

FINAL VERSION

VERSION FINALE



Lamps for road vehicles – Performance requirements

Lampes pour véhicules routiers – Exigences de performances

CONTENTS

FOREWORD.....	7
1 Scope.....	9
2 Normative references	9
3 Terms and definitions	11
4 Requirements and test conditions for filament lamps	14
4.1 Basic function and interchangeability	14
4.2 Torsion strength.....	14
4.3 Characteristic life T	15
4.4 Life B3	15
4.5 Luminous flux maintenance.....	15
4.6 Resistance to vibration and shock.....	15
4.7 Glass-bulb strength.....	16
5 Filament lamp data	16
6 Requirements and test conditions for discharge lamps	19
6.1 Basic function and interchangeability	19
6.2 Mechanical strength.....	20
6.2.1 Bulb-to-cap connection	20
6.2.2 Cable-to-cap connection (if any)	20
6.3 Characteristic life T	20
6.4 Life B3	20
6.5 Luminous flux maintenance.....	20
6.6 Resistance to vibration and shock.....	20
6.7 Discharge lamps with integrated starting device.....	20
6.8 Discharge lamps with integrated starting device and integrated ballast	20
7 Requirements and test conditions for LED light sources	21
7.1 Basic function and interchangeability	21
7.2 UV radiation.....	22
7.3 Luminous flux and colour maintenance	22
7.4 Resistance to vibration and shock.....	23
7.5 Electromagnetic compatibility.....	23
7.6 Powered thermal cycling test	23
8 Requirements and test conditions for LED packages	25
8.1 LED package stress test qualification.....	25
8.2 Test samples	25
8.2.1 Lot requirements.....	25
8.2.2 Production requirements.....	25
8.2.3 Pre- and post-stress test requirements	26
8.2.4 Assembly of LED packages on test boards	26
8.2.5 Moisture pre-conditioning (MP)	26
8.2.6 Thermal resistance (TR) test	26
8.3 Definition of failure criteria	26
8.4 Choice between test conditions.....	27
8.5 Criteria for passing qualification/requalification	27
8.6 Qualification test definition.....	27
8.6.1 Pre- and post- electrical and photometric test	27

8.6.2	Pre- and post- external visual (EV) test	27
8.6.3	High temperature operating life (HTOL) test	27
8.6.4	Temperature cycling (TMCL) test	28
8.6.5	Wet high temperature operating life (WHTOL) test	28
8.6.6	Power temperature cycling (PTMCL) test	28
8.6.7	Electrostatic discharge, human body model (ESD-HBM) test	29
8.6.8	Electrostatic discharge, machine model (ESD-MM) test	29
8.6.9	Destructive physical analysis (DPA) test	29
8.6.10	Physical dimensions (PD) test	29
8.6.11	Vibrations variable frequency (VVF) test	29
8.6.12	Mechanical shock (MS) test	29
8.6.13	Resistance to soldering heat (RSH-TTW) test	29
8.6.14	Resistance to soldering heat (RSH-reflow) test	30
8.6.15	Solderability (SO) test	30
8.6.16	Thermal shock (TMSK) test	30
8.6.17	Hydrogen sulphide (H ₂ S) test	30
8.6.18	Pulsed operating life (PLT) test	30
8.6.19	Dew (DEW) test	31
8.6.20	Flowing mixed gas corrosion (FMGC) test	31
Annex A (normative) Life test conditions for filament lamps		32
A.1	Ageing	32
A.2	Test voltage	32
A.3	Operating position and operating conditions	32
A.4	Switching cycle	32
A.4.1	Single-filament lamps	32
A.4.2	Dual-filament lamps for headlamps	33
A.4.3	Dual-filament lamps for light signalling equipment	33
A.5	Luminous flux and colour maintenance	33
Annex B (normative) Vibration tests		34
B.1	General	34
B.2	Test conditions	35
B.2.1	General	35
B.2.2	Mounting (see IEC 60068-2-47)	35
B.2.3	Measuring points	35
B.2.4	Control point	35
B.2.5	Conditioning	35
B.2.6	Axis of vibration	35
B.2.7	WBR test – Basic motion	36
B.3	Test conditions	36
B.3.1	General	36
B.3.2	Narrowband random vibration tests	36
B.3.3	Wideband random vibration tests	37
Annex C (normative) Glass-bulb strength test		39
C.1	General	39
C.2	Test equipment and procedure	39
C.2.1	Principle of the test equipment (see Figure C.1)	39
C.2.2	Test conditions	39
C.2.3	Requirements for plates	40

C.3	Requirements	40
C.4	Evaluation.....	40
C.4.1	General	40
C.4.2	Assessment based on attributes	40
C.4.3	Assessment based on variables.....	41
Annex D	(normative) Life and luminous flux maintenance test conditions for discharge lamps.....	42
D.1	Ageing	42
D.2	Test circuit and test voltage	42
D.3	Burning position and operating conditions	42
D.4	Switching cycle	42
D.5	Luminous flux maintenance.....	44
Annex E	(normative) Bulb deflection test.....	45
E.1	General.....	45
E.2	Test set-up and procedure	45
E.3	Requirement	45
Annex F	(informative) Guidance for equipment design	46
F.1	Pinch temperature limit	46
F.2	Solder temperature limit.....	46
F.3	Maximum filament lamp outline	46
F.4	Maximum surge voltage	46
F.5	Recommended instructions for use and handling of halogen filament lamps.....	46
F.6	Recommended instructions for use and handling of discharge lamps	47
Annex G	(informative) Information for ballast design	52
Annex H	(informative) Symbols	53
H.1	General.....	53
H.2	Symbol indicating that lamps operate at high temperatures.....	53
H.3	Symbol indicating that care should be taken to avoid touching the bulb.....	53
H.4	Symbol indicating that the use of protective gloves is advised.....	53
H.5	Symbol indicating that lamps with scratched or otherwise damaged bulbs should not be used	53
H.6	Symbol indicating that before handling, the lamp shall be switched off.....	53
H.7	Symbol indicating that the use of eye protection is advised	54
H.8	Symbol indicating that during operation, the lamp emits UV-radiation	54
H.9	Symbol indicating that the lamp shall be operated only in a luminaire with a protective shield.....	54
H.10	Symbol indicating dangerous voltage	54
H.11	Pictogram for instruction "Non-ECE"	54
H.12	Pictogram for instruction "Interior lighting only"	55
Annex I	(normative) Luminous flux maintenance test conditions for LED light sources	56
I.1	Ageing	56
I.2	Test voltage	56
I.3	Operating conditions	56
I.3.1	Test rack	56
I.3.2	LED light sources with integrated thermal management.....	56
I.3.3	LED light sources with external thermal management	56
I.4	Switching cycle	57
I.4.1	Single-function LED light sources	57

1.4.2	Dual-function LED light sources for headlamps	57
1.4.3	Multiple-function LED light sources for light signalling equipment	57
1.5	Luminous flux maintenance measurements	58
1.6	Colour measurement.....	58
Annex J (normative)	Destructive physical analysis for LED packages	59
J.1	Description	59
J.2	Equipment	59
J.3	Procedure.....	59
J.4	Failure criteria.....	59
Annex K (informative)	Communication sheet LED package testing.....	60
Annex L (normative)	Re-testing matrix for LED package testing.....	63
Bibliography.....		64
Figure 1 – Examples of LED packages.....		12
Figure 2 – Example for an LED module without integrated heatsink		13
Figure 3 – Example for an LED module with integrated heatsink		13
Figure 4 – Example for a replaceable LED light source		13
Figure 5 – Example for a non-replaceable LED light source		14
Figure 6 – Position of the centre of gravity (shaded areas).....		21
Figure 7 – Extract from IEC 60068-2-14 Test Nb, showing the temperature cycle profile		24
Figure B.1 – Recommended equipment layout for vibration testing		38
Figure C.1 – Diagrammatic sketch of the principle of the test equipment.....		39
Figure D.1 – Superposition of on/off switching and power switching cycle.....		43
Figure E.1 – Sketch of the test set-up		45
Figure F.1 – Voltage surges for 12 V filament lamps – Maximum tolerable duration for a voltage surge as a function of its height		47
Figure F.2 – Maximum filament lamp outlines H1		48
Figure F.3 – Maximum filament lamp outlines H2		49
Figure F.4 – Maximum filament lamp outlines H3		50
Figure F.5 – Maximum filament lamp outlines P21W, PY21W, P21/4W and P21/5W		51
Figure H.1 – Pictogram for instruction "Non-ECE"		55
Figure H.2 – Pictogram for instruction "Interior lighting only"		55
Table 1 – Conditions of compliance for life B3		15
Table 2 – Conditions of compliance for the vibration test		16
Table 3 – Rated life values for continuous operation		17
Table 4 – Rated luminous flux-maintenance values for continuous operation		19
Table 5 – Minimum $L_{70-B_{10}}$ values for standardised LED light sources		22
Table 6 – Typical “on”-times for the different functions per 100 000 km drive distance, based on an average speed of 33,6 km/h ^a		22
Table 7 – Example for product data		23
Table 8 – Temperature classes for the powered thermal cycling test.....		24
Table B.1 – Vibration test on motor vehicle lamps – Test conditions		36
Table B.2 – Vibration test on motor vehicle lamps – Standard test conditions		36

Table B.3 – Vibration test on motor vehicle lamps – Heavy-duty test conditions	37
Table B.4 – Vibration test on motor vehicle lamps – Standard test conditions	37
Table C.1 – Compression strength	40
Table C.2 – Inspection by attributes – Double sampling plan	40
Table C.3 – Inspection by variables – "S" method of assessment.....	41
Table D.1 – On/off switching cycle	42
Table D.2 – Power switching cycle.....	43
Table D.3 – Fast power switching cycle	44
Table G.1 – Open circuit voltage.....	52
Table I.1 – Examples for possible product data.....	57
Table L.1 – Retesting matrix	63

Currently in preview, click buy full version

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LAMPS FOR ROAD VEHICLES – PERFORMANCE REQUIREMENTS

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

DISCLAIMER

This Consolidated version is not an official IEC Standard and has been prepared for user convenience. Only the current versions of the standard and its amendment(s) are to be considered the official documents.

This Consolidated version of IEC 60810 bears the edition number 4.1. It consists of the fourth edition (2014-12) [documents 34A/1797/FDIS and 34A/1818/RVD] and its amendment 1 (2017-03) [documents 34A/1888/CDV and 34A/1927/RVC]. The technical content is identical to the base edition and its amendment.

This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.

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

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

- a) introduction of new gas discharge light sources;
- b) introduction of requirements for non-replaceable filament lamps;
- c) introduction of requirements and test conditions for LED packages.

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

The committee has decided that the contents of the base publication and its amendment 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

LAMPS FOR ROAD VEHICLES – PERFORMANCE REQUIREMENTS

1 Scope

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.

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 for the guidance of lighting and electrical equipment design.

For some of the requirements given in this standard, 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 standard, "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 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 can be used to describe similar products.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (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 60068-2-6:1995, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

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