

FINAL VERSION

VERSION FINALE



Lamps for road vehicles – Dimensional, electrical and luminous requirements

Lampes pour véhicules routiers – Exigences dimensionnelles, électriques et Lumineuses



INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC 60809
Edition 3.0 2014-12

**LAMPS FOR ROAD VEHICLES –
DIMENSIONAL, ELECTRICAL AND LUMINOUS REQUIREMENTS**

INTERPRETATION SHEET 1

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

The text of this interpretation sheet is based on the following documents:

ISH	Report on voting
34A/2007/ISH	34A/2017/RVD

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

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.

Introduction (not part of the proposal)

In the Amendment 1 to Ed.3 (34A/1901/CDV voted positively), Annex E was updated to extend the method of measuring internal elements of dual filament lamps to all such categories, for instance the new category H19.

In the amendment of the current category sheet for H19 (Regulation No. 37), the distinct physical shield width B is introduced ($8,6 \pm 0,3$ mm) to ensure interchangeability of light sources as it relates to road safety (see WP.29/2016/111; to become Resolution [R.E.5] on the common specification of light source categories). In the category sheet for H19 reference is made to Annex E of IEC 60809:2014 for the method of measurement of the internal elements.

See in Figure 1 an extract from WP.29/2016/111.

Practical measurement set-ups use optical vision-systems like a projection system to determine the dimensions of the internal elements.

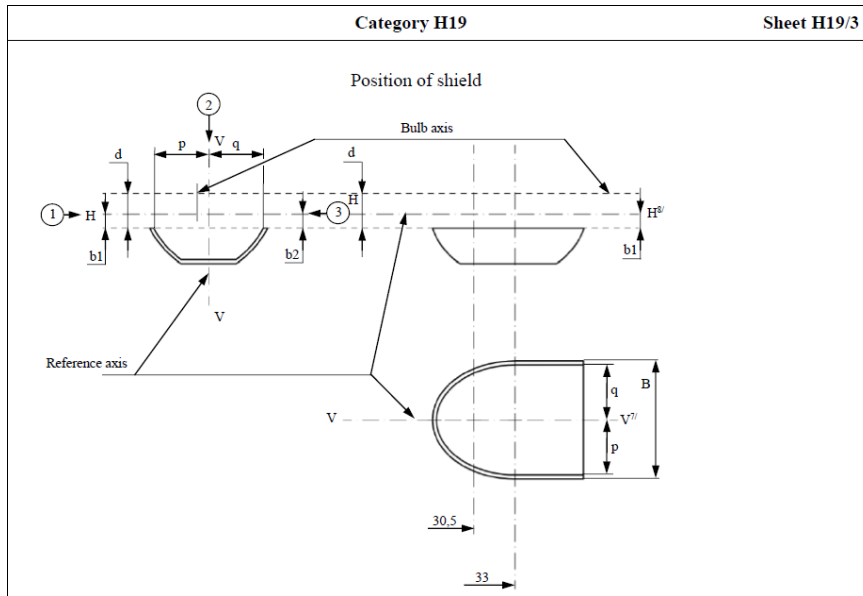


Figure 1 – Category sheet for H19

Problem statement:

When using the above mentioned vision system, a measurement error is introduced due to refraction and blurring (by the glass envelope), additional to the measurement uncertainty.

The effect is mainly dependent on the shield width in relation to the glass envelope diameter.

For lamp designs with a relatively small glass envelope diameter (there is only an upper limit specified), the shield gets close to the glass envelope and the effect becomes significant.

Figure 2 shows a simplified drawing of the view imaging situations of the shield, with and without the effect due to the “refractive index” of the glass envelope.

- a) Physical dimension “B” when the glass envelope is removed,
- b) Visual size of the shield width when measured through the glass envelope in direction ②, resulting in a “smaller value for “B”.
- c) Visual size of the shield width when measured through the glass envelope in direction “-②” (the opposite direction as defined in IEC 60809:2014/AMD1:2017), even show the contrary deviation from the real dimension, resulting in a “larger value for “B”.

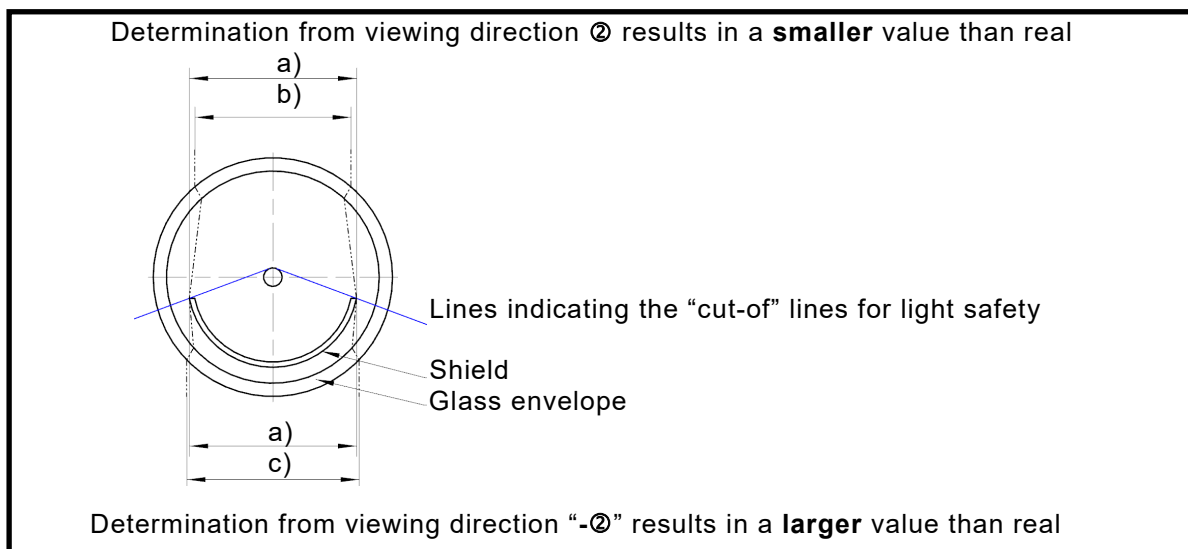


Figure 2 – Simplified drawing of the imaging situations

Proposal:

To publish an Interpretation Sheet on Clause E.5 of IEC 60809:2014/AMD1:2017, *Lamps for road vehicles – Dimensional, electrical and luminous requirements*, as follows:

INTERPRETATION SHEET

Clause E.5 of IEC 60809:2014/AMD1:2017, *Lamps for road vehicles – Dimensional, electrical and luminous requirements*

Note to MP 24 to MP 25 in Table E.1

To avoid measurement errors of the shield width B due to the refractions by the glass envelope the following options are considered:

- 1) The removal of the glass envelope.
- 2) The use of X-ray measurement.

NOTE 1 Option 1 can be used for verification.

- 3) The use of an immersion fluid inside and outside of the envelope in a rectangular glass bath ensuring the refractive index of the immersion fluid matches that of the glass envelope close enough to avoid refractions. The immersion fluid can be filled inside the envelope after removing the top of the bulb. Care shall be taken not to touch/move internal elements.

NOTE 2 Option 1 can be used for verification of the immersion fluid and the test setup.

- 4) The use of a correction factor, taking into account the optical offset and the measurement uncertainty. The verification of the correction factor for a certain lamp design shall be made according the measurement method under item “1)” i.e. after removal of the glass envelope.

NOTE 3 Option 1 can be used for verification.

Note to this interpretation sheet:

The next revision of this standard shall incorporate an improvement of the body text to eliminate the need for this interpretation sheet.

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 General requirements.....	14
4.2 Lamp marking	14
4.3 Bulbs	15
4.4 Colour.....	15
4.4.1 Colour of light	15
4.4.2 Colour endurance	16
4.4.3 Coated bulb	17
4.5 Lamp dimensions	17
4.6 Caps and bases	17
4.7 Initial electrical and luminous requirements	17
4.8 Check on optical quality.....	17
4.8.1 General	17
4.8.2 12 V lamps emitting white light.....	17
4.8.3 6 V and 24 V lamps emitting white light	18
4.8.4 Lamps emitting selective-yellow light.....	18
4.9 UV radiation	18
4.10 Standard (étalon) filament lamps	18
4.11 Non-replaceable filament lamps	19
4.11.1 General	19
4.11.2 Fixation.....	19
4.11.3 Lifetime	20
4.11.4 Colour endurance	20
4.11.5 Luminous flux and colour maintenance.....	20
4.11.6 Vibration and shock resistance.....	21
5 Requirements and test conditions for discharge lamps	21
5.1 General requirements.....	21
5.2 Lamp marking	21
5.3 Bulbs	21
5.4 Caps	22
5.5 Position and dimensions of electrodes, arc and black stripes	22
5.5.1 Measurements	22
5.5.2 Electrodes	22
5.5.3 Arc	22
5.5.4 Black stripes	22
5.6 Starting, run-up and hot-restrike characteristics.....	22
5.6.1 Starting.....	22
5.6.2 Run-up	22
5.6.3 Hot-restrike.....	23
5.6.4 Compliance.....	23
5.7 Electrical and photometric characteristics	23
5.7.1 Voltage and wattage	23

5.7.2	Luminous flux	23
5.7.3	Compliance.....	23
5.8	Colour.....	23
5.9	UV radiation	24
5.10	Standard (étalon) discharge lamps	25
6	Requirements and test conditions for LED light sources	25
6.1	General requirements.....	25
6.2	Light source marking.....	25
6.3	Optical surfaces	26
6.4	Colour of light	26
6.5	Lamp dimensions	26
6.6	Caps and bases	27
6.7	Initial electrical and photometrical requirements.....	27
6.8	Red content	27
6.9	UV radiation	27
6.10	Standard (étalon) light sources.....	27
7	Sampling and conditions of compliance.....	27
8	Lamp data sheets	28
8.1	General.....	28
8.2	List of specific lamp types	28
Annex A (normative)	Filament shape, length and position	52
A.1	General.....	52
A.2	Filaments shown as points	52
A.3	Line filaments.....	52
A.4	Coiled-coil filaments.....	52
A.5	Extreme filament turns	52
A.6	Filament extremities	52
A.6.1	General	52
A.6.2	Axial filaments	52
A.6.3	Transverse filaments.....	52
A.7	Determination of filament length	53
A.8	Filament offsets	53
A.9	Lateral deviation.....	53
A.10	Filament location check system (box system)	53
Annex B (normative)	Measurement method of the colour of filament lamps	56
B.1	General.....	56
B.2	Colour.....	56
B.3	Measuring directions	56
B.3.1	General	56
B.3.2	Filament lamps used in headlamps	56
B.3.3	Filament lamps used in light signalling devices	57
Annex C (normative)	Test conditions for electrical and luminous characteristics.....	58
C.1	Filament lamps.....	58
C.1.1	Ageing	58
C.1.2	Test conditions	58
C.1.3	Electrical instrumentation	58
C.1.4	Photometry	58
C.2	LED light sources	58

C.2.1	Test conditions	58
C.2.2	Luminous flux	58
C.2.3	Normalized luminous intensity	59
C.2.4	Colour	59
C.2.5	Power consumption	59
Annex D (normative)	Method of measuring internal elements of R2 lamps	60
D.1	General test conditions	60
D.1.1	Measurement position	60
D.1.2	Ageing	60
D.1.3	Test condition	60
D.2	Reference axis, reference plane and planes for measurements	60
D.2.1	Reference axis	60
D.2.2	Reference plane	60
D.2.3	Plane V-V	60
D.2.4	Plane H-H	60
D.2.5	Plane X-X	60
D.2.6	Plane Y1-Y1	60
D.2.7	Plane Y2-Y2	60
D.3	Viewing directions (see Figure D.1)	61
D.3.1	Viewing direction ①	61
D.3.2	Viewing direction ②	61
D.3.3	Viewing direction ③	61
D.4	Measuring points (MP)	61
D.5	Dimensions to be measured	62
Annex E (normative)	Method of measuring internal elements of H4 and HS1 lamps	65
E.1	General test conditions	65
E.1.1	Measurement position	65
E.1.2	Ageing	65
E.1.3	Test condition	65
E.2	Reference axis, reference plane and planes for measurements	65
E.2.1	Reference axis	65
E.2.2	Reference plane	65
E.2.3	Plane V-V	65
E.2.4	Plane H-H	65
E.2.5	Plane X-X	65
E.2.6	Plane Y1-Y1	65
E.2.7	Plane Y2-Y2	66
E.2.8	Plane Y3-Y3	66
E.2.9	Plane Y4-Y4	66
E.2.10	Plane Y5-Y5	66
E.3	Viewing directions (see Figure E.1)	66
E.3.1	Viewing direction ①	66
E.3.2	Viewing direction ②	66
E.3.3	Viewing direction ③	66
E.3.4	Viewing direction ④	66
E.4	Measuring points (MP)	66
E.4.1	Shield and filaments (see Figure E.2)	66
E.4.2	Top obscuration (see Figure E.3)	67
E.5	Dimensions to be measured	67

Annex F (normative) Method of measuring internal elements of HB1 lamps.....	72
F.1 General test conditions.....	72
F.1.1 Measurement position.....	72
F.1.2 Ageing.....	72
F.1.3 Test condition.....	72
F.2 Dipped beam filament location.....	72
F.2.1 Horizontal location.....	72
F.2.2 Vertical location.....	72
F.2.3 Axial location.....	72
F.3 Main beam filament location.....	72
F.3.1 Horizontal location.....	72
F.3.2 Vertical location.....	72
F.3.3 Axial location.....	73
Annex G (informative) Optical set-up for the measurement of the position and form of the arc and of the position of the electrodes of discharge lamps	74
Annex H (normative) Measurement method of electrical and photometric characteristics of discharge lamps.....	75
H.1 General.....	75
H.2 Ballast.....	75
H.3 Burning position.....	75
H.4 Ageing.....	75
H.5 Supply voltage.....	75
H.6 Starting test.....	75
H.7 Run-up test.....	75
H.8 Hot restrike test.....	76
H.9 Electrical and photometric test.....	76
H.10 Colour.....	76
Annex I (informative) Overview of lamp types and their applications.....	77
Annex J (normative) Test conditions for colour endurance measurements	80
J.1 General.....	80
J.2 Calibration and ageing.....	80
J.3 Test voltage.....	81
J.4 Operating position.....	81
J.5 Test rack.....	81
J.6 Operating cycles.....	81
J.7 Closure.....	84
Annex K (informative) Method(s) to determine the value of the light centre length for Lx3A, Lx3B, Lx4A, Lx4B, Lx5A, Lx5B, L1A/6 and L1B/6.....	85
K.1 Measurement and calculation method based on ray tracing.....	85
K.2 Alternative method.....	86
Bibliography.....	87
Figure A.1 – Determination of apexes, filament length and filament offsets (A and B).....	54
Figure A.2 – Determination of filament centre	54
Figure A.3 – Determination of lateral deviations (A and B) and tolerance on the light centre length (C).....	55
Figure B.1 – Positions of the colorimetric receiver when measuring lamps used in headlamps	57

Figure B.2 – Positions of the colorimetric receiver when measuring lamps used in light signalling devices	57
Figure D.1 – Viewing directions, seen from the top of the lamp.....	63
Figure D.2 – Position of measuring points of R2 lamps	64
Figure E.1 – Viewing directions, seen from the top of the lamp	69
Figure E.2 – Position of measuring points of H4, H17, H19 and HS1 lamps.....	70
Figure E.3 – Top obscuration	71
Figure F.1 – Side view, view from ③ ^{ab}	73
Figure F.2 – Plan view, view from ④ ^a	73
Figure G.1 – Optical system	74
Figure J.1 – Side view of box.....	81
Figure J.2 – Front view of box	81
Figure J.3 – Temperature in the climate chamber during one operating cycle	82
Figure J.4 – Relative humidity in the climate chamber during one operating cycle	82
Figure J.5 – Switching modes of filament lamps for intermittent operation during one operating cycle.....	83
Figure J.6 – Switching modes of filament lamps for intermittent and continuous operation during one operating cycle	83
Figure J.7 – Switching modes of filament lamps for continuous operation during one operating cycle.....	84
Figure J.8 – Switching modes of filament lamps for intermittent and continuous operation during one operating cycle	84
Figure K.1 – Set-up to measure the luminance distribution of the A versions of the LED light sources	85
Figure K.2 – Set-up to measure the luminance distribution of the B versions of the LED light sources	86
Table 1 – Lifetime of non-replaceable filament lamps	20
Table 2 – Spectral weighting function	25
Table C.1 – Luminous flux tolerance limits.....	59
Table D.1 – Dimensions to be measured for R2 lamps.....	62
Table E.1 – Dimensions to be measured for H4, H17, H19 and HS1 lamps	68
Table I.1 – Overview of lamp types and their applications	77
Table J.1 – Applicable switching modes.....	80
Table J.2 – Applicable boxes of the test racks	80
Table J.3 – Dimensions of the applicable boxes and the relative position of the centre of the filament	81
Table J.4 – Timing during one operating cycle	82
Table J.5 – Switching modes of the filament lamps	83

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LAMPS FOR ROAD VEHICLES – DIMENSIONAL, ELECTRICAL AND LUMINOUS 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 60809 bears the edition number 3.3. It consists of the third edition (2014-12) [documents 34A/1798/FDIS and 34A/1819/RVD], its amendment 1 (2017-03) [documents 34A/1901/CDV and 34A/1940/RVC] and its interpretation sheet (2017-07), its amendment 2 (2017-11) [documents 34A/2032/FDIS and 34A/2038/RVD] and its amendment 3 (2019-03) [documents 34A/2105/CDV and 34A/2128/RVC]. The technical content is identical to the base edition and its amendments.

This Final version does not show where the technical content is modified by amendments 1, 2 and 3. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 60809 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34, Lamps and related equipment.

This third edition constitutes a technical revision.

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

- a) the introduction of requirements for non-replaceable filament lamps;
- b) the introduction of requirements for LED light sources.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2. However, as the original editable data sheets and some figures from previous editions were not available, they have been reproduced in their old format which does not comply fully with the current drafting rules.

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

LAMPS FOR ROAD VEHICLES – DIMENSIONAL, ELECTRICAL AND LUMINOUS REQUIREMENTS

1 Scope

This International Standard is applicable to replaceable and standardised lamps (filament lamps, discharge lamps and LED light sources) to be used in headlamps, fog-lamps and signalling lamps for road vehicles. In some applications, these lamps may be installed as non-replaceable.

This standard is especially applicable to those lamps which are the subject of legislation. In particular, it includes the lamps contained in Regulations No. 37, No. 99, No. 128 and its series of amendments of the Geneva Agreement of 20 March 1958 of the United Nations Economic Commission for Europe (UNECE). However, the standard may be used for other lamps falling under the scope of this standard, as well as lamps which are subject of legislation but not contained in Regulations No. 37, No. 99 and No. 128, e.g. the non-replaceable (filament) lamps and LED modules.

For replaceable and standardised lamps, the standard specifies the technical requirements with methods of tests and basic interchangeability (dimensional, electrical and luminous) for lamps of normal production and for standard (étalon) lamps.

For most of the requirements given in this standard, reference is made to the “relevant lamp data sheet”. For all lamps listed in Clause 8, data sheets are contained in this standard or included by reference. For other lamps, the relevant data are supplied by the lamp manufacturer or responsible vendor. It could be based on national legislation.

Other requirements to replaceable and standardised lamps such as lamp life, luminous flux maintenance, torsion strength and resistance to vibration and shock are specified in IEC 60810. Such requirements to non-replaceable lamps are given in this standard.

For some test methods, reference is made to IEC 60810.

Road vehicle lamps for supplementary purposes which are not the subject of legislation are specified in IEC 60983.

In countries which legislate for approval, for example under the terms of the aforementioned UN Regulations, it is suggested that reference is made to this standard for assessment of compliance. IEC 60810 and IEC 60983 are not intended for that purpose.

NOTE 1 In various vocabularies and standards, different terms are used for “incandescent lamp”, “discharge lamp” and “LED lamp”. In this standard “filament lamp”, “discharge lamp” and “LED light source” are used. However, where only “lamp” is written all three kinds of lamp are meant, unless the context clearly shows that it applies to one kind only.

NOTE 2 Wherever the term “device” is used, it is meant to designate equipment which is used as luminaire. It can take the form and purpose of a headlight or signal light.

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.