintenance.

Example 2 L_{50} is the time in hours to 50 % lumen maintenance.

3.5 initial luminous flux

Replace the existing definition by the following:

luminous flux of a lamp measured after the ageing specified in Annex C of IEC 60809 for filament lamps or in Annex D of this standard for discharge lamps or in Annex I of this standard for LED light sources

Add, after 3.10, the following new terms and definitions:

3.11 life B_{10}

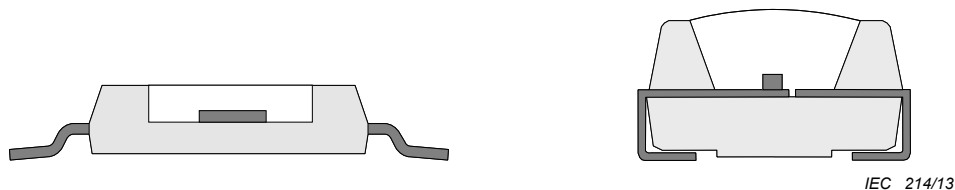
constant of the Weibull distribution indicating the time during which 10 % of a number of the tested lamps of the same type have reached the end of their individual lives

3.12 LED package

solid state device embodying a p-n junction, emitting optical radiation when excited by an electric current

Note 1 to entry: Examples are shown in Figure 1.

Note 2 to entry: In UNECE terminology the term "LED" is used with the same definition.



IEC 214/13

Figure 1 – Examples of LED packages

3.13

LED light source

light source where the visible radiation is emitted from one or more LED(s)

Note 1 to entry: An LED light source may or may not require an additional electronic control gear and may or may not require additional provisions for thermal management.

3.13.1

LED module

LED light source which can only be replaced with the use of mechanical tools

NOTE 1 LED modules are generally considered as components for use in trades, professions or industries and are generally not intended for sale to the general public.

NOTE 2 Examples are shown in Figures 2 and 3.

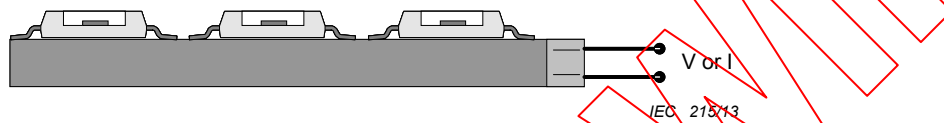


Figure 2 – Example for an LED module without integrated heatsink

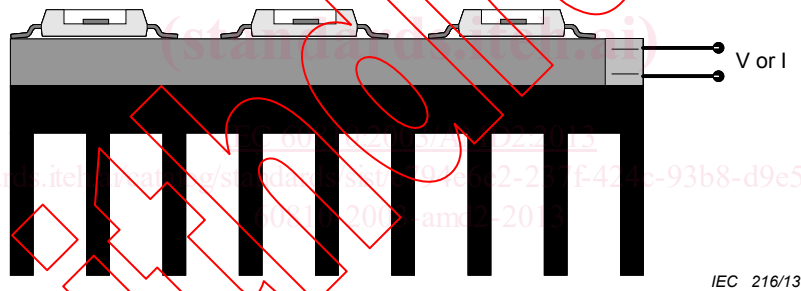


Figure 3 – Example for an LED module with integrated heatsink

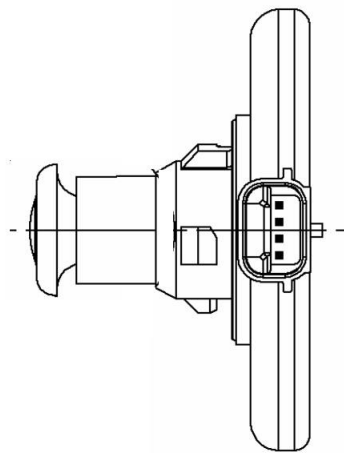
3.13.2

replaceable LED light source

LED light source which can be easily replaced without the use of special tools

NOTE 1 Replaceable LED light sources are usually intended for sale to the general public as a replacement part.

NOTE 2 An example is shown in Figure 4.



IEC 217/13

Figure 4 – Example for a replaceable LED light source

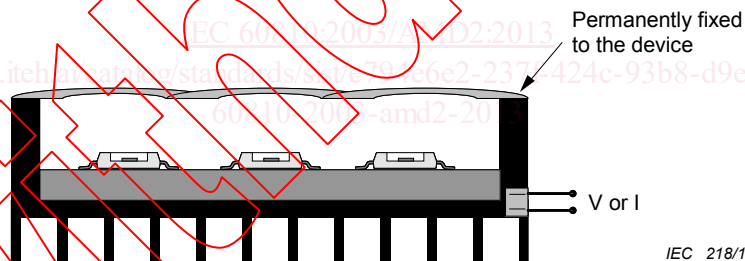
3.13.3

non-replaceable LED light source

LED light source which cannot be removed from the device or luminaire

NOTE 1 Non-replaceable LED light sources are usually intended as components for integration into the luminaire or device by manufacturers. They are designed and intended to be indivisible parts of a lighting or light signalling device, or of parts or modules or units of such devices.

NOTE 2 An example is shown in Figure 5.



IEC 218/13

Figure 5 – Example for a non-replaceable LED light source

3.14

T_p of a LED light source

temperature at a specified location on the surface of the LED light source (T_p -point) that can be measured during operation of the light source and that can be correlated to the temperature of the p-n junction of the LED

Note 1 to entry: The T_p -point is generally specified by the manufacturer of the LED light source or by its datasheet.

3.15

electronic light source controlgear

one or more component(s) between supply and light source to control voltage and/or electrical current of the light source

Add, after Clause 6, a new Clause 7 as follows:

7 Requirements and test conditions for LED light sources

7.1 Basic function and interchangeability

LED light sources shall:

- be so designed as to be and to remain in good working order when in normal use;
- exhibit no fault in design or manufacture;
- exhibit no scores or spots on their optical surfaces which might impair their efficiency and their optical performance.

Replaceable LED light sources shall be equipped with caps complying with IEC 60061-1. The cap shall be strong and firmly secured to the rest of the LED light source.

To ascertain whether LED light sources conform to these requirements above, a visual inspection, a dimension check and, where necessary, a trial fitting shall be carried out.

7.2 UV radiation

The UV-radiation of the LED light source shall be determined as:

$$k_{UV} = \frac{\int_{\lambda=250\text{nm}}^{400\text{nm}} E_e(\lambda) S(\lambda) d\lambda}{k_m \int_{\lambda=380\text{nm}} E_e(\lambda) V(\lambda) d\lambda}$$

where

$S(\lambda)$ (unit: 1) is the spectral weighting function;

$k_m = 683 \text{ lm/W}$ is the maximum value of the luminous efficacy of radiation.

This value shall be calculated using intervals of one nm. The UV-radiation shall be weighted according to the values as indicated in Table 5.

Table 5 – Weighting values for calculation of k_{UV}

λ	$S(\lambda)$	λ	$S(\lambda)$	λ	$S(\lambda)$
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	0,000 530
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				

NOTE Values according to "ICNIRP Guidelines on limits of exposure to ultraviolet radiation". Wavelengths (in nanometers) chosen are representative; other values should be interpolated.

If $k_{UV} \leq 10^{-5} \text{ W/lm}$ the light source is of the low-UV type.

7.3 Lumen and colour maintenance

The lumen maintenance value L_{70} and the colour maintenance shall be measured on a test quantity of at least 20 LED light sources according to the procedure given in Annex I.

For very small production batches a test quantity less than 20 may be acceptable.

The manufacturer shall declare and determine the L_{70-T_c} and $L_{70-B_{10}}$ values.

The measured values shall be not less than the value declared by the manufacturer.

For LED light sources which were approved under the corresponding UN/ECE Regulation 128, the $L_{70-B_{10}}$ values shall be not less than specified in the Table 6.

Table 6 – Minimum $L_{70-B_{10}}$ values for standardised LED light sources

Category according to UN/ECE R 128	Minimum $L_{70-B_{10}}$ (h)
LR1	2 200 ^a 1 000 ^b
^a low power function	
^b high power function	

Table 7 shows typical “on”-time values for the different functions per 100 000 km, for information.

Table 7 – Typical “on”-times for the different functions per 100 000 km drive distance, based on an average speed of 33,6 km/h^a

Intended application	Typical “on” times in hours per 100 000 km drive distance
Rear registration plate lamp	1 100 ^b
Direction indicator lamp	250
Front and rear position lamp	1 100 ^b
Stop lamp	500
End-outline marker lamp	1 100
Reversing lamp	50
Rear fog lamp	50
Daytime running lamp (DRL)	2 000
Side marker lamp	1 100 ^b
Cornering lamp	100
Low beam lamp (passing beam)	1 000
High beam lamp (driving beam)	100 ^c
Front fog lamp	100

a	The average driving speed is taken from the New European Driving Cycle (NEDC).
b	In case these light sources are intended for vehicles where these functions are also switched ON together with the DRL function, then the value of 3 100 shall be used.
c	In case these light sources are intended for vehicles which use the 'adaptive driving beam' function of UN/ECE R123, then the value of 200 shall be used.

NOTE If the specific requirements of the intended use are known for the LED light source, these should be taken into account.

Compliance is checked by the tests prescribed in Annex I.

Values are based on a non-compliance level of 10 %.

Example for LED light source life-time data are given in Table 8.

Table 8 – Example for product data

Type	Intended use	L_{70}, B_{10}	L_{70}, T_c
MD0815	Stop Lamp	1 500 h	2 500 h

7.4 Resistance to vibration and shock

In the event of service life being influenced by vibration and shock, the test methods and schedules in Annex B shall be used to assess the performance.

The light sources are deemed to have satisfactorily completed the wideband or narrowband random vibration test as described in Annex B, if they continue to function during and after the test.

Values are based on a non-compliance level of 4 %.

NOTE It is necessary to take care to protect service employees. See the note to Clause D.3.

7.5 Electromagnetic compatibility

Replaceable LED light sources shall be classified according to CISPR 25.

7.6 Powered thermal cycling test

This test is intended to determine the ability of the LED light source to withstand changes of ambient temperatures.

LED light sources shall be tested according to test condition “Nb” of IEC 60068-2-14, under the following conditions (see Figure 6):

- rate of change of temperature is 3 K/min
- the exposure time t_1 shall be a minimum of 2 h
- the number of cycles shall be 15
- the test shall be performed on a minimum of 20 LED light sources
- during the testing, the LED light source shall be continuously switched on and off in 5 minute intervals (5 min on, 5 min off, 5 min on, etc.)
- the test voltage shall be chosen according to clause I.2 of this standard

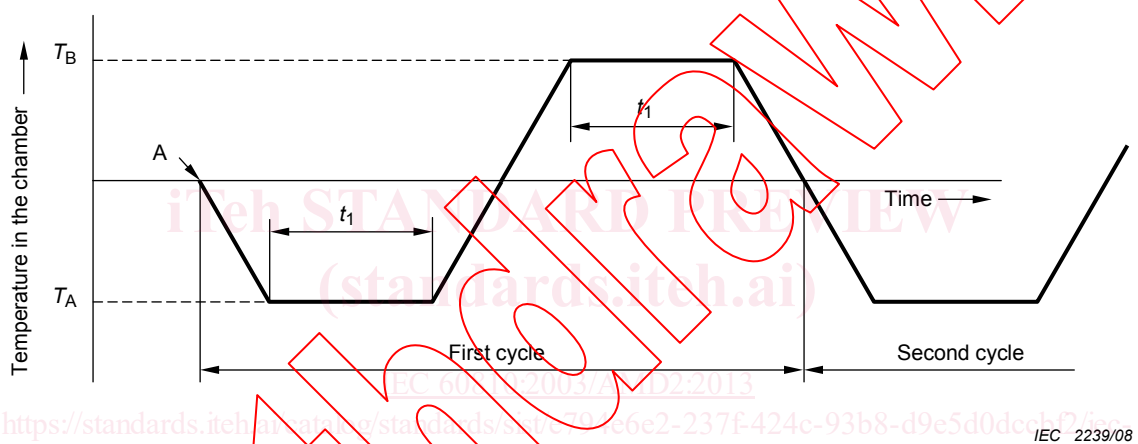
- The temperatures T_A and T_B shall be chosen according to the classes defined in Table 9.

Table 9 – Temperature classes for the powered thermal cycling test

	Lower temperature T_A	Higher temperature T_B
Class A	– 40 °C	+ 60 °C
Class B	– 40 °C	+ 85 °C

For LED light sources that require an external light source control gear, the light source control gear may also be subjected to this test.

LED light sources that require additional provisions for thermal management shall be tested with these provisions in place. A description of the thermal management design shall be included in the test report.



Key

A start of first cycle

Figure 6 – Extract from IEC 60068-2-14 Test Nb, showing the temperature cycle profile

After the powered thermal cycling test, the electrical and photometrical performance of the LED light source shall be tested.

The LED light sources are deemed to have satisfactorily completed the test if they continue to function after the test and if the photometrical and electrical performance is within the specifications provided by the manufacturer.

Values are based on a non-compliance level of 10 %.

Add a new Annex I as follows:

Annex I (normative)

Lumen maintenance test conditions for LED light sources

I.1 Ageing

LED light sources shall be aged at their test voltage for 48 h under the operating conditions specified in Clause I.3. LED light sources which fail during the ageing period shall be omitted from the test results.

I.2 Test voltage

Measurements shall be carried out at a test voltage of:

- 6,75 V for products intended for a 6 V board voltage;
- 13,5 V for products intended for a 12 V board voltage;
- 28 V for products intended for a 24 V board voltage.

The applied voltage shall be a stable d.c.

If the LED light source is intended to be operated by an electronic light source control gear, the test voltage shall be applied to the input terminals of the control gear. In this case, the output of the electronic light source control gear, e.g. voltage, electrical current, power, operating mode, etc. shall be described in the test report.

NOTE The test voltage is deemed to be stable when the momentary fluctuations do not exceed 1 % and the deviation of the average over the test period does not exceed 0,5 % of the specified value.

I.3 Operating conditions

I.3.1 Test rack

LED light sources shall be operated on a vibration-free test rack.

I.3.2 LED light sources with integrated thermal management

LED light sources with integrated thermal management shall be installed in a chamber with the following characteristics:

- well-mixed air, but no excessive forced convection across the light source;
- ambient air temperature in the chamber: $25\text{ °C} \pm 10\text{ °C}$.

I.3.3 LED light sources with external thermal management

LED light sources, for which the thermal management is intended to be achieved in conjunction with the luminaire/device or a separate thermal management component, shall be operated at the specified base temperature T_p . The base temperature T_p shall be included in the test report and shall be part of the lumen maintenance declaration by the manufacturer.

NOTE Control of the T_p temperature during testing can be achieved by active or passive methods e. g. a heat-sink, a heat-sink combined with a cooling fan or a Peltier-cooling-element.

Examples for possible product data are given in Table I.1.