BS EN 60809:2015

BSI Standards Publication

Lamps for road vehicles — Dimensional, electrical and luminous requirements

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National foreword

This British Standard is the UK implementation of EN 60809:2015. It is identical to IEC 60809:2014. It supersedes BS EN 60809:1996+A5:2012, which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee CPL/34, Lamps and Related Equipment, to Subcommittee CPL/34/1, Electric lamps.

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Lamps for road vehicles - Dimensional, electrical and luminous requirements (IEC 60809:2014)

Lampes pour véhicules routiers - Exigences dimensionnelles, électriques et lumineuses (IEC 60809:2014)

Lampen für Straßenfahrzeuge - Maße, elektrische und lichttechnische Anforderungen (IEC 60809:2014)

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Foreword

The text of document 34A/1798/FDIS, future edition 3 of IEC 60809, 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 60809:2015.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2015-10-20
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-01-20

This document supersedes EN 60809:1996.

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Endorsement notice

The text of the International Standard IEC 60809:2014 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

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.

Publication	Year	Title	EN/HD	Year
IEC 60050	series	International electrotechnical vocabulary	-	-
IEC 60051-1	-	Direct acting indicating analogue electrical measuring instruments and their accessories - Part 1: Definitions and general requirements common to all parts	EN 60051-1	-
IEC 60061-1	-	Lamp caps and holders together with gauges for the control of interchangeability and safety - Part 1: Lamp caps	EN 60061-1	-
IEC 60810	2014	Lamps for road vehicles - Performance requirements	EN 60810	2015
IEC 60983	-	Miniature lamps	EN 60983	-
IEC 62504	-	General lighting - Light emitting diode (LED) products and related equipment - Terms and definitions	EN 62504	-
CIE 15	2004	Colorimetry	-	-
UNECE 1958 Agreement	-	Agreement concerning the adoption of uniform technical prescription 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	-	-
UNECE 4	-	1958 Agreement, Addendum 3: Regulation No. 4: Uniform provisions concerning the approval of devices for the illumination of rear registration plates of power-driven vehicles and their trailers	-	-
UNECE 6	-	1958 Agreement, Addendum 5: Regulation No. 6: Uniform provisions concerning the approval of direction indicators for power-driven vehicles and their trailers	-	-

Publication	Year	Title	EN/HD	Year
UNECE 7	-	1958 Agreement, Addendum 6: Regulation No. 7: Uniform provisions concerning the approval of front and rear position lamps, stop-lamps and end-outline marker lamps for motor vehicles (except motor cycles) and their trailers	-	-
UNECE 23	-	1958 Agreement, Addendum 22: Regulation No. 23: Uniform provisions concerning the approval of reversing and manoeuvring lamps for power-driven vehicles and their trailers	-	-
UNECE 37	-	1958 Agreement, Addendum 36: Regulation No. 37: Uniform provisions concerning the approval of filament lamps for use in approved lamp units of power-driven vehicles and of their trailers	-	-
UNECE 38	-	1958 Agreement, Addendum 37: Regulation No. 38: Uniform provisions concerning the approval of rear fog lamps for power-driven vehicles and their trailers	-	-
UNECE 50	-	1958 Agreement, Addendum 49: Regulation No. 50: Uniform provisions concerning the approval of front position lamps, rear position lamps, stop lamps, direction indicators and rear-registration-plate illuminating devices for vehicles of category L	-	-
UNECE 77	-	1958 Agreement, Addendum 76: Regulation No. 77: Uniform provisions concerning the approval of parking lamps for power-driven vehicles	-	-
UNECE 87	-	1958 Agreement, Addendum 86: Regulation No. 87: Uniform provisions concerning the approval of daytime running lamps for power-driven vehicles	-	-
UNECE 91	-	1958 Agreement, Addendum 90: Regulation No. 91: Uniform provisions concerning the approval of side-marker lamps for motor vehicles and their trailers	-	-
UNECE 99	-	1958 Agreement, Addendum 98: Regulation No. 99: Uniform provisions concerning the approval of gas-discharge light sources for use in approved gas-discharge lamp units of power-driven vehicles	-	-
UNECE 101	-	1958 Agreement, 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 M_1 and N_1 vehicles powered by an electric power train only with regard to the measurement of electric energy consumption and electric range	-	-
UNECE 119	-	1958 Agreement, Addendum 118: Regulation No. 119: Uniform provisions concerning the approval of cornering lamps for power-driven vehicles	-	-
UNECE 128	-	1958 Agreement, Addendum 127: 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	-	-

CONTENTS

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.

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available at <http://www.electropedia.org/)

IEC 60051-1, *Direct acting indicating analogue electrical measuring instruments and their accessories – Part 1: Definitions and general requirements common to all parts*

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

IEC 60810:2014, *Lamps for road vehicles – Performance requirements*

IEC 60983, *Miniature lamps*

IEC 62504, *General lighting – Light emitting diode (LED) products and related equipment – Terms and definitions*

CIE 15:2004, *Colorimetry*

United Nations, *Agreement concerning the adoption of uniform technical prescription 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* [1]
Available from Internet: www.unece.org/trans/main/wp29/wp29regs.html (website checked 2014-08-12

Addendum 3: Regulation No. 4, *Uniform provisions concerning the approval of devices for the illumination of rear registration plates of power-driven vehicles and their trailers*

Addendum 5: Regulation No. 6, *Uniform provisions concerning the approval of direction indicators for power-driven vehicles and their trailers*

Addendum 6: Regulation No. 7, *Uniform provisions concerning the approval of front and rear position lamps, stop-lamps and end-outline marker lamps for motor vehicles (except motor cycles) and their trailers*

Addendum 22: Regulation No. 23, *Uniform provisions concerning the approval of reversing and manoeuvring lamps for power-driven vehicles and their trailers*

Addendum 36: Regulation No. 37, *Uniform provisions concerning the approval of filament lamps for use in approved lamp units of power-driven vehicles and of their trailers*

Addendum 37: Regulation No. 38, *Uniform provisions concerning the approval of rear fog lamps for power-driven vehicles and their trailers*

Addendum 49: Regulation No. 50, *Uniform provisions concerning the approval of front position lamps, rear position lamps, stop lamps, direction indicators and rear-registration-plate illuminating devices for vehicles of category L*

Addendum 76: Regulation No. 77, *Uniform provisions concerning the approval of parking lamps for power-driven vehicles*

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[1] Also known as *The 1958 Agreement*. In the text of this standard the regulations under this agreement are referred to as, for example, UN Regulation 37 or R 37.

Addendum 86: Regulation No. 87, *Uniform provisions concerning the approval of daytime running lamps for power-driven vehicles*

Addendum 90: Regulation No. 91, *Uniform provisions concerning the approval of side-marker lamps for motor vehicles and their trailers*

Addendum 98: Regulation No. 99, *Uniform provisions concerning the approval of gas-discharge light sources for use in approved gas-discharge lamp units of power-driven vehicles*

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 M_1 and N_1 vehicles powered by an electric power train only with regard to the measurement of electric energy consumption and electric range*

Addendum 118: Regulation No. 119, *Uniform provisions concerning the approval of cornering lamps for power-driven vehicles*

Addendum 127: 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

For the purposes of this document, the terms and definitions given in IEC 60050-845, IEC 60810, IEC 62504, R 37, R 99 and R 128 as well as the following apply.

3.1
category
term used to describe different basic designs of standardized lamps

Note 1 to entry: Each specific designation, for example P21/5W, H4, D2R forms a category. Most of these designations are taken from the UN Regulations.

3.2
type
lamps which are distinguished by common features relevant to the test applied

Note 1 to entry: Lamps bearing the same trade name or mark but produced by different manufacturers are considered as being of different types. Lamps produced by the same manufacturer differing only by the trade name or mark may be considered to be of the same type.

Note 2 to entry: Lamps with different bulb designs, insofar as it affects the optical results, are considered to be of different types.

Note 3 to entry: For filament lamps, lamps of different nominal voltages are considered to be of different types.

Note 4 to entry: A selective-yellow bulb or a selective-yellow additional outer bulb, solely intended to change the colour but not the other characteristics of a light source emitting white light, does not constitute a change of type of the light source.

3.3
type test
test or series of tests, made on a type test sample, for the purpose of checking compliance of the design of a given product with the requirements of the relevant specification

3.4
type test sample
sample consisting of one or more similar units, submitted by the manufacturer or responsible vendor for the purpose of a type test

3.5
conformity of production
compliance of the series production of a given type with the requirements of the relevant specification

Note 1 to entry: Production lamps are of the same design as the approved type test sample.

Note 2 to entry: Local regulations may provide for checking conformity of production by a government agency.

3.6
nominal voltage
voltage used to designate a lamp, usually being the battery voltage (6 V, 12 V or 24 V) of the road vehicle supply network

Note 1 to entry: The term used in the UN regulations is "rated voltage".

3.7
nominal wattage
wattage used to designate a lamp

3.8
test voltage
voltage at the cap terminals for filament lamps and at the input terminals of the ballast for discharge lamps for which some characteristics are specified and at which they shall be tested

3.9
rated value
value of a characteristic specified for operation of a lamp at test voltage and/or other specified conditions

Note 1 to entry: The term used in the UN regulations is "objective value".

3.10
tolerance
allowable variation from a rated value generally expressed as percentage of the rated value

3.11
limit values
lowest and/or highest values for characteristics to which the lamp has to comply when operated under specified conditions

3.12
test luminous flux
specified luminous flux of a standard (étalon) lamp at which the photometric characteristics of lighting and light-signalling devices shall be measured and which has to be adjusted for testing a lamp in the standard headlamp according to 4.8

3.13
reference plane
plane defined with reference to the cap or base and with respect to which positions of certain parts of the lamp are measured

3.14
reference axis
axis defined with reference to the cap or base and with respect to which the positions of certain parts of the lamp are measured

3.15
ageing period
period during which unused lamps are operated at their test voltage in order to stabilize their performance

3.16
standard lamp
étalon lamp
lamp emitting white or amber or red light with reduced dimensional tolerances, used for the photometric testing of lighting and light-signalling devices

Note 1 to entry: Standard lamps are specified for only one nominal voltage for each category.

3.17
production lamp
lamp which shall comply with the requirements of this standard as indicated in the column “production lamps” on the relevant lamp data sheet

Note 1 to entry: The term used in the UN regulations is "lamp of normal production".

3.18
heavy duty lamp
lamp declared as such by the manufacturer or responsible vendor which shall comply with the heavy duty test conditions specified in Table B.3 of IEC 60810:2014 in addition to the requirements specified in this standard

3.19
main beam
driving beam
high beam
headlight designed to illuminate for a considerable distance ahead of the vehicle carrying it

Note 1 to entry: The term used in the UN regulations is "driving beam".

3.20
dipped beam
passing beam
low beam
headlight designed to illuminate without causing undue glare to people in front of the vehicle carrying it, particularly to the drivers of approaching vehicles

Note 1 to entry: The term used in the UN regulations is "passing beam".

3.21
non-replaceable filament lamp
filament lamp which cannot be removed from the device or luminaire

Note 1 to entry: Non-replaceable filament lamps 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.

3.22
life B10
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

3.23
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 h to 70 % luminous flux maintenance.

Example 2 L_{50} is the time in h to 50 % luminous flux maintenance.

3.24
initial luminous flux
luminous flux of a lamp measured after the ageing specified in Clause C.1 for filament lamps or in Annex D of IEC 60810:2014 for discharge lamps or in Clause C.2 for LED light sources

4 Requirements and test conditions for filament lamps

4.1 General requirements

Filament lamps shall be so designed as to be and to remain in good working order when in normal use. They shall, moreover, exhibit no fault in design or manufacture.

4.2 Lamp marking

The following information shall be legibly and durably marked on all filament lamps, except for non-replaceable filament lamps:

– the trade name or mark of the manufacturer or responsible vendor;
– the nominal voltage;
– the international designation of the relevant category;
– the nominal wattage (in the sequence: high wattage filament/low wattage filament for dual filament lamps); this need not be indicated separately if it is part of the international designation of the relevant filament lamp category.

Additionally, halogen filament lamps meeting the requirements of 4.9 shall be marked with a “U”.

NOTE 1 Halogen filament lamps are filament lamps whose category designation usually starts with the letter “H”. Some halogen lamps complying with the requirements in 4.9 have a category designation staring with another letter.

Inscriptions other than the above may be affixed.

NOTE 2 An example of such an inscription is the approval mark conferred by an administrative authority.

Compliance shall be checked by the following:

a) presence and legibility – by visual inspection;
b) durability – by applying the following test on unused lamps:

The area of the marking on the lamp shall be rubbed by hand with a smooth cloth, dampened with water, for a period of 15 s.

After this test the marking shall still be legible.

If the marking is on the bulb, it shall not adversely affect the luminous characteristics.

4.3 Bulbs

Filament lamp bulbs shall exhibit no scores or spots which might impair their optical performance.

4.4 Colour

4.4.1 Colour of light

The colour of the light emitted by the filament lamp shall be white, unless otherwise prescribed on the relevant filament lamp data sheet. For some categories, other colour(s) of light are allowed.

The colorimetric characteristics of the light emitted, expressed in CIE *x,y* chromaticity co-ordinates, shall lie within the following limits:

– finished filament lamps emitting white light:

W_{12}	green boundary:	$y = 0{,}150 + 0{,}640\ x$
W_{23}	yellowish green boundary:	$y = 0{,}440$
W_{34}	yellow boundary:	$x = 0{,}500$
W_{45}	reddish purple boundary:	$y = 0{,}382$
W_{56}	purple boundary:	$y = 0{,}050 + 0{,}750\ x$
W_{61}	blue boundary:	$x = 0{,}310$

with intersection points:

W_1:	$x = 0{,}310$, $y = 0{,}348$
W_2:	$x = 0{,}453$, $y = 0{,}440$
W_3:	$x = 0{,}500$, $y = 0{,}440$
W_4:	$x = 0{,}500$, $y = 0{,}382$
W_5:	$x = 0{,}443$, $y = 0{,}382$
W_6:	$x = 0{,}310$, $y = 0{,}283$

– finished filament lamps emitting selective-yellow light:

SY_{12}	green boundary:	$y = 1{,}290\ x - 0{,}100$
SY_{23}	the spectral locus[2]	
SY_{34}	red boundary:	$y = 0{,}138 + 0{,}580\ x$
SY_{45}	yellowish white boundary:	$y = 0{,}440$
SY_{51}	white boundary:	$y = 0{,}940 - x$

with intersection points:

SY_1:	$x = 0{,}454$, $y = 0{,}486$
SY_2:	$x = 0{,}480$, $y = 0{,}519$
SY_3:	$x = 0{,}545$, $y = 0{,}454$
SY_4:	$x = 0{,}521$, $y = 0{,}440$
SY_5:	$x = 0{,}500$, $y = 0{,}440$

– finished filament lamps emitting red light:

R_{12}	yellow boundary:	$y = 0{,}335$
R_{23}	the spectral locus	
R_{34}	the purple line:	(its linear extension across the purple range of colours between the red and the blue extremities of the spectral locus).
R_{41}	purple boundary:	$y = 0{,}980 - x$

with intersection points:

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2 See CIE 15.

R_1: x = 0,645, y = 0,335
R_2: x = 0,665, y = 0,335
R_3: x = 0,735, y = 0,265
R_4: x = 0,721, y = 0,259

The colour of the light emitted shall be measured by the method specified in Annex B.

Each measured value shall lie within the required tolerance area. Moreover, in the case of filament lamps emitting white light, the measured values shall not deviate more than 0,020 units in the x and/or y direction from a point of choice on the Planckian locus[3].

For conformity of production purposes of amber and red colour only, at least 80 % of the measuring results shall lie within the required tolerance area.

4.4.2 Colour endurance

Filament lamps, but for conformity of production purposes only colour coated lamps, for use in light signalling devices shall be operated under test conditions for colour endurance measurements as specified in Annex J.

Thereafter the colour of the light shall be measured by the method specified in Annex B, and all measuring results, but for amber and red colour at least 80 % of the measuring results for conformity of production purposes, shall be within the limits specified in 4.4.1.

In case of colour filter coatings, no cracks in these coatings shall be visible without specific optical tools.

Test samples that have been operated under conditions as specified in Annex J shall no longer be used in light signalling devices and are to be considered end of life for that purpose.

4.4.3 Coated bulb

In the case of a coated bulb, after the ageing period corresponding to C.1.1, the surface of the bulb shall be lightly wiped with a cotton cloth soaked in a mixture of 70 % by volume of n-heptane and 30 % by volume of toluol. After about 5 min, the surface shall be inspected visually. It shall not show any apparent changes.

4.5 Lamp dimensions

The filament lamp dimensions shall comply with the limiting values given in the lamp drawing or on the relevant filament lamp data sheet.

The definition of and the measuring condition for the filament shape, length and position, shall be in accordance with the appropriate requirements of Annexes A, D, E and F respectively; this does not apply to non-replaceable filament lamps.

4.6 Caps and bases

Filament lamps shall have standard caps or bases as specified on the relevant filament lamp data sheet and shall comply with the relevant cap data sheet of IEC 60061-1. This requirement does not apply to non-replaceable filament lamps; in this case, filament lamps shall be equipped with bases that allow firm and secure fixation to the lighting or light signalling devices, or to parts/modules/units of such devices, for which these filament lamps are designed and intended.

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3 See CIE 15.

4.7 Initial electrical and luminous requirements

Filament lamp wattage and luminous flux shall comply with the limiting values given on the relevant lamp data sheet.

The luminous flux specified on the relevant filament lamp data sheet applies for filament lamps emitting white light, unless a special colour is stated there.

In the case where selective-yellow colour is allowed the luminous flux of the filament lamp with selective-yellow (outer) bulb shall be at least 85 % of the specified luminous flux of the relevant filament lamps with colourless bulb.

Compliance shall be checked by the tests specified in Clause C.1.

4.8 Check on optical quality

4.8.1 General

This requirement applies only to double filament lamps with internal shield for headlamps emitting an asymmetrical dipped beam when the relevant regulation requires such a test.

The check on optical quality shall be carried out at a voltage such that the test luminous flux is obtained.

4.8.2 12 V lamps emitting white light

The sample which most nearly conforms to the requirements laid down for the standard filament lamp shall be tested in an appropriate standard headlamp and it shall be verified that the assembly comprising the aforesaid headlamp and the filament lamp being tested meets the light-distribution requirements laid down for the dipped beam in the relevant regulation, directive or standard.

4.8.3 6 V and 24 V lamps emitting white light

The sample which most nearly conforms to the rated dimension values shall be tested in an appropriate standard headlamp and it shall be verified that the assembly comprising the aforesaid headlamp and the filament lamp being tested meets the light-distribution requirements laid down for the dipped beam in the relevant regulation, directive or standard. Deviations not exceeding 10 % of the minimum values will be acceptable.

4.8.4 Lamps emitting selective-yellow light

Filament lamps emitting selective-yellow light shall be tested in the same manner as described in 4.8.1 and 4.8.2 in an appropriate standard headlamp to ensure that the illuminance complies with at least 85 % for 12 V filament lamps, and at least 77 % for 6 V and 24 V filament lamps, with the minimum values of the light-distribution requirements laid down for the dipped beam in the relevant regulation, directive or standard. The maximum illuminance limits remain unchanged.

In the case of a filament lamp having a selective-yellow bulb, the test shall be left out if the approval is also given to the same type of filament lamp emitting white light.

4.9 UV radiation

The UV radiation of a halogen filament lamp shall be such that:

$k_1 \leq 2 \times 10^{-4}$ W/lm, and $k_2 \leq 2 \times 10^{-6}$ W/lm,

k_1 and k_2 are calculated according to:

$$k_1 = \frac{\int_{315}^{400} \Phi_\lambda d\lambda}{k_m \bullet \int_{380}^{780} \Phi_\lambda V(\lambda) d\lambda} \quad \text{and} \quad k_2 = \frac{\int_{250}^{315} \Phi_\lambda d\lambda}{k_m \bullet \int_{380}^{780} \Phi_\lambda V(\lambda) d\lambda}$$

where

k_m 683 lm/W;

Φ_λ is the spectral power of the radiant flux expressed in watts per nanometre (W/nm);

$V(\lambda)$ is the CIE luminosity function;

λ is the wavelength expressed in nanometres (nm).

These values shall be calculated using intervals of five nanometres.

In the case of non-replaceable filament lamps, compliance to UV radiation requirements may be exempted if this is specified in the relevant lamp data sheet.

4.10 Standard (étalon) filament lamps

Standard filament lamps shall fulfil the additional requirements as specified on the relevant filament lamp data sheets.

Bulbs of standard (étalon) filament lamps emitting white light shall not alter the CIE chromaticity co-ordinates of a luminous source having a colour temperature of 2 856 K by more than 0,010 units in the *x* and/or *y* direction. For standard (étalon) filament lamps emitting amber or red light, changes of the bulb temperature shall not affect the luminous flux, which might impair photometric measurements of signalling devices. Moreover, for amber standard (étalon) filament lamps, the colour shall be in the lower part of the tolerance area, i.e. towards the red.

4.11 Non-replaceable filament lamps

4.11.1 General

For non-replaceable filament lamps (either as part of a lighting or light signalling device (luminaire), or as part of parts/modules/units of such devices), compliance shall be demonstrated, with a test report or other means, with requirements to:

a) lifetime;

b) colour and colour endurance;

c) luminous flux maintenance and colour maintenance;

d) vibration and shock resistance

as specified below.

A brief technical description (data sheet) of the non-replaceable filament lamp shall be submitted by the manufacturer or responsible vendor, stating in particular:

- the part number or other identification means;
- the test voltage;
- the device (luminaire) the filament lamp is used for;
- whether “standard” or “heavy duty” test conditions apply for testing vibration and shock resistance.

For testing purposes, 20 type test samples shall be used for performing the testing of non-replaceable filament lamps.

For conformity of production of non-replaceable filament lamps, compliance shall be checked with the requirements to lifetime in 4.11.3 and for colour coated filament lamps also with requirements to colour endurance as specified in 4.11.4.

For conformity of production test purposes, 20 test samples per year of normal production shall be used. In the case of colour coated non-replaceable filament lamps and the colour endurance requirement, a representative distribution over different lamps may be used provided that these are using the same colour coating technology and finishing, and that this representative distribution comprises lamps of the smallest and the largest diameter of the outer bulb, each at the highest rated wattage.

Alternatively to testing compliance, (previous) measurements or test reports of test samples may be used, under the condition that:

- the essential parameters of these test samples are identical in relation to the test under consideration;
- simulations may be used additionally, in case essential parameters of these test samples are not identical but similar in relation to the test under consideration.

4.11.2 Fixation

For testing purposes, non-replaceable filament lamps shall be used that are fixed firmly and securely to appropriate means necessary to conduct the test or as specified by the respective test. They do not need to be installed in the devices for which they are designed and intended, but may be fixed to parts/modules/units of the devices for which they have been designed and intended.

4.11.3 Lifetime

The life B10 of non-replaceable filament lamps shall not be less than the value given in Table 1, and not less than 50 % of that value, in the case of non-replaceable filament lamps that are an indivisible part of parts/modules/units of lighting or light signalling devices.

Table 1 – Lifetime of non-replaceable filament lamps

Devices (luminaires) in which non-replaceable filament lamp(s) are used	Life B10 * h	Corresponding UN Regulations (for information only)
Rear registration plate lamps	2 200**	No. 4
Direction indicator lamps	500	No. 6, 50
Front and rear position lamps	2 200**	No. 7, 50
Stop-lamps	1 000	No. 7, 50
End-outline marker lamps	2 200	No. 7
Reversing lamps	100	No. 23
Rear fog lamps	100	No. 38
Parking lamps	2 200	No. 77
Daytime running lamps	4 000	No. 87
Side marker lamps	2 200**	No. 91
Cornering lamps	200	No. 119
* Typical “on”- times for different functions per 200 000 km drive distance with an average speed of 33,6 km/h, based on the composition of driving cycles defined in R101.		
** In case these lamps are intended for vehicles where the devices in which they are used are also switched ON together with daytime running lamps (DRL), the value of 6 200 h shall be used.		

Compliance is checked by life tests as prescribed in Annex A of IEC 60810:2014

In the case of dual non-replaceable filament lamps, the applicable filament shall be considered that is used for the specified device.

4.11.4 Colour endurance

Non-replaceable filament lamps shall comply with the colour endurance requirements as specified in 4.4.

4.11.5 Luminous flux and colour maintenance

The luminous flux maintenance shall not be less than 70 % at life B10.

In the case of amber and red coloured non-replaceable filament lamps, the colour of the light emitted by these filament lamps shall be measured at the moment of luminous flux maintenance and be within the colour boundaries as defined in 4.4.1. These measurements shall be made at test voltage as indicated in the relevant datasheet and at an ambient temperature of 23 °C ± 5 °C using a suitable integrating photometer.

In the case of dual non-replaceable filament lamps, the applicable filament shall be considered that is used for the specified device.

Testing may be combined with the lifetime test.

4.11.6 Vibration and shock resistance

To assess the performance influenced by vibration or shock, the test methods and schedules detailed in Annex B of IEC 60810:2014 shall be used.

The non-replaceable filament lamps are deemed to have satisfactorily completed the wideband or narrowband random vibration test as described in Annex B of IEC 60810:2014 if they continue to function during and after the test.

The number of non-replaceable filament lamps failing one of the tests shall not be more than 2.

5 Requirements and test conditions for discharge lamps

5.1 General requirements

Discharge lamps shall be so designed as to be and to remain in good working order when in normal use. They shall, moreover, exhibit no fault in design or manufacture.

5.2 Lamp marking

The following information shall be legibly and durably marked on the cap of the discharge lamps:

– the trade name or mark of manufacturer or responsible vendor;
– the nominal wattage;
– the international designation of the relevant category.

Inscriptions other than the above may be affixed.

NOTE 1 An example of such inscription is the approval mark conferred by an administrative authority.

NOTE 2 The ballast used for starting and operating the discharge lamps is marked with type and trade mark identification and with the nominal voltage and wattage, as indicated on the relevant data sheet.

Compliance shall be checked by the following:

a) presence and legibility – by visual inspection;
b) durability – by applying the following test on unused lamps:

The area of the marking on the lamp shall be rubbed by hand with a smooth cloth, dampened with water, for a period of 15 s.

After the test the marking shall still be legible.

5.3 Bulbs

The bulb of the discharge lamps shall exhibit no scores or spots which might impair their optical performance.

The bulb shall comply with the dimensional specifications given on the relevant data sheet.

In the case of a coloured (outer) bulb after an operating period of 15 h with the ballast at test voltage, the surface of the bulb shall be lightly wiped with a cotton cloth of 70 % by volume of n-heptane and 30 % by volume of toluol. After 5 min, the surface shall be inspected visually. It shall not show any apparent changes.

5.4 Caps

Discharge lamps shall be equipped with standard caps complying with the cap data sheets of IEC 60061-1 as specified on the relevant data sheet. The cap shall be strong and firmly secured to the bulb.

5.5 Position and dimensions of electrodes, arc and black stripes

5.5.1 Measurements

An example of a method of measuring arc and electrode position is given in Annex G. Any method with equivalent measurement accuracy may be used.

5.5.2 Electrodes

The geometric position and dimensions of the electrodes shall be as specified on the relevant data sheet.

Compliance shall be checked before the ageing period, the discharge lamp unlit and using optical methods through the glass envelope.

5.5.3 Arc

The shape and the displacement of the arc shall conform to the requirements as given on the relevant data sheet.

Compliance shall be checked after ageing with the lamp supplied by the ballast at test voltage.

5.5.4 Black stripes

The position, dimensions and transmission of the black stripes (if any) shall comply with the requirements as given on the relevant data sheet.

Compliance shall be checked after ageing, with the lamp supplied by the ballast at test voltage.

5.6 Starting, run-up and hot-restrike characteristics

5.6.1 Starting

The discharge lamp shall start directly and remain alight.

5.6.2 Run-up

5.6.2.1 Lamps > 2 000 lm

When measured according to the conditions specified in Annex H, a discharge lamp having a rated luminous flux which exceeds 2 000 lm shall emit at least:

– After 1 s: 25 % of its rated luminous flux.
– After 4 s: 80 % of its rated luminous flux.

The rated luminous flux is as indicated on the relevant data sheet.

5.6.2.2 Lamps ≤ 2 000 lm

When measured according to the conditions specified in Annex H, a discharge lamp having a rated luminous flux which does not exceed 2 000 lm shall emit at least:

– After 1 s: 800 lm.
– After 4 s: 1 000 lm.

The rated luminous flux is as indicated on the relevant data sheet.

5.6.3 Hot-restrike

After being switched-off for a period as indicated on the relevant data sheet, when switched-on, the lamp shall restart directly.

After 1 s the lamp shall emit at least 80 % of its rated luminous flux.

5.6.4 Compliance

Compliance shall be checked by the tests specified in Annex H.

5.7 Electrical and photometric characteristics

5.7.1 Voltage and wattage

The voltage and wattage of the lamp shall be within the limits given on the relevant data sheet.

5.7.2 Luminous flux

The luminous flux shall be within the limits given on the relevant data sheet. In the case where white and yellow is specified for the same type, the rated value applies to the lamp emitting white light, whereas the luminous flux of the lamp emitting yellow light shall be at least 68 % of the specified value.

5.7.3 Compliance

Compliance shall be checked by the tests specified in Annex H.

5.8 Colour

The colour of the light emitted shall be white unless yellow is prescribed on the relevant data sheet.

In case of white the colorimetric characteristics, expressed in CIE chromaticity co-ordinates, shall lie within the limits given on the relevant data sheet.

In case of yellow, the chromaticity coordinates (x,y) of the light emitted shall lie inside the chromaticity areas defined by the boundaries:

SY_{12}	green boundary:	$y = 1{,}290\ x - 0{,}100$
SY_{23}	the spectral locus[4]	
SY_{34}	red boundary:	$y = 0{,}138 + 0{,}580\ x$
SY_{45}	yellowish white boundary:	$y = 0{,}440$
SY_{51}	white boundary:	$y = 0{,}940 - x$

with intersection points:

SY_1:	$x = 0{,}454$, $y = 0{,}486$
SY_2:	$x = 0{,}480$, $y = 0{,}519$
SY_3:	$x = 0{,}545$, $y = 0{,}454$
SY_4:	$x = 0{,}521$, $y = 0{,}440$
SY_5:	$x = 0{,}500$, $y = 0{,}440$

4 See CIE 15.

The minimum red content of the light of a discharge lamp emitting white light shall be such that

$k_{red} \geq 0{,}05$.

k_{red} is calculated according to:

$$k_{red} = \frac{\int_{610}^{780} \Phi_\lambda V(\lambda) d\lambda}{\int_{380}^{780} \Phi_\lambda V(\lambda) d\lambda}$$

where Φ_λ, $V(\lambda)$ and λ are as defined in 4.9.

This value shall be calculated using intervals of one nanometre.

Compliance is checked by the tests specified in Annex H.

5.9 UV radiation

The maximum UV content of the light of a discharge lamp shall be such that

$k_{UV} \leq 10^{-5}$ W/lm.

k_{UV} is calculated according to:

$$k_{UV} = \frac{\int_{250}^{400} \Phi_\lambda S(\lambda) d\lambda}{k_m \bullet \int_{380}^{780} \Phi_\lambda V(\lambda) d\lambda}$$

where k_m, Φ_λ, $V(\lambda)$ and λ are as defined in 4.9 and $S(\lambda)$ is the spectral weighting function according to Table 2.

This value shall be calculated using intervals of one nanometre.

Table 2 – Spectral weighting function

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 0	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	0,000 053
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				

Wavelengths chosen are representative, other values shall be interpolated.

Compliance shall be checked by the tests specified in Annex H.

5.10 Standard (étalon) discharge lamps

Standard discharge lamps shall comply with the requirements applicable to production lamps and to the specific requirements as stated in the relevant data sheet. In case of a type emitting white and yellow light, the standard lamp shall emit white light.

6 Requirements and test conditions for LED light sources

6.1 General requirements

LED light sources shall be so designed as to be and to remain in good working order when in normal use. They shall, moreover, exhibit no fault in design or manufacture.

6.2 Light source marking

The following information shall be legibly and durably marked on all LED light sources:

– the trade name or mark of the manufacturer or responsible vendor;
– the nominal voltage or voltage range;
– the international designation of the relevant category.

Inscriptions other than the above may be affixed.

NOTE An example of such an inscription is the approval mark conferred by an administrative authority.

Compliance shall be checked by the following:

a) presence and legibility – by visual inspection;
b) durability – by applying the following test on unused light source:

The area of the marking on the lamp shall be rubbed by hand with a smooth cloth, dampened with water, for a period of 15 s.

After this test, the marking shall still be legible.

6.3 Optical surfaces

LED light sources shall exhibit no scores or spots on their optical surfaces which might impair their efficiency and their optical performance.

6.4 Colour of light

The colour of the light emitted by the LED light source shall be white, unless otherwise prescribed on the relevant filament lamp data sheet. For some categories, other colour(s) of light are allowed.

The colorimetric characteristics of the light emitted, expressed in CIE chromaticity co-ordinates, shall lie within the limits as specified in 4.4.1.

6.5 Lamp dimensions

The LED light source dimensions shall comply with the limiting values given in the lamp drawing or on the relevant data sheet.

6.6 Caps and bases

Replaceable LED light sources shall have standard caps or bases as specified on the relevant data sheet and shall comply with the relevant cap data sheet of IEC 60061-1.

The cap shall be strongly and firmly secured to the rest of the LED light source. To ascertain whether LED light sources conform to the requirements above, a visual inspection, a dimension check and, where necessary, a trial fitting into the holder as specified in IEC publication 60061 shall be carried out.

6.7 Initial electrical and photometrical requirements

LED light source wattage, luminous flux and intensity distribution (e.g. normalized luminous intensity distribution, cumulative luminous flux) shall comply with the limiting values given on the relevant data sheet.

The colorimetric characteristics of the light emitted, expressed in CIE chromaticity coordinates, shall lie within the limits as specified in 4.4.1.

Compliance shall be checked by the tests specified in Clause C.2.

6.8 Red content

For LED light sources emitting white light, the minimum red content of the light shall be such that

$k_{red} \geq 0{,}05$ (see 5.8).

6.9 UV radiation

The UV radiation of the LED light source shall be determined according to 5.9.

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

6.10 Standard (étalon) light sources

Standard LED light sources shall fulfil the additional requirements as specified on the relevant data sheets.

7 Sampling and conditions of compliance

Requirements for sampling and conditions of compliance, except for non-replaceable filament lamps, are specified in the relevant regulation, for example UN Regulations No. 37, No. 99 and No. 128.

Requirements for sampling and conditions of compliance for non-replaceable filament lamps, are specified in the relevant regulation for devices, using non-replaceable filament lamps.

NOTE At date of publication these are specified in UN Regulations Nos. 4, 6, 7, 23, 38, 50, 77, 87, 91 and 119.

8 Lamp data sheets

8.1 General

Data sheets are numbered so that:

– The first part of the lamp data sheet number represents the number of this standard (60809) followed by the letters “IEC”.

– The second part represents the lamp data sheet number.

– The third part on the sheet indicates the edition of the sheet.

In the case that a reference is made from this standard to the lamp data sheet in UN regulation:

– The first part of the reference represents the number of the UN Regulation (R37, R99 or R128).

– The second part represents the name of the lamp data sheet in the UN.

Many data sheets in this document have been copied from previous editions of the standard, pre-dating the general change to IEC standard numbers. In these data sheets the sheet number and reference number to the cap standard still refer to the old numbering. For data sheets dated before 2014, read the sheet reference as 60809-IEC-xxxx instead of 809-IEC-xxxx, and read references to IEC 61-1 as IEC 60061-1.

8.2 List of specific lamp types

IEC sheet no.[5]	UN sheet no.[6]	Category	Voltage V	Wattage W	Cap
60809-IEC-2110-	R37-R2	R2	6 12 24	45/40 45/40 55/50	P45t P45t P45t
60809-IEC-2120-	R37-H4	H4	12 24	60/55 75/70	P43t-38 P43t-38
60809-IEC-2125-	-	H6	12	65/55	PZ43t
60809-IEC-2130-	R37-HS1	HS1	6 12	35/35 35/35	PX43t PX43t
60809-IEC-2132-	R37-HS5	HS5	12	35/30	P23t
60809-IEC-2135-	-	HB1	12	65/45	P29t
60809-IEC-2140-	R37-S1/S2	S1	6 12	25/25 25/25	BA20d BA20d

5 If a UN sheet number is referenced in the second column, the IEC sheet number refers to a data sheet withdrawn with Amendment 5 of Edition 2 of this standard and is given for information only.

6 The number in front of the dash indicates the number of the UN regulation.

IEC sheet no.[5]	UN sheet no.[6]	Category	Voltage V	Wattage W	Cap
60809-IEC-2150-	R37-S1/S2	S2	6 12	35/35 35/35	BA20d BA20d
60809-IEC-2160-	-	S4	6 12	15/15 15/15	BAX15d BAX15d
60809-IEC-2305-	-	H5	12	50	PY43d
60809-IEC-2310-	R37-H1	H1	6 12 24	55 55 70	P14.5s P14.5s P14.5s
60809-IEC-2315-	R37-H7	H7	12 24	55 70	PX26d PX26d
60809-IEC-2320-	-	H2	6 12 24	55 55 70	X511 X511 X511
60809-IEC-2325-	R37-HB3	HB3 HB3A	12 12	60 60	P20d P20d
60809-IEC-2330-	R37-H3	H3	6 12 24	55 55 70	PK22s PK22s PK22s
60809-IEC-2335-	R37-HB4	HB4 HB4A	12 12	51 51	P22d P22d
60809-IEC-2340-	R37-HS2	HS2	6 12	15 15	PX13.5s PX13.5s
60809-IEC-2350-	-	HS3	6	2,4	PX13.5s
60809-IEC-2360-	R37-S3	S3	6 12	15 15	P26s P26s
60809-IEC-2365-	R37-H8	H8	12	35	PGJ19-1
60809-IEC-2370-	R37-H9	H9	12	65	PGJ19-5
60809-IEC-2375-	R37-H10	H10	12	42	PY20d
60809-IEC-2380-	R37-H11	H11	12 24	55 70	PGJ19-2 PGJ19-2
60809-IEC-2385-	R37-H12	H12	12	53	PZ20d
60809-IEC-2410-	R37-HIR1	HIR1	12	65	PX20d
60809-IEC-2420-	R37-HIR2	HIR2	12	55	PX22d
60809-IEC-3110-	R37-P21/5W	P21/5W	6 12 24	21/5 21/5 21/5	BAY15d BAY15d BAY15d
60809-IEC-3120-	R37-P21/4W	P21/4W	6 12 24	21/4 21/4 21/4	BAZ15d BAZ15d BAZ15d
60809-IEC-3130-	R37-W21/5W	W21/5W	12	21/5	W3x16q
60809-IEC-3135-	R37-WR21/5W	WR21/5W	12	21/5	WY3x16q
60809-IEC-3140-	R37-PR27/7W	PR27/7W	12	27/7	W2.5x16q
60809-IEC-3141-	R37-PY27/7W	PY27/7W	12	27/7	WX2.5x16q
60809-IEC-3310-	R37-P21W	P21W	6 12 24	21 21 21	BA15s(BA15d) BA15s(BA15d) BA15s(BA15d)
60809-IEC-3311-	R37-PY21W	PY21W	12 24	21 21	BAU15s BAU15s
60809-IEC-3315-	R37-P27W	P27W	12	27	W2.5x16d
60809-IEC-3320-	R37-R5W	R5W	6 12 24	5 5 5	BA15s(BA15d) BA15s(BA15d) BA15s(BA15d)

IEC sheet no.[5]	UN sheet no.[6]	Category	Voltage V	Wattage W	Cap
60809-IEC-3330-	R37-R10W	R10W	6 12 24	10 10 10	BA15s(BA15d) BA15s(BA15d) BA15s(BA15d)
60809-IEC-3340-	R37-T4W	T4W	6 12 24	4 4 4	BA9s BA9s BA9s
60809-IEC-3410-	R37-H6W	H6W	12	6	BAX9s
60809-IEC-3420-	R37-H21W	H21W	12 24	21 21	BAY9s BAY9s
60809-IEC-3430	R37-H27W	H27W/1 H27W/2	12 12	27 27	PG13 PGJ13
60809-IEC-4110-	R37-C5W	C5W	6 12 24	5 5 5	SV8.5 SV8.5 SV8.5
60809-IEC-4120-	R37-C21W	C21W	12	21	SV8.5
60809-IEC-4305-	R37-W2.3W	W2.3W	12	2,3	W2x4.6d
60809-IEC-4310-	R37-W3W	W3W	6 12 24	3 3 3	W2.1x9.5d W2.1x9.5d W2.1x9.5d
60809-IEC-4320-	R37-W5W	W5W	6 12 24	5 5 5	W2.1x9.5d W2.1x9.5d W2.1x9.5d
60809-IEC-4321-	R37-W5W	WY5W	6 12 24	5 5 5	W2.1x9.5d W2.1x9.5d W2.1x9.5d
60809-IEC-4330-	R37-W21W	W21W	12	21	W3x16d
60809-IEC-4335-	R37-WY21W	WY21W	12	21	WX3x16d
60809-IEC-4340-	R37-W16W	W16W	12	16	W2.1x9.5d
60809-IEC-5010-	R37-T1.4W	T1.4W	12	1,4	P11.5d
60809-IEC-7110-	R99-DxS	D1S D2S D3S D4S	12 12 12 12	35 35 35 35	PK32d-2 P32d-2 PK32d-5 P32d-5
60809-IEC-7120-	R99-DxR	D1R D2R D3R D4R	12 12 12 12	35 35 35 35	PK32d-3 P32d-3 PK32d-6 P32d-6
60809-IEC-9310-	-	B1.13W	2,7	1,13	PX13.5s
60809-IEC-9610-	-	B0.6W	6	0,6	E10
60809-IEC-9620-	-	B2.4W	6	2,4	EP10/14x11
-	R37-H10W	H10W/1 HY10W	12 12	10 10	BAU9s BAUZ9s
-	R37-H11	H11B	12 24	55 70	PGJY19-2 PGJY19-2
-	R37-H13	H13 H13A	12 12	55/60 55/60	P26.4t PJ26.4t
-	R37-H14	H14	12	55/60	P38t
-	R37-H15	H15	12 24	15/55 20/60	PGJ23t-1 PGJ23t-1
-	R37-H16	H16 H16B	12 12	19 19	PGJ19-3 PGJY19-3
-	R37-H21W	HY21W	12 24	21 21	BAW9s BAW9s

IEC sheet no.[5]	UN sheet no.[6]	Category	Voltage V	Wattage W	Cap
-	R37-H6W	HY6W	12	6	BAZ9s
-	R37-H8	H8B	12	35	PGJY19-1
-	R37-H9	H9B	12	65	PGJY19-5
-	R37-HS5A	HS5A	12	45/40	PX23t
-	R37-P13W	P13W PW13W	12 12	13 13	PG18.5d-1 WP3.3x14.5-7
-	R37-P19W	P19W PY19W PR19W PS19W PSY19W PSR19W PW19W PWR19W PWY19W	12 12 12 12 12 12 12 12 12	19 19 19 19 19 19 19 19 19	PGU20-1 PGU20-2 PGU20-5 PG20-1 PG20-2 PG20-5 WP3.3x14.5-1 WP3.3x14.5-2 WP3.3x14.5-5
-	R37-P24W	P24W PX24W PY24W PR24W PS24W PSX24W PSY24W PSR24W PW24W PWR24W PWY24W	12 12 12 12 12 12 12 12 12 12 12	24 24 24 24 24 24 24 24 24 24 24	PGU20-3 PGU20-7 PGU20-4 PGU20-6 PG20-3 PG20-7 PG20-4 PG20-6 WP3.3x14.5-3 WP3.3x14.5-4 WP3.3x14.5-6
-	R37-P27/7W	P27/7W	12	27/7	WU2.5x16
-	R37-PC16W	PC16W PCY16W PCR16W PW16W PWR16W PWY16W	12 12 12 12 12 12	16 16 16 16 16 16	PU20d-1 PU20d-2 PU20d-7 WP3.3x14.5-8 WP3.3x14.5-9 WP3.3x14.5-10
-	R37-PR21/4W	PR21/4W	12 24	21/4 21/4	BAU15d BAU15d
-	R37-PR21/5W	PR21/5W	12 24	21/5 21/5	BAW15d BAW15d
-	R37-PR21W	PR21W	12 24	21 21	BAW15s BAW15s
-	R37-PSX26W	PSX26W	12	26	PG18.5d-3
-	R37-R10W	RR10W RR10W RR10W RY10W RY10W RY10W	6 12 24 6 12 24	10 10 10 10 10 10	BAW15s BAW15s BAW15s BAU15s BAU15s BAU15s
-	R37-R5W	RR5W	6 12 24	5 5 5	BAW15s BAW15s BAW15s
-	R37-W10W	W10W W10W WY10W WY10W	6 12 6 12	10 10 10 10	W2.1x9.5d W2.1x9.5d W2.1x9.5d W2.1x9.5d
-	R37-W15/5W	W15/5W	12	15/5	WZ3x16q
-	R37-W16W	WY16W	12	16	W2.1x9.5d
-	R37-W5W	WR5W	6 12 24	5 5 5	W2.1x9.5d W2.1x9.5d W2.1x9.5d

IEC sheet no.[5]	UN sheet no.[6]	Category	Voltage V	Wattage W	Cap
-	R37-WP21W	WP21W WPY21W	12 12	21 21	WY2.5x16d WZ2.5x16d
-	R37-WR21/5W	WR21/5W	12	21/5	WY3x16q
-	R37-WY2.3W	WY2.3W	12	2,3	W2x4.6d
-	R37-WY21W	WY21W	12	21	WX3x16d
-	R99-D5S	D5S	12	25	PK32d-7
-	R99-D6S	D6S	12	25	P32d-1
-	R99-D8S	D8S	12	25	PK32d-1
-	R37-H17	H17	12	35	PU43t-4
-	R37-PY21/5W	PY21/5W	12	21/5	BA15d-3 (100°/130°)
-	R37-WT21W	WT21W	12 24	21 21	WUX2.5x16d WUX2.5x16d
-	R37-WT21W	WTY21W	12 24	21 21	WUY2.5x16d WUY2.5x16d
-	R37-WT21/7W	WT21/7W	12	21/7	WZX2.5x16q
-	R37-WT21/7W	WTY21/7W	12	21/7	WZY2.5x16q
	R128-LR1	LR1	12	0,75/3,5	PGJ21t-1
	R128-LW2	LW2	12	1/12	PGJY50

LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: H6 CULOT: PZ43t	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: H6 CAP: PZ43t**	Page 1

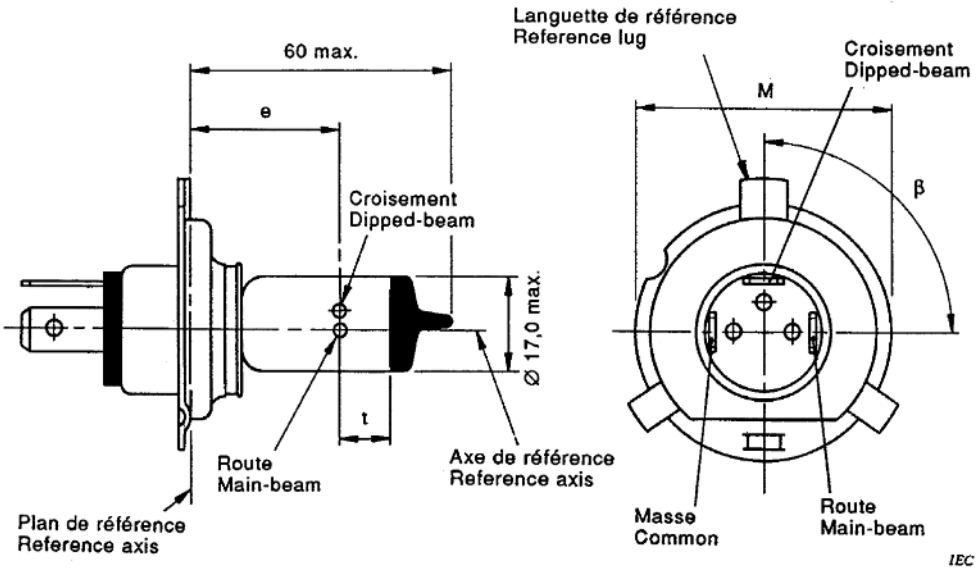
Tension nominale Nominal voltage	[V]	12
Puissance nominale Nominal wattage	[W]	65/55
Tension d'essai Test voltage	[V]	13,2

Dessin de la lampe à filament - Filament lamp drawing

Les dessins ont pour seul but d'illustrer les dimensions essentielles de la lampe à filament.

The drawings are intended only to illustrate the essential dimensions of the filament lamp.

Dimensions en millimètres - Dimensions in millimetres



Culot
PZ43t selon la CEI 61-1 (feuille 7004-89).

Axe de référence
L'axe de référence est perpendiculaire au plan de référence et passe par le centre du cercle de diamètre M.

Ampoule
L'ampoule doit être incolore.

Cap
PZ43t in accordance with IEC 61-1 (sheet 7004-89).

Reference axis
The reference axis is perpendicular to the reference plane and passes through the centre of circle of diameter M.

Bulb
The bulb shall be colourless.

	LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: H6 CULOT: PZ43t	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: H6 CAP: PZ43t**	Page 2

Caractéristiques et dimensions des lampes à filament
Filament lamps characteristics and dimensions

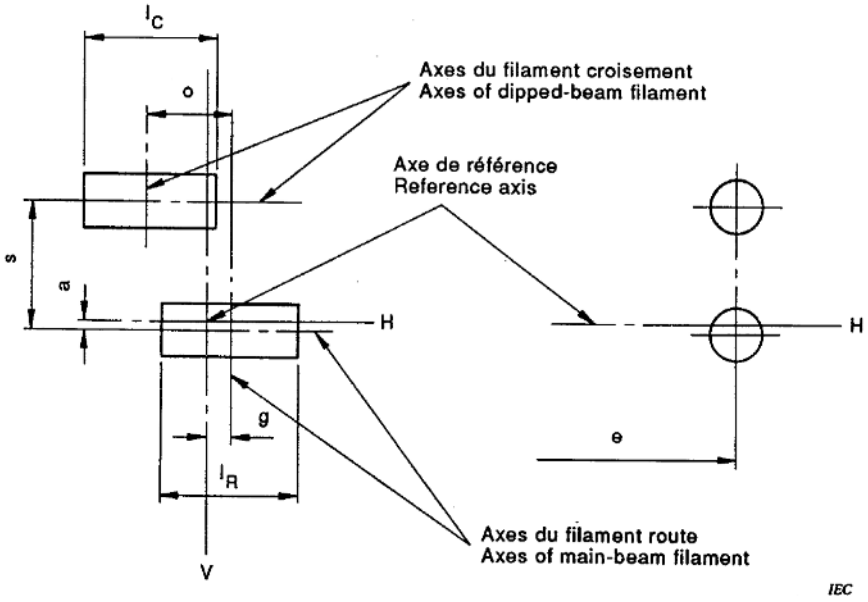
Caractéristiques Characteristics	Valeurs Values	Tolérances et valeurs limites Tolerances and limiting values
	Lampes de fabrication Production lamps	
Tension nominale Nominal voltage	12 V	12 V
Puissance assignée [W] Rated wattage		
Filament route Main-beam filament	–	76 max. [1]
Filament croisement Dipped-beam filament	–	64 max. [2]
Flux lumineux assigné [lm] Rated luminous flux		
Filament route Main-beam filament	1 320	±15 %
Filament croisement Dipped-beam filament	880	±15 %
Dimensions [mm]		
e [3]	26,0	±0,3
t	–	3,0 min.
Ecart latéral / Lateral deviation	–	0,5 max. [4]
β [5]	90°	±15 [4]

1) Valeurs calculées à 5,76 A max.
2) Valeurs calculées à 4,85 A max.
3) Cette dimension désigne le filament route.
4) A l'étude.
5) Angle (degrés) de l'axe de la languette de référence par rapport aux filaments.

1) Calculated values at 5,76 A max.
2) Calculated values at 4,85 A max.
3) This dimension specifies main-beam filament.
4) Under consideration.
5) Reference lug rotation with respect to filament (degrees).

	LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: H6 CULOT: PZ43t	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: H6 CAP: PZ43t**	Page 3

Position des filaments / Position of filaments



Dimensions en millimètres - Dimensions in millimetres

Type	a	g	o	s	l_C	l_R
12 V	0 + 0,35 [1)]	0 + 0,35 [1)]	2,4 nom.	2,4 nom.	6,0 max.	6,0 max.

1) A l'étude.
Under consideration.

LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: HB1 CULOT: P29t	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: HB1 CAP: P29t**	Page 1

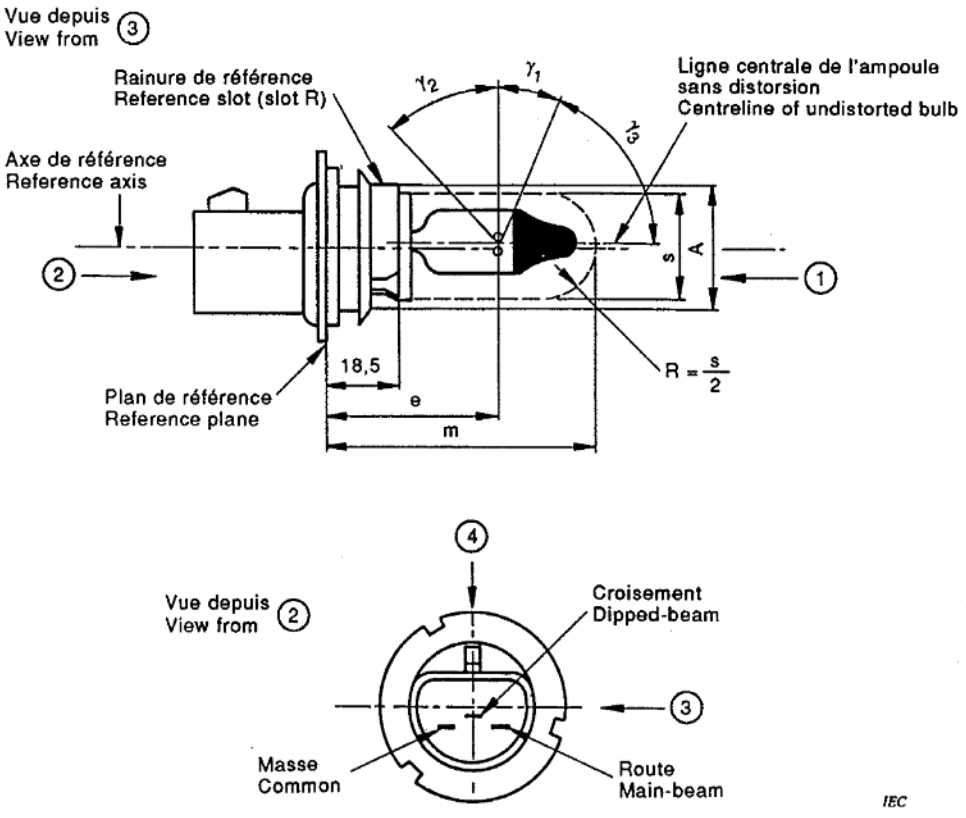
Tension nominale Nominal voltage	[V]	12
Puissance nominale Nominal wattage	[W]	65/45
Tension d'essai Test voltage	[V]	13,2

Dessin de la lampe à filament - Filament lamp drawing

Les dessins ont pour seul but d'illustrer les dimensions essentielles de la lampe à filament.

The drawings are intended only to illustrate the essential dimensions of the filament lamp.

Dimensions en millimètres - Dimensions in millimetres



Culot
P29t selon la CEI 61-1 (feuille 7004-66-).

Encombrement maximal de la lampe
Il doit être possible d'insérer la lampe dans un cylindre de diamètre s, concentrique à l'axe de référence et limité à une extrémité par un plan parallèle à, et situé à 18,5 mm du plan de référence, et à l'autre extrémité par une demi-sphère de rayon s/2.

Cap
P29t in accordance with IEC 61-1 (sheet 7004-66-).

Maximum lamp outline
It shall be possible to insert the lamp into a cylinder of diameter s concentric with the reference axis and limited at one end by a plane parallel to and 18,5 mm distant from the reference plane and at the other end by a hemisphere of radius s/2.

	LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: HB1 CULOT: P29t	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: HB1 CAP: P29t**
		Page 2

Axe de référence
L'axe de référence est perpendiculaire au plan de référence et passe par le centre d'un cercle de diamètre A.

Ampoule
Incolore avec calotte noire.
Le corps de l'ampoule en verre doit être cylindrique et exempt de distorsion à l'intérieur des angles γ_1 et γ_2.
Cette exigence s'applique à la totalité de la circonférence de l'ampoule entre les angles γ_1 et γ_2.
L'occultation doit couvrir au moins l'angle γ_3 et doit aller au moins aussi loin que la partie de l'ampoule sans distorsion, définie par l'angle γ_1.
Le sommet des angles γ_1, γ_2 et γ_3 est l'intersection entre l'axe de l'ampoule sans distorsion et le plan de référence parallèle à, et situé à 44,5 mm (cote e) du plan de référence.

Reference axis
The reference axis is the line perpendicular to the reference plane and passing through the centre of the circle of diameter A.

Bulb
Colourless, with black top obscuration.
The glass bulb periphery shall be optically distortion free and cylindrical within the angles γ_1 and γ_2.
This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2.
The obscuration shall extend at least over angle γ_3 and shall be at least as far as the undistorted part of the bulb defined by angle γ_1.
The apex of the angles γ_1, γ_2 and γ_3 is the intersection between the axis of the undistorted bulb with a plane parallel to and 44,5 mm distant (dimension e) from the reference plane.

Caractéristiques et dimensions des lampes à filament

Filament lamp characteristics and dimensions

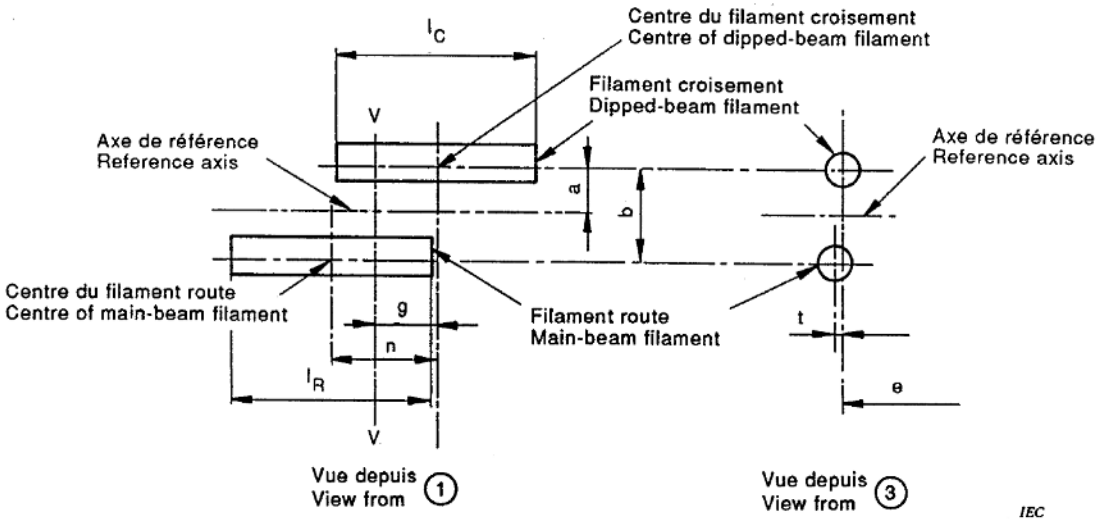
Caractéristiques Characteristics	Valeurs Values	Tolérances et valeurs limites Tolerances and limiting values	
		Lampes de fabrication Production lamps	Lampes étalon Standard lamps
Tension nominale Nominal voltage	12 V	12 V	12 V
Puissance assignée [W] Rated wattage			
Filament route Main-beam filament	–	73 max.	73 max.
Filament croisement Dipped-beam filament	–	52 max.	52 max.
Flux lumineux assigné [lm] Rated luminous flux			
Filament route Main-beam filament	1 320	±12 %	[1]
Filament croisement Dipped-beam filament	770	±12 %	[1]
Dimensions [mm]			
A	28,55	±0,05	±0,05
e	44,50	±0,25	±0,15
m	–	70 max.	70 max.
s	24,50	nom.	nom.
γ_1	38°	±5°	±5°
γ_2	–	43° min.	43° min.
γ_3	52°	±5°	±5°

[1] Flux lumineux d'essai 990 lm et 570 lm à environ 12 V.

[1] Test luminous flux 990 lm and 570 lm at approximately 12 V.

	LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: HB1 CULOT: P29t	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: HB1 CAP: P29t**	Page 3

Position des filaments / Position of filaments
Dimensions en millimètres - Dimensions in millimetres



Le plan V-V est perpendiculaire au plan de référence et contient l'axe de référence et la ligne centrale de la rainure R du culot.

The plane V-V is perpendicular to the reference plane and contains the reference axis and the centreline of the slot R of the cap.

Dimensions des filaments

Filament dimensions

Dimensions [1]	Valeurs Values	Tolérances et valeurs limites Tolerances and limiting values	
		Lampes de fabrication Production lamps	Lampes étalon Standard lamps
Tension nominale Nominal voltage	12 V	12 V	12 V
a	1,15	±0,38	±0,20
b	2,30	±0,64	±0,25
g	1,20	±0,38	±0,20
l_C [2]	4,80	±0,40	±0,40
l_R [3]	4,80	±0,40	±0,40
n	2,40	±0,80	±0,40
t	0,00	±0,64	±0,25

1) La méthode de mesure est spécifiée dans l'annexe F.

2) L'écart de linéarité du filament croisement ne doit pas dépasser 0,3 fois le diamètre réel d'une spire.

3) L'écart de linéarité du filament route ne doit pas dépasser 0,4 fois le diamètre réel d'une spire.

1) The method of measurement is specified in annex F.

2) The deviation of the straightness of the dipped-beam filament shall not exceed 0,3 times the actual diameter of the coil.

3) The deviation of the straightness of the main-beam filament shall not exceed 0,4 times the actual diameter of the coil.

LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: S4 CULOT: BAX15d	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: S4 CAP: BAX15d**	Page 1

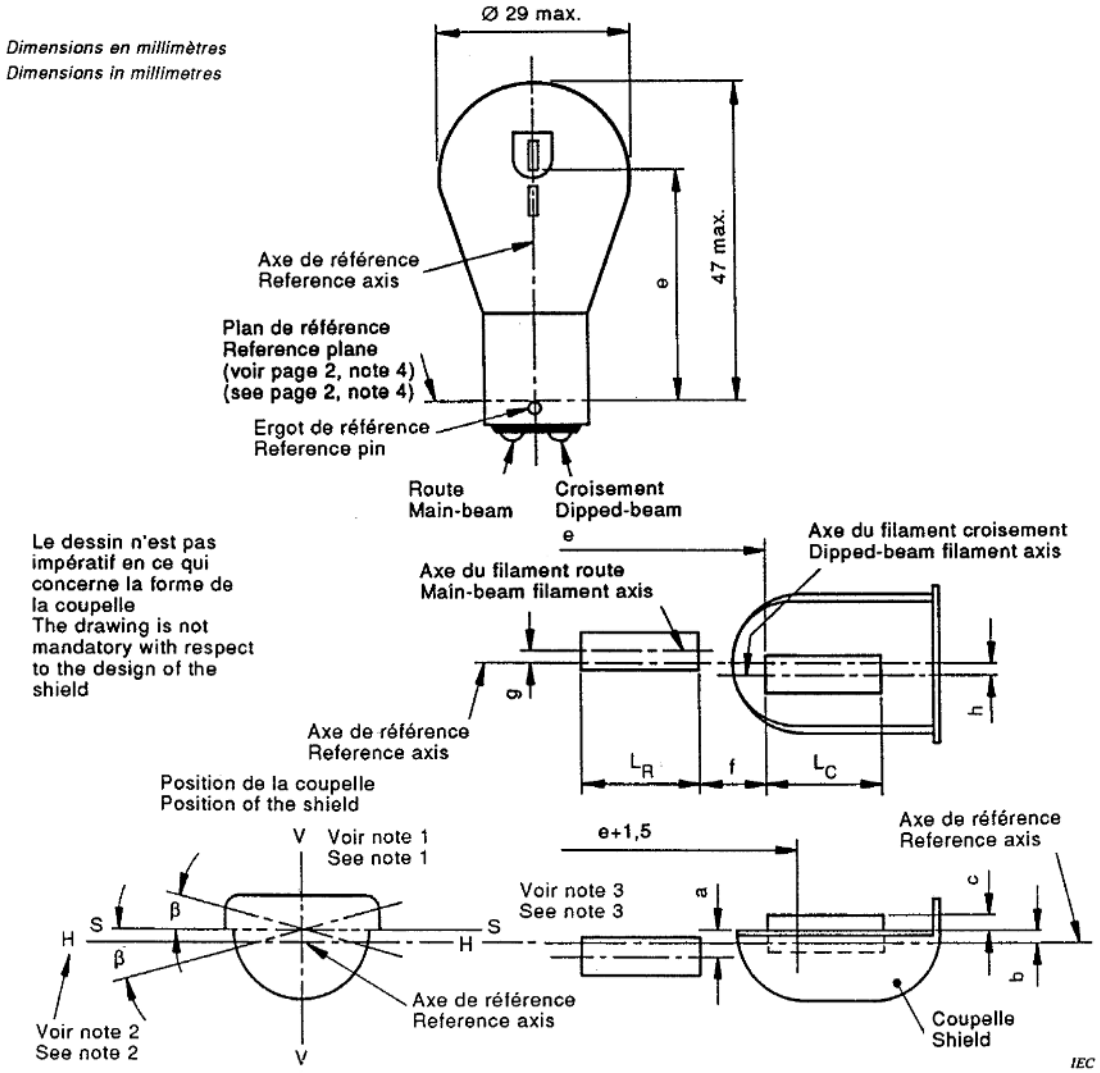
Tension nominale Nominal voltage	[V]	6	12
Puissance nominale Nominal wattage	[W]	15/15	15/15
Tension d'essai Test voltage	[V]	6,75	13,5

Dessin de la lampe à filament - Filament lamp drawing

Les dessins ont pour seul but d'illustrer les dimensions essentielles de la lampe à filament.

The drawings are intended only to illustrate the essential dimensions of the filament lamp.

Dimensions en millimètres
Dimensions in millimetres



NOTES

1 Le plan V-V contient l'axe de référence et passe par la ligne du centre de l'ergot de référence.

2 Le plan H-H contient l'axe de référence et est perpendiculaire au plan V-V.

3 Le plan S-S indique la position du plan parallèle au plan H-H et passant par les bords de la coupelle.

NOTES

1 Plane V-V contains the reference axis and the centre line of the reference pin.

2 Plane H-H contains the reference axis and is perpendicular to plane V-V.

3 Plane S-S denotes the position of the plane through the shield edges parallel to plane H-H.

	LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: S4 CULOT: BAX15d	ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: S4 CAP: BAX15d	Page 2

Culot
BAX15d selon la CEI 61-1 (feuille 7004-18-).

Cap
BAX15d in accordance with IEC 61-1 (sheet 7004-18-).

Ampoule
Incolore ou jaune-sélectif.

Bulb
Colourless or selective-yellow.

Caractéristiques et dimensions des lampes à filament

Filament lamp characteristics and dimensions

Caractéristiques Characteristics	Valeurs Values		Tolérances et valeurs limites Tolerances and limiting values		
			Lampes de fabrication Production lamps		Lampes étalon Standard lamps
Tension nominale Nominal voltage	6 V	12 V	6 V	12 V	6 V
Puissance assignée [W] Rated wattage					
Filament route Main-beam filament	15		±6 %		±6 %
Filament croisement Dipped-beam filament	15		±6 %		±6 %
Flux lumineux assigné [lm] Rated luminous flux					
Filament route Main-beam filament	–		180 min.		1)
Filament croisement Dipped-beam filament	–		125 min. 190 max.		1)
Dimensions [mm]					
e	33,6		±0,35		±0,15
f	1,8		±0,35		±0,2
$L_C - L_R$	3,5		±1,0		±0,5
c 2)	0,4		±0,35		±0,15
b 2)	0,2		±0,35		±0,15
a 2)	0,6		±0,35		±0,15
h	0,0		±0,5		±0,2
g	0,0		±0,5		±0,2
β 2) 3)	0,0		±2°30'		±1°

1) Flux lumineux d'essai 240 lm (route) et 160 lm (croisement) à environ 6 V.

2) Les dimensions a, b, c et β se réfèrent à un plan, parallèle au plan de référence, et coupant les deux bords de la coupelle, à une distance de e + 1,5 mm.

3) Ecart angulaire admissible du plan passant par les bords de la coupelle, par rapport à la position normale.

4) Le plan de référence est perpendiculaire à l'axe de référence, et touche la face supérieure de l'ergot de référence, ayant une longueur de 2 mm.

1) Test luminous flux 240 lm (main-beam) and 160 lm (dipped-beam) at approximately 6 V.

2) Dimensions a, b, c and β refer to a plane parallel to the reference plane and cutting the two edges of the shield at a distance e + 1,5 mm.

3) Admissible angular deviation of the plane through the shield edges from the objective position.

4) The reference plane is perpendicular to the reference axis and touches the upper surface of the reference pin having a length of 2 mm.

	LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: H5 CULOT: PY43d	ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: H5 CAP: PY43d	Page 1

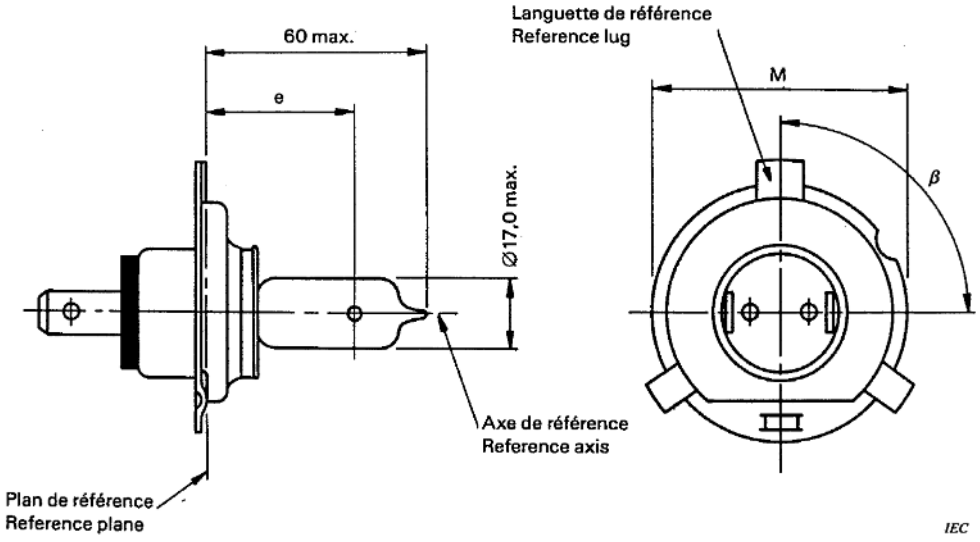
Tension nominale Nominal voltage	[V]	12
Puissance nominale Nominal wattage	[W]	50
Tension d'essai Test voltage	[V]	13,2

Dessin de la lampe à filament - Filament lamp drawing

Les dessins ont pour seul but d'illustrer les dimensions essentielles de la lampe à filament.

The drawings are intended only to illustrate the essential dimensions of the filament lamp.

Dimensions en millimètres - Dimensions in millimetres



Culot
PY43d selon la CEI 61-1 (feuille 7004-88-).

Axe de référence
L'axe de référence est la ligne perpendiculaire au plan de référence, qui passe par le centre du cercle de diamètre M.

Ampoule
L'ampoule doit être incolore.

Cap
PY43d in accordance with IEC 61-1 (sheet 7004-88-).

Reference axis
The reference axis is the line perpendicular to the reference plane and passes through the centre of the circle of diameter M.

Bulb
The bulb shall be colourless.

LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: H5 CULOT: PY43d	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: H5 CAP: PY43d**	Page 2

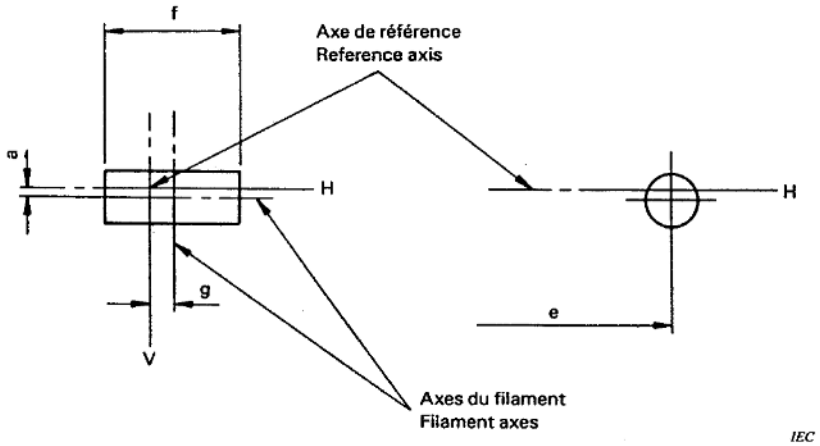
Caractéristiques et dimensions des lampes à filament

Filament lamp characteristics and dimensions

Caractéristiques Characteristics	Valeurs Values	Tolérances et valeurs limites Tolerances and limiting values
	Lampes de fabrication / Production lamps	
Tension nominale Nominal voltage	12 V	12 V
Puissance assignée [W] Rated wattage	–	58 max. 1)
Flux lumineux [lm] Rated luminous flux	1 210	±15 %
Dimensions [mm] e Ecart latéral /Lateral deviation β 3)	26,0 – 90°	±0,3 0,5 max. 2) ±15 2)

Position des filaments

Position of filament



Dimensions en millimètres - Dimensions in millimetres

Type	a	g	f
12 V	0 + 0,35 4)	0 + 0,35 4)	6,0 max.

1) Valeurs calculées à 4,39 A max.
2) A l'étude.
3) Angle (degrés) de l'axe de la languette de référence par rapport au filament.
4) A l'étude.

1) Calculated values at 4,39 A max.
2) Under consideration.
3) Reference lug rotation with respect to filament (degrees).
4) Under consideration.

LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: H2 CULOT: X511	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: H2 CAP: X511**	Page 1

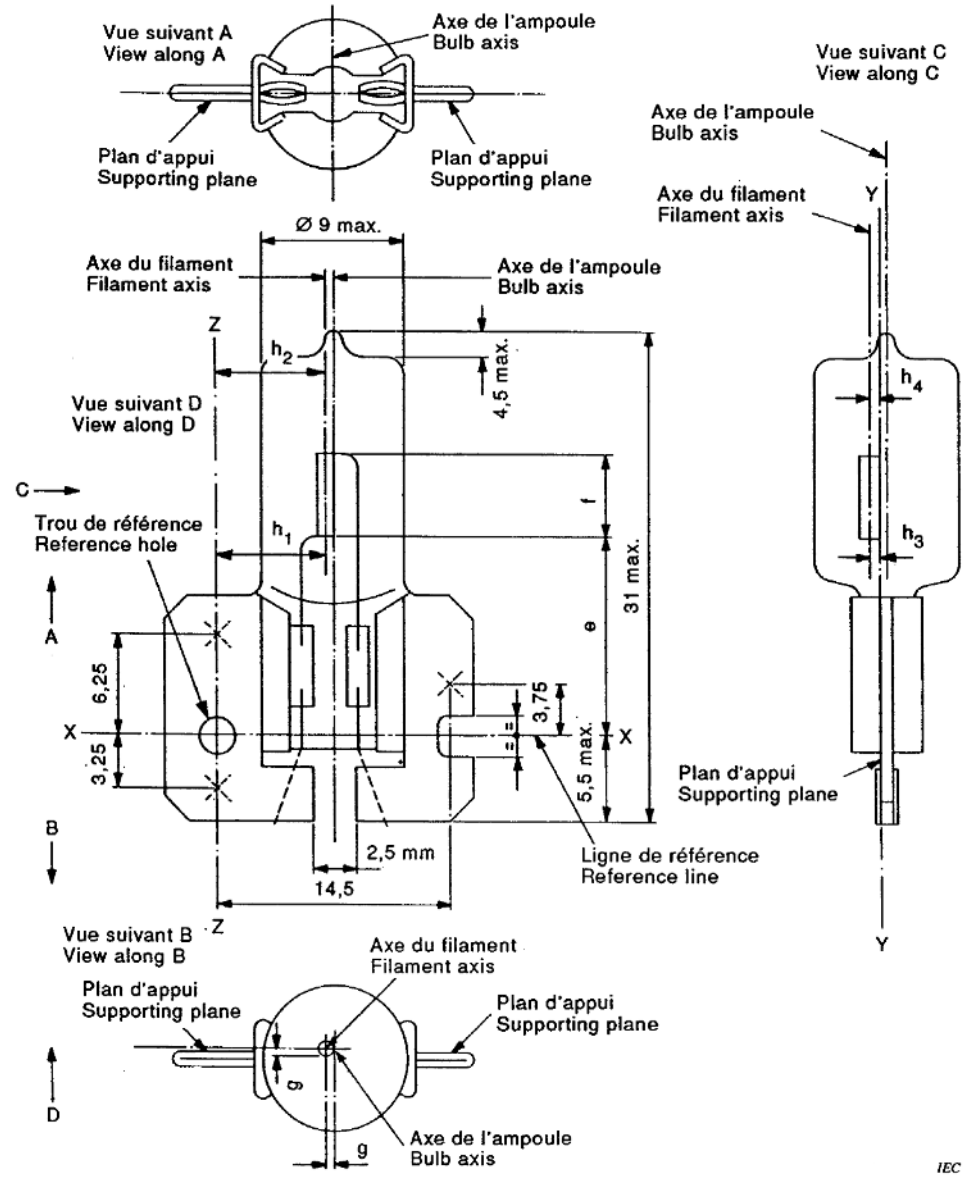
Tension nominale Nominal voltage	[V]	6	12	24
Puissance nominale Nominal wattage	[W]	55	55	70
Tension d'essai Test voltage	[V]	6,3	13,2	28,0

Dessin de la lampe à filament - Filament lamp drawing

Les dessins ont pour seul but d'illustrer les dimensions essentielles de la lampe à filament.

The drawings are intended only to illustrate the essential dimensions of the filament lamp.

Dimensions en millimètres - Dimensions in millimetres



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	LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: H2 CULOT: X511	ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: H2 CAP: X511	Page 2

Culot
X511 selon la CEI 61-1 (feuille 7004-99-).

Les trois croix sur le plan d'appui indiquent les positions des sommets des trois bossages délimitant le plan d'appui sur la douille. Centré sur trois points et à l'intérieur d'un cercle de diamètre 3 mm, il ne doit exister aucune déformation apparente, ni aucune gravure influençant le positionnement de la lampe.

Ampoule
Incolore ou jaune-sélectif.

Cap
X511 in accordance with IEC 61-1 (sheet 7004-99-).

The three crosses on the supporting plane show the position of the three bosses defining this plane on the holder. Within a circle 3 mm in diameter centred on these points there should be no apparent deformation and no notches affecting the positioning of the lamp.

Bulb
Colourless or selective-yellow.

Caractéristiques et dimensions des lampes à filament
Filament lamp characteristics and dimensions

Caractéristiques Characteristics	Valeurs Values			Tolérances et valeurs limites Tolerances and limiting values			
				Lampes de fabrication Production lamps			Lampes étalon Standard lamps
Tension nominale Nominal voltage	6 V	12 V	24 V	6 V	12 V	24 V	12 V
Puissance assignée Rated wattage [W]	–	–	–	63 max.	68 max.	84 max.	68 max.
Flux lumineux assigné Rated luminous flux [lm]	1 300	1 800	2 150	±15 %			1)
Dimensions [mm]							
e 3)	12,25			2)			±0,15
f 3)	4,5		5,5	±1,0			±0,50
g 4) 5)	0,5 d			±0,5 d			±0,25 d
h_1 6)	7,1			2)			±0,20
h_2 6)	7,1			2)			±0,25
h_3 4) 6)	0,5 d - 0,35			2)			±0,20
h_4 4) 6)	0,5 d - 0,35			2)			±0,25

1) Flux lumineux d'essai 1 300 lm à environ 12 V.

2) A vérifier au moyen du système de contrôle «box system», page 3.

3) Les extrémités du filament sont définies comme les points où, lorsque la direction de visée est définie comme indiqué par D (page 1), la projection de l'extérieur des spires d'extrémités les plus proches ou les plus éloignées du culot, croise une ligne parallèle à, et à une distance de 7,1 mm, de la ligne Z-Z.
(Instructions particulières pour les filaments bispiralés à l'étude.)

4) d diamètre du filament.

5) A mesurer dans une section transversale perpendiculaire à l'axe de l'ampoule et passant par l'extrémité du filament la plus proche du culot.

6) Les décalages h_1 et h_2 doivent être mesurés pour Z-Z, dans un plan parallèle au plan d'appui.
Les décalages h_3 et h_4 doivent être mesurés pour Y-Y, dans un plan perpendiculaire au plan d'appui.
Les points à mesurer sont ceux où la projection de l'extérieur des spires d'extrémités, les plus proches ou les plus éloignées du culot, croise l'axe du filament.

1) Test luminous flux 1 300 lm at approximately 12 V.

2) To be checked by means of the box system, page 3.

3) The ends of the filament are defined as the points where, when the viewing direction is as defined by D (page 1), the projection of the outside of the end turns nearest or farthest from the cap crosses a line parallel to and at a distance of 7,1 mm from the Z-Z line.
(Special instructions for coiled-coil filaments are under consideration.)

4) d diameter of filament.

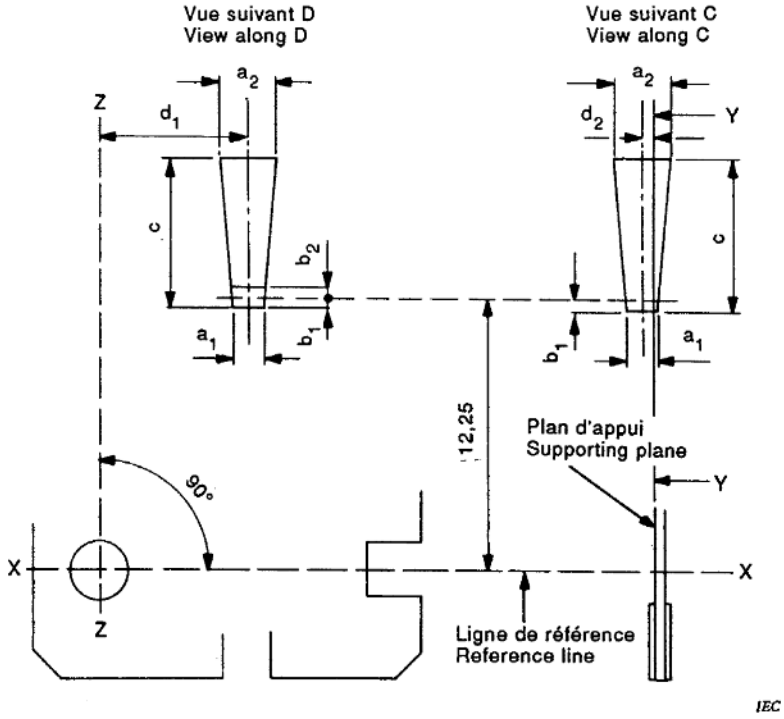
5) To be measured in a cross-section perpendicular to the axis of the bulb and passing through that end of the filament which is nearer to the cap.

6) The offsets h_1 and h_2 shall be measured for Z-Z in a plane parallel to the supporting plane.
The offsets h_3 and h_4 shall be measured for Y-Y in a plane perpendicular to the supporting plane.
The points to be measured are those where the projection of the outside of the end turns nearest to or farthest from the cap crosses the filament axis.

LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: H2 CULOT: X511	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: H2 CAP: X511**	Page 3

Système de contrôle de la position du filament («box system») – (voir article A.10, annexe A)
Filament location check system (box system) – (see clause A.10, annex A)

Dimensions en millimètres - Dimensions in millimetres



Type	a_1	a_2	b_1	b_2	c	d_1	d_2
6 V	d + 0,50	d + 1,0	0,25	0,25	6	7,1	0,5 d - 0,35
12 V	d + 0,50	d + 1,0	0,25	0,25	7	7,1	0,5 d - 0,35
24 V	d + 1,0	d + 1,0	0,25	0,25	7	7,1	0,5 d - 0,35

d diamètre du filament.
d diameter of the filament.

L'extrémité du filament qui est la plus proche du culot doit être située entre b_1 et b_2.
L'extrémité du filament est définie dans la note 3, page 2.

The end of the filament which is nearer to the cap shall lie between b_1 and b_2.
The end of the filament is defined in note 3, on page 2.

LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: HS3 CULOT: PX13.5s	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: HS3 CAP: PX13.5s**	Page 1

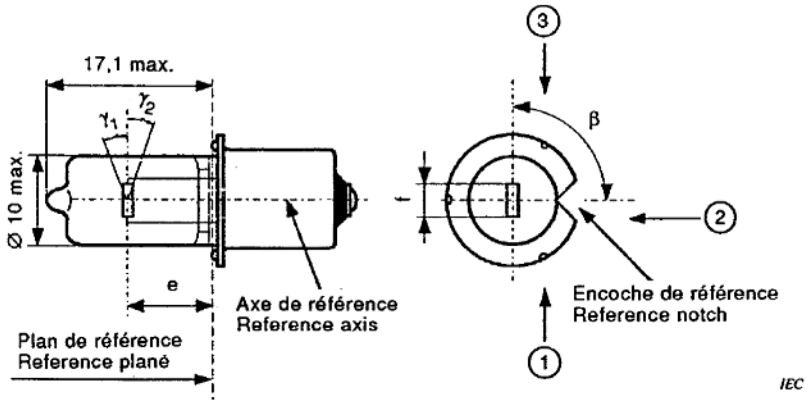
Tension nominale Nominal voltage	[V]	6
Puissance nominale Nominal wattage	[W]	2,4
Tension d'essai Test voltage	[V]	6

Dessin de la lampe à filament - Filament lamp drawing

Les dessins ont pour seul but d'illustrer les dimensions essentielles de la lampe à filament.

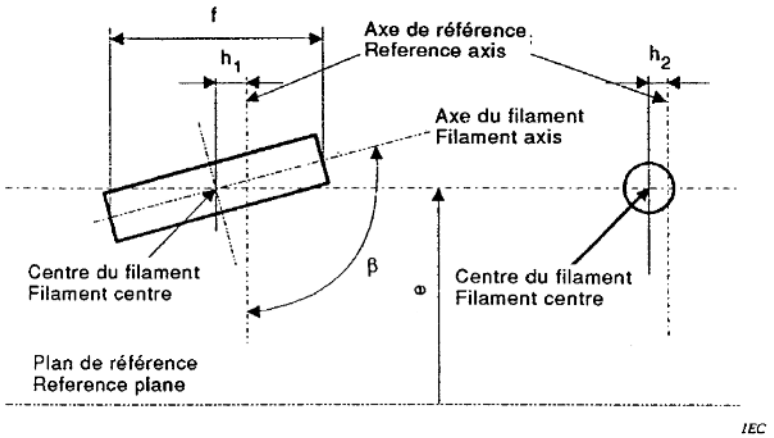
The drawings are intended only to illustrate the essential dimensions of the filament lamp.

Dimensions en millimètres - Dimensions in millimetres



Vue du filament indiquant les dimensions e, f, h_1 et h_2

View of filament showing dimension lines for e, f, h_1 and h_2



	LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: HS3 CULOT: PX13.5s	ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: HS3 CAP: PX13.5s	Page 2

Culot
PX13.5s selon la CEI 61-1 (feuille 7004-35-).

Ampoule
Incolore ou jaune-sélectif.

Axe de référence
L'axe de référence est perpendiculaire au plan de référence et passe par l'intersection de ce plan avec l'axe de la collerette du culot .

Cap
PX13.5s in accordance with IEC 61-1 (sheet 7004-35-).

Bulb
Colourless or selective-yellow.

Reference axis
The reference axis is perpendicular to the reference plane and passes through the intersection of this plane with the axis of the cap ring.

Caractéristiques et dimensions des lampes à filament
Filament lamp characteristics and dimensions

Caractéristiques Characteristics	Valeurs Values	Tolérances et valeurs limites Tolerances and limiting values	
		Lampes de fabrication Production lamps	Lampes étalon Standard lamps
Tension nominale Nominal voltage	6 V	6 V	6 V
Puissance assignée [W] Rated wattage	2,4	±8 %	±8 %
Flux lumineux assigné [lm] Rated luminous flux	36	±15 %	1)
Dimensions [mm]			
e	6,55	2)	±0,15
f 4)	1,25	±0,35	±0,25
h_1	0,0	2)	±0,15
h_2	0,0	2)	±0,15
β 3)	90°	±20°	±5°
γ_1 5)	–	30° min.	30° min.
γ_2 5)	–	25° min.	30° min.

1) Flux lumineux d'essai 36 lm à environ 6,0 V.
2) A vérifier au moyen du système de contrôle de position («box system»), page 3.
3) L'axe du filament et le plan de la monture interne, par rapport à l'encoche de référence, doivent être situés à l'intérieur de la tolérance de l'angle β.
4) Les extrémités du filament sont définies par les intersections de l'extérieur de la première et de la dernière spire lumineuse ayant pratiquement l'angle d'enroulement correct avec l'axe du filament, vu de la direction ② .
5) Dans l'aire comprise entre les parties extérieures des côtés des angles γ_1 et γ_2, l'ampoule ne doit comporter aucune surface présentant des distorsions optiques et le rayon de courbure de l'ampoule doit être égal ou supérieur à 50 % du diamètre réel de l'ampoule.

Note concernant le fonctionnement
Comme les lampes à filament aux halogènes fonctionnent à une température supérieure à celle des lampes conventionnelles, il est nécessaire de s'assurer qu'elles ne sont pas soumises à des tensions du générateur dépassant 8,0 V afin d'éviter une défaillance rapide.

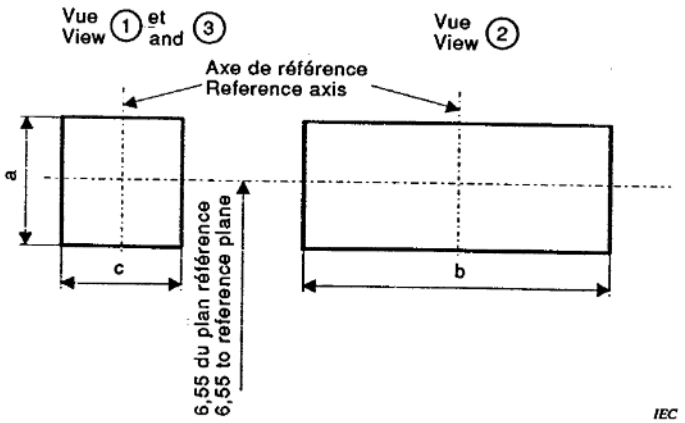
1) Test luminous flux 36 lm at approximately 6,0 V.
2) To be checked by means of the location check system (box system), page 3.
3) Both the filament axis and the plane of the internal mount with regard to the reference notch shall lie within the tolerance of angle β.
4) The ends of the filament are defined by the intersections of the outside of the first and last light emitting turns having substantially the correct helix angle with the filament axis, seen from direction ② .
4) In the area between the outer legs of the angles γ_1 and γ_2 the bulb shall have no optically distorting areas and the curvature of the bulb shall have a radius of not less than 50% of the actual bulb diameter.

Note regarding service operation
Because the filament of halogen lamps operates at higher temperatures than those of conventional lamps, it is necessary to ensure that these lamps are not subjected to generator voltages in excess of 8,0 V in order to avoid rapid failure.

	LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: HS3 CULOT: PX13.5s	ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: HS3 CAP: PX13.5s	Page 3

Système de contrôle de la position du filament («box system») – (voir article A.10, annexe A)
Filament location check system (box system) – (see clause A.10, annex A)

Dimensions en millimètres - Dimensions in millimetres



Type	a	b	c
6 V	d + 0,5	2,1	1,1

d diamètre du filament.
d diameter of the filament.

La projection du filament dans les directions d'observation ①, ② et ③ doit se situer entièrement à l'intérieur des limites définies.

Si le filament, vu des directions ① et ③ est caché par les supports, ceux-ci en plus du filament doivent se trouver entièrement à l'intérieur de la dimension c.

The projection of the filament in viewing directions ①, ② and ③ shall lie completely within the limits defined.

If the filament is covered by the mounting parts seen from directions ① or ③, the mounting parts in addition to the filament shall lie completely within dimension c.

LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: B1.13W CULOT: PX13.5s	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: B1.13W CAP: PX13.5s**	

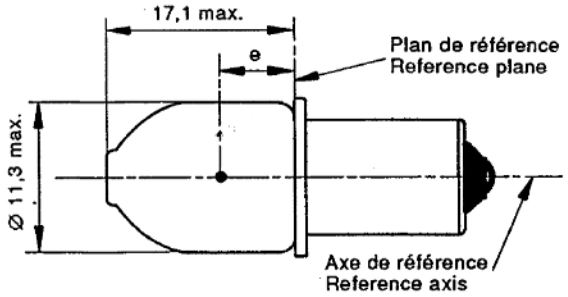
Tension nominale Nominal voltage	[V]	2,7
Puissance nominale Nominal wattage	[W]	1,13
Tension d'essai Test voltage	[V]	2,7

Dessin de la lampe à filament - Filament lamp drawing

Les dessins ont pour seul but d'illustrer les dimensions essentielles de la lampe à filament.

The drawings are intended only to illustrate the essential dimensions of the filament lamp.

Dimensions en millimètres - Dimensions in millimetres



Culot
PX13.5s selon la CEI 61-1 (feuille 7004-35-).

Ampoule
Ampoule incolore.

Cap
PX13.5s in accordance with IEC 61-1 (sheet 7004-35-).

Bulb
Bulb colourless.

Caractéristiques et dimensions des lampes à filament
Filament lamp characteristics and dimensions

Caractéristiques Characteristics	Valeurs Values	Tolérances et valeurs limites Tolerances and limiting values	
		Lampes de fabrication Production lamps	Lampes étalon Standard lamps
Puissance assignée [W] Rated wattage	1,13	±10 %	±10 %
Flux lumineux assigné [lm] Rated luminous flux	9,4	±20 %	1)
Dimensions [mm]			
e	6,35	±0,25	±0,15
Ecart latéral 2) Lateral deviation 2)	0,0	max. 0,4	max. 0,2

1) Flux lumineux d'essai 9,4 lm à environ 2,7 V.
2) Ecart latéral du centre du filament par rapport à l'axe de référence.

1) Test luminous flux 9,4 lm at approximately 2,7 V.
2) Lateral deviation of filament centre from the reference axis.

LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: B0.6W CULOT: E10	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: B0.6W CAP: E10**	

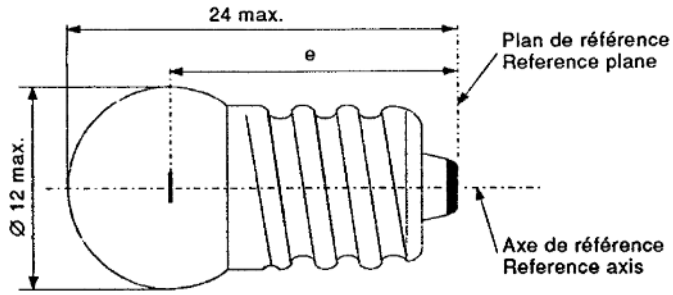
Tension nominale Nominal voltage	[V]	6
Puissance nominale Nominal wattage	[W]	0,6
Tension d'essai Test voltage	[V]	6

Dessin de la lampe à filament - Filament lamp drawing

Les dessins ont pour seul but d'illustrer les dimensions essentielles de la lampe à filament.

The drawings are intended only to illustrate the essential dimensions of the filament lamp.

Dimensions en millimètres - Dimensions in millimetres



Culot
E10 selon la CEI 61-1 (feuille 7004-22-).

Ampoule
Ampoule incolore.

Cap
E10 in accordance with IEC 61-1 (sheet 7004-22-).

Bulb
Bulb colourless.

Caractéristiques et dimensions des lampes à filament
Filament lamps characteristics and dimensions

Caractéristiques Characteristics	Valeurs Values	Tolérances et valeurs limites Tolerances and limiting values	
		Lampes de fabrication Production lamps	Lampes étalon Standard lamps
Puissance assignée [W] Rated wattage	0,6	±10 %	±10 %
Flux lumineux assigné [lm] Rated luminous flux	3,0	±33 %	1)
Dimensions [mm]			
e	18,0	±1	±0,15
Ecart latéral 2) Lateral deviation 2)	0,0	max. 1,0	max. 0,2

1) Flux lumineux d'essai 3,0 lm à environ 6 V.
2) Ecart latéral du centre du filament par rapport à l'axe de référence.

1) Test luminous flux 3,0 lm at approximately 6 V.
2) Lateral deviation of filament from the reference axis.

LAMPES À FILAMENT POUR VÉHICULES ROUTIERS FEUILLE DE CARACTÉRISTIQUES CATÉGORIE: B2.4W CULOT: EP10/14x11	**ROAD VEHICLE FILAMENT LAMP DATA SHEET CATEGORY: B2.4W CAP: EP10/14x11**	

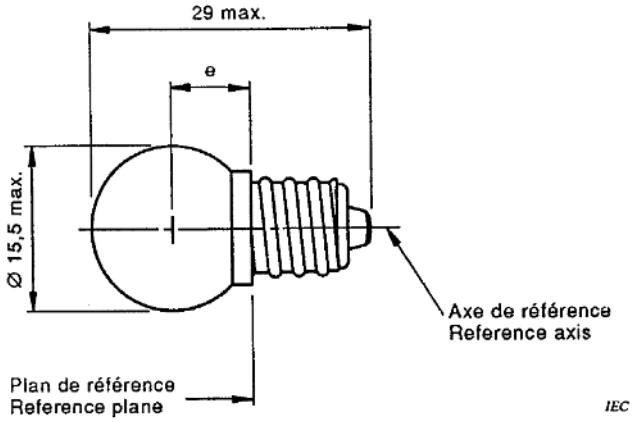
Tension nominale Nominal voltage	[V]	6
Puissance nominale Nominal wattage	[W]	2,4
Tension d'essai Test voltage	[V]	6

Dessin de la lampe à filament - Filament lamp drawing

Les dessins ont pour seul but d'illustrer les dimensions essentielles de la lampe à filament.

The drawings are intended only to illustrate the essential dimensions of the filament lamp.

Dimensions en millimètres - Dimensions in millimetres



Culot
EP10/14x11 selon la CEI 61-1 (feuille 7004-30-).

Ampoule
Ampoule incolore.

Cap
EP10/14x11 in accordance with IEC 61-1 (sheet 7004-30-).

Bulb
Bulb colourless.

Caractéristiques et dimensions des lampes à filament
Filament lamp characteristics and dimensions

Caractéristiques Characteristics	Valeurs Values	Tolérances et valeurs limites Tolerances and limiting values	
		Lampes de fabrication Production lamps	Lampes étalon Standard lamps
Puissance assignée [W] Rated wattage	2,4	±10 %	±6 %
Flux lumineux assigné [lm] Rated luminous flux	24	±20 %	1)
Dimensions [mm]			
e	8,75	±0,5	±0,15
Ecart latéral 2) Lateral deviation 2)	0,0	max. 1,0	max. 0,2

1) Flux lumineux d'essai 24 lm à environ 6 V.
2) Ecart latéral du centre du filament par rapport à l'axe de référence.

1) Test luminous flux 24 lm at approximately 6 V.
2) Lateral deviation of filament from the reference axis.

Annex A
(normative)

Filament shape, length and position

A.1 General

When the shape of the filament is shown on a filament lamp data sheet, the filament shall have basically the same shape.

A.2 Filaments shown as points

If the filament is shown as a point on the filament lamp data sheet, the filament shape is optional and the luminous centre of the filament shall be determined as specified in Figure A.2.

A.3 Line filaments

The correct position and shape of line filaments shall be checked as specified on the relevant filament lamp data sheet. Measurements shall be carried out at a voltage between 90 % and 100 % of test voltage. Filament lamps shall be measured in normal operating position.

A.4 Coiled-coil filaments

A coiled-coil filament is regarded in the same way as a single coil filament with its primary coil assumed to represent the wire of a single coil filament.

A.5 Extreme filament turns

Unless otherwise specified in the relevant filament lamp data sheet, the extreme filament turns are defined as the first and last turn that in projection are fully at the correct helix angle. A turn is considered to be at the correct helix angle if its pitch does not exceed 150 % of that of the average pitch.

A.6 Filament extremities

A.6.1 General

Unless otherwise specified in the relevant filament lamp data sheet, the extremities of a line filament are established by the position of the apex of the projection of the first and last filament turn, provided that the angle with the leg of the filament does not exceed 90° (see Figure A.1).

A.6.2 Axial filaments

For axial filaments, the extreme position of apexes to be taken into consideration shall be determined by rotation of the filament lamp around its reference axis until the most extreme position is reached.

A.6.3 Transverse filaments

For transverse filaments, the filament axis shall be brought into a position perpendicular to the projection direction.

A.7 Determination of filament length

Unless otherwise specified in the relevant filament lamp data sheet, the filament length is the distance between the filament extremities as defined in Clause A.6 (see Figure A.1) measured either parallel with, or perpendicular to, the reference axis according to the type of filament. Apices outside the point of connection to the current lead-in legs shall be disregarded for the determination of the filament length.

A.8 Filament offsets

Unless otherwise specified in the relevant filament lamp data sheet, in cases where the filament position is dimensioned by offsets, these are defined as the distances between the intersection points of the extreme turns as defined in Clause A.5, with the actual filament axis, and the filament reference line (see Figure A.1).

A.9 Lateral deviation

Unless otherwise specified in the relevant filament lamp data sheet, in cases where the filament position is toleranced by lateral deviations, these are defined as the distance between the reference axis or plane and the centre of the filament, determined as specified in Clause A.2. Lateral deviations are mostly given in two mutually perpendicular planes. These two deviations together with the tolerance on the light centre length determine the deviation of the centre of the filament with respect to an x, y, z system of co-ordinates (see Figure A.3).

A.10 Filament location check system (box system)

The filament shape and position of some filament lamps with line filaments are checked by means of a so-called box system. This system is used to determine whether the filament is correctly positioned relative to the reference plane and also whether the light centre length is within certain limits. Magnified targets of the permitted limits as given on the relevant filament lamp data sheet are drawn on the test screens and positioned correctly with respect to the reference axis and reference plane. Images of the filament with the same degree of magnification are then projected on to the test screens. These images shall fall entirely within the target areas and, if required, the ends or centre of the filament shall fall within the specified limits.

The ends of the filament are defined as the points, where, when viewing in a given direction, the projection of the outside of the first and last turn crosses the filament reference line. The centre of the filament is the halfway distance between the crossings.

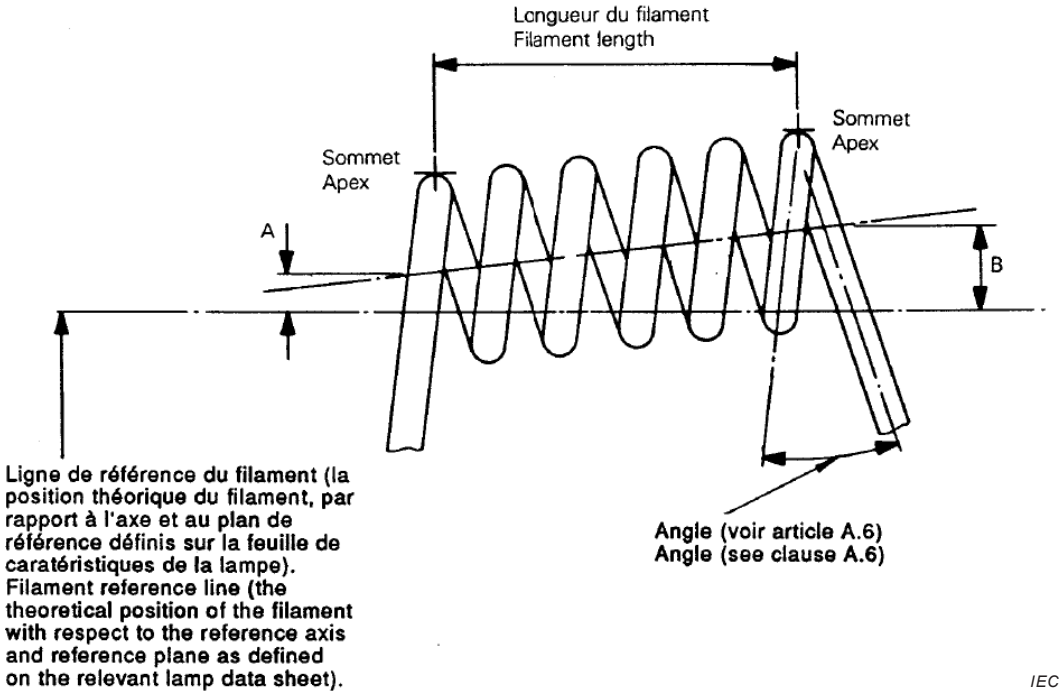


Figure A.1 – Determination of apexes, filament length and filament offsets (A and B)

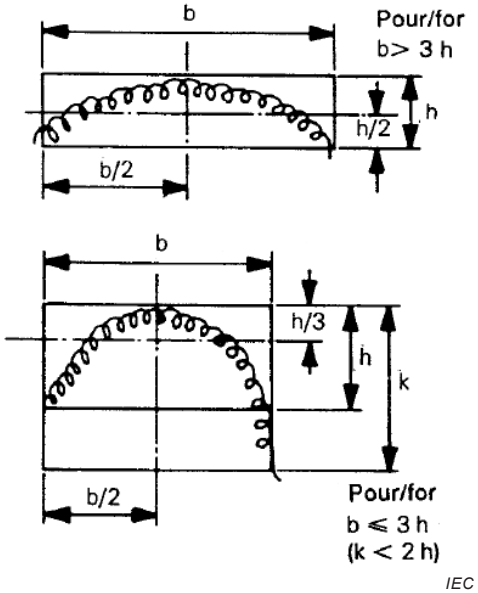


Figure A.2 – Determination of filament centre

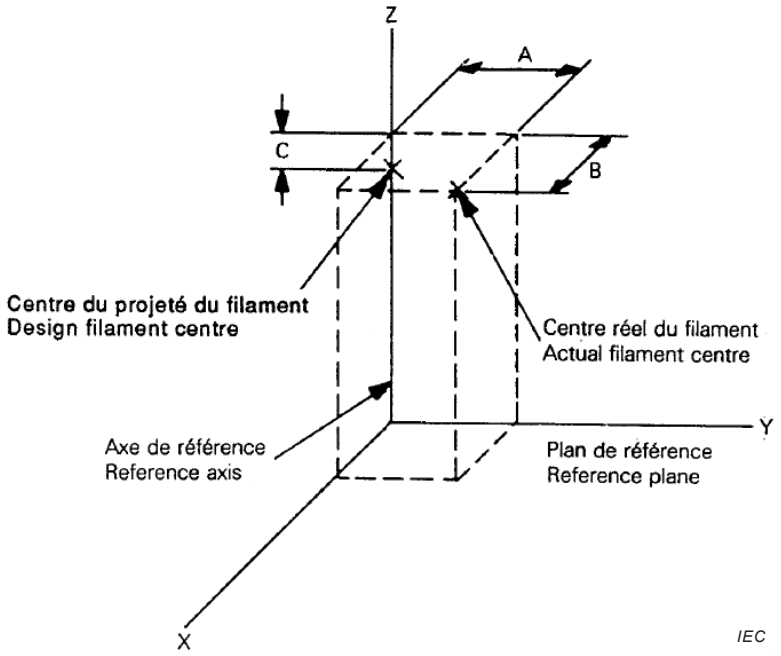


Figure A.3 – Determination of lateral deviations (A and B) and tolerance on the light centre length (C)

Annex B
(normative)

Measurement method of the colour of filament lamps

B.1 General

Measurements shall be made on finished lamps. Filament lamps with secondary (outer) bulb acting as colour filter shall be handled as filament lamp with primary bulb.

Tests shall be made at an ambient temperature of 23 °C ± 5 °C.

Tests shall be made at test voltage as specified in the relevant filament lamp data sheet.

Filament lamps shall be measured preferably in the normal operating position. In case of dual filament lamps, the high wattage (major) filament shall be operated only.

Before starting a test, the stabilisation of the temperature of the filament lamp shall be obtained by operating at test voltage for 10 min.

B.2 Colour

Colour tests shall be made with a measuring system that determines CIE chromaticity co-ordinates of the received light with an accuracy of ± 0,002.

The chromaticity co-ordinates shall be measured with a colorimetric receiver integrating over a right circular cone subtending an angle of minimum 5° and maximum 15° at the centre of the filament.

B.3 Measuring directions

B.3.1 General

Initially, the receiver shall be positioned perpendicular to the lamp axis and to the filament axis (or plane in case of a curved filament). After measurement, the receiver shall be moved around the filament lamp in bi-directional steps of about 30° until the area specified in B.3.2 or B.3.3 is covered. In each position, a measurement shall be made. However, no measurement shall be made when:

– the centreline of the receiver coincides with the filament axis; or
– the line of sight between the receiver and the filament is blocked by opaque (non-transmittent) parts of the light source, such as lead wires or a second filament, if any.

B.3.2 Filament lamps used in headlamps

Measurements shall be made in directions around the filament lamp with the centreline of the receiver aperture located within an angle ± 30° from the plane perpendicular to the lamp axis and with the origin in the centre of the filament (see Figure B.1). In case of filament lamps with two filaments, the centre of the main beam filament shall be taken.

B.3.3 Filament lamps used in light signalling devices

Measurements shall be made around the filament lamp (see Figure B.2), with exception of:

– the area claimed or covered by the cap of the filament lamp;
– the immediate transition area along the cap.

In case of filament lamps with two filaments, the centre of the major filament shall be taken.

In case of filament lamp categories with a specified distortion-free angle, the measurement shall be done only within the defined angle.

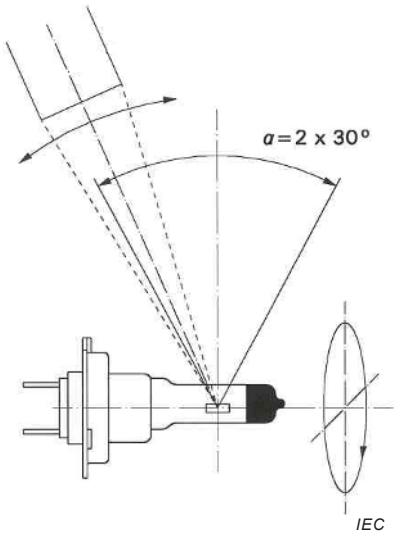


Figure B.1 – Positions of the colorimetric receiver when measuring lamps used in headlamps

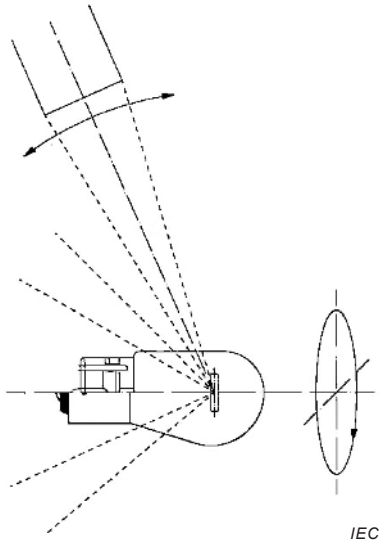


Figure B.2 – Positions of the colorimetric receiver when measuring lamps used in light signalling devices

Annex C
(normative)

Test conditions for electrical and luminous characteristics

C.1 Filament lamps

C.1.1 Ageing

Filament lamps shall be aged at their test voltage for approximately 1 h. The test voltage is indicated on the relevant filament lamp data sheet. For dual-filament lamps, each filament shall be aged separately.

C.1.2 Test conditions

Electrical and photometric measurements shall be carried out at the test voltage.

C.1.3 Electrical instrumentation

Electrical measurements shall be carried out with instruments being of a precision appropriate to the requirements (equivalent to at least class 0,2 according to IEC 60051-1).

C.1.4 Photometry

The luminous flux shall be measured in a suitable integrating photometer.

C.2 LED light sources

C.2.1 Test conditions

LED light sources shall be aged at their test voltage for at least forty-eight hours. For multi-function LED light sources, each function shall be aged separately.

LED Light sources of all categories with integrated heatsink shall be measured at ambient temperature of (23 ± 2) °C in still air. For these measurements, the minimum free space as defined in the data sheets shall be maintained.

Light sources of all categories with definition of a temperature Tb shall be measured by stabilising the Tb-point at the specific temperature defined on the category data sheet.

C.2.2 Luminous flux

A luminous flux measurement using an integrating method shall be made:

a) in case of an integrated heat sink, after 1 min and after 30 min of operation, or
b) after stabilisation of the temperature at the Tb point.

The luminous flux values, as measured after:

a) 30 min, or
b) stabilisation of temperature Tb

shall comply with the minimum and maximum requirements.

In case of item a), this value shall be in between 100 % and 80 % of the value measured after 1 min.

Measurements shall be carried out at relevant test voltage and at the minimum and maximum values of the relevant voltage range. Unless specified more tightly on the data sheet, the following deviation of the luminous flux at the tolerance interval limits shall not be exceeded (see Table C.1):

Table C.1 – Luminous flux tolerance limits

Rated voltage	Minimum voltage	Maximum voltage
6	6,0	7,7
12	12,0	14,0
24	24,0	28,0
Corresponding luminous flux tolerance*	±30 %	±15 %
* The maximum luminous flux deviation at the tolerance limits is calculated by using the measured flux at test voltage as reference. In between test voltage and voltage range limits, the luminous flux behaviour shall be substantially uniform.		

C.2.3 Normalized luminous intensity

The luminous intensity measurements shall be started after:

a) 30 min of stabilization time, or

b) stabilisation of temperature Tb at the value given in the relevant datasheet.

Measurements shall be carried out at relevant test voltage.

Normalized luminous intensity of a test sample is calculated by dividing the luminous intensity distribution by the luminous flux as determined after 30 min.

C.2.4 Colour

The colour of the light emitted, measured under the same conditions as the luminous flux, shall be within the required colour boundaries.

C.2.5 Power consumption

A power consumption measurement shall be made under the same conditions as described for the luminous flux measurements.

Power consumption measurements shall be carried out at relevant test voltage.

Values obtained shall comply with the minimum and maximum requirements of the relevant data sheet.

Annex D
(normative)

Method of measuring internal elements of R2 lamps

D.1 General test conditions

D.1.1 Measurement position

Filament lamps shall be measured in a horizontal normal operating position, reference notch down.

D.1.2 Ageing

Each filament shall be aged for approximately 1 h at test voltage. Immediately prior to a measurement, the filament shall be operated for at least 2 min at test voltage.

D.1.3 Test condition

Measurement on filaments shall be carried out at test voltage.

D.2 Reference axis, reference plane and planes for measurements

D.2.1 Reference axis

The reference axis is the line perpendicular to the reference plane and passing through the centre of the 45 mm cap ring diameter.

D.2.2 Reference plane

The reference plane is the plane formed by the seating points of the cap ring.

D.2.3 Plane V-V

Plane V-V is the plane perpendicular to the reference plane containing the reference axis and the centre line of the locating notch.

D.2.4 Plane H-H

Plane H-H is the plane perpendicular to the reference plane and to plane V-V containing the reference axis.

D.2.5 Plane X-X

Plane X-X is the plane perpendicular to the reference plane, containing the reference axis and forming an angle of 15° to plane H-H which is turned clockwise towards the locating notch, seen from the top of the bulb.

D.2.6 Plane Y1-Y1

Plane Y1-Y1 is a plane parallel to the reference plane at a distance of 30 mm from it.

D.2.7 Plane Y2-Y2

Plane Y2-Y2 is a plane parallel to the reference plane at a distance of 33 mm from it.

NOTE In the case of very short filaments, an intersection of plane Y2-Y2 with the filament may not be possible. In this case, plane Y2-Y2 will be moved in the direction of plane Y1-Y1 until intersections are possible. These intersections are then MP 13 and MP 14 which have to be measured.

D.3 Viewing directions (see Figure D.1)

D.3.1 Viewing direction ①

Viewing direction ① is perpendicular to plane V-V, seen from the side of the left-hand shield edge.

D.3.2 Viewing direction ②

Viewing direction ② is perpendicular to plane H-H, seen from the side opposite to the location notch.

D.3.3 Viewing direction ③

Viewing direction ③ is parallel to plane X-X and the reference plane, seen from the right-hand side of the shield turned 15°.

D.4 Measuring points (MP)

The following points as specified in Figure D.2 shall be measured. Measurements shall be made perpendicular to the viewing directions respectively:

Viewing direction ①

MP 1 and MP 12 — The intersections of the silhouette of the shield edge with planes Y1-Y1 land Y2-Y2

MP 2 and MP 13 — The intersection of the upper rim of the envelope of the dipped-beam filament with planes Y1-Y1 and Y2-Y2, farthest from plane H-H

In the case of very short filaments, an intersection of plane Y2-Y2 with the filament may not be possible. In this case, plane Y2-Y2 will be moved in the direction of plane Y1-Y1 until intersections are possible. Then the intersections MP 13 and MP 14 shall be measured.

MP 4 and MP 8 — The intersections of the outer part of respectively the first and last luminous turn of the dipped beam filament with the silhouette of the shield

MP 5 — Apex for the coil turn as defined for MP 11

MP 11 — The centre of the main beam filament, being the centre of
- the coil turn farthest from the reference plane for arc-shaped filaments;
- the middle turn for transversal, or at least partly transversal filaments

Viewing direction ②

MP 7 — The centre of the coil turn as defined for MP 11

MP 6 and MP 14 — The intersections of the dipped beam filament axis with planes Y1-Y1 and Y2-Y2

MP 9 and MP 10 — The intersections of the edges of the sunk area of the shield with plane Y2-Y2

NOTE MP 5 and MP 7 may not be seen from viewing direction ② , in which case both points will be measured from the opposite side.

Viewing direction ③

MP 3 and MP 15 The intersections of the silhouette of the 15° bent part of the shield with planes Y1-Y1 and Y2-Y2

D.5 Dimensions to be measured

Table D.1 states the dimensions to be measured. Values and tolerances are given on the relevant filament lamp data sheet R2 of UN Regulation 37.

Table D.1 – Dimensions to be measured for R2 lamps

Distance	Measured perpendicular to plane	Viewing direction	Dimension
MP 1 to MP 11	H-H	1	a
MP 1 to H-H MP 12 to H-H	H-H H-H	1 1	$b_1/30,0$ [a] $b_1/33,0$ [a]
MP 3 to X-X MP 15 to X-X	X-X X-X	3 3	$b_2/30,0$ [a] $b_2/33,0$ [a]
MP 9 to V-V MP 10 to V-V	V-V V-V	2 2	p/33,0 [a] q/33,0 [a]
MP 2 to MP 1 MP 13 to MP 12	H-H H-H	1 1	p/33,0 [a] q/33,0 [a]
MP 6 to V-V MP 14 to V-V	V-V V-V	2 2	p/33,0 [a] q/33,0 [a]
MP 4 to reference plane	Reference plane	1	e
MP 4 to MP 5	Reference plane	1	f
MP 7 to V-V	V-V	2	g
MP 4 to MP 8	Reference plane	1	l_c

[a] Dimension to be measured at the distance from the reference plane indicated in millimetres after the stroke.

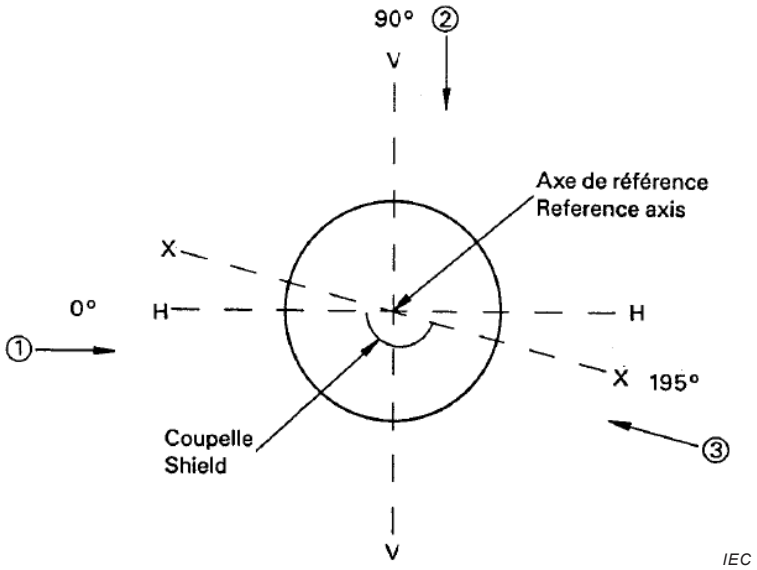
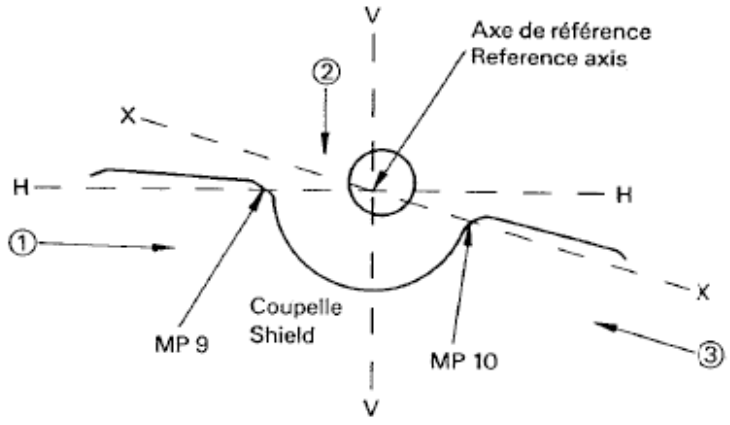


Figure D.1 – Viewing directions, seen from the top of the lamp



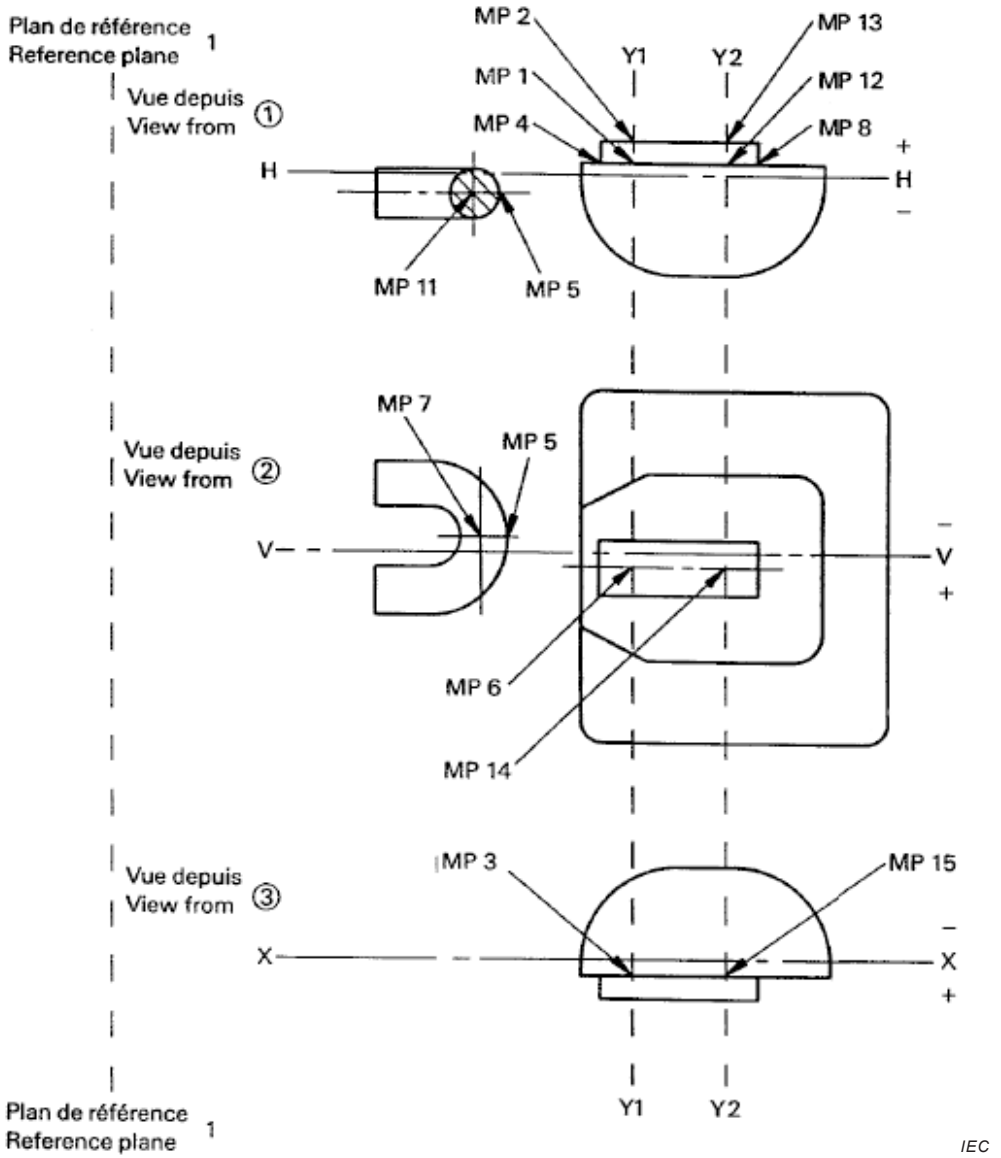


Figure D.2 – Position of measuring points of R2 lamps

Annex E
(normative)

Method of measuring internal elements of H4 and HS1 lamps

E.1 General test conditions

E.1.1 Measurement position

Filament lamps shall be measured in a horizontal normal operating position, reference lug up.

E.1.2 Ageing

Each filament shall be aged for approximately 1 h at test voltage. Immediately prior to a measurement, the filament shall be operated for at least 2 min at test voltage.

E.1.3 Test condition

Measurement on filaments shall be carried out at test voltage.

E.2 Reference axis, reference plane and planes for measurements

E.2.1 Reference axis

The reference axis is the line perpendicular to the reference plane and passing through the centre of the circle with diameter M of the cap ring.

E.2.2 Reference plane

The reference plane is the plane formed by the seating points of the three lugs.

E.2.3 Plane V-V

Plane V-V is the plane perpendicular to the reference plane containing the reference axis and the centre line of the reference lug.

E.2.4 Plane H-H

Plane H-H is the plane perpendicular to the reference plane and to plane V-V containing the reference axis.

E.2.5 Plane X-X

Plane X-X is the plane perpendicular to the reference plane, containing the reference axis and forming an angle of 15° to plane H-H which is turned clockwise away from the reference lug, seen from the top of the bulb.

E.2.6 Plane Y1-Y1

Plane Y1-Y1 is a plane parallel to the reference plane at a distance of 29,5 mm from it (30,0 mm for the 24 V type).

E.2.7 Plane Y2-Y2

Plane Y2-Y2 is a plane parallel to the reference plane at a distance of 33,0 mm from it (31,0 mm for category HS1).

E.2.8 Plane Y3-Y3

Plane Y3-Y3 is a plane parallel to the reference plane at a distance of 23,5 mm from it (25,0 mm for category HS1).

E.2.9 Plane Y4-Y4

Plane Y4-Y4 is a plane parallel to the reference plane at a distance of 26,0 mm from it.

E.2.10 Plane Y5-Y5

Plane Y5-Y5 is a plane parallel to the reference plane at a distance of 28,95 mm from it (29,25 mm for the 24 V type).

E.3 Viewing directions (see Figure E.1)

E.3.1 Viewing direction ①

Viewing direction ① is perpendicular to plane V-V, seen from the side of the left-hand shield edge.

E.3.2 Viewing direction ②

Viewing direction ② is perpendicular to plane H-H, seen from the side of the reference lug.

E.3.3 Viewing direction ③

Viewing direction ③ is parallel to plane X-X and the reference plane, seen from the side of the right-hand shield edge.

E.4 Measuring points (MP)

The following points as specified in Figures E.2 and E3 shall be measured. Measurements shall be made perpendicular to the viewing directions respectively.

E.4.1 Shield and filaments (see Figure E.2)

Viewing direction ①

MP 1 and MP 12	The intersections of the main beam filament axis with planes Y3-Y3 and Y4-Y4
MP 3 and MP 4	The intersections of the shield edge with planes Y1-Y1 and Y2-Y2
MP 5 and MP 6	The intersections of the envelope of the dipped beam filament with planes Y1-Y1 and Y2-Y2 farthest from plane H-H
MP 7	The intersection of the bulb axis with plane Y1-Y1

MP 8 and MP 11 The intersections of the outer part of respectively the first and last luminous turns of the dipped beam filament with the shield edge

MP 9 and MP 10 The intersections of the outer part of respectively the first and last luminous turns of the main beam filament with the centre line (axis) of that filament

Viewing direction ②

MP 12 and MP 13 The intersections of the main beam filament axis with planes Y3-Y3 and Y4-Y4

MP 14 and MP 15 The intersections of the dipped beam filament axis with planes Y1-Y1 and Y2-Y2

MP 16 and MP 17 The intersections of the shield edges with plane Y2-Y2

Viewing direction ③

MP 18 and MP 19 The intersections of the shield edge with plane Y1-Y1 and Y2-Y2

E.4.2 Top obscuration (see Figure E.3)

Viewing direction ①

MP 20 Intersection of the top obscuration with a plane parallel to plane V-V and containing the bulb axis

Viewing direction ②

MP 23 Intersection of the bulb axis with plane Y5-Y5

MP 21 and MP 22 Intersections of the top obscuration with a plane parallel to plane H-H and containing the bulb axis

E.5 Dimensions to be measured

Table E.1 states the dimensions to be measured. Values and tolerances are given on the relevant filament lamp data sheet H4 or HS1 of UN Regulation 37.

Table E.1 – Dimensions to be measured for H4 and HS1 lamps

Distance (see Figure E.2)	Measured perpendicular to plane	Viewing direction	Dimension	
			12 V	24 V
MP 2 to MP 3	H-H	1	a/26,0	
MP 1 to MP 3 [a]	H-H	1	a/23,5	
MP 3 to H-H	H-H	1	b_1/29,5	b_1/30,0
MP 4 to H-H [b]	H-H	1	b /33,0	
MP 18 to X-X	X-X	3	b_2/29,5	b_2/30,0
MP 19 to X-X [b]	X-X	3	b /33,0	
MP 3 to MP 5	H-H	1	c/29,5	c/30,0
MP 4 to MP 6 [b]	H-H	1	c/33,0	
MP 7 to MP 3	H-H	1	d	
MP 8 to reference plane	Reference plane	1	e	
MP 8 to MP 9	Reference plane	1	f	
MP 13 to V-V	V-V	2	g/26,0	
MP 12 to V-V [a]	V-V	2	g/23,5	
MP 14 to V-V	V-V	2	h/29,5	h/30,0
MP 15 to V-V	V-V	2	h/33,0	
MP 9 to MP 10	Reference plane	1	l_r	
MP 8 to MP 11	Reference plane	1	l_c	
MP 16 to V-V [b]	V-V	2	p/33,0	
MP 17 to V-V [b]	V-V	2	q/33,0	
Angle α (see Figure E.3)				
MP 23 to MP 20	H-H	1	α	
MP 23 to MP 21	V-V	2	α	
MP 23 to MP 22	V-V	2	α	

[a] For category HS1, this dimension shall be measured at 25,0 mm distance from the reference plane.

[b] For category HS1, this dimension shall be measured at 31,0 mm distance from the reference plane.

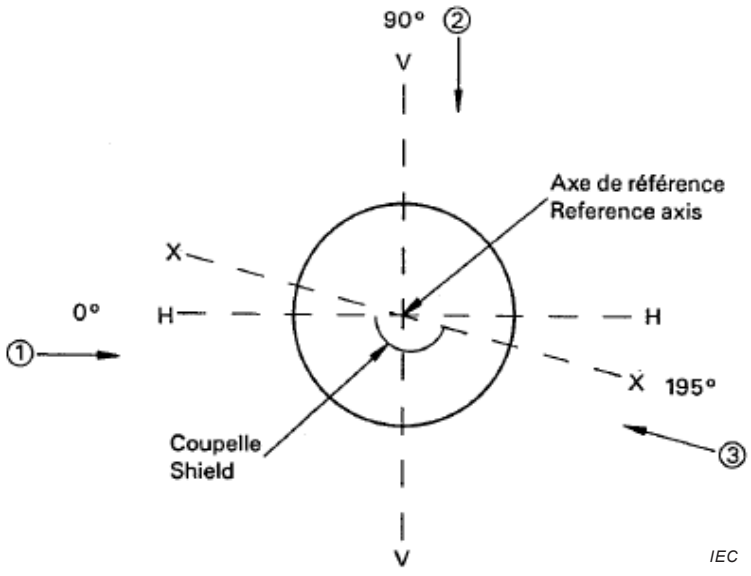


Figure E.1 – Viewing directions, seen from the top of the lamp

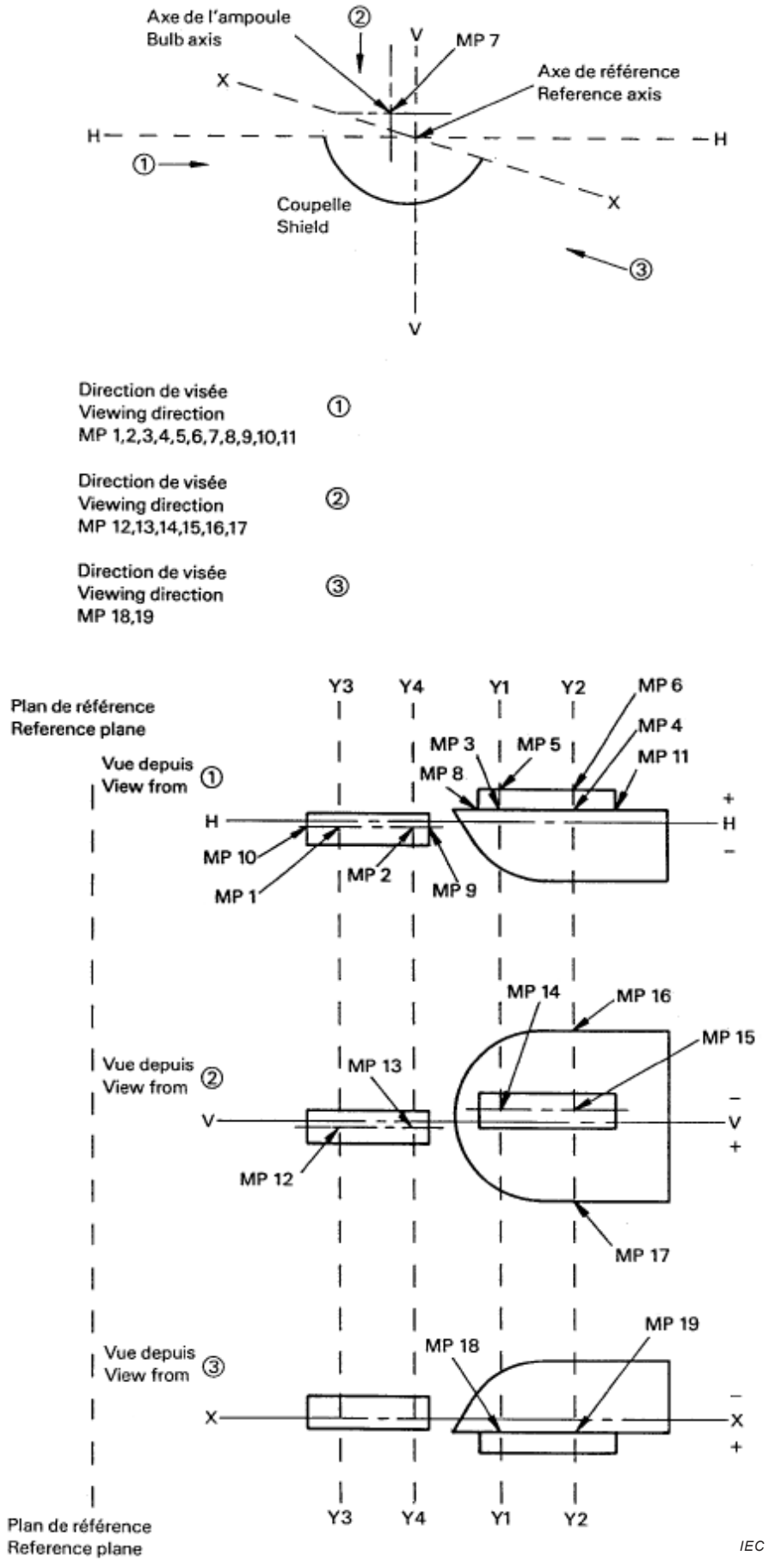


Figure E.2 – Position of measuring points of H4 and HS1 lamps

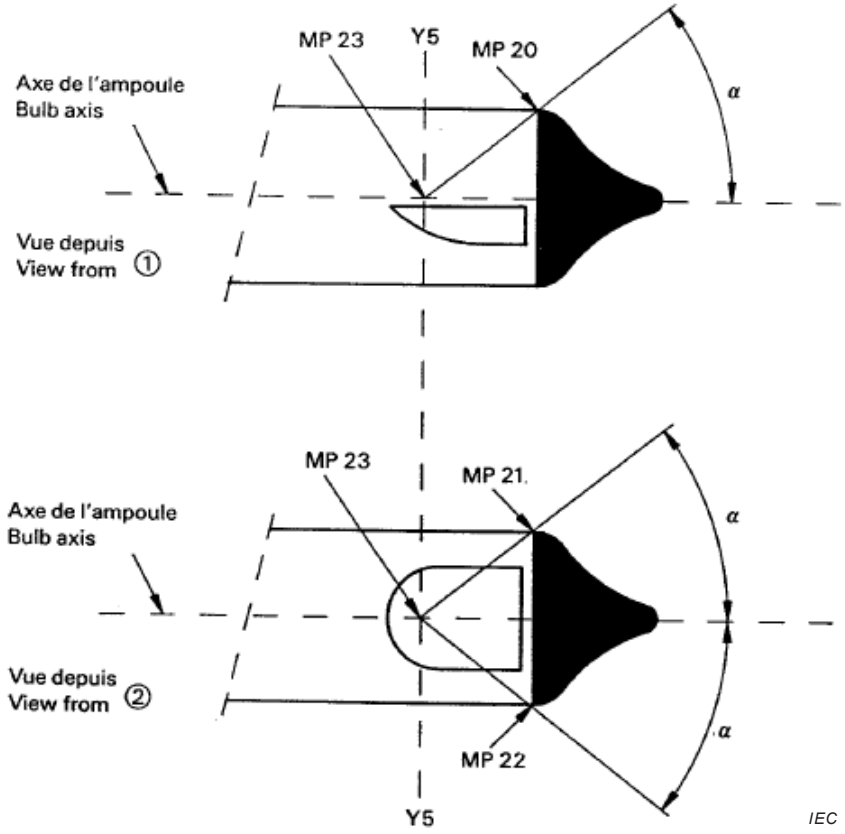


Figure E.3 – Top obscuration

Annex F
(normative)

Method of measuring internal elements of HB1 lamps

F.1 General test conditions

F.1.1 Measurement position

Filament lamps shall be measured in a horizontal operating position, reference slot up.

F.1.2 Ageing

Each filament shall be aged for approximately 1 h at test voltage. Immediately prior to a measurement, the filament shall be operated for at least 2 min at test voltage.

F.1.3 Test condition

For the measurements, the O-ring of the cap shall be removed.

NOTE For the O-ring, see IEC 60061-1, sheet 7004-66.

F.2 Dipped beam filament location

F.2.1 Horizontal location

The horizontal location – dimension g – shall be measured in the plan view (see Figure F.2) from a vertical plane through the reference axis to the centre of the smallest rectangle which encloses the dipped beam filament image.

F.2.2 Vertical location

The vertical location – dimension a – shall be measured in the side view (see Figure F.1) from a horizontal plane through the reference axis to the centre of the smallest rectangle which encloses the dipped beam filament image.

F.2.3 Axial location

The axial location, the light centre length – dimension e – shall be measured in the side view (see Figure F.1) from the reference plane to the centre of the smallest rectangle which encloses the dipped beam filament image.

F.3 Main beam filament location

F.3.1 Horizontal location

The horizontal location – dimension n – shall be measured in the plane view (see Figure F.2) from the centre of the dipped beam filament rectangle as defined in F.2.1 to the centre of the smallest rectangle which encloses the main beam filament image.

F.3.2 Vertical location

The vertical location – dimension b – shall be measured in the side view (see Figure F.1) from the centre of the dipped beam filament rectangle as defined in F.2.2 to the centre of the smallest rectangle which encloses the main beam filament image.

F.3.3 Axial location

The axial location – dimension t – shall be measured in the side view (see Figure F.1) from the centre of the dipped beam filament rectangle as defined in F.2.3 to the centre of the smallest rectangle which encloses the main beam filament image.

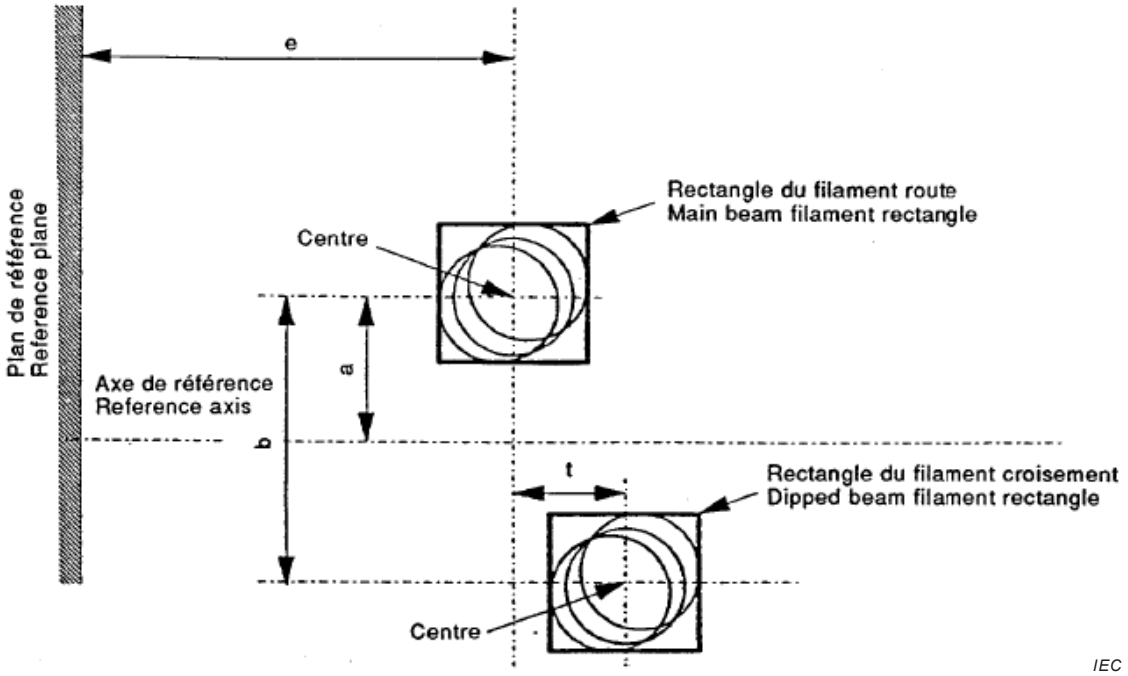


Figure F.1 – Side view, view from ③[ab]

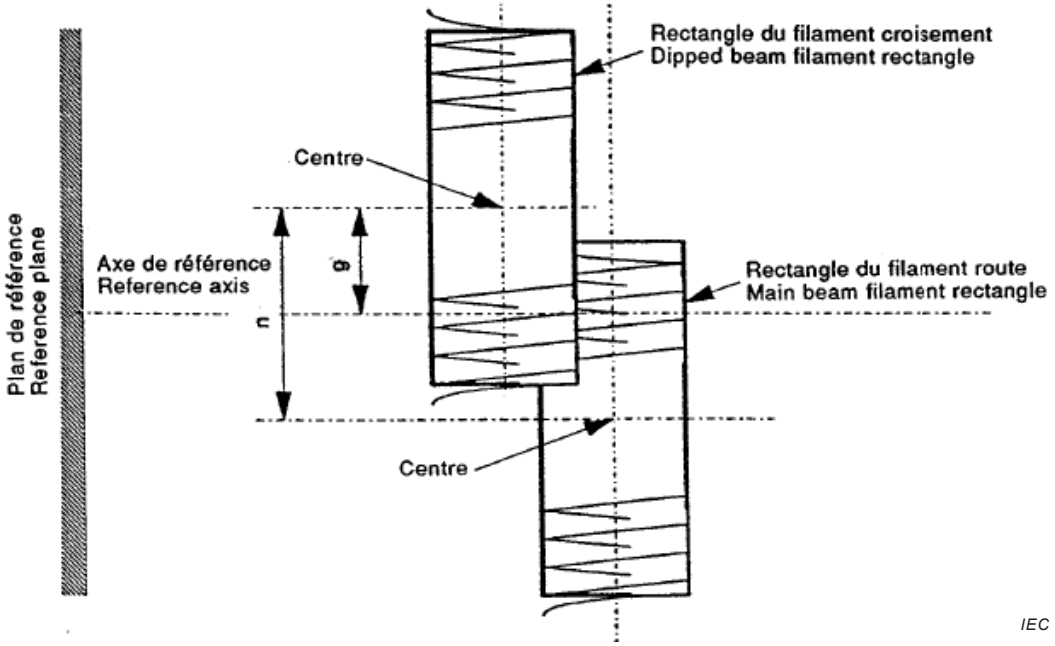


Figure F.2 – Plan view, view from ④[a]

[a] For the viewing directions, see sheet 809-IEC-2135, page 1.

[b] Side view perpendicular to plane V-V, see sheet 809-IEC-2135, page 3.

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

The discharge lamp shall be positioned as shown in Figure 1 on sheet 1 of the D1R/D2R/D3R/D4R-lamp or on sheet 1 of the D1S/D2S/D3S/D4S-lamp.

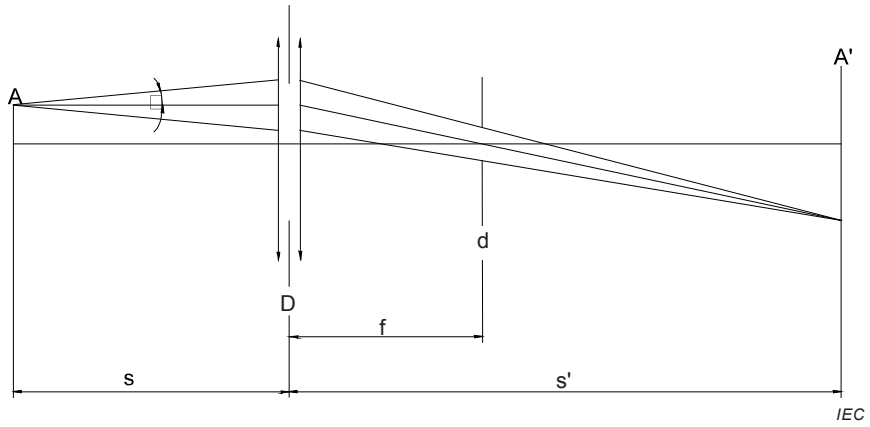


Figure G.1 – Optical system

An optical system shall project a real image A' of the arc A with a magnification of preferably M = s'/s = 20 on a screen (see Figure G.1).

The optical system shall be aplanatic and achromatic. At the focal length f of the optical system a diaphragm d shall cause a projection of the arc with nearly parallel observation directions. To get the angle of the half divergence not larger than μ = 0,5°, the diameter of the focus-diaphragm with respect to the focal length of the optical system shall be not more than d = 2f tan(μ).

The active diameter of the optical system shall be not more than:

D = (1 + 1/M)d + c + (b1 + b2)/2 (c, b1 and b2 are given on the relevant discharge lamp data sheet).

A scale on the screen shall enable the position of the electrodes to be measured. The calibration of the arrangement can be done by using a separate projector with a parallel beam in connection with a gauge whose shadow is projected to the screen. The gauge shall show the reference axis and the plane parallel to the reference plane and at distance "e" mm from it. (e is given on the relevant discharge lamp data sheet).

In the plane of the screen a receiver has to be mounted movable in a vertical direction on a line corresponding to the plane at "e" from the reference plane of the discharge lamp. The receiver shall have the relative spectral sensitivity of the human eye. The size of the receiver shall be not more than 0,2 M mm in the horizontal and not more than 0,025 M mm in the vertical direction (M = the magnification).

The range of measurable movement shall be such that the required dimensions of the arc bending r and arc diffusion s can be measured.

Annex H
(normative)

Measurement method of electrical and photometric characteristics of discharge lamps

H.1 General

For starting, run-up and hot-restrike tests and for the measurement of electrical and photometric characteristics, the discharge lamp shall be operated in free air with an ambient temperature of 25 °C ± 5 °C.

H.2 Ballast

All tests and measurements shall be carried out with the ballast supplied by the manufacturer of the discharge lamp. The power supply used for the starting and run-up tests shall be able to provide the quick rise of the high current pulse.

H.3 Burning position

The burning position shall be horizontal within ± 10° with the lead wire down. Ageing and testing positions shall be identical. If the lamp is accidentally operated in the wrong orientation, it shall be re-aged before measurements begin. During ageing and measurements, no electrically conducting objects shall be allowed within a cylinder having a diameter of 32 mm and a length of 60 mm concentric with the reference axis. Moreover, stray magnetic fields shall be avoided.

H.4 Ageing

With exception of the starting test, all tests shall be carried out with lamps which have been aged for a minimum of 15 cycles having the following switching cycle: 45 min on, 15 s off, 5 min on, 10 min off.

H.5 Supply voltage

All tests shall be carried out at the test voltage as indicated on the relevant data sheet.

H.6 Starting test

The starting test shall be applied to unaged lamps which have not been used for a period of at least 24 h prior to the test.

H.7 Run-up test

The run-up test shall be applied to lamps which have not been used for a period of at least 1 h prior to the test.

H.8 Hot restrike test

The lamp shall be started and be operated with the ballast at the test voltage for a period of 15 min. Then the supply voltage to the ballast shall be switched off for a switch-off period as indicated on the relevant data sheet and be switched on again.

H.9 Electrical and photometric test

Before any measurement, the lamp shall be stabilized for a period of 15 min.

H.10 Colour

The colour of the lamp shall be measured in an integrating sphere using a measuring system which shows the CIE chromaticity co-ordinates of the received light with a resolution of ± 0,002.

Annex I
(informative)

Overview of lamp types and their applications

Automotive lamps																	
Lamps for headlights and/or fog lamps										Lamps for signal lights						Bicycle lamps	
Filament lamps								Discharge lamps		Filament lamps				LED light sources			
Double filament				Single filament						Double filament		Single filament					
Cars and Trucks		Motorcycles and mopeds		Cars and Trucks		Motorcycles and Mopeds											
H4	R37-H4	S2	R37-S1/S2	H1	R37-H1	HS2	R37-HS2	D1S	R99-DxS	P21/4W	R37-P21/4W	WY16W	R37-W16W	LR1	R128-LR1	B1.13W	60809-IEC-9310
H13 / H13A	R37-H13	HS1	R37-HS1	H3	R37-H3			D2S	R99-DxS	P21/5W	R37-P21/5W	W21W	R37-W21W	LW2	R128-LW2	B0.6W	60809-IEC-9610
H15	R37-H15	H17*)	R37-H17	H7	R37-H7			D3S	R99-DxS	PR21/5W	R37-PR21/5W	H10W/1	R37-H10W			B2.4W	60809-IEC-9620
		HS5	R37-HS5	H8 / H8B	R37-H8			D4S	R99-DxS	P27/7W	R37-P27/7W	HY10W/1	R37-H10W				
				H9 / H9B	R37-H9			D1R	R99-DxR	PY27/7W	R37-PY27/7W	HY21W	R37-HY21W				
				H10	R37-H10			D2R	R99-DxR	W15/5W	R37-W15/5W	HY6W	R37-H6W				
				H11 / H11B	R37-H11			D3R	R99-DxR	W21/5W	R37-W21/5W	P13W	R37-P13W				
				H12	R37-H12			D4R	R99-DxR	WT21/7W	R37-WT21/7W	P24W	R37-P24W				
				H16 / H16B	R37-H16			D5S	R99-D5S	WTY21/7W	R37-WT21/7W	PY24W	R37-P24W				
				PSX26W **)	R37-PSX26W			D8S	R99-D8S			PR21W	R37-PR21W				
				HB3	R37-HB3							PS19W	R37-P19W				
				HB4	R37-HB4							PS24W	R37-P24W				
				H27W	R37-H27W					Single filament		PSY19W	R37-P19W				
				HIR2	R37-HIR2					C5W	R37-C5W	PSY24W	R37-P24W				
				PSX24W **)	R37-P24W					H6W	R37-H6W	PW13W	R37-P13W				
										H21W	R37-H21W	PW16W	R37-PC16W				
										P21W	R37-P21W	PWY16W	R37-PC16W				
	legend:									PY21W	R37-PY21W	PW19W	R37-P19W				
		*) no use restriction								P27W	R37-P27W	PWY19W	R37-P19W				
		**) typical use for front fog application								R5W	R37-R5W	PW24W	R37-P24W				
										R10W	R37-R10W	PWY24W	R37-P24W				
										T4W	R37-T4W	WT21W	R37-WT21W				
	Light sources listed under "Cars and Trucks" generally may also be used on motorcycles and mopeds									W2.3W	R37-W2.3W	WTY21W	R37-WT21W				
	For more detailed usage restrictions see UN R37, UN R99 and UN R128									W3W	R37-W3W	WY21W	R37-WY21W				
										W5W	R37-W5W	RY10W	R37-R10W				
										WY5W	R37-W5W	W10W	R37-W10W				
										W16W	R37-W16W	WY10W	R37-W10W				

Annex J
(normative)

Test conditions for colour endurance measurements

J.1 General

The test conditions for colour endurance measurements shall apply to filament lamps for use in light signalling devices. The applicable set of test conditions is indicated in Tables J.1 and J.2:

– switching modes (see Clause J.6) in Table J.1;
– boxes in which the filament lamps shall be mounted (see Clause J.5) in Table J.2.

Table J.1 – Applicable switching modes

Filament lamps		Applicable test conditions
Emitting	For use in	
Amber light	Intermittent operation[a]	Figure J.5
Red light	Intermittent and continuous operation	Figure J.6
White light	Continuous operation	Figure J.7
Amber light	Intermittent and continuous operation[b]	Figure J.8
[a] Single filament lamps; including single filament lamps for continuous operation. [b] Dual filament lamps.		

Table J.2 – Applicable boxes of the test racks

Filament lamps' maximum wattage [a]					Applicable box in Table J.3
>	0 W	and	≤	10 W	A
>	10 W	and	≤	20 W	B
>	20 W	and	≤	30 W	C
>	30 W	and	≤	45 W	D
[a] Wattage – at test voltage; – of the higher wattage (major) filament in case of dual filament lamps. (IEC 60809: rated wattage; UN R37: objective value of wattage)					

J.2 Calibration and ageing

The climate chamber shall be calibrated while empty and before filament lamps on test racks are placed in the climate chamber.

Filament lamps shall be aged at their test voltage for 60 min ± 5 min. For dual filament lamps, only the major filament shall be aged. Filament lamps which fail during the ageing period shall be replaced and the ageing process re-applied.

J.3 Test voltage

Filament lamps shall be operated at the test voltage as specified in the relevant filament lamp data sheet.

J.4 Operating position

Filament lamps shall be operated on test racks. The test racks shall be positioned horizontally in a climate chamber in such a way that temperature and relative humidity around each test rack are as specified in Clause J.6. To facilitate air distribution, the use of a fan is recommended. The test rack shall then be positioned so that the bulbs of the filament lamps are not facing the fan. Test racks shall not be stacked or overlapped.

J.5 Test rack

The test rack shall consist of a horizontal array of boxes as specified in Figures J.1 and J.2 and in Table J.3. Front and bottom of the box shall be open. The other faces shall be closed using 1 mm thick stainless steel. In case of an array of boxes, total thickness of adjoining sides shall be 1 mm. Filament lamps shall be mounted on their normal cap holders with both lamp axis and filament(s) horizontal, and their positions relative to the box as specified by Figures J.1 and J.2. In case normal cap holders would not be resistant to temperatures as specified in Annex J, other means may be applied to position filament lamps as prescribed.

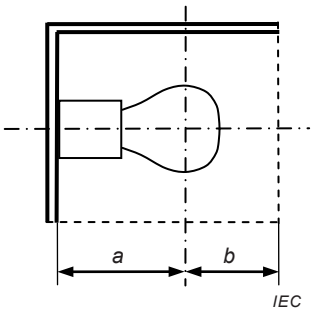


Figure J.1 – Side view of box

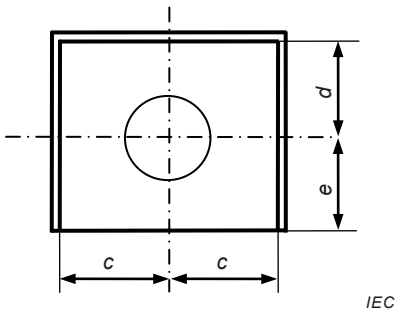


Figure J.2 – Front view of box

Table J.3 – Dimensions of the applicable boxes and the relative position of the centre of the filament

Box	*a* mm	*b* mm	*c* mm	*d* mm	*e* mm
A	13	11	7,75	8	12
B	28	15	13	14	26
C	42	18	19	19	40
D	42	18	19	19	40

J.6 Operating cycles

Filament lamps shall be operated in the climate chamber following 10 times a 24 h cycle of varying temperature, relative humidity and switching modes, as specified in Tables J.1, J.4 and J.5 and Figures J.3 to J.8.

In case of dual filament lamps, the high wattage (major) filament shall be operated only.

Table J.4 – Timing during one operating cycle

Beginning of cycle												**End of cycle**
t_0 h	t_1 h	t_2 h	t_3 h	t_4 h	t_5 h	t_6 h	t_7 h	t_8 h	t_9 h	t_{10} h	t_{11} h	t_{12} h
0	1	5	5:20	7	8	12	12:20	20	21	21:20	23	24

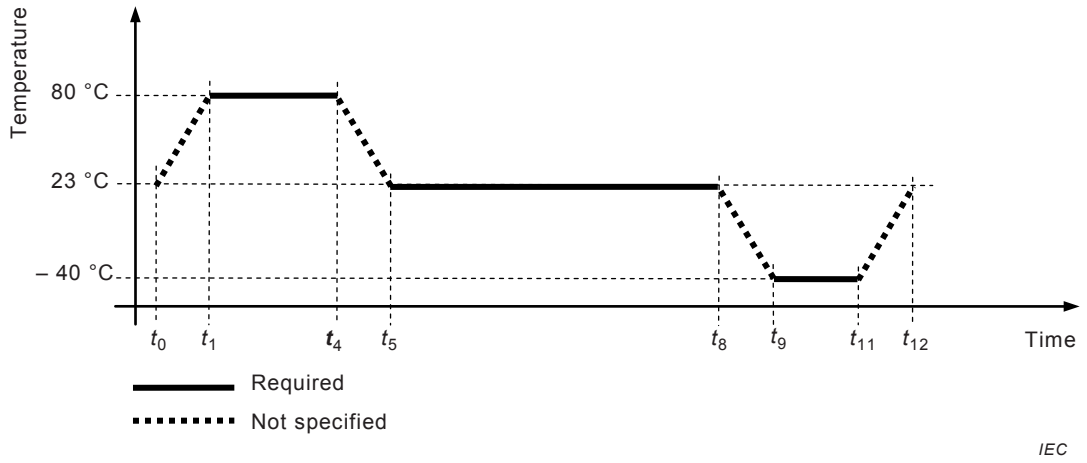


Figure J.3 – Temperature in the climate chamber during one operating cycle

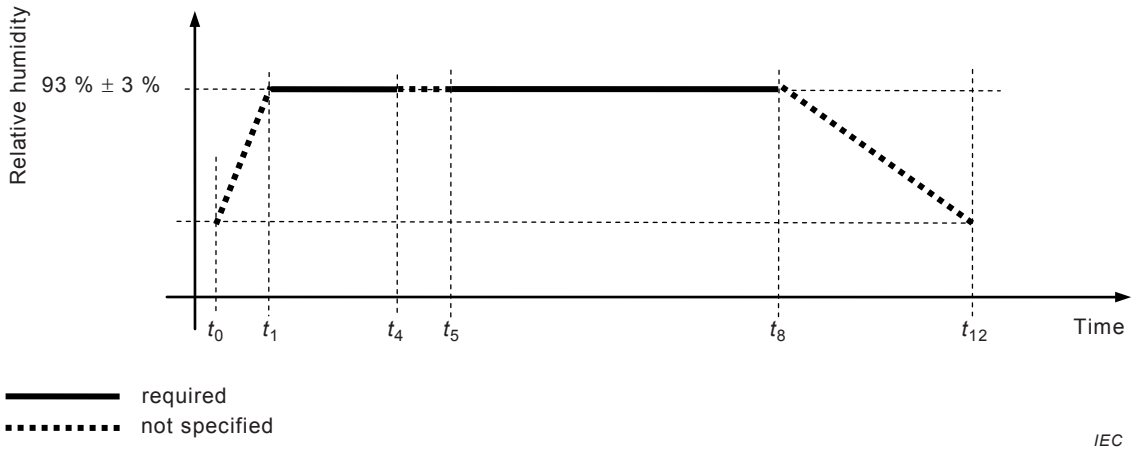


Figure J.4 – Relative humidity in the climate chamber during one operating cycle

Table J.5 – Switching modes of the filament lamps

Mode	Filament switched	Common name of mode
1	Off	'Off' mode
2	For 15 s in intermittent operation with flashing frequency 90/min and on/off ratio 1:1; for 15 s off	'Intermittent' mode
3	In intermittent operation with flashing frequency 90/min and on/off ratio 1:1	'Flashing' mode
4	For 5 min on; for 5 min off	'Interrupted on' mode
5	On	'On' mode

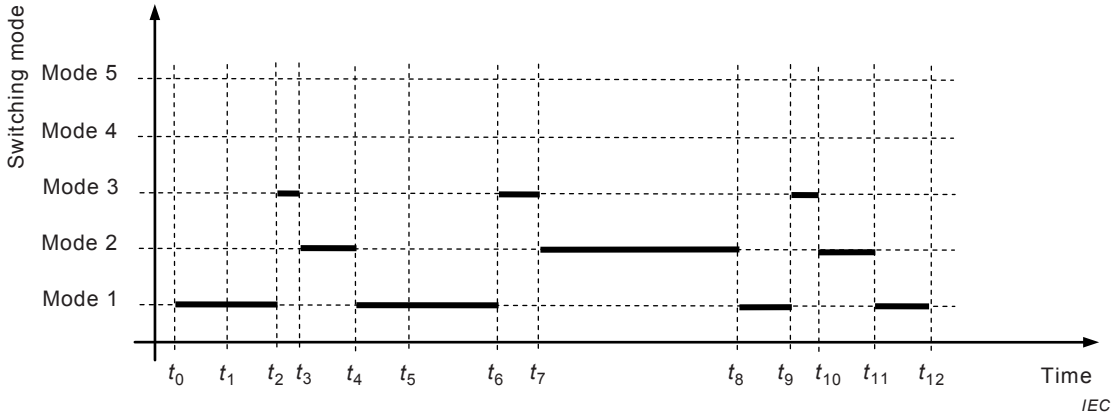


Figure J.5 – Switching modes of filament lamps for intermittent operation during one operating cycle

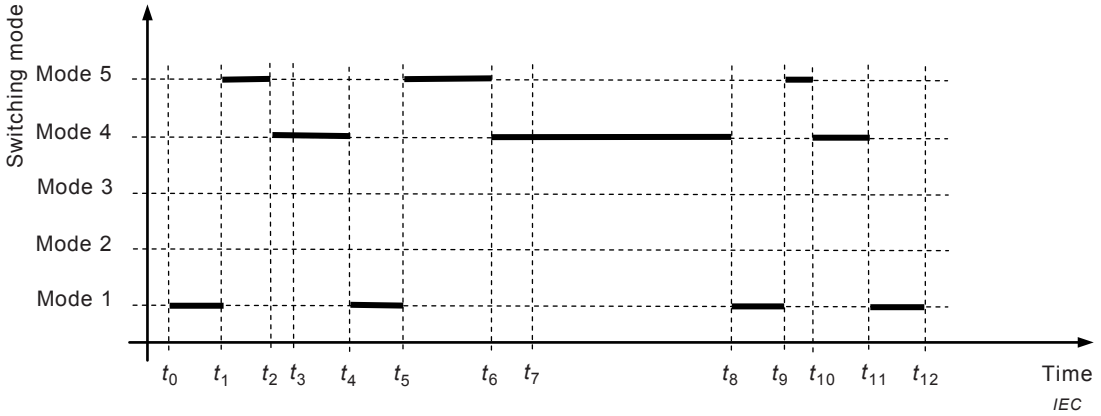


Figure J.6 – Switching modes of filament lamps for intermittent and continuous operation during one operating cycle

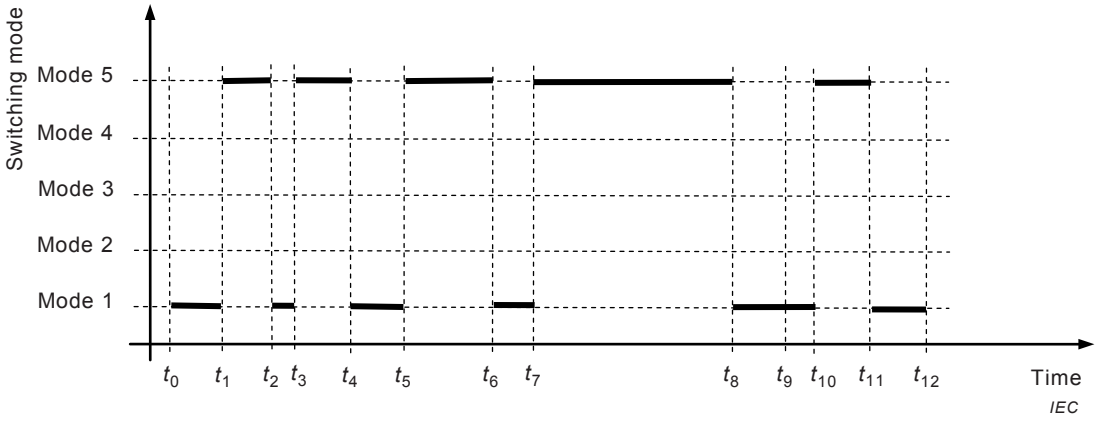


Figure J.7 – Switching modes of filament lamps for continuous operation during one operating cycle

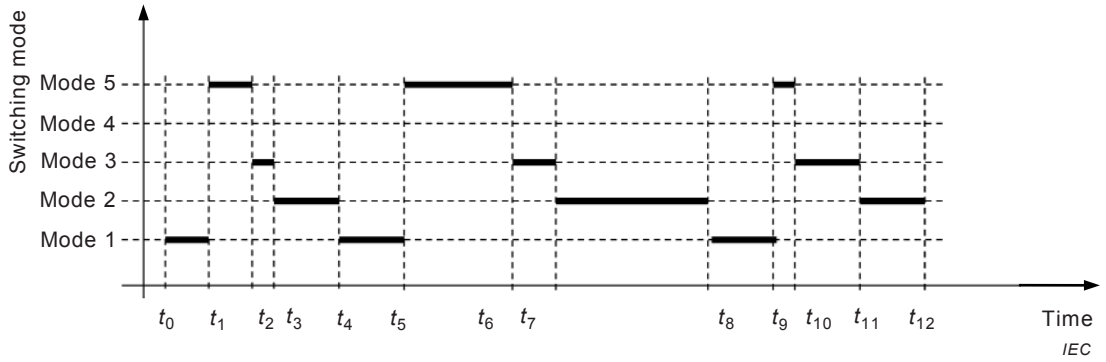


Figure J.8 – Switching modes of filament lamps for intermittent and continuous operation during one operating cycle

J.7 Closure

Filament lamps shall be held at rest, switched off, at a room temperature of 23 °C ± 2 °C for at least 2 h after the end of the 10 operating cycles and shall no longer be used in light signalling devices but to be considered end of life for that purpose.

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