



BSI Standards Publication

Lamps, light sources and LED packages for road vehicles — Performance requirements

National foreword

This British Standard is the UK implementation of EN IEC 60810:2018+A2:2022. It is identical to IEC 60810:2017, incorporating amendment 1:2019 and amendment 2:2022. It supersedes BS EN IEC 60810:2018+A1:2022, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment A1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee CPL/34/1, Electric lamps.

A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Lamps, light sources and led packages for road vehicles -
Performance requirements
(IEC 60810:2017)

Lampes, sources lumineuses et led encapsulées pour
véhicules routiers - Exigences de performances
(IEC 60810:2017)

Lampen für Straßenfahrzeuge - Anforderungen an die
Arbeitsweise
(IEC 60810:2017)

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EN IEC 60810:2018+A2:2022 (E)

European foreword

The text of document 34A/2021/FDIS, future edition 5 of IEC 60810, prepared by SC 34A "Lamps" of IEC/TC 34 "Lamps and related equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60810:2018.

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- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2021-02-09

This document supersedes EN 60810:2015.

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The text of the International Standard IEC 60810:2017 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60068-2-20	NOTE Harmonized as EN 60068-2-20
IEC 60068-2-47	NOTE Harmonized as EN 60068-2-47
IEC 60682:1980	NOTE Harmonized as EN 60682:1993
IEC 60809:1995	NOTE Harmonized as EN 60809:1996
IEC 60809:1995/A5:2012	NOTE Harmonized as EN 60809:1996/A5:2012

Foreword to amendment A1

The text of document 34A/2106/CDV, future IEC 60810/A1, prepared by SC 34A "Lamps" of IEC/TC 34 "Lamps and related equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60810:2018/A1:2019.

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Foreword to amendment A2

The text of document 34A/2272/FDIS, future IEC 60810/AMD2, prepared by SC 34A "Electric light sources" of IEC/TC 34 "Lighting" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60810:2018/A2:2022.

The following dates are fixed:

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- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-06-02

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Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-845	-	International Electrotechnical Vocabulary- (IEV) -- Chapter 845: Lighting		-
IEC 60061-1	-	Lamp caps and holders together withEN 60061-1 gauges for the control of interchangeability and safety -- Part 1: Lamp caps		-
IEC 60068-2-14	-	Environmental testing -- Part 2-14: Tests -EN 60068-2-14 Test N: Change of temperature		-
IEC 60068-2-43	-	Environmental testing -- Part 2-43: Tests -EN 60068-2-43 Test Kd: Hydrogen sulphide test for contacts and connections		-
IEC 60068-2-58	-	Environmental testing -- Part 2-58: Tests -EN 60068-2-58 Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)		-
IEC 60068-2-60	-	Environmental testing -- Part 2-60: Tests -EN 60068-2-60 Test Ke: Flowing mixed gas corrosion test		-
 IEC 60809	2021	Lamps and light sources for road vehicles - Dimensional, electrical and luminous requirements	EN IEC 60809	2021 
ISO 7637-2	2011	Road vehicles_- Electrical disturbances - from conduction and coupling_- Part 2: Electrical transient conduction along supply lines only		-
ISO 10605	-	Road vehicles_- Test methods for electrical-disturbances from electrostatic discharge		-
CISPR 25	-	Vehicles, boats and internal combustionEN 55025 engines - Radio disturbance characteristics - Limits and methods of measurement for the protection of on-board receivers		-
United Nations1958 Vehicle Regulations		Agreement concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions		-
JESD22-A101C	-	Steady-state temperature humidity bias life-test		-
JESD22-A104E	-	Temperature cycling	-	

JESD22-A105C	-	Power and temperature cycling	-	-
JESD22-A106B	-	Thermal shock	-	-
JESD22-A108D	-	Temperature, bias, and operating life	-	-
 JESD22-A113H	-	Preconditioning of nonhermetic surface mount devices prior to reliability testing	-	
JESD22-A115C	-	Electrostatic discharge (ESD) sensitivity testing machine model (MM)	-	-
JESD22-B101B	-	External visual	-	-
JESD22-B103B	-	Vibration, variable frequency	-	-
JESD22-B106D	-	Resistance to solder shock for through-hole mounted devices	-	-
JESD22-B110B	-	Mechanical shock - Component and-subassembly	-	-
JESD22-B116	1998	Wire Bond Shear Test Method	-	-
JESD51-50:2012-04-		Overview of methodologies for the thermal-measurement of single- and multi-chip, single- and multi-pn-junction light-emitting diodes (LEDs)	-	-
JESD51-51:2012-04-		Implementation of the electrical test-method for the measurement of real thermal resistance and impedance of light-emitting diodes with exposed cooling surface	-	-
JESD51-52:2012-04-		Guidelines for combining CIE 127-2007-total flux measurements with thermal measurements of LEDs with exposed cooling surface	-	-
JESD51-53:2012-05-		Terms, definitions and units glossary for-LED thermal testing	-	-
ANSI/IPC/ECA J--STD-002C		Solderability tests for component leads,-terminations, lugs, terminals and wires	-	-
ANSI/ESDA/JEDEC 2012 JS-001		Joint JEDEC/ESDA standard for-electrostatic discharge sensitivity testing human body model (HBM) – component level	-	-
MIL-STD-883E	2015	Visual Inspection Criteria	-	-
ZVEI	2016	Guideline for Customer Notifications of-Product and/or Process Changes (PCN) of Electronic Components specified for Automotive Applications	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LAMPS, LIGHT SOURCES AND LED PACKAGES FOR ROAD VEHICLES – PERFORMANCE REQUIREMENTS

FOREWORD

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International Standard IEC 60810 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

This fifth edition cancels and replaces the fourth edition published in 2014 and Amendment 1:2017. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) update and clarification of the title and scope;
- b) introduction of new LED light sources;
- c) introduction of requirements for LED light sources;
- d) introduction of guidelines on LED package robustness validation for LED packages.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
34A/2021/FDIS	34A/2033/RVD

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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

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LAMPS, LIGHT SOURCES AND LED PACKAGES FOR ROAD VEHICLES – PERFORMANCE REQUIREMENTS

1 Scope

This document is applicable to filament lamps, discharge lamps, LED light sources and LED packages to be used in road vehicles, i.e. in headlamps, fog-lamps, signalling lamps and interior lighting. It is especially applicable to those lamps and light sources which are listed in IEC 60809.

It specifies requirements and test methods for the measurement of performance characteristics such as lamp life, luminous flux maintenance, torsion strength, glass bulb strength and resistance to vibration and shock. Moreover, information on temperature limits, maximum lamp outlines and maximum tolerable voltage surges is given as guidance for lighting and electrical equipment design.

For some of the requirements given in this document, reference is made to data given in tables. For lamps not listed in such tables, the relevant data are supplied by the lamp manufacturer or responsible vendor.

The performance requirements are additional to the basic requirements specified in IEC 60809. They are, however, not intended to be used by authorities for legal type-approval purposes.

NOTE 1 In the various vocabularies and standards, different terms are used for "incandescent lamp" (IEC 60050-845:1987, 845-07-04) and "discharge lamp" (IEC 60050-845:1987, 845-07-17). In this document, "filament lamp" and "discharge lamp" are used. However, where only "lamp" is written both types are meant, unless the context clearly shows that it applies to one type only.

NOTE 2 This document does not apply to luminaires.

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

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-845, *International Electrotechnical Vocabulary – Part 845: Lighting* (available at <http://www.electropedia.org>)

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

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

IEC 60068-2-43, *Environmental testing – Part 2-43: Tests – Test Kd: Hydrogen sulphide test for contacts and connections*

IEC 60068-2-58, *Environmental testing – Part 2-58: Tests – Test Td: Test methods for solderability, resistance to dissolution of metallization and to soldering heat of surface mounting devices (SMD)*

IEC 60068-2-60, *Environmental testing – Part 2-60: Tests – Test Ke: Flowing mixed gas corrosion test*

 IEC 60809:2021, *Lamps and light sources for road vehicles – Dimensional, electrical and luminous requirements* 

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

ISO 7637-2:2011, *Road vehicles – Electrical disturbances from conduction and coupling – Part 2: Electrical transient conduction along supply lines only*

ISO 10605, *Road vehicles – Test methods for electrical disturbances from electrostatic discharge*

United Nations Vehicle Regulations – 1958 Agreement, *Agreement concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions*
(available at www.unece.org/trans/main/wp29/wp29regs.html)¹

 Text deleted 

Addendum 47: Regulation No 48, *Uniform provisions concerning the approval of vehicles with regard to the installation of lighting and light-signalling devices*

Addendum 100: Regulation No. 101, *Uniform provisions concerning the approval of passenger cars powered by an internal combustion engine only, or powered by a hybrid electric power train with regard to the measurement of the emission of carbon dioxide and fuel consumption and/or the measurement of electric energy consumption and electric range, and of categories M1 and N1 vehicles powered by an electric power train only with regard to the measurement of electric energy consumption and electric range*

Addendum 122: Regulation No. 123, *Uniform provisions concerning the approval of adaptive front-lighting systems (AFS) for motor vehicles*

 Text deleted 

 JESD22-A101D , *Steady-state temperature humidity bias life test*

 JESD22-A108F , *Temperature cycling*

JESD22-A105C, *Power and temperature cycling*

JESD22-A106B, *Thermal shock*

 JESD22-A108F , *Temperature, bias, and operating life*

 JESD22-A113H, *Preconditioning of nonhermetic surface mount devices prior to reliability testing* 

JESD22-A115C, *Electrostatic discharge (ESD) sensitivity testing machine model (MM)*

 JESD22-B101C , *External visual*

JESD22-B103B, *Vibration, variable frequency*

¹ Also known as The 1958 Agreement. In the text of this document the regulations under this agreement are referred to as, for example, UN Regulation 37 or R37.

JESD22-B110B, *Mechanical shock*

Ⓐ JESD22-B106E Ⓐ, *Resistance to solder shock for through-hole mounted devices*

Ⓐ JESD22-B116B Ⓐ, *Wire Bond Shear Test Method*

JESD51-50:2012-04, *Overview of methodologies for the thermal measurement of single- and multi-chip, single- and multi-pn-junction light-emitting diodes (LEDs)*

JESD51-51:2012-04, *Implementation of the electrical test method for the measurement of real thermal resistance and impedance of light-emitting diodes with exposed cooling surface*

JESD51-52:2012-04, *Guidelines for combining CIE 127-2007 total flux measurements with thermal measurements of leds with exposed cooling surface*

JESD51-53:2012-05, *Terms, definitions and units glossary for LED thermal testing*

ANSI/IPC/ECA J-STD-002C, *Solderability tests for component leads, terminations, lugs, terminals and wires*

ANSI/ESDA/JEDEC JS-001-2012, *Joint JEDEC/ESDA standard for electrostatic discharge sensitivity testing human body model (HBM) – component level*

MIL-STD-883E:2015, *Visual Inspection Criteria*

ZVEI "Guideline for Customer Notifications of Product and/or Process Changes (PCN) of Electronic Components specified for Automotive Applications" 4th revised Edition, October 2016, Rev. 3

Ⓐ CIE 015:2018, *Colorimetry* Ⓐ

Ⓐ R.E.5, Consolidated Resolution on the common specification of light source categories

R.E.5 is published by UNECE under the reference ECE/TRANS/WP.29/1127 and is available at the following address (website checked on 6 March 2019) <http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29resolutions.html> Ⓐ

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-845 and IEC 60809, and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

life

total time (expressed in hours) during which a lamp has been operated before it becomes useless

Note 1 to entry: For filament lamps, it is considered to be so according to one of the following criteria:

- a) the end of life is the time when the filament fails;
- b) the life of a dual-filament lamp is the time until either filament fails, if the lamp is tested in a switching cycle involving alternative operation of both filaments.

3.2

characteristic life

T

T_c

constant of the Weibull distribution indicating the time up to which 63,2 % of a number of tested lamps of the same type have ended their individual lives

3.3

life B_3

constant of the Weibull distribution indicating the time during which 3 % of a number of the tested lamps of the same type have reached the end of their individual lives

3.4

luminous flux maintenance

ratio of the luminous flux of a lamp at a given time in its life to its initial luminous flux, the lamp being operated under specific conditions

EXAMPLE 1 L_{70} is the time in hours to 70 % luminous flux maintenance.

EXAMPLE 2 L_{50} is the time in hours to 50 % luminous flux maintenance.

3.5

initial luminous flux

luminous flux of a lamp measured after specified ageing

Note 1 to entry: The ageing is specified in Annex C of [IEC 60809:2021](#) [A2](#) for filament lamps or in Annex D of this document for discharge lamps or in Annex I of this document for LED light sources.

3.6

rated value

value of a characteristic specified for operation of a lamp at test voltage and/or other specified conditions

3.7

pinch temperature limit

maximum admissible pinch temperature to ensure satisfactory lamp performance in service

3.8

solder temperature limit

maximum admissible solder temperature to ensure satisfactory lamp performance in service

3.9

maximum lamp outline

contour limiting the space to be reserved for the lamp in the relevant equipment

3.10

heavy-duty lamp

lamp which shall comply with the heavy-duty test conditions specified in Table B.2 of IEC 60810 in addition to the requirements specified in IEC 60809

Note 1 to entry: A lamp is declared as heavy-duty by the manufacturer or responsible vendor.

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 UN terminology the term "LED" is used with the same definition.

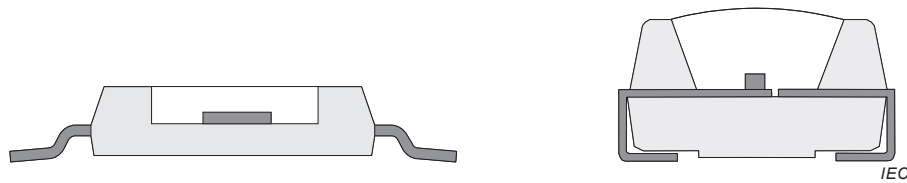


Figure 1 – Examples of LED packages

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 controlgear 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 to entry: 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 to entry: Examples are shown in Figures 2 and 3.

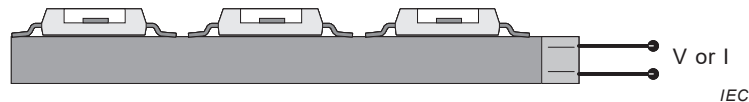


Figure 2 – Example of an LED module without integrated heatsink

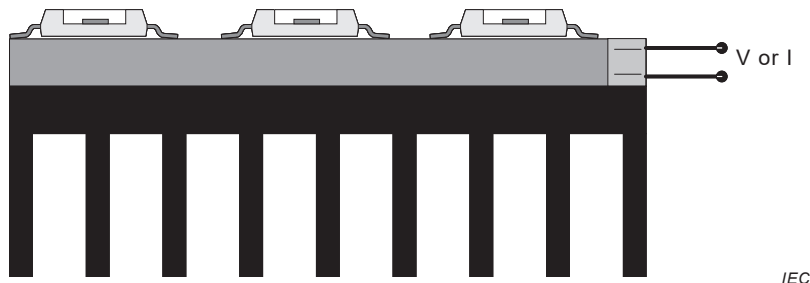


Figure 3 – Example of an LED module with integrated heatsink

3.13.2

replaceable LED light source

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

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

Note 2 to entry: An example is shown in Figure 4.

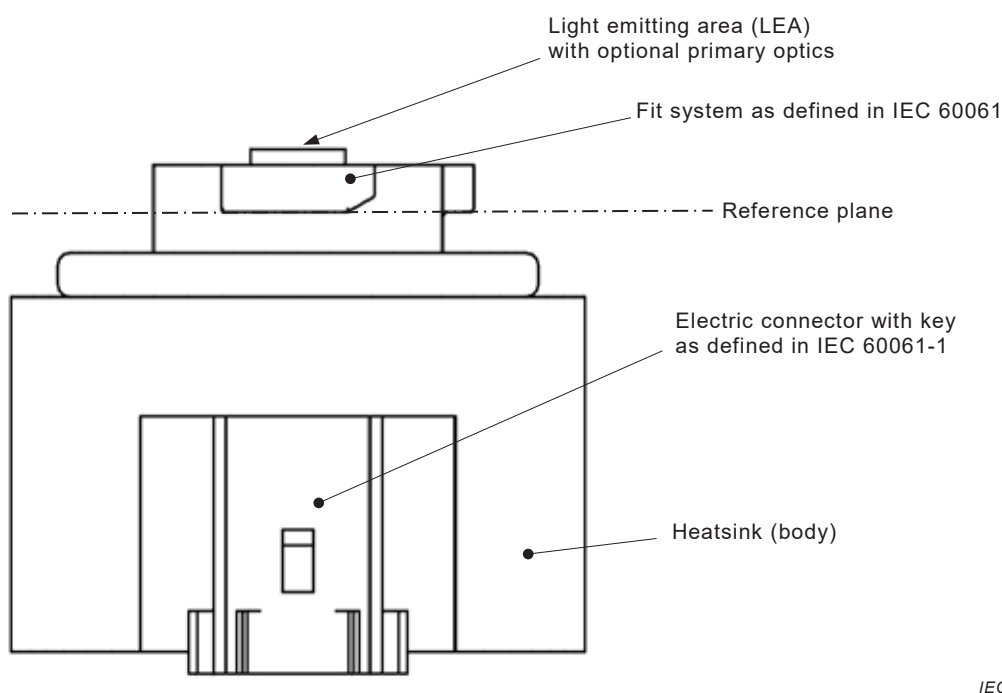


Figure 4 – Example of a replaceable LED light source

3.13.3

non-replaceable LED light source

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

Note 1 to entry: 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 to entry: An example is shown in Figure 5.

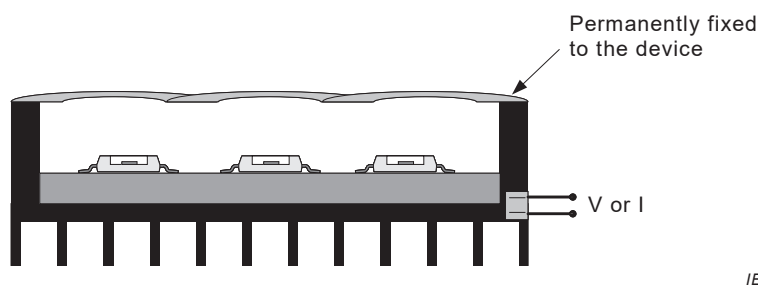


Figure 5 – Example of a non-replaceable LED light source

3.14

T_p
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

3.16

case temperature

T_s

temperature of the thermocouple attachment point on the LED package as defined by the manufacturer of the package

4 Requirements and test conditions for filament lamps

4.1 Basic function and interchangeability

Filament lamps shall comply with IEC 60809.

4.2 Torsion strength

The cap shall be strong and firmly secured to the bulb.

Compliance is checked before and after the life test by submitting the filament lamp to the following torque values:

- filament lamps with bayonet caps
 - with 9 mm shell diameter: 0,3 Nm;
 - with 15 mm shell diameter: 1,5 Nm;
 - with 20 mm shell diameter: 3,0 Nm;
- filament lamps with screw caps
 - with 10 mm shell diameter: 0,8 Nm.

NOTE The torque values given above are all under consideration.

The torque shall not be applied suddenly but shall be increased progressively from 0 to the specified amount.

Values are based on a non-compliance level of 1 %.

4.3 Characteristic life T_c

The life T_c measured on a test quantity of at least 20 filament lamps shall be at least 96 % of the rated value, given in Table 3.

Compliance is checked by life tests as specified in Annex A.

4.4 Life B_3

The life B_3 shall not be less than the rated value given in Table 3.

Compliance is checked by life tests as specified in Annex A.

The number of filament lamps failing before the required time shall not exceed the values in Table 1.

Table 1 – Conditions of compliance for life *B*

Number of filament lamps tested	Acceptance number
23 to 35	2
36 to 48	3
49 to 60	4
61 to 74	5
75 to 92	6

4.5 Luminous flux maintenance

The luminous flux maintenance shall be not less than the rated value given in Table 4. This value is based on a non-compliance level of 10 %.

4.6 Resistance to vibration and shock

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

The filament lamps 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.

The number of filament lamps failing one of the tests shall not exceed the values in Table 2 (values are based on an acceptance quality limit (AQL) of 4 %).

Table 2 – Conditions of compliance for the vibration test

Number of filament lamps tested	Acceptance number
14 to 20	2
21 to 32	3
33 to 41	4
42 to 50	5
51 to 65	6

4.7 Glass-bulb strength

In the event of bulbs being impaired by mechanical handling for their assembly in equipment, the test methods and schedules defined in Annex C shall be used to assess the performance. The bulbs shall withstand the specified compression strength.

5 Filament lamp data

Rated life and luminous flux-maintenance values for road vehicle filament lamps are tested under the conditions specified in Annex A.

Tables 3 and 4 provide rated life and luminous flux maintenance values for continuous operation.



Table 3 – Rated life values for continuous operation

Filament lamp data sheet number		Type	12 V			24 V		
IEC 60809 ^a	R.E.5	Category	Test V	B_3/h	T_c/h	Test V	B_3/h	T_c/h
Lamps for front lighting applications								
2310	H1	H1	13,2	150	400	28,0	90	250
2320	-	H2	13,2	90	250	28,0	90	250
2330	H3	H3	13,2	150	400	28,0	90	250
2120	H4	H4 (HB/LB)	13,2	125/250	250/500	28,0	100/200	200/400
2315	H7	H7	13,2	300	500	28,0	200	400
2365	H8	H8, H8B	13,2	400	800			
2370	H9	H9, H9B	13,2	250	500			
2375	H10	H10	13,2	800	1 600			
2380	H11	H11, H11B	13,2	350	600	28,0	300	600
2385	H12	H12	13,2	480	970			
-	H13	H13, H13A (HB/LB)	13,2	170/1 200	350/2 500			
-	H15	H15 (HB/DRL)	13,2	250/2 000	500/4 000	28,0	200/1 500	400/3 000
-	H16	H16, H16B	13,2	500	1 000			
-	H17	H17	13,2	100/200	200/400			
-	H18	H18	13,2	300	500			
-	H19	H19 (HB/LB)	13,2	125/250	250/500			
-	H20	H20	13,2	100	200			
3430	H27W	H27W/1 H27W/2	13,5	90	190			
2325	HB3	HB3/ HB3A	13,2	250	500			
2335	HB4	HB4/ HB4A	13,2	850	1 700			
2420	HIR2	HIR2	13,2	300	600			
2130	HS1	HS1 (HB/LB)	13,2	75/150	150/300			
2340	HS2	HS2	13,2	100	250			
-	PSX26 W	PSX26W	13,2	1 000	2 000			
2110	R2	R2 (HB / LB)	13,2	30/60	90/160			
2150	S1/S2	S2	13,2	50/100	100/200			
Lamps for signalling applications								
		C5W	13,5	350	750	28,0	120	350
3410	H6W	H6W, HY6W	13,5	350	700			
-	H10W	H10W/1	13,5	150	400			
-	H10W	HY10W/1	13,5	300	600			
3420	H21W	H21W	13,5	200	400	28,0	90	180
-	HY21W	HY21W	13,5	200	400	28,0	90	180
-	P13W	P13W	13,5	4 000	8 000			
-	P19W	P19W	13,5	1 000	2 000			

Filament lamp data sheet number		Type	12 V			24 V		
IEC 60809 ^a	R.E.5	Category	Test V	B_3/h	T_c/h	Test V	B_3/h	T_c/h
3310	P21W	P21W	13,5	120	320	28,0	60	160
3120	P21/4W	P21/4W	13,5	60/600	160/1 600	28,0	60/600	160/1 600
3110	P21/5W	P21/5W	13,5	60/600	160/1 600	28,0	60/600	160/1 600
-	P24W	P24W	13,5	750	1 500			
3315	P27W	P27W	13,5	550	1 320			
-	P27/7W	P27/7W	13,5	550/3 690	1 320/8 820			
-	PR21W	PR21W	13,5	120	320	28,0	60	160
-	PR21/5W	PR21/5W	13,5	60/600	160/1 600			
-	P19W	PSY19W	13,5	1 200	2 400			
-	P24W	PSY24W	13,5	1 000	2 000			
-	P19W	PY19W	13,5	1 200	2 400			
3311	PY21W	PY21W	13,5	120	320	28,0	60	160
-	P24W	PY24W	13,5	1 000	2 000			
3141	PY27/7W	PY27/7W	13,5	550/3 600	1 300/8 000			
3320	R5W	R5W	13,5	100	300	28,0	80	225
3330	R10W	R10W	13,5	100	300	28,0	80	225
-	R10W	RY10W	13,5	100	300			
3340	T4W	T4W	13,5	300	750	28,0	120	350
4310	W3W	W3W	13,5	500	1 500	28,0	400	1 100
4320	W5W	W5W	13,5	200	500	28,0	120	350
4340	W16W	W16W	13,5	250	700			
4321	W5W	WY5W	13,5	200	500			
4120	C21W	C21W	13,5	40	110			
-	WY16W	WY16W	13,5	250	700			
-	W21W	W21W	13,5	120	320			
-	W21/5W	W21/5W	13,5	60/600	160/1 600			
-	WY21W	WY21W	13,5	120	320			
-	W15/5W	W15/5W	13,5	120/600	320/1 600			
-	W10W	W10W	13,5	100	300			
-	WY10W	WY10W	13,5	100	300			

The values indicated are minimum requirements. Depending on some particular customers' specifications, different values may be obtained, i.e. shorter life/higher luminous flux or longer life/lower luminous flux. This shall be negotiated between filament lamp manufacturers and their customers.

If there is no direct contact between the customer and supplier, the information on deviation from recommended life time data shall be given on the package and/or in publicly available technical documentation.

^a If an R.E.5 sheet number is referenced, the IEC sheet number refers to the data sheet given in withdrawn IEC 60809:1995/AMD5:2012 and is given for information only.

A1

Table 4 – Rated luminous flux-maintenance values for continuous operation

Filament lamp data sheet number		Type	12 V			24 V		
IEC 60809 ^e	R.E.5	Category	Test V	Luminous flux maintenance		Test V	Luminous flux maintenance	
				h	%		h	%
Lamps for front lighting applications								
2110	R2	R2	13,2	55 ^c	85	28,0	55 ^c	85
				110 ^d	70	28,0	110 ^d	70
2120	H4	H4	13,2	110 ^c	85	28,0	110 ^c	85
				225 ^d	85		225 ^d	85
2125	-	H6	14,0	75 ^c 150 ^d	85 80	—	—	—
2305		H5	14,0	75	85	—	—	—
2310	H1	H1	13,2	170	90	28,0	170	90
2320		H2	13,2	170	90	28,0	170	90
2330	H3	H3	13,2	170	90	28,0	170	90
3110	P21/5W	P21/5W	13,5	110 ^a	70	28,0	110 ^a	70
				750 ^b	70		750 ^b	70
3120	P21/4W	P21/4W	13,5	110 ^a 750 ^b	70 70	28,0	Under consideration	Under consideration
3310	P21W	P21W	13,5	110	70	28,0	110	70
3320	R5W	R5W	13,5	150	70	28,0	150	70
3330	R10W	R10W	13,5	150	70	28,0	150	70
3340	T4W	T4W	13,5	225	70	28,0	225	70
4110	C5W	C5W	13,5	225	60	28,0	225	60
4120	C21W	C21W	13,5	75	60	—	—	—
4310	W3W	W3W	13,5	750	60	28,0	750	60
4320	W5W	W5W	13,5	225	60	28,0	225	60
The values indicated are minimum requirements. Depending on some particular customers' specifications, different values may be obtained, i.e. shorter life/higher luminous flux or longer life/lower luminous flux. This shall be negotiated between filament lamp manufacturers and their customers.								
Luminous flux-maintenance values for extended operation times are under consideration.								
^a High-wattage filament.								
^b Low-wattage filament.								
^c Main or upper beam filament.								
^d Dipped or lower beam filament.								
^e If an R.E.5 sheet number is referenced, the IEC sheet number refers to a data sheet given in withdrawn IEC 60809:1995/AMD5:2012 and is given for information only.								

A1

6 Requirements and test conditions for discharge lamps

6.1 Basic function and interchangeability

Discharge lamps shall comply with the technical requirements of IEC 60809.

6.2 Mechanical strength

6.2.1 Bulb-to-cap connection

The bulb shall be strongly secured to the cap. Compliance is checked by means of the bulb deflection test conducted in accordance with Annex E.

6.2.2 Cable-to-cap connection (if any)

If the cable has a fixed connection to the cap, it shall withstand a pulling force of 60 N. The force shall be applied in the direction of the (straight) cable.

6.3 Characteristic life T_c

The life T_c measured on a test quantity of at least 20 lamps shall be not less than the value declared by the manufacturer, which shall be at least 3 000 h. Compliance is checked by tests as specified in Annex D.

6.4 Life B_3

The life B_3 measured on a test quantity of at least 20 lamps shall be not less than the value declared by the manufacturer, which shall be at least 1 500 h. Compliance is checked by tests as specified in Annex D.

6.5 Luminous flux maintenance

The luminous flux maintenance shall be at least 60 % of the initial luminous flux. Compliance is checked by tests as specified in Annex D.

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

6.6 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 discharge lamps 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. Moreover, the position of the electrodes shall comply with the dimensional requirements as specified in the relevant standard.

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

Precautions should be taken to avoid potential hazards due to high voltages, UV radiation and risk of bulb breakage during starting, run-up and operation of some discharge lamp types.

6.7 Discharge lamps with integrated starting device

The total weight of the lamp shall not exceed 75 g. Information for ballast design is given in Annex G.

6.8 Discharge lamps with integrated starting device and integrated ballast

The total weight of the lamp shall not exceed 120 g.

The centre of gravity of lamps using IEC cap PK32d shall be positioned within the shape of a cylinder as indicated by the shaded areas in Figure 6.

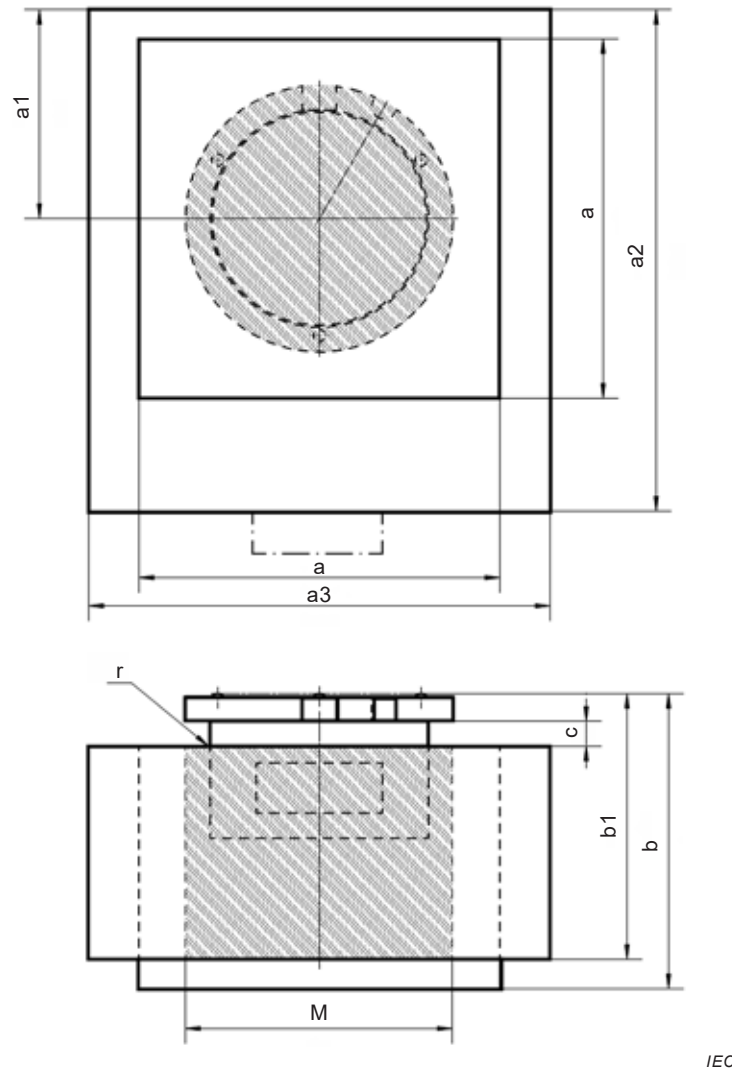


Figure 6 – Position of the centre of gravity (shaded areas)

6.9 White colour groups

The discharge lamp shall be marked with the applicable colour group name or its abbreviation or its nominal CCT value as defined in Table 17. No marking is required for discharge lamps of the white colour group "Neutral white".

NOTE "Neutral white" is considered as the default white colour group for discharge lamps (e.g. in UN Resolution R.E.5).

These three white colour groups are defined with a nominal correlated colour temperature (CCT).

The white colour space, which is subdivided into these colour groups, is defined in UN Regulation No. 48 and in IEC 60809:2021, 4.4.