

Official Journal of the European Union

L 213



English edition

Legislation

Volume 57

18 July 2014

Contents

II *Non-legislative acts*

ACTS ADOPTED BY BODIES CREATED BY INTERNATIONAL AGREEMENTS

- ★ **Regulation No 6 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of direction indicators for power-driven vehicles and their trailers** 1
- ★ **Regulation No 37 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of filament lamps for use in approved lamp units of power-driven vehicles and of their trailers** 36

EN

Acts whose titles are printed in light type are those relating to day-to-day management of agricultural matters, and are generally valid for a limited period.

The titles of all other acts are printed in bold type and preceded by an asterisk.

II

*(Non-legislative acts)***ACTS ADOPTED BY BODIES CREATED BY INTERNATIONAL AGREEMENTS**

Only the original UN/ECE texts have legal effect under international public law. The status and date of entry into force of this Regulation should be checked in the latest version of the UN/ECE status document TRANS/WP.29/343, available at: <http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29fdocstts.html>.

Regulation No 6 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of direction indicators for power-driven vehicles and their trailers

Incorporating all valid text up to:

Supplement 25 to the 01 series of amendments — Date of entry into force: 9 October 2014

CONTENTS

0. Scope
1. Definitions
2. Application for approval
3. Markings
4. Approval
5. General specifications
6. Intensity of light emitted
7. Test procedure
8. Colour of light emitted
9. Modifications of a type of direction indicator for motor vehicles and their trailers and extension of approval
10. Conformity of production
11. Penalties for non-conformity of production
12. Production definitely discontinued
13. Names and addresses of Technical Services responsible for conducting approval tests, and of Type Approval Authorities
14. Transitional provisions

ANNEXES

1. Categories of direction indicators: Minimum angles required for light distribution in space of these categories of direction indicators
2. Communication concerning the approval or extension or refusal or withdrawal of approval or production definitely discontinued of a type of direction indicator pursuant to Regulation No 6
3. Examples of arrangements of the approval marks
4. Photometric measurements
5. Minimum requirements for conformity of production control procedures
6. Minimum requirements for sampling by an inspector

0. SCOPE

This Regulation applies to direction indicators for vehicles of categories L, M, N, O, and T ⁽¹⁾.

1. DEFINITIONS

For the purposes of this Regulation,

1.1. 'Direction indicator' means a device mounted on a motor vehicle or trailer which, when operated by the driver, signals the latter's intention to change the direction in which the vehicle is proceeding. The present Regulation applies solely to fixed-position flashing light devices whose flashing is obtained by the intermittent supply of electric current to the lamp.

1.2. The definitions given in Regulation No 48 and its series of amendments in force at the time of application for type approval shall apply to this Regulation.

1.3. 'Direction indicators of different types' means lamps which differ in such essential respects as:

(a) the trade name or mark;

(b) the characteristics of the optical system (levels of intensity, light distribution angles, category of light source, light source module, etc.);

(c) the category of direction indicator lamps;

(d) the variable intensity control, if any;

(e) the sequential activation of light sources, if any.

A change of the colour of the light source or the colour of any filter does not constitute a change of type.

1.4. References made in this Regulation to standard (étalon) filament lamp(s) and to Regulation No 37 shall refer to Regulation No 37 and its series of amendments in force at the time of application for type approval.

References made in this Regulation to standard (étalon) LED light source(s) and to Regulation No 128 shall refer to Regulation No 128 and its series of amendments in force at the time of application for type approval.

2. APPLICATION FOR APPROVAL

2.1. The application for approval of a type of direction indicator shall be submitted by the holder of the trade name or mark or by his duly accredited representative. It shall specify to which category or to which of the categories 1, 1a, 1b, 2a, 2b, 5 or 6 according to Annex 1, the direction indicator belongs and, if it belongs to category 2, whether it has steady luminous intensity (category 2a) or whether it has variable luminous intensity (category 2b) and if the direction indicator may also be used in an assembly of two lamps of the same category. At the choice of the applicant, it will also specify that the device may be installed on the vehicle with different inclinations of the reference axis in respect to the vehicle reference planes and to the ground or rotate around its reference axis; these different conditions of installation shall be indicated in the communication form.

⁽¹⁾ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.2, para. 2.

- 2.2. For each type of direction indicator the application shall be accompanied by the following:
- 2.2.1. Drawings, in triplicate, sufficiently detailed to permit identification of the type and category and showing geometrically the following:
- (a) in what position(s) the direction indicator may be mounted on the vehicle; the axis of observation to be taken as the axis of reference in the tests (horizontal angle $H = 0^\circ$, vertical angle $V = 0^\circ$); and the point to be taken as the centre of reference in the said tests;
 - (b) the geometrical conditions of installation of the device(s) that meet(s) the requirements of paragraph 6;
 - (c) in the case of an interdependent lamp system, the interdependent lamp or the combination of interdependent lamps that fulfil the requirements of paragraph 5.7, paragraph 6.1 and of Annex 4 to this Regulation;
 - (d) the drawings shall show the position intended for the approval number and the additional symbols in relation to the circle of the approval mark.
- 2.2.2. A brief technical description stating in particular, with the exception of lamps with non-replaceable light sources:
- (a) the category or categories of filament lamp(s) prescribed; this filament lamp category shall be one of those contained in Regulation No 37 and its series of amendments in force at the time of application for type approval; and/or
 - (b) the category or categories of LED light source(s) prescribed; this LED light source category shall be one of those contained in Regulation No 128 and its series of amendments in force at the time of application for type approval; and/or
 - (c) the light source module specific identification code.
- 2.2.3. For a direction indicator of category 2b, a concise description of the variable intensity control, an arrangement diagram and a specification of the characteristics of the system ensuring the two levels of intensity.
- 2.2.4. For a direction indicator lamp of categories 1, 1a, 1b, 2a and 2b, information regarding activation of the signals according to paragraphs 5.6 and 6.2.2 below.
- 2.2.5. Two samples; if the approval is applied for devices which are not identical but are symmetrical and suitable for mounting one on the left and one on the right side of the vehicle, the two samples submitted may be identical and be suitable for mounting only on the right or only on the left side of the vehicle.

For a direction indicator of category 2b, the application shall also be accompanied by variable intensity control or a generator providing the same signal(s).

3. MARKINGS

Devices submitted for approval shall:

- 3.1. Bear the trade name or mark of the applicant; this marking shall be clearly legible and indelible;

- 3.2. With the exception of lamps with non-replaceable light sources, bear a clearly legible and indelible marking indicating:
- (a) the category or categories of filament lamp(s) prescribed; and/or
 - (b) the light source module specific identification code;
- 3.3. Comprise a space of sufficient size for the approval marking and the additional symbols prescribed in paragraph 4.2 below; this space shall be shown in the drawings mentioned in paragraph 2.2.1 above.
- 3.4. In case of lamps with an electronic light source control gear or a variable intensity control and/or non-replaceable light sources and/or light source module(s), bear the marking of the rated voltage or range of voltage and rated maximum wattage.
- 3.5. In the case of lamps with light source module(s), the light source module(s) shall bear:
- 3.5.1. The trade name or mark of the applicant; this marking must be clearly legible and indelible;
 - 3.5.2. The specific identification code of the module; this marking must be clearly legible and indelible. This specific identification code shall comprise the starting letters 'MD' for 'MODULE' followed by the approval marking without the circle as prescribed in paragraph 4.2.1.1 below and, in the case several non-identical light source modules are used, followed by additional symbols or characters; this specific identification code shall be shown in the drawings mentioned in paragraph 2.2.1 above.
- The approval marking does not have to be the same as the one on the lamp in which the module is used, but both markings shall be from the same applicant;
- 3.5.3. The marking of the rated voltage or range of voltage and rated maximum wattage.
- 3.6. An electronic light source control gear or a variable intensity control being part of the lamp but not included into the lamp body shall bear the name of the manufacturer and its identification number.
4. APPROVAL
- 4.1. General
 - 4.1.1. If the two devices submitted for approval in pursuance of paragraph 2.2.4 above, meet the requirements of this Regulation, approval shall be granted. All the devices of an interdependent lamp system must be submitted for type approval by the same applicant.
 - 4.1.2. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations annexed to the 1958 Agreement, a single international approval mark may be applied provided that such lamps are not grouped, combined or reciprocally incorporated with a lamp or lamps not satisfying any one of these Regulations.
 - 4.1.3. An approval number shall be assigned to each type approved. Its first two digits (at present 01, corresponding to the 01 series of amendments which entered into force on 27 June 1987) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another type of device covered by this Regulation. Direction indicators of different categories may be marked with a single approval number when they form one assembly.

- 4.1.4. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a type of device pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement which apply this Regulation, by means of a form conforming to the model in Annex 2 to this Regulation.
- 4.1.5. Every device conforming to a type approved under this Regulation shall bear in the space referred to in paragraph 3.3 above, and in addition to the markings prescribed in paragraphs 3.1 and 3.2 or 3.4 respectively, an approval mark as described in paragraphs 4.2 and 4.3 below.
- 4.2. Composition of the approval mark
- The approval mark shall consist of:
- 4.2.1. An international approval marking, comprising:
- 4.2.1.1. A circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval⁽¹⁾;
- 4.2.1.2. The approval number prescribed in paragraph 4.1.3 above.
- 4.2.2. The following additional symbol (or symbols):
- 4.2.2.1. One or more of the numbers: 1, 1a, 1b, 2a, 2b, 5 or 6, according to whether the device belongs to one or more categories 1, 1a, 1b, 2a, 2b, 5 or 6 for which approval is sought in accordance with paragraph 2.1;
- 4.2.2.2. On devices which cannot be mounted on either side of the vehicle indiscriminately, a horizontal arrow showing in which position the device is to be mounted (the arrow shall be directed outwards from the vehicle in the case of devices of categories 1, 1a, 1b, 2a and 2b and towards the front of the vehicle in the case of devices of categories 3, 4, 5 and 6). In addition, for devices of category 6, an indication 'R' or 'L' shall in this case be shown on the device, indicating the right or left side of the vehicle;
- 4.2.2.3. To the right side of the symbol mentioned in paragraph 4.2.2.1; it shall be marked on each device:
- (a) the additional letter 'D', on devices which may be used as part of an assembly of two lamps;
- (b) the additional letter 'Y', on devices which may be used as part of an interdependent lamps system.
- 4.2.2.4. On devices with reduced light distribution in conformity to paragraph 2.1.3 of Annex 4 to this Regulation a vertical arrow starting from a horizontal segment and directed downwards;
- 4.2.2.5. The two digits of the approval number which indicate the series of amendments in force at the time of issue of the approval and, if necessary, the required arrow may be marked close to the above additional symbols.
- 4.2.2.6. The marks and symbols referred to in paragraphs 4.2.1 and 4.2.2 above shall be clearly legible and be indelible even when the device is fitted in the vehicle.

⁽¹⁾ The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to Consolidated Resolution on the Construction of Vehicles (R.E.3), document ECE/TRANS/WP.29/78/Rev.2.

4.3. Arrangement of the approval mark

4.3.1. Independent lamps

Annex 3, Figure 1, to this Regulation gives an example of arrangement of the approval mark with the abovementioned additional symbols.

If different types of lamps complying with the requirements of several Regulations, use the same outer lens having the same or different colour, a single international approval mark may be affixed, consisting of a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the lamp, provided that:

- 4.3.1.1. It is visible after their installation.
- 4.3.1.2. The identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval and if necessary, the required arrow shall be marked.
- 4.3.1.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks by the Regulation under which approval has been granted.
- 4.3.1.4. The main body of the lamp shall include the space described in paragraph 3.3 above and shall bear the approval mark of the actual function(s).
- 4.3.1.5. Figure 4 in Annex 3 to this Regulation gives examples of an approval mark with the abovementioned additional symbols.
- 4.3.2. Grouped, combined or reciprocally incorporated lamps
 - 4.3.2.1. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations, a single international approval mark may be applied consisting of a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the grouped, combined or reciprocally incorporated lamps, provided that:
 - 4.3.2.1.1. It is visible after the installation of the lamps;
 - 4.3.2.1.2. No part of the grouped, combined or reciprocally incorporated lamps that transmits light can be removed without at the same time removing the approval mark.
 - 4.3.2.2. An identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval and, if necessary, the required arrow shall be marked:
 - 4.3.2.2.1. Either on the appropriate light-emitting surface;
 - 4.3.2.2.2. Or in a group, in such a way that each lamp of the grouped, combined or reciprocally incorporated lamps may be clearly identified.

- 4.3.2.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks by the Regulation under which approval has been granted.
- 4.3.2.4. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of grouped, combined or reciprocally incorporated lamps covered by this Regulation.
- 4.3.2.5. Annex 3, Figure 2, to this Regulation gives examples of the arrangement of the approval marks for grouped, combined or reciprocally incorporated lamps with all the abovementioned additional symbols.
- 4.3.3. Lamps reciprocally incorporated with other lamps, of which the lens may also be used for other types of headlamps.
- The provisions laid down in paragraph 4.3.2 above are applicable.
- 4.3.3.1. In addition, where the same lens is used, the latter may bear the different approval marks relating to the different types of headlamps or units of lamps, provided that the main body of the headlamp, even if it cannot be separated from the lens, also comprises the space described in paragraph 3.3 above and bears the approval marks of the actual functions.
- If different types of headlamps comprise the same main body, the latter may bear the different approval marks.
- 4.3.3.2. Annex 3, Figure 3, to this Regulation gives examples of approval marks for lamps reciprocally incorporated with a headlamp.
- 4.4. The approval marking shall be clearly legible and indelible. It may be placed on an inner or outer part (transparent or not) of the device which cannot be separated from the transparent part of the device emitting the light. In any case the marking shall be visible when the device is fitted on the vehicle or when a movable part such as the hood or boot lid or a door is opened.

5. GENERAL SPECIFICATIONS

- 5.1. Each device supplied shall conform to the specifications set forth in paragraphs 6 and 8 below.
- 5.2. The devices must be so designed and constructed that under normal conditions of use and notwithstanding the vibrations to which they may be subjected in such use, their satisfactory operation remains assured and they retain the characteristics prescribed by this Regulation.
- 5.3. In the case of light source modules, it shall be checked that:
- 5.3.1. The design of the light source module(s) shall be such as:
- (a) that each light source module can only be fitted in no other position than the designated and correct one and can only be removed with the use of tool(s);
- (b) if there are more than one light source module used in the housing for a device, light source modules having different characteristics can not be interchanged within the same lamp housing.
- 5.3.2. The light source module(s) shall be tamperproof.

- 5.3.3. A light source module shall be so designed that regardless of the use of tool(s), it shall not be mechanically interchangeable with any replaceable approved light source.
- 5.4. In case of failure of the variable intensity control of a direction indicator of category 2b emitting more than the maximum value of category 2a, requirements of steady luminous intensity of category 2a shall be fulfilled automatically.
- 5.5. In the case of replaceable light source(s):
- 5.5.1. Any category or categories of light source(s) approved according to Regulation No 37 and/or Regulation No 128 may be used, provided that no restriction on the use is made in Regulation No 37 and its series of amendments in force at the time of application for type approval or in Regulation No 128 and its series of amendments in force at the time of application for type approval.
- 5.5.2. The design of the device shall be such that light source cannot be fixed in any other position but the correct one.
- 5.5.3. The light source holder shall conform to the characteristics given in IEC Publication 60061. The holder data sheet relevant to the category of light source used, applies.
- 5.6. For direction indicator lamps of categories 1, 1a, 1b, 2a or 2b the flash may be produced by sequential activation of their light sources if the following conditions are met:
- (a) each light source, after its activation, shall remain lit until the end of the ON cycle;
 - (b) the sequence of activation of the light sources shall proceed in a uniform progressive manner from inboard towards the outboard edge of the apparent surface;
 - (c) it shall be one continuous line with no repeating alternation in the vertical direction (e.g. no waves).
 - (d) the variation shall finish no more than 200 ms after the beginning of the ON cycle;
 - (e) for the orthogonal projection in the direction of the axis of reference of a rectangle, circumscribing the apparent surface of the direction indicator shall have its longer sides parallel to the H-plane, the ratio of the horizontal to the vertical sides shall not be less than 1,7.

Compliance to the conditions mentioned above shall be verified in flashing mode.

- 5.7. An interdependent lamp system shall meet the requirements when all its interdependent lamps are operated together.

However, if the interdependent lamp system providing the rear direction indicator function is partly mounted on the fixed component and partly mounted on a movable component, the interdependent lamp(s) specified by the applicant shall meet the geometric visibility, colorimetric and photometric requirement, at all fixed positions of the movable component(s). This does not apply to interdependent direction indicator lamp(s) intended for fitting on vehicle(s) where, to fulfil or complete the geometric visibility angle, additional lamps are activated when the movable component is in any fixed open position, provided that these additional lamps satisfy all the position, photometric and colorimetric requirements applicable to the direction indicator lamps installed on the movable component.

6. INTENSITY OF LIGHT EMITTED

- 6.1. The light emitted by each of the two devices supplied must be in the case of direction indicators of categories 1, 1a, 1b, 2a, 2b, in the reference axes, in the case of direction indicators of categories 5 or 6 in direction A according to Annex 1 of not less than the minimum intensity and of not more than the maximum intensity specified below:

Direction indicator of category	Minimum luminous intensity in cd	Maximum luminous intensity in cd when used as	
		Single lamp	Lamp (single) marked 'D' (see paragraph 4.2.2.3)
1	175	1 000	500
1a	250	1 200	600
1b	400	1 200	600
2a (steady)	50	500	250
2b (variable)	50	1 000	500
5	0,6	280	140
6	50	280	140

- 6.1.1. For an assembly of two or more direction indicator lamps the total intensity shall not exceed the maximum value.
- 6.1.2. When an assembly of two lamps marked 'D' having the same function is deemed to be a single lamp, it shall comply with the requirements for:
- (a) maximum intensity if all lamps together are lit;
 - (b) minimum intensity if one lamp has failed.
- 6.2. In case of failure of a single lamp, or of an interdependent lamp system of the categories 1, 1a, 1b, 2a and 2b, containing more than one light source, the following provisions shall apply:
- 6.2.1. A group of light sources, wired so that the failure of any one of them causes all of them to stop emitting light, shall be considered to be one light source.
- 6.2.2. A signal for activation of the tell-tale prescribed in paragraph 6.5.8 of Regulation No 48 shall be produced if:
- (a) any one light source has failed, or
 - (b) in the case of a lamp designed for only two filament light sources, the intensity in the axis of reference is less than 50 % of the minimum intensity, or
 - (c) as a consequence of a failure of one or more light sources, the intensity in one of the following directions as indicated in Annex 4 to this Regulation is less than the minimum intensity required:
 - (i) $H = 0^\circ$, $V = 0^\circ$
 - (ii) $H = 20^\circ$ to the outside of the vehicle, $V = +5^\circ$
 - (iii) $H = 10^\circ$ to the inside of the vehicle, $V = 0^\circ$.

- 6.3. Outside the reference axis, within the angular fields specified in the arrangement diagrams in Annex 1 to this Regulation, the intensity of the light emitted by each of the two devices supplied must:
- 6.3.1. In each direction corresponding to the points in the relevant table of luminous-intensity distribution reproduced in Annex 4 to this Regulation, be not less than the minimum specified in paragraph 6.1 above multiplied by the percentage specified in the said table for the direction in question;
- 6.3.1.1. In divergence from paragraphs 6.4 and 6.4.1, for categories 5 direction indicators, to the rear, a minimum value of 0,6 cd is required throughout the fields specified in Annex 1;
- 6.3.2. In no direction within the area from which the indicator lamp is visible, exceed the maximum specified in paragraph 6.1 above;
- 6.3.3. Moreover,
- 6.3.3.1. Throughout the fields defined in the diagrams in Annex 1, the intensity of the light emitted must be not less than 0,7 cd for devices of category 1b, not less than 0,3 cd for devices of categories 1, 1a, 2a and for those of category 2b by day; it shall not be less than 0,07 cd for devices of category 2b by night;
- 6.3.3.2. The provisions of paragraph 2.2 of Annex 4 to this Regulation on local variations of intensity must be observed.
- 6.4. In general the intensities shall be measured with the light source(s) continuously alight.

However, depending on the construction of the device, for example, the use of light-emitting diodes (LEDs), or the need to take precautions to avoid overheating, it is allowed to measure the lamps in flashing mode.

This must be achieved by switching with a frequency of $f = 1,5 \pm 0,5$ Hz with the pulse width greater than 0,3 s, measured at 95 % peak light intensity.

In the case of replaceable filament lamps, the filament lamps shall be operated at reference luminous flux during on time.

In the case of LED light sources all measurements shall be made at 6,75 V, 13,5 V or 28,0 V; the luminous flux value produced during on time shall be corrected. The correction factor is the ratio between the objective luminous flux and the value of the luminous flux during on time found at the voltage applied.

In all other cases the voltage as required in paragraph 7.1.1 shall be switched with a rise time and fall time shorter than 0,01 s; no overshoot is allowed.

In the case of measurements taken in flashing mode the reported luminous intensity shall be represented by the maximum intensity.

- 6.5. In the case of devices of category 2b the time that elapses between energising the light source(s) and the light output measured on the reference axis to reach 90 % of the value measured in accordance with paragraph 6.3 above shall be measured for the extreme levels of luminous intensity produced by the direction indicator. The time measured to obtain the lowest luminous intensity shall not exceed the time measured to obtain the highest luminous intensity.

- 6.6. The variable intensity control shall not generate signals which cause luminous intensities:
- 6.6.1. Outside the range specified in paragraph 6.1 above; and
- 6.6.2. Exceeding the category 2a maximum specified in paragraph 6.1:
- (a) for systems depending only on daytime and night-time conditions: under night-time conditions;
- (b) for other systems: under reference conditions as demonstrated by the manufacturer ⁽¹⁾.
- 6.7. Annex 4, referred to in paragraph 6.3.1 above, gives particulars of the measurement methods to be used.
7. TEST PROCEDURE
- 7.1. All measurements, photometric and colorimetric, shall be made:
- 7.1.1. In the case of a lamp with replaceable light source, if not supplied by an electronic light source control gear or a variable intensity control, with an uncoloured or coloured standard light source of the category prescribed for the device; supplied with the voltage:
- (a) in the case of filament lamp(s), it is necessary to produce the reference luminous flux required for that category of filament lamp;
- (b) in the case of LED light source(s) of 6,75 V, 13,5 V or 28,0 V; the luminous flux value produced shall be corrected. The correction factor is the ratio between the objective luminous flux and the mean value of the luminous flux found at the voltage applied.
- 7.1.2. In the case of a lamp equipped with non-replaceable light sources (filament lamps and other), at 6,75 V, 13,5 V or 28,0 V respectively.
- 7.1.3. In the case of a system that uses an electronic light source control gear or a variable intensity control, being part of the lamp ⁽²⁾ applying at the input terminals of the lamp the voltage declared by the manufacturer or, if not indicated, 6,75 V, 13,5 V or 28,0 V respectively.
- 7.1.4. In the case of a system that uses an electronic light source control gear or a variable intensity control, not being part of the lamp with the voltage declared by the manufacturer applied to the input terminals of the lamp.
- 7.2. However in the case of a direction indicator of category 2b operated by a variable intensity control to obtain variable luminous intensity, photometric measurements shall be performed according to the applicant's description.
- 7.3. The test laboratory shall require from the manufacturer the light source control gear or a variable intensity control needed to supply the light source and the applicable functions.

⁽¹⁾ Good visibility (meteorological optical range MOR > 2 000 m defined according to WMO, Guide to Meteorological Instruments and Methods of Observation, Sixth Edition, ISBN: 92-63-16008-2, pp. 1.9.1/1.9.11, Geneva 1996) and clean lens.

⁽²⁾ For the purpose of this Regulation 'being part of the lamp' means to be physically included in the lamp body or to be external, separated or not, but supplied by the lamp manufacturer as part of the lamp system.

7.4. The voltage to be applied to the lamp shall be noted in the communication form in Annex 2 of this Regulation.

7.5. The limits of the apparent surface in the direction of the reference axis of a direction indicator shall be determined. However, in the case of category 5 and 6 direction indicators, the limits of the light emitting surface shall be determined.

8. COLOUR OF LIGHT EMITTED

The colour of the light emitted inside the field of the light distribution grid defined in paragraph 2 of Annex 4 shall be amber. Outside this field, no sharp variation of colour shall be observed. To check these colorimetric characteristics, the test procedure described in paragraph 7 of this Regulation shall be applied. These requirements shall also apply within the range of variable luminous intensity produced by direction indicators of category 2b.

However, for lamps equipped with non-replaceable light sources (filament lamps and other), the colorimetric characteristics should be verified with the light sources present in the lamp, in accordance with relevant subparagraphs of paragraph 7.1 of this Regulation.

9. MODIFICATIONS OF A TYPE OF DIRECTION INDICATOR FOR MOTOR VEHICLES AND THEIR TRAILERS AND EXTENSION OF APPROVAL

9.1. Every modification of a type of direction indicator shall be notified to the Type Approval Authority which approved the type. The department may then either:

9.1.1. Consider that the modifications made are unlikely to have an appreciable adverse effect and that in any case the device still complies with the requirements; or

9.1.2. Require a further test report from the technical service responsible for conducting the tests.

9.2. Confirmation or refusal of approval, specifying the alterations, shall be communicated by the procedure specified in paragraph 4.1.4 above to the Parties to the Agreement applying this Regulation.

9.3. The Competent Authority issuing the extension of approval shall assign a series number for such an extension and inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 2 to this Regulation.

10. CONFORMITY OF PRODUCTION

The conformity of production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/324-E/ECE/TRANS/505/Rev.2), with the following requirements:

10.1. Direction indicators approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 6 and 8 above.

10.2. The minimum requirements for conformity of production control procedures set forth in Annex 5 to this Regulation shall be complied with.

10.3. The minimum requirements for sampling by an inspector set forth in Annex 6 to this Regulation shall be complied with.

10.4. The authority which has granted type approval may at any time verify the conformity control methods applied in each production facility. The normal frequency of these verifications shall be once every two years.

11. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

11.1. The approval granted in respect of a device pursuant to this Regulation may be withdrawn if the foregoing requirements are not met.

11.2. If a Contracting Party to the Agreement which applies this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in Annex 2 to this Regulation.

12. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a device approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication, that authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 2 to this Regulation.

13. NAMES AND ADDRESSES OF TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF TYPE APPROVAL AUTHORITIES

The Parties to the 1958 Agreement which apply this Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Type Approval Authorities which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

14. TRANSITIONAL PROVISIONS

14.1. As from the official date of entry into force of Supplement 8 to the 01 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by Supplement 8 to the 01 series of amendments.

14.2. As from 24 months after the date of entry into force, Contracting Parties applying this Regulation shall grant ECE approvals only if the type of direction indicator to be approved meets the requirements of this Regulation as amended by Supplement 8 to the 01 series of amendments.

14.3. Contracting Parties applying this Regulation shall not refuse to grant extensions of approval to the preceding series of amendments to this Regulation.

14.4. Contracting Parties applying this Regulation shall continue to grant approvals to those types of direction indicators which comply with the requirements of this Regulation as amended by the preceding series of amendments during the 12-month period which follows the date of entry into force of Supplement 8 to the 01 series of amendments.

14.5. ECE approvals granted under this Regulation earlier than 12 months after the date of entry into force and all extensions of approvals, including those to a preceding series of amendments to this Regulation granted subsequently, shall remain valid indefinitely. When the type of direction indicator approved to the preceding series of amendments meets the requirements of this Regulation as amended by Supplement 8 to the 01 series of amendments, the Contracting Party which granted the approval shall notify the other Contracting Parties applying this Regulation thereof.

14.6. No Contracting Party applying this Regulation shall refuse a type of direction indicator approved to Supplement 8 to the 01 series of amendments to this Regulation.

14.7. Until 36 months after the date of entry into force of Supplement 8 to the 01 series of amendments to this Regulation, no Contracting Party applying this Regulation shall refuse a type of direction indicator approved to the preceding series of amendments to this Regulation.

-
- 14.8. Starting 36 months after the date of entry into force of Supplement 8 to the 01 series of amendments to this Regulation, Contracting Parties applying this Regulation may refuse the sale of a type of direction indicator which does not meet the requirements of Supplement 8 to the 01 series of amendments to this Regulation unless the direction indicator is intended as a replacement for fitting on vehicles in use.
- 14.9. Contracting Parties applying this Regulation shall continue to issue approvals for direction indicators on the basis of any previous series of amendments, provided that the direction indicators are intended as replacements for fitting to vehicles in use.
- 14.10. As from the official date of entry into force of Supplement 8 to the 01 series of amendments, no Contracting Party applying this Regulation shall prohibit the fitting on a vehicle of a direction indicator approved under this Regulation as amended by Supplement 8 to the 01 series of amendments.
- 14.11. Contracting Parties applying this Regulation shall continue to allow the fitting on a vehicle of a direction indicator approved to this Regulation as amended by the preceding series of amendments during the 48-month period which follows the date of entry into force of Supplement 8 to the 01 series of amendments.
- 14.12. Upon the expiration of a period of 48 months after the date of entry into force of Supplement 8 to the 01 series of amendments, Contracting Parties applying this Regulation may prohibit the fitting of a direction indicator which does not meet the requirements of this Regulation as amended by Supplement 8 to the 01 series of amendments on a new vehicle for which national type or individual approval was granted more than 24 months after the date of entry into force of Supplement 8 to the 01 series of amendments to this Regulation.
- 14.13. Upon the expiration of a period of 60 months after the date of entry into force, Contracting Parties applying this Regulation may prohibit the fitting of a direction indicator which does not meet the requirements of this Regulation as amended by Supplement 8 to the 01 series of amendments on a new vehicle first registered more than 60 months after the date of entry into force of Supplement 8 to the 01 series of amendments to this Regulation.
- 14.14. Existing approvals to direction indicator lamps of the categories 3 and 4 approved under this Regulation prior to the introduction of Supplement 16 to the 01 series of amendments, shall remain valid indefinitely.
-

ANNEX 1

Categories of direction indicators: Minimum angles required for light distribution in space of these categories of direction indicators ⁽¹⁾

In all cases, the minimum vertical angles of light distribution in space of direction indicator lamps are 15° above and 15° below the horizontal except:

- (a) direction indicator lamps intended to be installed with the H plane of the lamp at a mounting height of less than 750 mm above the ground, for which they are 15° above and 5° below the horizontal;
- (b) optional direction indicator lamps intended to be installed with the H plane of the lamp at a mounting height of more than 2 100 mm above the ground, for which they are 5° above and 15° below the horizontal;
- (c) direction indicator lamps of Category 6.

Minimum horizontal visibility angles

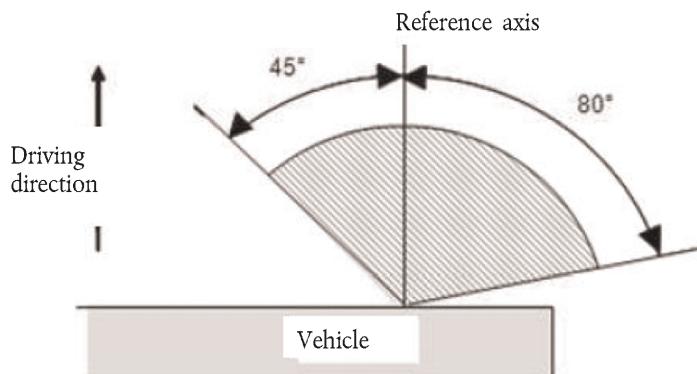
Direction indicators for the front of the vehicle

Category 1: For use at a distance not less than 40 mm from the dipped-beam headlamp and/or the front fog lamp;

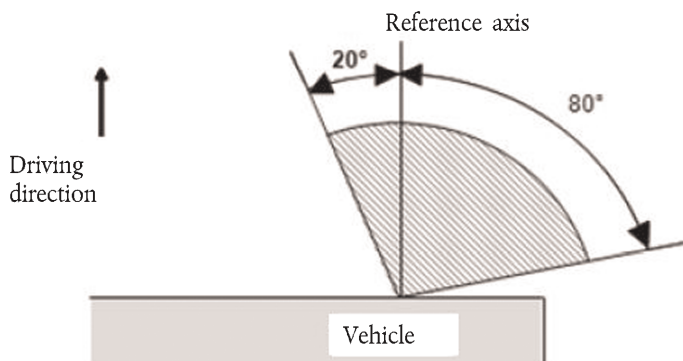
Category 1a: For use at a distance greater than 20 mm but less than 40 mm from the dipped-beam headlamp and/or the front fog lamp;

Category 1b: For use at a distance less than or equal to 20 mm from the dipped-beam headlamp and/or the front fog lamp.

On and above the H plane for all lamps. Under the H plane for lamps intended for M₂, M₃, N₂ or N₃ category of vehicles



Under the H plane for M₁ and N₁ category of vehicles



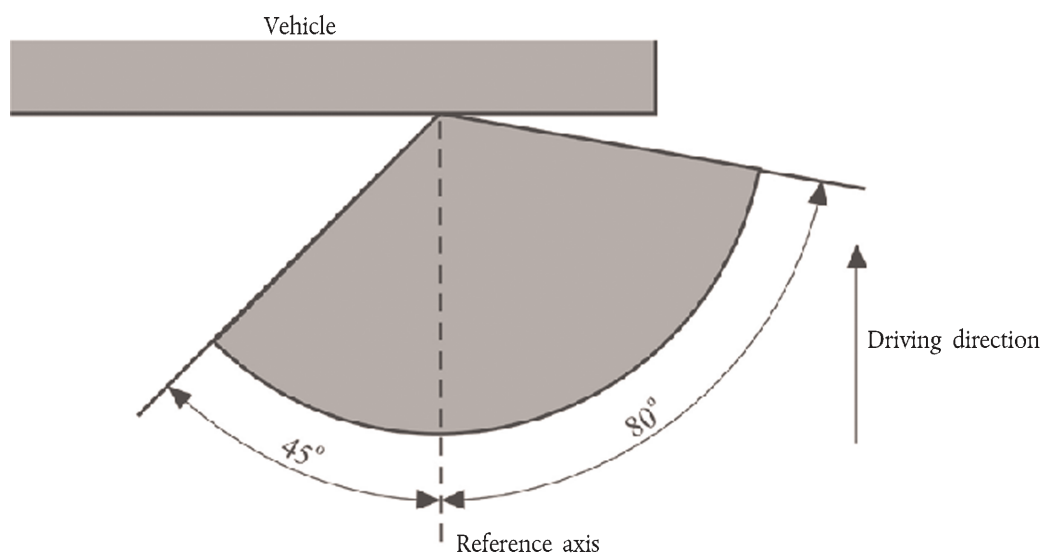
⁽¹⁾ The angles shown in these arrangements are correct for devices to be mounted on the right side of the vehicle. The arrows in these diagrams point towards the front of the vehicle.

H plane: 'horizontal plane going through the reference centre of the lamp'

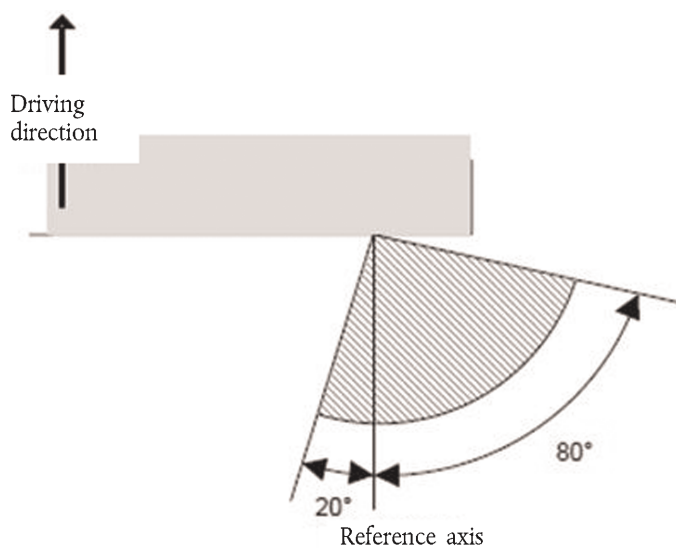
Categories 2a and 2b: Direction indicators for the rear of the vehicle

Category 2a: Rear direction indicator lamps with steady luminous intensity

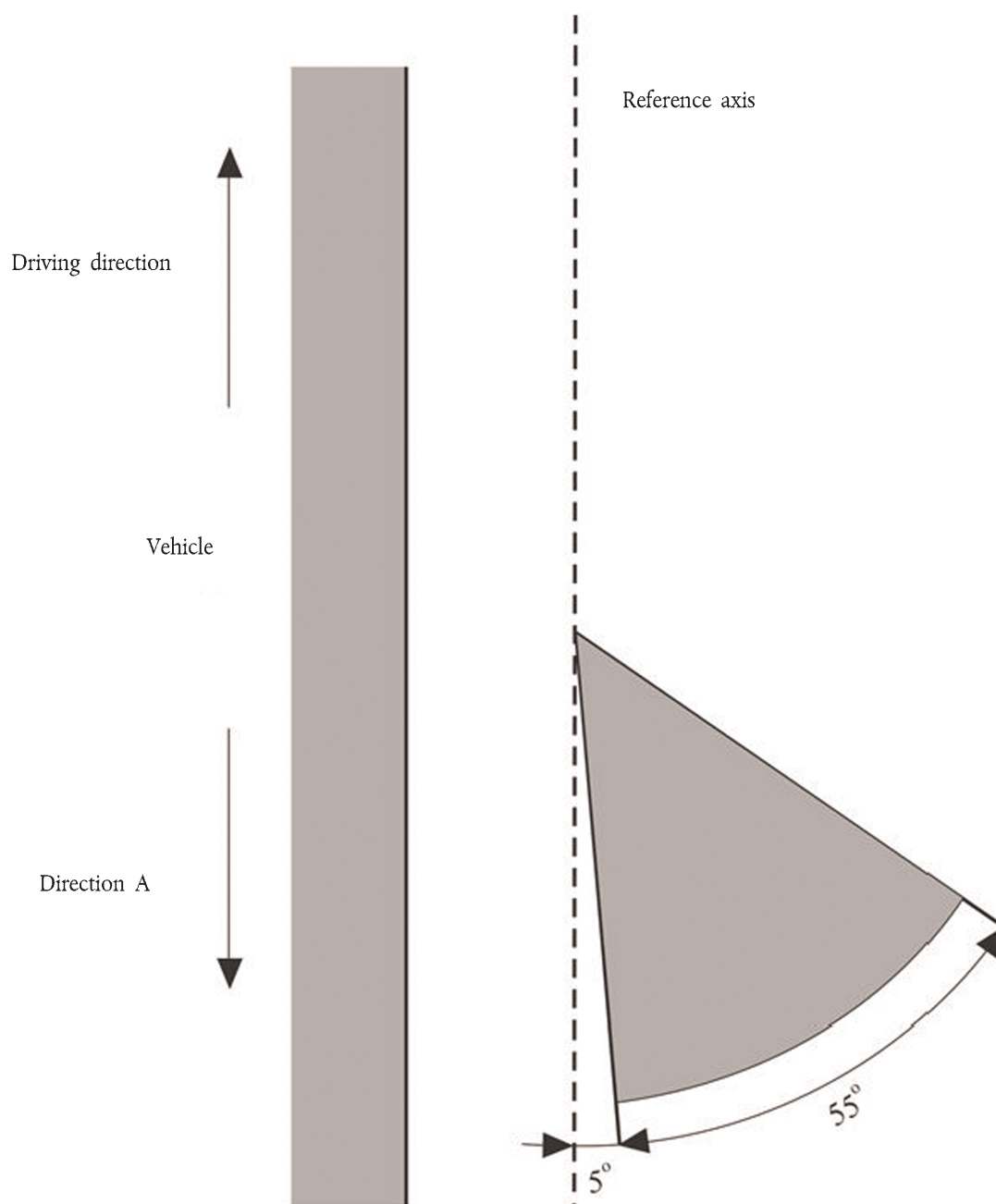
Category 2b: Rear direction indicator lamps with variable luminous intensity



Under the H plane for lamps intended to be installed with this plane at a mounting height less than 750 mm above the ground.



Categories 5 and 6: Supplementary side direction indicators for use on a vehicle also equipped with categories 1, 1a or 1b and 2a or 2b direction indicators



ANNEX 2

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration

.....

.....

.....

Concerning ⁽²⁾:

- Approval granted
- Approval extended
- Approval refused
- Approval withdrawn
- Production definitively discontinued

of a type of direction indicator pursuant to Regulation No 6

Approval No

Extension No

1. Trade name or mark of the device
2. Manufacturer's name for the type of device:
3. Manufacturer's name and address:
4. If applicable, name and address of the manufacturer's representative:
5. Submitted for approval on:
6. Technical service responsible for conducting approval tests:
7. Date of test report issued by that service:
8. Number of test report issued by that service:
9. Concise description:

Category: 1, 1a, 1b, 2a, 2b, 3, 4, 5, 6 ⁽²⁾

Number, category:

Function(s) produced by an interdependent lamp forming part of an interdependent lamps system:

Voltage and wattage:

Light source module specific identification code:

Only for limited mounting height of equal to or less than 750 mm above the ground: yes/no ⁽²⁾

Geometrical conditions of installation and relating variations, if any:

Application of an electronic light source control gear/variable intensity control:

(a) Being part of the lamp: yes/no ⁽²⁾(b) Being not part of the lamp: yes/no ⁽²⁾

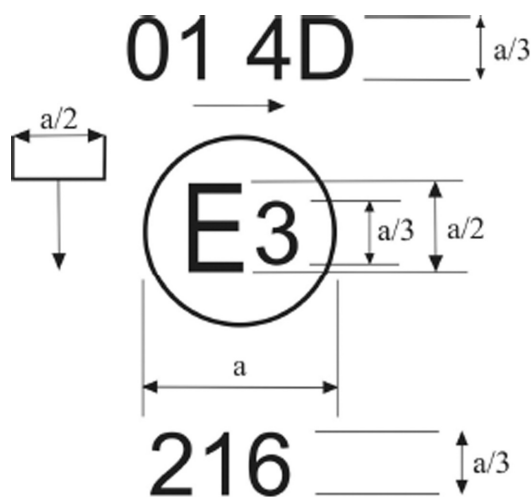
- Input voltage(s) supplied by an electronic light source control gear/variable intensity control:
- Electronic light source control gear/variable intensity control manufacturer and identification number (when the light source control gear is part of the lamp but is not included into the lamp body):
- Variable luminous intensity: yes/no ⁽²⁾
- Sequential activation of light sources
(see paragraph 5.6 of this Regulation): yes/no ⁽²⁾
10. Position of the approval mark:
11. Reason(s) for extension (if applicable):
12. Approval granted/extended/refused/withdrawn ⁽²⁾:
13. Place:
14. Date:
15. Signature:
16. The list of documents deposited with the Administrative Service which has granted approval is annexed to this communication and may be obtained on request
-

⁽¹⁾ Distinguishing number of the country which has granted/extended/refused/withdrawn an approval (see approval provisions in the Regulation).

⁽²⁾ Strike out what does not apply.

ANNEX 3

EXAMPLES OF ARRANGEMENTS OF THE APPROVAL MARKS



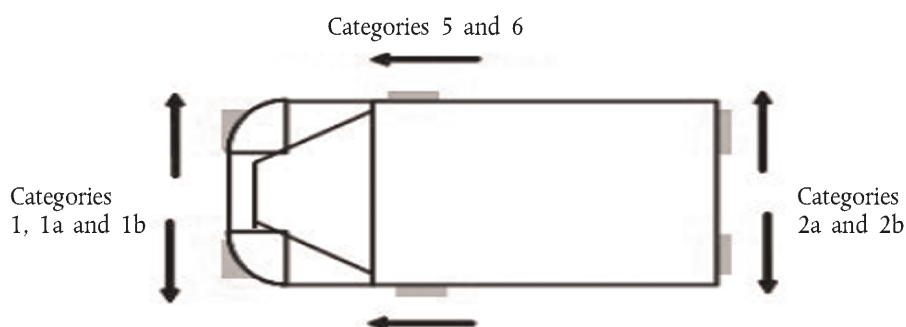
$a = 5 \text{ mm min.}$

The device bearing the approval marking shown above is a category 4 device (front-side direction indicator) approved in Italy (E3) under No 216, which may also be used in an assembly of two lamps. The horizontal arrow shows in what position this device, which cannot be mounted on either side of the vehicle indiscriminately, is to be mounted. The arrow points towards the front of the vehicle. The vertical arrow starting from a horizontal segment and directed downwards indicates a permissible mounting height of equal to or less than 750 mm from the ground for this device.

The number mentioned close to the symbol '4D' indicates that the approval was granted according to the requirements of Regulation No 6 as amended by the 01 series of amendments.

The direction in which the arrows on the approval mark point, according to the category of the device, is shown below:

Figure 1



Note: The approval number and the additional symbols shall be placed close to the circle and either above or below the letter 'E', or to the right or left of that letter. The digits of the approval number shall be on the same side of the letter 'E' and face the same direction. The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

Figure 2

Simplified marking of grouped, combined or reciprocally incorporated lamps when two or more lamps are part of the same assembly

The vertical and horizontal lines schematise the shape of the light-signalling device. These are not part of the approval mark.

Model A

	3333 E4 → A02		2b01	R201
	F200		AR00	S201

Model B

		A02 F200 3333 E4 →	2b01 AR00	R201 S201

Model C

IA02 F200 3333 E4 →			

Note: The three examples of approval marks shown above (models A, B and C) represent three possible variables for the marking of a lighting device when two or more lamps are part of the same assembly of grouped, combined or reciprocally incorporated lamps.

They indicate that the device was approved in the Netherlands (E4) under number 3333 and comprises:

A rear direction indicator lamp with variable luminous intensity (category 2b) approved in accordance with the 01 series of amendments to Regulation No 6;

A red rear position (side) lamp with variable luminous intensity (R2) approved in accordance with the 01 series of amendments to Regulation No 7;

A rear fog lamp with variable luminous intensity (F2) approved in accordance with Regulation No 38 in its original version;

A reversing lamp (AR) approved in accordance with Regulation No 23 in its original version;

A stop lamp with variable luminous intensity (S2) approved in accordance with the 01 series of amendments to Regulation No 7.

		02 B	01 1a
--	--	------	-------

	01 A 02 HCR 02 B 01 1a → ↔ 		
--	---	--	--

A 01	HCR 02	B 02	1a 01			
 17120						

Note: The three examples shown above correspond to a lighting device bearing an approval mark relating to:

A front position lamp approved in accordance with the 01 series of amendments to Regulation No 7;

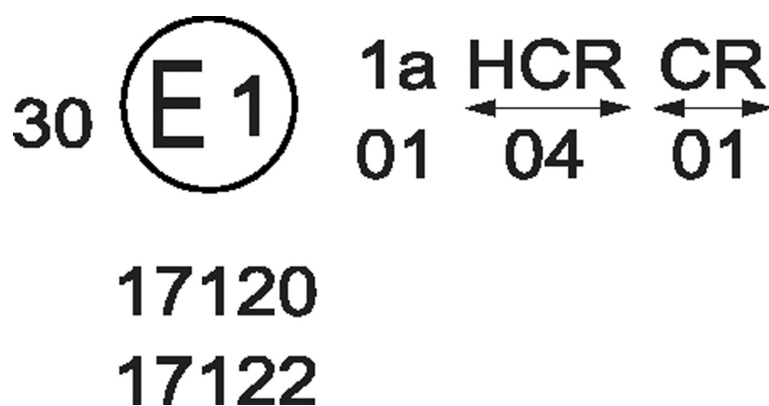
A headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas, approved in accordance with the 02 series of amendments to Regulation No 20;

A front fog lamp approved in accordance with the 02 series of amendments to Regulation No 19;

A front direction indicator lamp of category 1a approved in accordance with the 01 series of amendments to Regulation No 6.

Figure 3

Lamp reciprocally incorporated with a headlamp



The above example corresponds to the marking of a lens intended to be used in different types of headlamps, namely:

Either: A headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 101 250 candelas, approved in Germany (E1) in accordance with the requirements of Regulation No 8 as amended by the 04 series of amendments; which is reciprocally incorporated with a front direction indicator approved in accordance with the 01 series of amendments to Regulation No 6;

Or: A headlamp with a passing beam designed for right-hand and left-hand traffic and a driving beam, approved in Germany (E1) in accordance with the requirements of Regulation No 1 as amended by the 01 series of amendments, which is reciprocally incorporated with the same front direction indicator as above;

Or even: Either of the abovementioned headlamps approved as a single lamp.

The main body of the headlamp shall bear the only valid approval number, for instance:

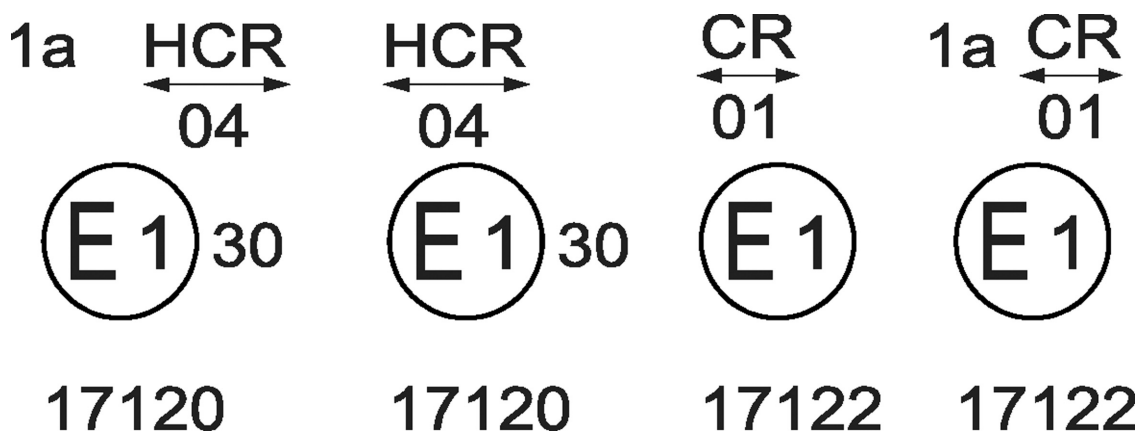
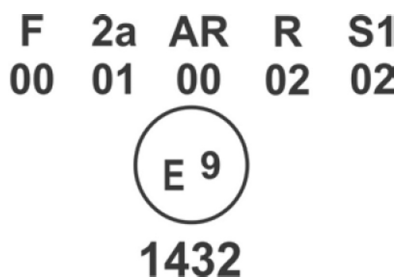


Figure 4

Marking of independent lamps



The above example corresponds to the marking of a lens intended to be used in different types of lamps. The approval marks indicate that the device was approved in Spain (E9) under approval number 1432 and comprises:

A rear fog lamp (F) approved in accordance with Regulation No 38 in its original version;

A rear direction indicator lamp of category 2a approved in accordance with the 01 series of amendments to Regulation No 6;

A reversing lamp (AR) approved in accordance with Regulation No 23 in its original version;

A red rear position (side) lamp (R) approved in accordance with the 02 series of amendments to Regulation No 7;

A stop lamp with one level of illumination (S1) approved in accordance with the 02 series of amendments to Regulation No 7.

Light source modules

MD E3 17325

The light source module bearing the identification code shown above has been approved together with a lamp approved in Italy (E3) under approval number 17325.

Marking of interdependent lamps

2aY R1 S1
01 02 02



3223

Marking of an interdependent lamp comprising part of an interdependent lamp system providing:

A rear direction indicator lamp (category 2a) approved in accordance with the 01 series of amendments to Regulation No 6. This is also marked Y as it is an interdependent lamp forming part of an interdependent lamp system,

A rear fog lamp with variable luminous intensity (F2) approved in accordance with Regulation No 38 in its original version.

2aY F2
01 00



3223

Marking of an interdependent lamp comprising part of an interdependent lamp system providing:

A rear direction indicator lamp (category 2a) approved in accordance with the 01 series of amendments to Regulation No 6. This is also marked Y as it is an interdependent lamp forming part of an interdependent lamp system,

A red rear position (side) lamp (R1) approved in accordance with the 02 series of amendments to Regulation No 7,

A stop lamp (S1) approved in accordance with Regulation No 7 in its original version.

ANNEX 4

PHOTOMETRIC MEASUREMENTS

1. MEASUREMENT METHODS

1.1. During photometric measurements, stray reflections shall be avoided by appropriate masking.

1.2. In case the results of measurements should be challenged, measurements shall be carried out in such a way as to meet the following requirements:

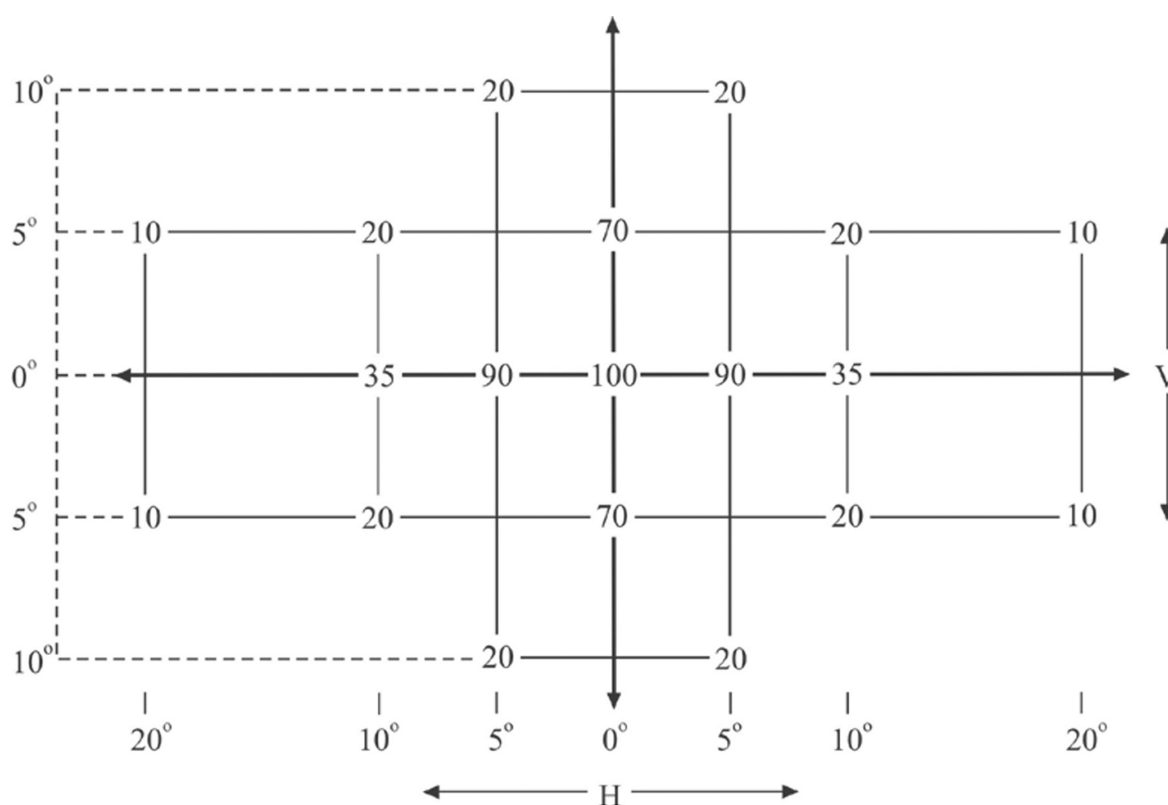
1.2.1. The distance of measurement shall be such that the law of the inverse of the square of the distance is applicable;

1.2.2. The measuring equipment shall be such that the angular aperture of the receiver viewed from the reference centre of the light is comprised between 10' and 1 degree;

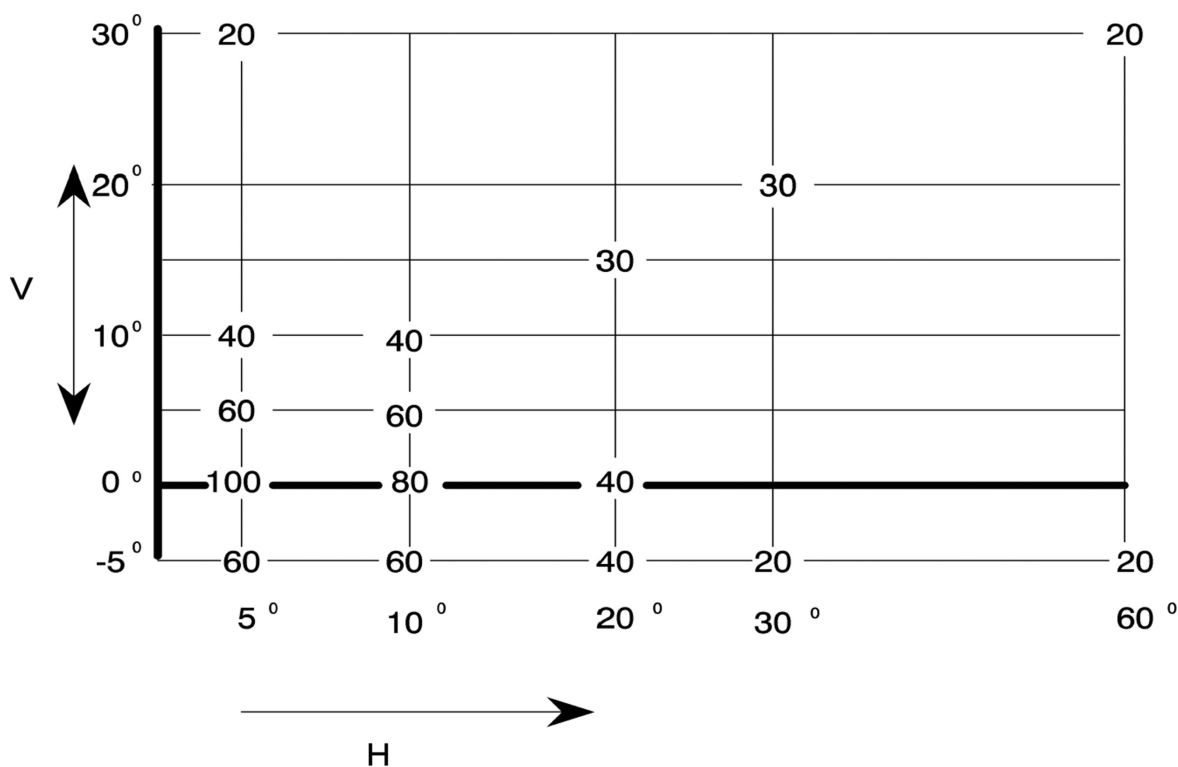
1.2.3. The intensity requirement for a particular direction of observation shall be deemed to be satisfied if that requirement is met in a direction deviating by not more than one-quarter of a degree from the direction of observation.

1.3. In the case where the device may be installed on the vehicle in more than one or in a field of different positions the photometric measurements shall be repeated for each position or for the extreme positions of the field of the reference axis specified by the manufacturer.

2. TABLE OF STANDARD LIGHT DISTRIBUTION IN SPACE FOR DIRECTION INDICATOR LAMPS OF CATEGORIES 1, 1A, 1B, 2A, 2B.



For direction indicators of category 6



(outer side of the vehicle)

2.1. The direction $H = 0^\circ$ and $V = 0^\circ$ corresponds to the reference axis. (On the vehicle, it is horizontal, parallel to the median longitudinal plane of the vehicle and oriented in the required direction of visibility.) It passes through the centre of reference. The values shown in the tables give, for the various directions of measurement, the minimum intensities as a percentage of the minimum intensities required in the table in paragraph 6.1:

2.1.1. In the direction $H = 0^\circ$ and $V = 0^\circ$ for categories 1, 1a, 1b, 2a, 2b and in the case of category 5 in the angular area in the direction A as prescribed in Annex 1;

2.1.2. In the direction $H = 5^\circ$ and $V = 0^\circ$ for category 6.

2.1.3. However, in the case where a device is intended to be installed with its H plane at a mounting height less than 750 mm above the ground, the photometric intensity is verified only up to an angle of 5° downwards.

2.2. Within the field of light distribution of paragraph 2, schematically shown as a grid, the light pattern should be substantially uniform, i.e. in so far as the light intensity in each direction of a part of the field formed by the grid lines shall meet at least the lowest minimum value being shown on the grid lines surrounding the questioned direction as a percentage.

3. PHOTOMETRIC MEASUREMENT OF LAMPS

The photometric performance shall be checked:

3.1. For non-replaceable light sources (filament lamps and other):

With the light sources present in the lamp, in accordance with the relevant subparagraph of paragraph 7.1 of this Regulation.

3.2. For replaceable light source(s):

When equipped with filament lamps at 6,75 V, 13,5 V or 28,0 V, the luminous intensity values produced shall be corrected. The correction factor is the ratio between the reference luminous flux and the mean value of the luminous flux found at the voltage applied (6,75 V, 13,5 V or 28,0 V).

For LED light sources the correction factor is the ratio between the objective luminous flux and the mean value of the luminous flux found at the voltage applied (6,75 V, 13,5 V or 28,0 V).

The actual luminous fluxes of each light source used shall not deviate more than 5 % from the mean value. Alternatively and in case of filament lamps only, a standard filament lamp may be used in turn, in each of the individual positions, operated at its reference flux, the individual measurements in each position being added together.

- 3.3. For any direction indicator lamp except those equipped with filament lamp(s), the luminous intensities measured after one minute and after 30 minutes of operation in flashing mode ($f = 1,5$ Hz, duty factor 50 %), shall comply with the minimum and maximum requirements. The luminous intensity distribution after one minute of operation can be calculated by applying at each test point the ratio of luminous intensity measured in HV after one minute and after 30 minutes of operation as above described.
-

ANNEX 5

MINIMUM REQUIREMENTS FOR CONFORMITY OF PRODUCTION CONTROL PROCEDURES

1. GENERAL

- 1.1. The conformity requirements shall be considered satisfied from a mechanical and geometric standpoint, if the differences do not exceed inevitable manufacturing deviations within the requirements of this Regulation.
- 1.2. With respect to photometric performances, the conformity of mass-produced lamps shall not be contested if, when testing photometric performances of any lamp chosen at random according to paragraph 7 of this Regulation:
 - 1.2.1. No measured value deviates unfavourably by more than 20 % from the values prescribed in this Regulation.
 - 1.2.2. If, in the case of a direction indicator equipped with a replaceable light source and if results of the test described above do not meet the requirements, tests on direction indicators shall be repeated using another standard light source.
- 1.3. The chromaticity coordinates shall be complied when tested under conditions of paragraph 7 of this Regulation.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of direction indicator the holder of the approval mark shall carry out at least the following tests, at appropriate intervals. The tests shall be carried out in accordance with the provisions of this Regulation.

If any sampling shows non-conformity with regard to the type of test concerned, further samples shall be taken and tested. The manufacturer shall take steps to ensure the conformity of the production concerned.

2.1. Nature of tests

Tests of conformity in this Regulation shall cover the photometric and colorimetric characteristics.

2.2. Methods used in tests

- 2.2.1. Tests shall generally be carried out in accordance with the methods set out in this Regulation.
- 2.2.2. In any test of conformity carried out by the manufacturer, equivalent methods may be used with the consent of the competent authority responsible for approval tests. The manufacturer is responsible for proving that the applied methods are equivalent to those laid down in this Regulation.
- 2.2.3. The application of paragraphs 2.2.1 and 2.2.2 requires regular calibration of test apparatus and its correlation with measurements made by a competent authority.
- 2.2.4. In all cases the reference methods shall be those of this Regulation, particularly for the purpose of administrative verification and sampling.

2.3. Nature of sampling

Samples of direction indicators shall be selected at random from the production of a uniform batch. A uniform batch means a set of direction indicators of the same type, defined according to the production methods of the manufacturer.

The assessment shall in general cover series production from individual factories. However, a manufacturer may group together records concerning the same type from several factories, provided these operate under the same quality system and quality management.

2.4. Measured and recorded photometric characteristics

The sampled lamp shall be subjected to photometric measurements for the minimum values at the points listed in Annex 4, and the required chromaticity coordinates.

2.5. Criteria governing acceptability

The manufacturer is responsible for carrying out a statistical study of the test results and for defining, in agreement with the competent authority, criteria governing the acceptability of his products in order to meet the specifications laid down for verification of conformity of products in paragraph 10.1 of this Regulation.

The criteria governing the acceptability shall be such that, with a confidence level of 95 %, the minimum probability of passing a spot check in accordance with Annex 6 (first sampling) would be 0,95.

ANNEX 6

MINIMUM REQUIREMENTS FOR SAMPLING BY AN INSPECTOR

1. GENERAL

1.1. The conformity requirements shall be considered satisfied from a mechanical and a geometric standpoint, in accordance with the requirements of this Regulation, if any, if the differences do not exceed inevitable manufacturing deviations.

1.2. With respect to photometric performances, the conformity of mass-produced lamps shall not be contested if, when testing photometric performances of any lamp chosen at random according to paragraph 7 of this Regulation:

1.2.1. No measured value deviates unfavourably by more than 20 % from the values prescribed in this Regulation.

1.2.2. If, in the case of a direction indicator equipped with a replaceable light source and if results of the test described above do not meet the requirements, tests on direction indicators shall be repeated using another standard light source.

1.2.3. Direction indicators with apparent defects are disregarded.

1.3. The chromaticity coordinates shall be complied when tested under conditions of paragraph 7 of this Regulation.

2. FIRST SAMPLING

In the first sampling four direction indicators are selected at random. The first sample of two is marked A, the second sample of two is marked B.

2.1. The conformity is not contested

2.1.1. Following the sampling procedure shown in Figure 1 of this annex the conformity of mass-produced direction indicators shall not be contested if the deviation of the measured values of the direction indicators in the unfavourable directions are:

2.1.1.1. Sample A

A1:	One direction indicator	0 %
	One direction indicator not more than	20 %
A2:	Both direction indicators more than	0 %
	But not more than	20 %
	Go to sample B	

2.1.1.2. Sample B

B1:	Both direction indicators	0 %
-----	---------------------------	-----

2.1.2. Or if the conditions of paragraph 1.2.2 for sample A are fulfilled.

2.2. The conformity is contested

2.2.1. Following the sampling procedure shown in Figure 1 of this annex the conformity of mass-produced direction indicators shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the direction indicators are:

2.2.1.1. Sample A

A3: One direction indicator not more than	20 %
One direction indicator more than	20 %
But not more than	30 %

2.2.1.2. Sample B

B2: On the case of A2	
One direction indicator more than	0 %
But not more than	20 %
One direction indicator not more than	20 %
B3: On the case of A2	
One direction indicator	0 %
One direction indicator more than	20 %
But not more than	30 %

2.2.2. Or if the conditions of paragraph 1.2.2 for sample A are not fulfilled.

2.3. Approval withdrawn

Conformity shall be contested and paragraph 11 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the direction indicators are:

2.3.1. Sample A

A4: One direction indicator not more than	20 %
One direction indicator more than	30 %
A5: Both direction indicators more than	20 %

2.3.2. Sample B

B4: In the case of A2	
One direction indicator more than	0 %
But not more than	20 %
One direction indicator more than	20 %

B5: In the case of A2

Both direction indicators more than 20 %

B6: In the case of A2

One direction indicator 0 %

One direction indicator more than 30 %

2.3.3. Or if the conditions of paragraph 1.2.2 for samples A and B are not fulfilled.

3. REPEATED SAMPLING

In the cases of A3, B2, B3 a repeated sampling, third sample C of two direction indicators and fourth sample D of two direction indicators, selected from stock manufactured after alignment, is necessary within two months' time after the notification.

3.1. The conformity is not contested

3.1.1. Following the sampling procedure shown in Figure 1 of this annex the conformity of mass-produced direction indicators shall not be contested if the deviations of the measured values of the direction indicators are:

3.1.1.1. Sample C

C1: One direction indicator 0 %

One direction indicator not more than 20 %

C2: Both direction indicators more than 0 %

But not more than 20 %

Go to sample D

3.1.1.2. Sample D

D1: In the case of C2

Both direction indicators 0 %

3.1.2. Or if the conditions of paragraph 1.2.2 for sample C are fulfilled.

3.2. The conformity is contested

3.2.1. Following the sampling procedure shown in Figure 1 of this annex the conformity of mass-produced direction indicators shall be contested and the manufacturer requested to make his production meet the requirements (alignment) if the deviations of the measured values of the direction indicators are:

3.2.1.1. Sample D

D2: In the case of C2

One direction indicator more than 0 %

But not more than 20 %

One direction indicator not more than 20 %

3.2.1.2. Or if the conditions of paragraph 1.2.2 for sample C are not fulfilled.

3.3. Approval withdrawn

Conformity shall be contested and paragraph 11 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the direction indicators are:

3.3.1. Sample C

C3: One direction indicator not more than 20 %

One direction indicator more than 20 %

C4: Both direction indicators more than 20 %

3.3.2. Sample D

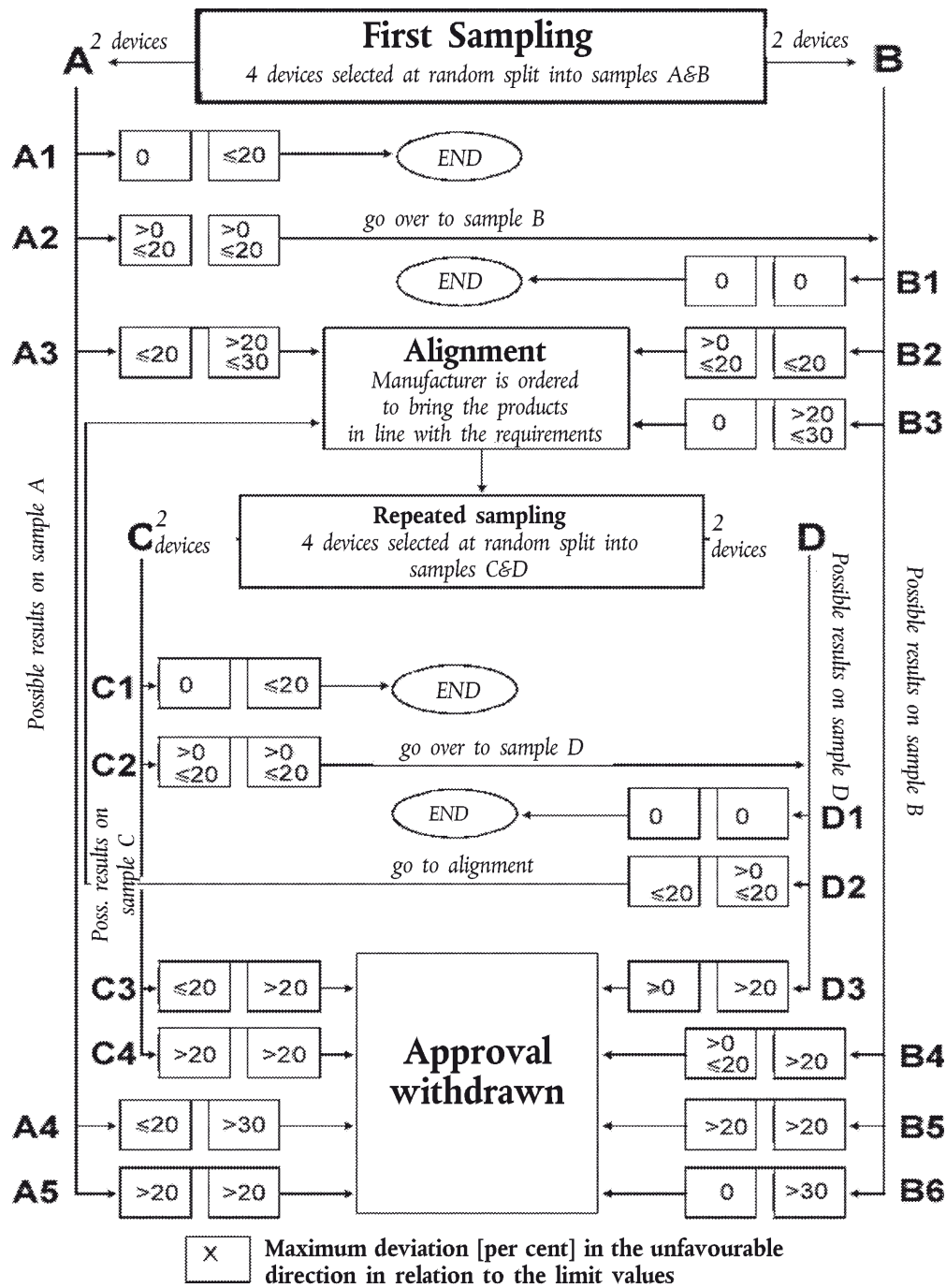
D3: In the case of C2

One direction indicator 0 or more than 0 %

One direction indicator more than 20 %

3.3.3. Or if the conditions of paragraph 1.2.2 for samples C and D are not fulfilled.

Figure 1



Only the original UN/ECE texts have legal effect under international public law. The status and date of entry into force of this Regulation should be checked in the latest version of the UN/ECE status document TRANS/WP.29/343, available at: <http://www.unece.org/trans/main/wp29/wp29wgs/wp29gen/wp29docsts.html>

**Regulation No 37 of the Economic Commission for Europe of the United Nations (UN/ECE) —
Uniform provisions concerning the approval of filament lamps for use in approved lamp units of
power-driven vehicles and of their trailers**

Incorporating all valid text up to:

Supplement 42 to the 03 series of amendments — Date of entry into force: 10 June 2014

CONTENTS

REGULATION

1. Scope
2. Administrative provisions
3. Technical requirements
4. Conformity of production
5. Penalties for non-conformity of production
6. Production definitively discontinued
7. Names and addresses of Technical Services responsible for conducting approval tests, and of Type Approval Authorities
8. Transitional provisions

ANNEXES

- 1 Sheets for filament lamps
- 2 Communication
- 3 Example of the arrangement of the approval mark
- 4 Luminous centre and shapes of filament lamps
- 5 Checking the colour of filament lamps
- 6 Minimum requirements for quality control procedures by the manufacturer
- 7 Sampling and compliance levels for manufacturer test records
- 8 Minimum requirements for spot checks by the Type Approval Authority
- 9 Compliance approved by spot check
- 10 Translation of the terms used in the drawings in Annex 1

1. SCOPE

This Regulation applies to filament lamps shown in Annex 1 and intended for use in approved lamp units of power-driven vehicles and of their trailers.

2. ADMINISTRATIVE PROVISIONS

2.1. Definitions

2.1.1. Definition of 'category'

The term 'category' is used in this Regulation to describe different basic design of standardised filament lamps. Each category has a specific designation, as for example: 'H4', 'P21W', 'T4W', 'PY21W' or 'RR10W'.

2.1.2. Definition of 'type'

Filament lamps of different ⁽¹⁾ 'types' are filament lamps within the same category which differ in such essential respects as:

2.1.2.1. Trade name or mark (Filament lamps bearing the same trade name or mark but produced by different manufacturers are considered as being of different types. Filament lamps produced by the same manufacturer differing only by the trade name or mark may be considered to be of the same type);

2.1.2.2. Bulb design and/or cap design, in so far as these differences affect the optical results;

2.1.2.3. Rated voltage;

2.1.2.4. Halogen.

2.2. Application for approval

2.2.1. Application for approval shall be submitted by the owner of the trade name or mark, or by his duly accredited representative.

2.2.2. Every application for approval shall be accompanied (see also paragraph 2.4.2) by:

2.2.2.1. Drawings in triplicate, sufficiently detailed to permit identification of the type;

2.2.2.2. A brief technical description;

2.2.2.3. Five samples of each colour which has been applied for;

2.2.3. In the case of a type of filament lamp differing only by the trade name or mark from a type that has already been approved it shall be sufficient to submit:

2.2.3.1. A declaration by the manufacturer that the type submitted is identical (except in the trade name or mark) with and has been produced by the same manufacturer as, the type already approved, the latter being identified by its approval code;

2.2.3.2. Two samples bearing the new trade name or mark.

2.2.4. The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control of the conformity of production before type approval is granted.

2.3. Inscriptions

2.3.1. Filament lamps submitted for approval shall bear on the cap or bulb ⁽²⁾:

2.3.1.1. The trade name or mark of the applicant;

⁽¹⁾ A selective-yellow bulb or an additional selective-yellow outer bulb, solely intended to change the colour but not the other characteristics of a filament lamp emitting white light, does not constitute a change of type of the filament lamp.

⁽²⁾ In the latter case, the luminous characteristics shall not be adversely affected.

- 2.3.1.2. The rated voltage. However, for filament lamps for which only a 12 V type is standardised and the maximum allowed bulb diameter of which does not exceed 7,5 mm, the rated voltage need not be marked;
- 2.3.1.3. The international designation of the relevant category. The wattage character 'W' of this designation need not be marked when the maximum allowed bulb diameter of the filament lamp type does not exceed 7,5 mm;
- 2.3.1.4. The rated wattage (in the sequence, high wattage/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;
- 2.3.1.5. A space of sufficient size to accommodate the approval mark.
- 2.3.2. The space mentioned in paragraph 2.3.1.5 above shall be indicated in the drawings accompanying the application for approval.
- 2.3.3. Halogen filament lamps meeting the requirements of paragraph 3.7 below shall be marked with a 'U'.
- 2.3.4. Inscriptions other than those covered by paragraphs 2.3.1 and 2.4.3 may be affixed, on the condition that they do not adversely affect the luminous characteristics.
- 2.4. Approval
- 2.4.1. If all samples of a type of filament lamp which are submitted in pursuance of paragraphs 2.2.2.3 or 2.2.3.2 above meet the requirements of this Regulation, approval shall be granted.
- 2.4.2. An approval code shall be assigned to each type approved. Its first character (at present 2, corresponding to the 02 series of amendments which entered into force on 27 October 1983 and to the 03 series of amendments (not requiring changes in the approval number), which entered into force on 1 June 1984) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. This will be followed by an identification code comprising not more than three characters. Only the Arabic numerals and capital letters listed in footnote (1) shall be used. The same Contracting Party may not assign the same code to another type of filament lamp. Notice of approval or of extension or refusal or withdrawal of approval or production definitively discontinued of a type of filament lamp pursuant to this Regulation shall be communicated to the Parties of the Agreement which apply this Regulation by means of a form conforming to the model in Annex 2 to this Regulation and of a drawing, supplied by the applicant for approval in a format not exceeding A4 (210 × 297 mm) and on a scale of at least 2: 1. If the applicant so desires, the same approval code may be assigned to the filament lamp emitting white light and to the filament lamp emitting selective-yellow light (see para. 2.1.2.3).
- 2.4.3. To every filament lamp conforming to a type approved under this Regulation there shall be affixed in the space referred to in paragraph 2.3.1.5, in addition to the inscriptions required under paragraph 2.3.1, an international approval mark consisting of:
- 2.4.3.1. A truncated circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval (2);
- 2.4.3.2. The approval code, placed close to the truncated circle.

(1) 0 1 2 3 4 5 6 7 8 9

A B C D E F G H J K L M N P R S T U V W X Y Z

(2) The distinguishing numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to Consolidated Resolution on the Construction of Vehicles (R.E.3), document TRANS/WP.29/78/Rev.2/Amend.1.

- 2.4.4. If the applicant has obtained the same approval code for several trade names or marks, one or more of them will suffice to meet the requirements of paragraph 2.3.1.1.
- 2.4.5. The marks and inscriptions specified in paragraphs 2.3.1 and 2.4.3 shall be clearly legible and be indelible.
- 2.4.6. Annex 3 to this Regulation gives an example of arrangement of the approval mark.
3. TECHNICAL REQUIREMENTS
- 3.1. Definitions
- 3.1.1. Rated voltage: voltage (in volts) marked on the filament lamp;
- 3.1.2. Rated wattage: wattage (in watts) marked on the filament lamp which may be incorporated into the international designation of the relevant category;
- 3.1.3. Test voltage: voltage, at the filament lamp terminals for which the electrical and photometric characteristics of the filament lamp are intended and are to be tested.
- 3.1.4. Objective values: values to be achieved, within the specified tolerances, when the filament lamp is supplied with current at its test voltage;
- 3.1.5. Standard (étalon) filament lamp: a filament lamp emitting white or amber or red light with reduced dimensional tolerances, used for the photometric testing of lighting and light-signalling devices. Standard filament lamps are specified in only one voltage rating for each category;
- 3.1.6. Reference luminous flux: specified luminous flux of a standard filament lamp to which the optical characteristics of a lighting device shall be referred;
- 3.1.7. Measuring luminous flux: specified value of the luminous flux for testing a filament lamp in a standard headlamp as specified in paragraph 3.9;
- 3.1.8. Reference axis: an axis defined with reference to the cap and to which certain dimensions of the filament lamp are referred;
- 3.1.9. Reference plane: a plane defined with reference to the cap and to which certain dimensions of the filament lamp are referred.
- 3.1.10. Filament light source (filament lamp): a light source where the element for visible radiation is one or more heated filaments producing thermal radiation.
- 3.2. General specifications
- 3.2.1. Each sample submitted shall conform to the relevant specifications of this Regulation.
- 3.2.2. 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.
- 3.2.3. The filament(s) as specified in the data sheet of the relevant category in Annex 1 shall be the only element(s) of the filament lamp that generate and emit light when energised.

3.3. Manufacture

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

3.3.2. Filament lamps shall be equipped with standard caps complying with the cap data sheets of IEC Publication 60061, third edition, as specified on the individual data sheets of Annex 1.

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

3.3.4. To ascertain whether filament lamps conform to the requirements of paragraphs 3.3.1 to 3.3.3 above, a visual inspection, a dimension check and, where necessary, a trial fitting shall be carried out.

3.4. Tests

3.4.1. Filament lamps shall first be aged at their test voltage for approximately one hour. For dual-filament lamps, each filament shall be aged separately. In the case of filament lamps, for which more than one test voltage is specified, the highest test voltage value shall be used for ageing.

3.4.2. In the case of a filament lamp having a coated bulb, after the ageing period corresponding to paragraph 3.4.1, the surface of the bulb shall be lightly wiped with a cotton cloth soaked in a mixture of 70 vol. per cent of n-heptane and 30 vol. per cent of toluol. After about five minutes, the surface shall be inspected visually. It shall not show any apparent changes.

3.4.3. The position and dimensions of the filament shall be measured with the filament lamps being supplied with current at from 90 per cent to 100 per cent of the test voltage. In the case of filament lamps, for which more than one test voltage is specified, the highest test voltage value shall be used for measurement of the position and dimensions of the filament.

3.4.4. Unless otherwise specified, electrical and photometric measurements shall be carried out at the test voltage(s).

3.4.5. Electrical measurements shall be carried out with instruments of at least class 0,2.

3.4.6. The luminous flux (in lumen) specified on the filament lamp data sheets of Annex 1 is valid for filament lamps emitting white light unless a special colour is stated there.

In the case where the selective-yellow colour is allowed, the luminous flux of the filament lamp with the selective-yellow outer bulb shall be at least 85 per cent of the specified luminous flux of the relevant filament lamp emitting white light.

3.5. Filament position and dimensions

3.5.1. The geometric shapes of the filament shall in principle be as specified on the filament lamp data sheets of Annex 1.

3.5.2. For line filaments the correct position and shape shall be checked as specified in the relevant data sheets.

3.5.3. If the filament is shown on the filament lamp data sheet in at least one view as a point, the position of the luminous centre shall be determined in conformity with Annex 4.

- 3.5.4. The length of a line filament shall be determined by its ends, defined — unless otherwise specified on the relevant data sheet — as the apices of the first and the last filament turn as seen in projection perpendicular to the reference axis of the filament lamp. Such an apex shall comply with the requirement that the angle formed by the legs shall not exceed 90°. In the case of coiled-coil filaments the apices of the secondary turns shall be taken into account.
- 3.5.4.1. For axial filaments the extreme position of the apices considered shall be determined by rotating the filament lamp about its reference axis. The length shall then be measured in a direction parallel to the reference axis.
- 3.5.4.2. For transverse filaments the filament axis shall be placed perpendicular to the direction of projection. The length shall be measured in a direction perpendicular to the reference axis.
- 3.6. Colour
- 3.6.1. The colour of the light emitted by the filament lamp shall be white unless otherwise specified on the relevant data sheet.
- 3.6.2. The definitions of the colour of the light emitted, given in Regulation No 48 and its series of amendments in force at the time of application for type approval, shall apply to this Regulation.
- 3.6.3. The colour of the light emitted shall be measured by the method specified in Annex 5. Each measured value shall lie within the required tolerance area ⁽¹⁾. Moreover, in the case of filament lamps emitting white light, the measured values shall not deviate more than 0,020 unit in the x and/or y direction from a point of choice on the Planckian locus (CIE 015:2004, 3rd edition). Filament lamps for use in light signalling devices shall meet the requirements as specified in paragraph 2.4.2 of IEC Publication 60809, Edition 3.
- 3.7. UV radiation

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

$$k_1 = \frac{\int_{\lambda=315 \text{ nm}}^{400 \text{ nm}} E_e(\lambda) \cdot d\lambda}{k_m \cdot \int_{\lambda=380 \text{ nm}}^{780 \text{ nm}} E_e(\lambda) \cdot V(\lambda) \cdot d\lambda} \leq 2 \cdot 10^{-4} \text{ W/lm}$$

$$k_2 = \frac{\int_{\lambda=250 \text{ nm}}^{315 \text{ nm}} E_e(\lambda) \cdot d\lambda}{k_m \cdot \int_{\lambda=380 \text{ nm}}^{780 \text{ nm}} E_e(\lambda) \cdot V(\lambda) \cdot d\lambda} \leq 2 \cdot 10^{-6} \text{ W/lm}$$

where:

$E_e(\lambda)$	(W/nm)	is the spectral distribution of the radiant flux;
$V(\lambda)$	(1)	is the spectral luminous efficiency;
$k_m = 683$	(lm/W)	is the photometric radiation equivalent;
λ	(nm)	is the wave length.

This value shall be calculated using intervals of five nanometres.

⁽¹⁾ For Conformity of Production purposes of amber and red colour only, at least 80 per cent of the measuring results shall lie within the required tolerance area.

3.8. Observation concerning selective-yellow colour

An approval of a filament lamp type under this Regulation may be granted, pursuant to paragraph 3.6 above, for a filament lamp emitting white light as well as selective-yellow light; Article 3 of the Agreement to which this Regulation is annexed shall not prevent the Contracting Parties from prohibiting, on vehicles registered by them, filament lamps emitting either white or selective-yellow light.

3.9. Check on optical quality

(Applies only to filament lamps of categories R2, H4 and HS1).

3.9.1. This check on optical quality shall be carried out at a voltage such that the measuring luminous flux is obtained; the specifications of paragraph 3.4.6 are to be observed accordingly.

3.9.2. For 12-Volt filament lamps emitting white light:

The sample which most nearly conforms to the requirements laid down for the standard filament lamp shall be tested in a standard headlamp as specified in paragraph 3.9.5 and it shall be verified whether the assembly comprising the aforesaid headlamp and the filament lamp being tested meets the light-distribution requirements laid down for the passing beam in the relevant Regulation.

3.9.3. For 6-Volt and 24-Volt filament lamps emitting white light:

The sample which most nearly conforms to the nominal dimension values shall be tested in a standard headlamp as specified in paragraph 3.9.5 and it shall be verified whether the assembly comprising the aforesaid headlamp and the filament lamp being tested meets the light-distribution requirements laid down for the passing beam in the relevant Regulation. Deviations not exceeding 10 per cent of the minimum values will be acceptable.

3.9.4. Filament lamps emitting selective-yellow light shall be tested in the same manner as described in paragraphs 3.9.2 and 3.9.3 in a standard headlamp as specified in paragraph 3.9.5 to ensure that the illumination complies with at least 85 per cent for 12-Volt filament lamps, and at least 77 per cent for 6-Volt and 24-Volt filament lamps, with the minimum values of the light-distribution requirements laid down for the passing beam in the relevant Regulation. The maximum illumination limits remain unchanged.

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

3.9.5. A headlamp shall be deemed to be a standard headlamp if:

3.9.5.1. It satisfies the pertinent conditions of approval;

3.9.5.2. It has an effective diameter of not less than 160 mm;

3.9.5.3. With a standard filament lamp it produces at the various points and in the various zones specified for the headlamp type concerned, illumination equal to:

3.9.5.3.1. Not more than 90 per cent of the maximum limits;

3.9.5.3.2. Not less than 120 per cent of the minimum limits prescribed for the headlamp type concerned.

3.10. Standard filament lamps

Additional requirements for standard (étalon) filament lamps are given on the relevant data sheets of Annex 1.

Bulbs of standard (étalon) filament lamps emitting white light shall not alter the CIE trichromatic coordinates 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.

4. CONFORMITY OF PRODUCTION

4.1. Filament lamps approved to this Regulation shall be so manufactured as to conform to the type approved by meeting the inscriptions and technical requirements set forth in paragraph 3 above and Annexes 1, 3 and 4 to this Regulation.

4.2. In order to verify that the requirements of paragraph 4.1. are met, suitable controls of the production shall be carried out.

4.3. The holder of the approval shall in particular:

4.3.1. Ensure existence of procedures for the effective control of the quality of products,

4.3.2. Have access to the control equipment necessary for checking the conformity to each approved type,

4.3.3. Ensure that data of test results are recorded and that related documents shall remain available for a period to be determined in accordance with the administrative service,

4.3.4. Analyse the results of each type of test, applying criteria of Annex 7, in order to verify and ensure the stability of the product characteristics making allowance for variation of an industrial production,

4.3.5. Ensure that for each type of filament lamp, at least the tests prescribed in Annex 6 to this Regulation are carried out,

4.3.6. Ensure that any collecting of samples giving evidence of non-conformity with the type of test considered shall give rise to another sampling and another test. All the necessary steps shall be taken to re-establish the conformity of the corresponding production.

4.4. The competent authority which has granted type-approval may at any time verify the conformity control methods applicable to each production unit.

4.4.1. In every inspection, the test books and production survey records shall be presented to the visiting inspector.

4.4.2. The inspector may take samples at random which will be tested in the manufacturer's laboratory. The minimum number of samples may be determined according to the results of the manufacturer's own verification.

4.4.3. When the quality level appears unsatisfactory or when it seems necessary to verify the validity of the tests carried out in application of paragraph 4.4.2 above, the inspector shall select samples, to be sent to the Technical Service which has conducted the type approval tests.

4.4.4. The competent authority may carry out any tests prescribed in this Regulation. Where the competent authority decides to carry out spot checks, criteria of Annexes 8 and 9 to this Regulation shall be applied.

4.4.5. The normal frequency of inspection authorised by the competent authority shall be one every two years. In the case where negative results are recorded during one of these visits, the competent authority shall ensure that all necessary steps are taken to re-establish the conformity of production as rapidly as possible.

5. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

5.1. The approval granted in respect of a filament lamp pursuant to this Regulation may be withdrawn if the requirements are not met or if a filament lamp bearing the approval mark does not conform to the type approved.

5.2. If a Contracting Party to the Agreement applying this Regulation withdraws an approval it has previously granted, it shall forthwith so notify the other Contracting Parties applying this Regulation, by means of a communication form conforming to the model in Annex 2 to this Regulation.

6. PRODUCTION DEFINITELY DISCONTINUED

If the holder of the approval completely ceases to manufacture a type of filament lamp approved in accordance with this Regulation, he shall so inform the Type Approval Authority which has granted the approval. Upon receiving the relevant communication, that Type Approval Authority shall inform thereof the other Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 2 to this Regulation.

7. NAMES AND ADDRESSES OF THE TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF TYPE APPROVAL AUTHORITIES

The Parties to the 1958 Agreement which apply this Regulation shall communicate to the United Nations secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Type Approval Authorities which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, or production definitively discontinued issued in other countries, are to be sent.

8. TRANSITIONAL PROVISIONS

8.1. Approvals granted under the preceding series of amendments shall remain valid, except that for conformity of production, current production filament lamps shall comply with the requirements of the latest series of amendments starting 12 months from the date of application of this amendment ⁽¹⁾.

8.2 The correspondence between the former designations and the new ones is indicated in the following table:

Old designations	New designations in the 03 series of amendments
P25-1	P21W
P25-2	P21/5W
R19/5	R5W
R19/10	R10W

⁽¹⁾ The amended text of this paragraph was introduced by Supplement 14 to the 03 series of amendments. This supplement entered into force on 3 September 1997 and it also introduced in the text of the Regulation new paragraphs 2.3.3 and 3.7 and in Annex 1 new sheets HIR1 and PY27/7W.

Old designations	New designations in the 03 series of amendments
C11	C5W
C15	C21W
T8/4	T4W
W10/5	W5W
W10/3	W3W

- 8.3. As from the period after the entry into force of the Supplements to the 03 series of amendments, as indicated for each category in the table for group 3 in Annex 1, no filament lamps of these categories or of the types within these categories shall be used in lamps submitted for type approval.
- 8.4. However, for the period after entry into force of the Supplements to the 03 series of amendments, as indicated in the table for group 3 in Annex 1, Contracting Parties applying this Regulation may continue to grant approvals for lamps in which filament lamps of these categories or of the types within these categories are used, provided that these lamps are intended as replacement parts for installation on vehicles in use.
-

ANNEX 1

SHEETS (*) FOR FILAMENT LAMPS

List of categories of filament lamps, grouped and their sheet numbers.

Group 1

Without general restrictions:

Category	Sheet number(s)	Category	Sheet number(s)
H1 (*)	H1/1 to 3	H17	H17/1 to 6
H3 (*)	H3/1 to 4	H21W (*)	H21W/1 to 2
H4	H4/1 to 5	H27W/1	H27W/1 to 3
H7	H7/1 to 4	H27W/2	H27W/1 to 3
H8	H8/1 to 4	HB3	HB3/1 to 4
H8B	H8/1 to 4	HB4	HB4/1 to 4
H9 (*)	H9/1 to 4	HIR2	HIR2/1 to 3
H9B (*)	H9/1 to 4	HS1 (*)	HS1/1 to 5
H10	H10/1 to 3	HS2 (*)	HS2/1 to 3
H11	H11/1 to 4	HS5	HS5/1 to 4
H11B	H11/1 to 4	HS5A (*)	HS5A/1 to 3
H13	H13/1 to 4	PSX24W (*)	P24W/1 to 3
H15	H15/1 to 5	PSX26W (*)	PSX26W1 to 3
H16	H16/1 to 4	PX24W (*)	P24W/1 to 3
H16B	H16/1 to 4	S2 (*)	S1/S2/1 to 2

Group 2

Only for use in signalling lamps, cornering lamps, reversing lamps and rear registration plate lamps:

Category	Sheet number(s)	Category	Sheet number(s)
C5W (*)	C5W/1	PY21/5W	PY21/5W/1 to 3
H6W	H6W/1	PY24W	P24W/1 to 3
H10W/1	H10W/1 to 2	PY27/7W	PY27/7W/1 (P27/7W/2 to 3)
HY6W	H6W/1	R5W (*)	R5W/1
HY10W	H10W/1 to 2	R10W (*)	R10W/1
HY21W	H21W/1 to 2	RR5W	R5W/1
P13W	P13W/1 to 3	RR10W	R10W/1
P21W (*)	P21W/1 to 2	RY10W (*)	R10W/1
P21/4W	P21/4W/1 (P21/5W/2 to 3)	T4W (*)	T4W/1
P21/5W (*)	P21/5W/1 to 3	W2.3W	W2.3W/1
P24W	P24W/1 to 3	W3W (*)	W3W/1
P27W	P27W/1 to 2	W5W (*)	W5W/1
P27/7W	P27/7W/1 to 3	W10W (*)	W10W/1
PR21W	PR21W/1 (P21W/2)	W15/5W	W15/5W/1 to 3
PR21/5W	PR21/5W/1 (P21/5W/2 to 3)	W16W	W16W/1
PS19W	P19W/1 to 3	W21W	W21W/1 to 2
PS24W	P24W/1 to 3	W21/5W	W21/5W/1 to 3
PSY19W	P19W/1 to 3	WP21W	WP21W/1 to 2
PSY24W	P24W/1 to 3	WPY21W	WP21W/1 to 2
PW13W	P13W/1 to 3	WR5W	W5W/1
PW16W	PC16W/1 to 3	WR21/5W	WR21/5W/1 (W21/5W/2 to 3)
PWR16W	PC16W/1 to 3	WT21W	WT21W/1 to 2
PWY16W	PC16W/1 to 3	WT21/7W	WT21/7W/1 to 3
PW19W	P19W/1 to 3	WTY21W	WT21W/1 to 2
PWR19W	P19W/1 to 3	WTY21/7W	WT21/7W/1 to 3
PWY19W	P19W/1 to 3	WY5W (*)	W5W/1
PW24W	P24W/1 to 3	WY10W (*)	W10W/1
PWR24W	P24W/1 to 3	WY16W	W16W/1
PWY24W	P24W/1 to 3	WY21W	WY21W/1 to 2
PY21W	PY21W/1 (P21W/2)		

Group 3

For replacement purposes only (see transitional provisions of paragraphs 8.3 and 8.4):

Category	Sheet number(s)	As specified by transitional provisions in paragraph 8.3		As specified by transitional provisions in paragraph 8.4	
		Supplement	Period	Supplement	Period
C5W ^(*) , ^(*)	C5W/1	38	12 months	38	unlimited
C21W ^(*)	C21W/1 to 2	28	12 months	28	unlimited
H1 ^(*)	H1/1 to 3	38	12 months	38	unlimited
H3 ^(*)	H3/1 to 4	38	12 months	38	unlimited
H12	H12/1 to 3	40	24 months	40	unlimited
H13A	H13/1 to 4	40	24 months	40	unlimited
H14	H14/1 to 4	38	12 months	38	unlimited
HB3A	HB3/1 to 4	40	60 months	40	unlimited
HB4A	HB4/1 to 4	40	60 months	40	unlimited
HIR1 ^(*)	HIR1/1 to 3	40	24 months	40	unlimited
HS1 ^(*)	HS1/1 to 5	38	12 months	38	unlimited
HS2 ^(*)	HS2/1 to 3	38	12 months	38	unlimited
HS6 ^(*)	HS6/1 to 4	40	60 months	40	unlimited
P19W ^(*)	P19W/1 to 3	37	60 months	37	unlimited
P21W ^(*) , ^(*)	P21W/1 to 2	38	12 months	38	unlimited
P21/5W ^(*) , ^(*)	P21/5W/1 to 3	38	12 months	38	unlimited
PC16W ^(*)	PC16W/1 to 3	37	60 months	37	unlimited
PCR16W ^(*)	PC16W/1 to 3	37	12 months	37	unlimited
PCY16W ^(*)	PC16W/1 to 3	37	60 months	37	unlimited
PR19W ^(*)	P19W/1 to 3	37	12 months	37	unlimited
PR21/4W ^(*)	PR21/4W/1; (P21/5W/2 to 3)	40	24 months	40	unlimited
PR24W ^(*)	P24W/1 to 3	37	12 months	37	unlimited
PR27/7W ^(*)	PR27/7W/1; (P27/7W/2 to 3)	40	24 months	40	unlimited
PSR19W ^(*)	P19W/1 to 3	37	12 months	37	unlimited
PSR24W ^(*)	P24W/1 to 3	37	12 months	37	unlimited
PY19W ^(*)	P19W/1 to 3	37	60 months	37	unlimited
R2	R2/1 to 3	28	12 months	28	unlimited
R5W ^(*) , ^(*)	R5W/1	38	12 months	38	unlimited
R10W ^(*) , ^(*)	R10W/1	38	12 months	38	unlimited

Category	Sheet number(s)	As specified by transitional provisions in paragraph 8.3		As specified by transitional provisions in paragraph 8.4	
		Supplement	Period	Supplement	Period
RY10W ^(*) , ^(*)	R10W/1	38	12 months	38	unlimited
S1	S1/S2/1 to 2	28	12 months	28	unlimited
S2 ^(*)	S1/S2/1 to 2	38	12 months	38	unlimited
S3	S3/1	38	12 months	38	unlimited
T1.4W ^(*)	T1.4W/1	40	24 months	40	unlimited
T4W ^(*) , ^(*)	T4W/1	38	12 months	38	unlimited
W3W ^(*) , ^(*)	W3W/1	38	12 months	38	unlimited
W5W ^(*) , ^(*)	W5W/1	38	12 months	38	unlimited
W10W ^(*) , ^(*)	W10W/1	38	12 months	38	unlimited
WY2.3W	WY2.3W/1	40	24 months	40	unlimited
WY5W ^(*)	W5W/1	40	12 months	40	unlimited
WY10W ^(*) , ^(*)	W10W/1	38	12 months	38	unlimited

(*) Tables, Electrical and Photometric characteristics:

Voltage is expressed in V;

Wattage is expressed in W;

Luminous flux is expressed in lm.

In case a category of filament lamp has more than one value of reference luminous flux specified, the value of approximately 12 V for approval of a lighting device and 13,5 V for approval of a light-signalling device shall be applied unless otherwise specified by the regulation used for the approval of the device.

⁽²⁾ Not for use in passing beam headlamps.

⁽³⁾ Not for use in front fog lamps marked 'B' as defined in Regulation No 19.

⁽⁴⁾ Not for use in Regulation No 112 headlamps.

⁽⁵⁾ Not for use in headlamps other than Regulation No 113 class C headlamps.

⁽⁶⁾ All types except from 6 V type.

⁽⁷⁾ 6 V types only.

⁽⁸⁾ Only for use in signalling lamps, cornering lamps, reversing lamps and rear registration plate lamps.

List of sheets for filament lamps and their sequence in this Annex:

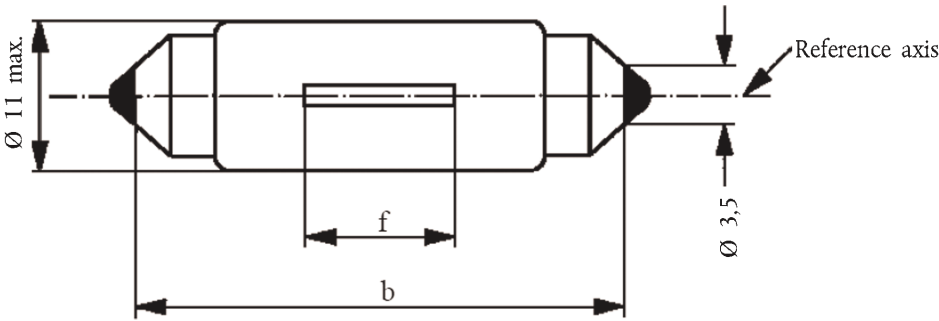
Sheet number(s)

C5W/1	H13/1 to 4
C21W/1 to 2	H14/1 to 4
H1/1 to 3	H15/1 to 5
H3/1 to 4	H16/1 to 4
H4/1 to 5	H17/1 to 6
H7/1 to 4	H6W/1
H8/1 to 4	H10W/1 to 2
H9/1 to 4	H21W/1 to 2
H10/1 to 3	H27W/1 to 3
H11/1 to 4	HB3/1 to 4
H12/1 to 3	HB4/1 to 4

HIR1/1 to 3	PY21W/1
HIR2/1 to 3	PY21/5W/1 to 3
HS1/1 to 5	PY27/7W/1
HS2/1 to 3	R2/1 to 3
HS5/1 to 4	R5W/1
HS5A/1 to 3	R10W/1
HS6/1 to 4	S1/S2/1 to 2
P13W/1 to 3	S3/1
P19W/1 to 3	T1.4W/1
P21W/1 to 2	T4W/1
P21/4W/1	W2.3W/1
P21/5W/1 to 3	W3W/1
P24W/1 to 3	W5W/1
P27W/1 to 2	W10W/1
P27/7W/1 to 3	W15/5W/1 to 3
PC16W/1 to 3	W16W/1
PR21W/1	W21W/1 to 2
PR21/4W/1	W21/5W/1 to 3
PR21/5W/1	WP21W/1 to 2
PR27/7W/1	WR21/5W/1
PSX26W/1 to 3	WT21W/1 to 2
	WT21/7W/1 to 3
	WY2.3W/1
	WY21W/1 to 2

CATEGORY C5W — Sheet C5W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
b ⁽¹⁾	34,0	35,0	36,0	35,0 ± 0,5
f ^{(2), (3)}	7,5 ⁽⁴⁾		15 ⁽⁵⁾	9 ± 1,5

Cap SV8.5 in accordance with IEC Publication 60061 (sheet 7004-81-4)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	6	12	24	12
	Watts	5			5
Test voltage	Volts	6,75	13,5	28,0	13,5
Objective values	Watts	5,5 max.		7,7 max.	5,5 max.
	Luminous flux	45 ± 20 %			

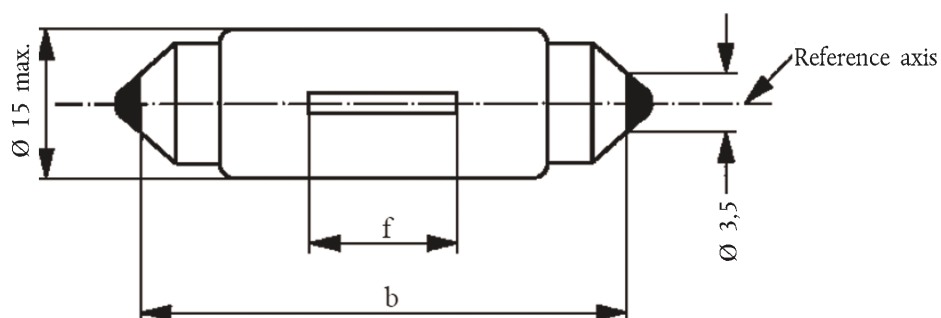
Reference luminous flux: 45 lm at approximately 13,5 V

- (¹) This dimension corresponds to a distance between two apertures of 3,5 mm diameter each bearing against one of the caps.
- (²) The filament shall be housed in a cylinder 19 mm long co-axial with the filament lamp and placed symmetrically about the filament lamp centre.
The diameter of the cylinder is for 6 V and 12 V filament lamps: d + 4 mm (for standard filament lamps: d + 2 mm) and for 24 V filament lamps: d + 5 mm, 'd' being the nominal diameter of the filament as stated by the manufacturer.
- (³) The deviation of the filament centre from the centre of the filament lamp shall not be more than ± 2,0 mm (for standard filament lamps: ± 0,5 mm) measured in the direction of the reference axis.
- (⁴) 4,5 mm for 6 V filament lamps.
- (⁵) 16,5 mm for 24 V filament lamps.

CATEGORY C21W — Sheet C21W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

Filament lamp for reversing lamp only



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
b ⁽¹⁾	40,0	41,0	42,0	41,0 ± 0,5
f ⁽²⁾	7,5		10,5	8 ± 1,0

Cap SV8.5 in accordance with IEC Publication 60061 (sheet 7004-81-4)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	21	21
Test voltage	Volts	13,5	13,5
Objective values	Watts	26,5 max.	26,5 max.
	Luminous flux	460 ± 15 %	

Reference luminous flux: 460 lm at approximately 13,5 V

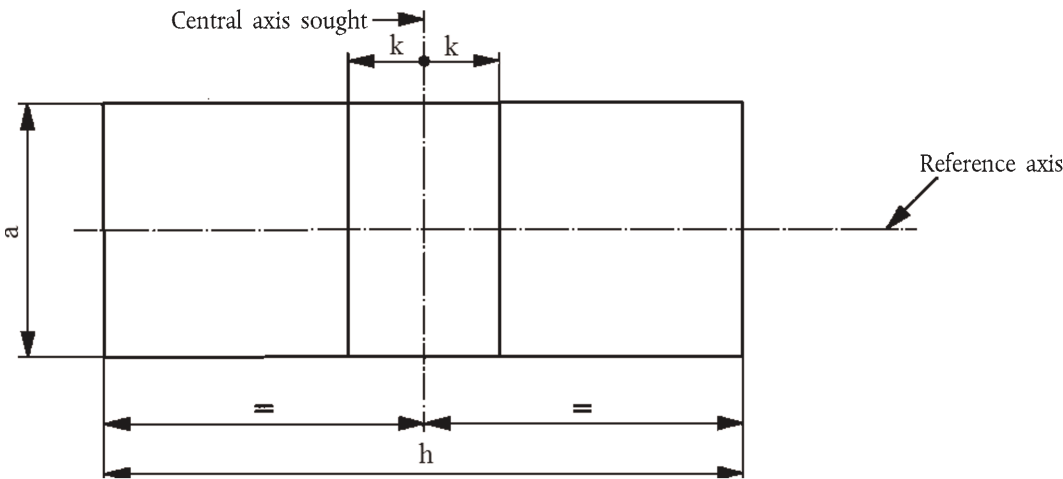
⁽¹⁾ This dimension corresponds to a distance between two apertures of 3,5 mm diameter.

⁽²⁾ The position of the filament is checked by means of a 'Box-System'; sheet C21W/2.

CATEGORY C21W — Sheet C21W/2

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and to the centre of the filament lamp's length, whether a filament lamp complies with the requirements.



12 V	a	h	k
Filament lamps of normal production	4,0 + d	14,5	2,0
Standard filament lamp	2,0 + d	14,5	0,5

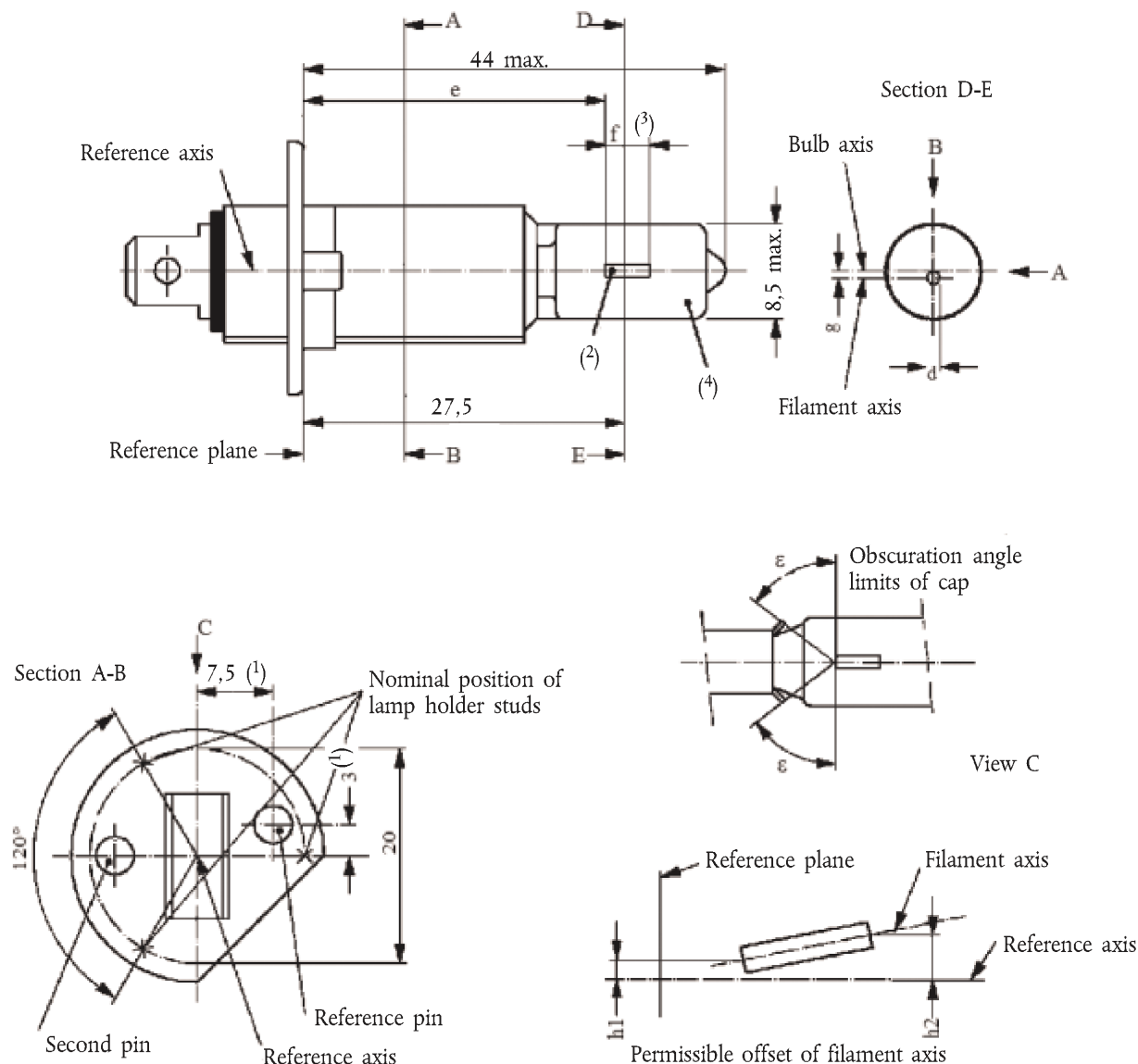
d = nominal filament diameter as stated by the manufacturer.

Test procedure and requirements

1. The filament lamp is placed in a holder (socket) capable of being so rotated through 360° about the reference axis that the front elevation is seen on the screen on to which the image of the filament is projected. The reference plane on the screen shall coincide with the centre of the filament lamp. The central axis sought on the screen shall coincide with the centre of the filament lamp length.
2. Front elevation
 - 2.1. The projection of the filament shall lie entirely within the rectangle when the filament lamp is rotated through 360°.
 - 2.2. The centre of the filament shall not be offset by more than distance 'k' from the central axis sought.

CATEGORY H1 — Sheet H1/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



- (¹) The reference axis is perpendicular to the reference plane and passes through the point defined by the dimensions marked with 1.
- (²) Both current lead-in electrodes shall be positioned in the bulb, the longer electrode above the filament (the filament lamp being viewed as shown in the figure). The internal design should be then such that stray light images and reflections are reduced to the minimum, e.g. by fitting cooling jackets over the non-coiled parts of the filament.
- (³) The cylindrical portion of the bulb over length 'f' shall be such as not to deform the projected image of the filament to such an extent as appreciably to affect the optical results.
- (⁴) The colour of the light emitted shall be white or selective-yellow.

CATEGORY H1 — Sheet H1/2

Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	6 V	12 V	24 V	12 V
e ⁽⁶⁾ , ⁽¹⁰⁾	25,0 ⁽⁹⁾			25,0 ± 0,15
f ⁽⁶⁾ , ⁽¹⁰⁾	4,5 ± 1,0	5,0 ± 0,5	5,5 ± 1,0	5,0 + 0,50/– 0,00
g ⁽⁷⁾ , ⁽⁸⁾	0,5 d ± 0,5 d			0,5 d ± 0,25 d
h1	⁽⁹⁾			0 ± 0,20 ⁽⁵⁾
h2	⁽⁹⁾			0 ± 0,25 ⁽⁵⁾
ε	45° ± 12°			45° ± 3°

Cap P14.5s in accordance with IEC Publication 60061 (sheet 7004-46-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	6	12	24	12
	Watts	55		70	55
Test Voltage	Volts	6,3	13,2	28,0	13,2
Objective values	Watts	63 max.	68 max.	84 max.	68 max.
	Luminous flux ± %	1 350	1 550	1 900	
		15			
Reference luminous flux at approximately				12 V	1 150
				13,2 V	1 550

⁽⁵⁾ The eccentricity is measured only in the horizontal and vertical directions of the filament lamp as shown in the figure. The points to be measured are those where the projections of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

⁽⁶⁾ The viewing direction is the perpendicular to the reference axis contained in the plane defined by the reference axis and the centre of the second pin of the cap.

⁽⁷⁾ Offset of filament in relation to bulb axis measured at 27,5 mm from the reference plane.

⁽⁸⁾ d: diameter of filament.

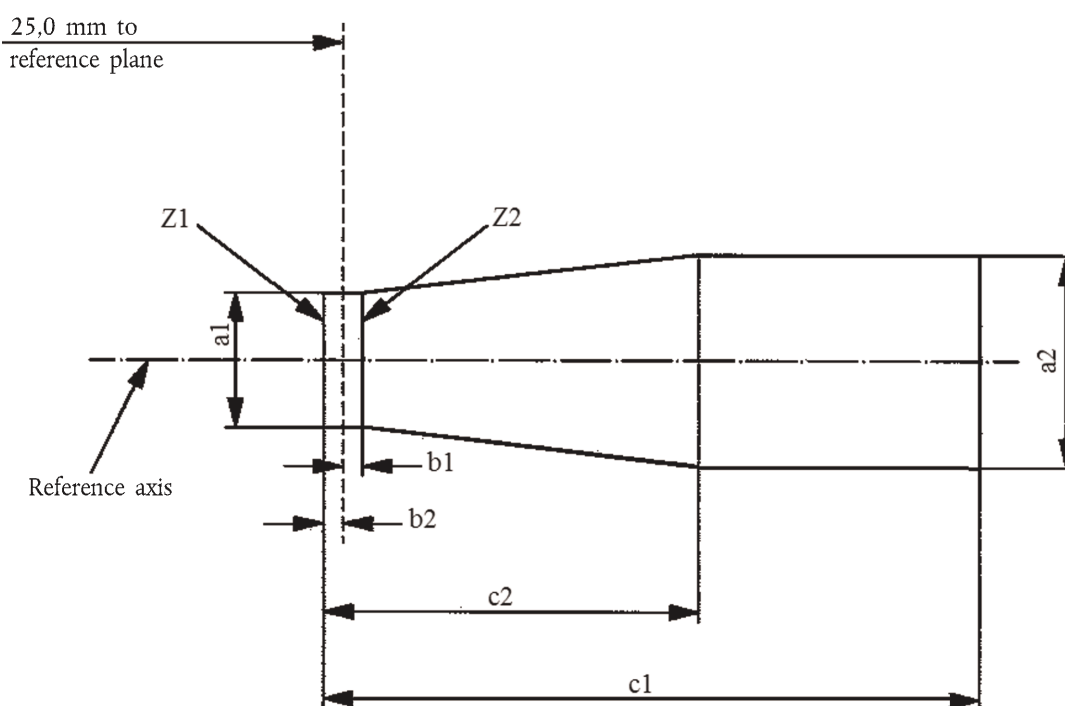
⁽⁹⁾ To be checked by means of a 'Box System', sheet H1/3.

⁽¹⁰⁾ The ends of the filament are defined as the points where, when the viewing direction is as defined in footnote 6 above, the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the reference axis (special instructions for coiled-coil filaments are under consideration).

CATEGORY H1 — Sheet H1/3

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



	a1	a2	b1	b2	c1	c2
6 V	1,4 d	1,9 d	0,25		6	3,5
12 V					6	4,5
24 V					7	4,5

d = diameter of filament.

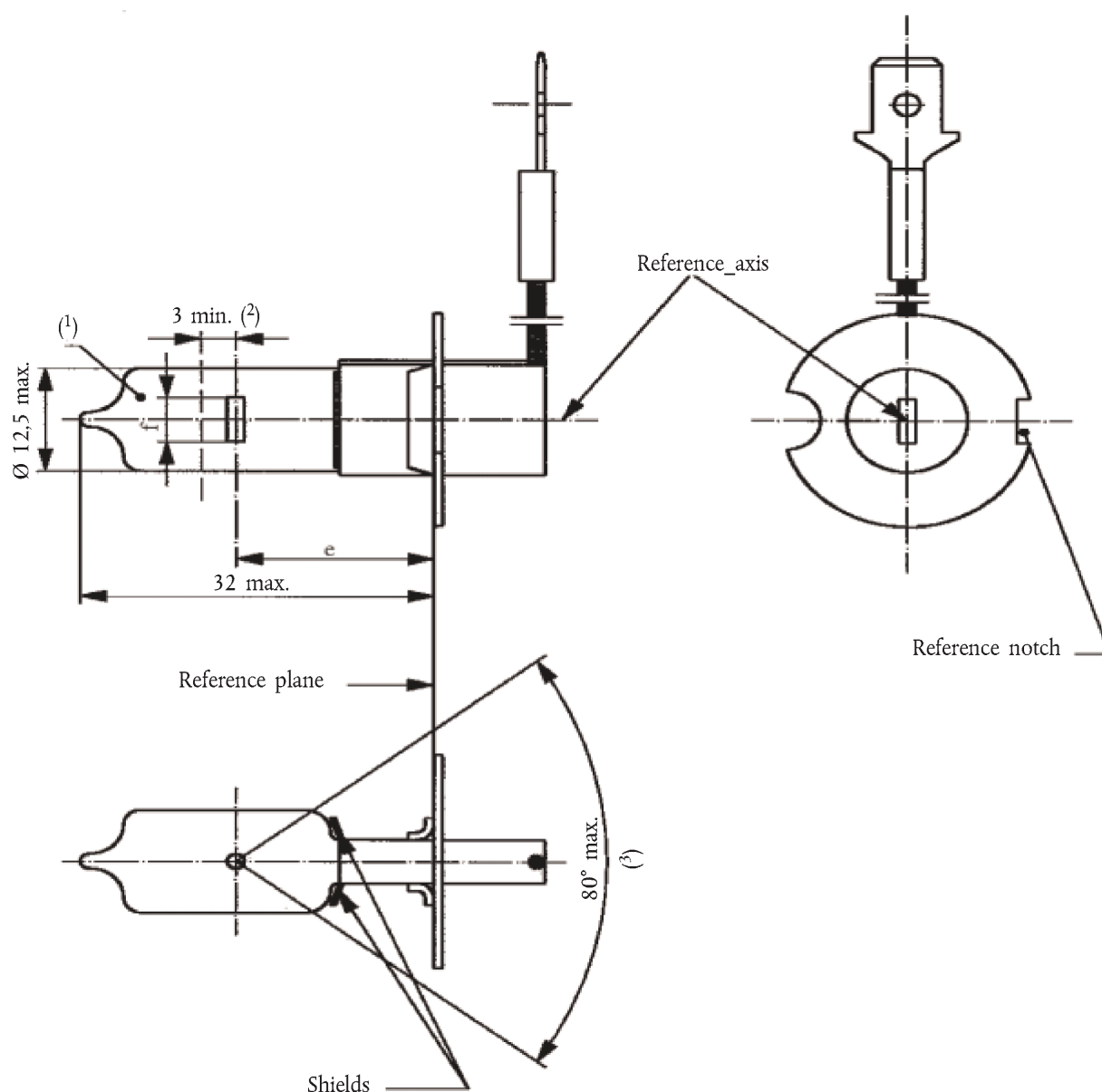
The filament position is checked solely in directions A and B as shown on sheet H1/1.

The filament shall lie entirely within the limits shown.

The beginning of the filament as defined on sheet H1/2, footnote 10, shall lie between lines Z1 and Z2.

CATEGORY H3 — Sheet H3/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

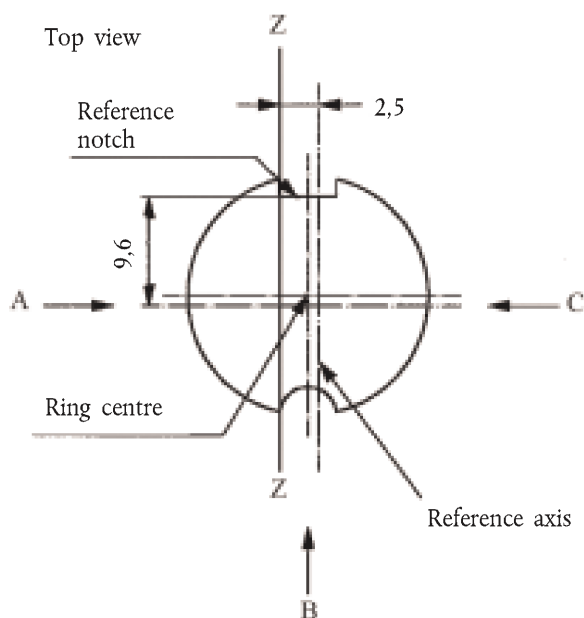


⁽¹⁾ The colour of the light emitted shall be white or selective-yellow.

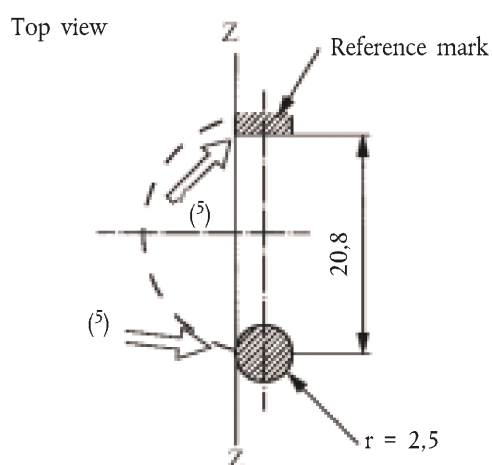
⁽²⁾ Minimum length above the height of the light emitting centre ('e') over which the bulb shall be cylindrical.

⁽³⁾ The distortion of the base-end portion of the bulb shall not be visible from any direction outside the obscuration angle of 80° max. The shields shall produce no inconvenient reflections. The angle between the reference axis and the plane of each shield, measured on the bulb side, shall not exceed 90° .

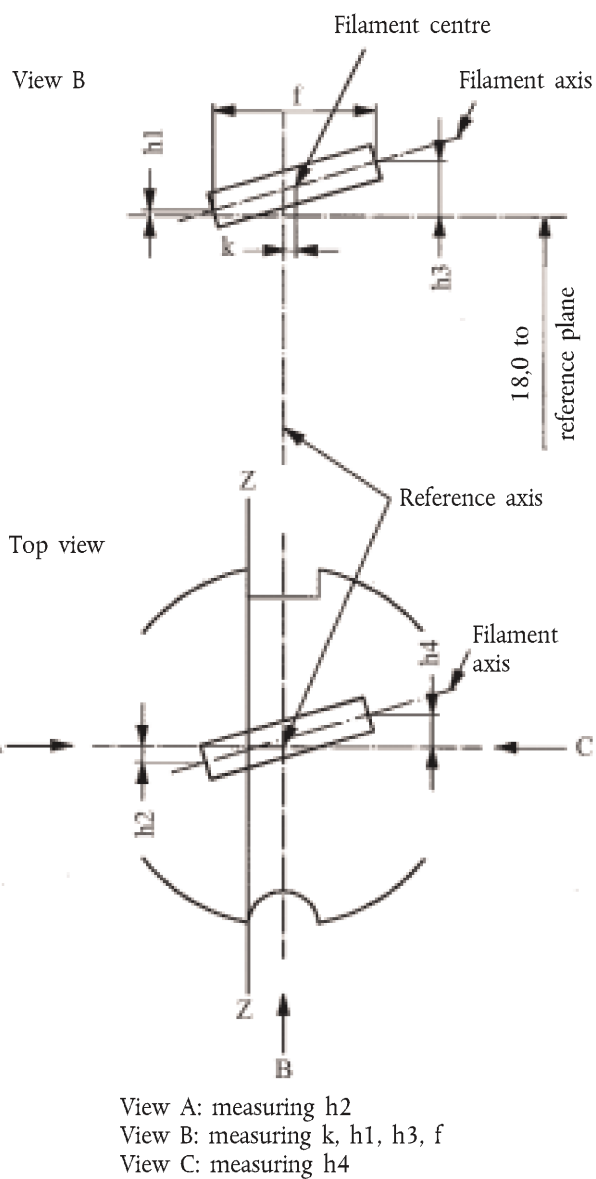
CATEGORY H3 — Sheet H3/2

Definition: Ring centre and reference axis ⁽⁴⁾

Definition of Z - Z



Filament position and dimensions



⁽⁴⁾ The permissible deviation of the ring centre from the reference axis is 0,5 mm in the direction perpendicular to the Z-Z line and 0,05 mm in the direction parallel to the Z-Z line.

⁽⁵⁾ The cap shall be pressed in these directions.

CATEGORY H3 — Sheet H3/3

Dimensions in mm	Filaments lamps of normal production			Standard filament lamp
	6 V	12 V	24 V	12 V
e	18,0 ⁽⁶⁾			18,0
f ⁽⁸⁾	3,0 min.	4,0 min.		5,0 ± 0,50
k	0 ⁽⁶⁾			0 ± 0,20
h1, h3	0 ⁽⁶⁾			0 ± 0,15 ⁽⁷⁾
h2, h4	0 ⁽⁶⁾			0 ± 0,25 ⁽⁷⁾

Cap PK22s in accordance with IEC Publication 60061 (sheet 7004-47-4)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	6	12	24	12
	Watts	55		70	55
Test voltage	Volts	6,3	13,2	28,0	13,2
Objective values	Watts	63 max.	68 max.	84 max.	68 max.
	Luminous flux ± %	1 050	1 450	1 750	
		15			
Reference luminous flux at approximately				12 V	1 100
				13,2 V	1 450

⁽⁶⁾ To be checked by means of a 'Box-System'; sheet H3/4.

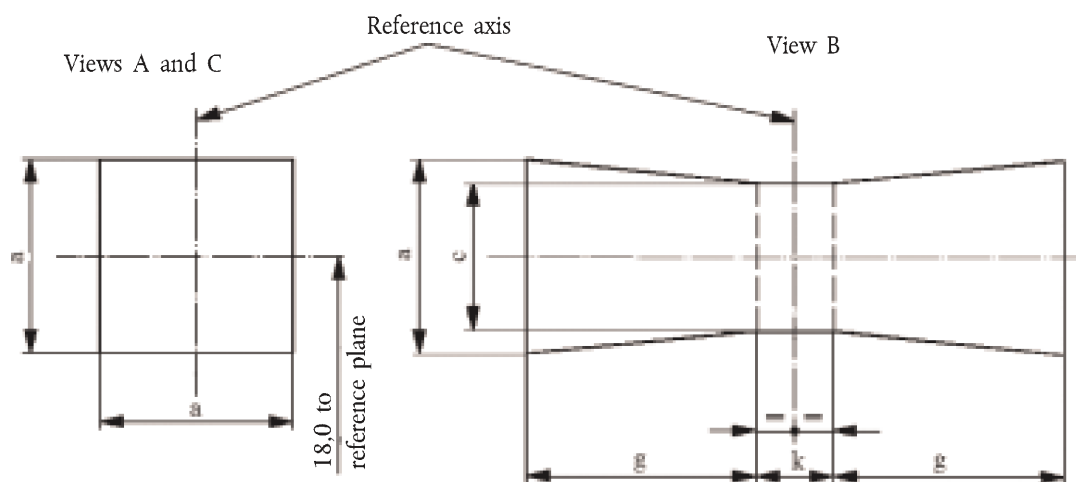
⁽⁷⁾ For standard filament lamps the points to be measured are those where the projection of the outside of the end turns crosses the filament axis.

⁽⁸⁾ The positions of the first and the last turn of the filament are defined by the intersections of the outside of the first and of the last light emitting turn, respectively, with the plane parallel to and 18 mm distant from the reference plane. (Additional instructions for coiled-coil filament are under consideration).

CATEGORY H3 — Sheet H3/4

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament complies with the requirements.



	a	c	k	g
6 V	1,8 d	1,6 d	1,0	2,0
12 V				2,8
24 V				2,9

d = diameter of filament

The filament shall lie entirely within the limits shown.

The centre of the filament shall lie within the limits of dimension k.

CATEGORY H4 — Sheet H4/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

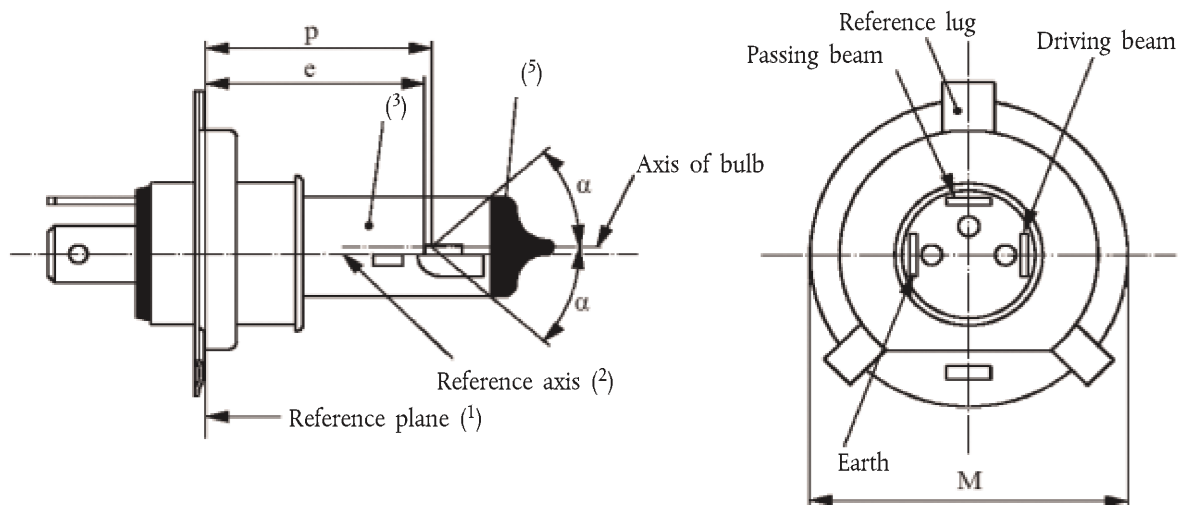


Figure 1

Main drawing

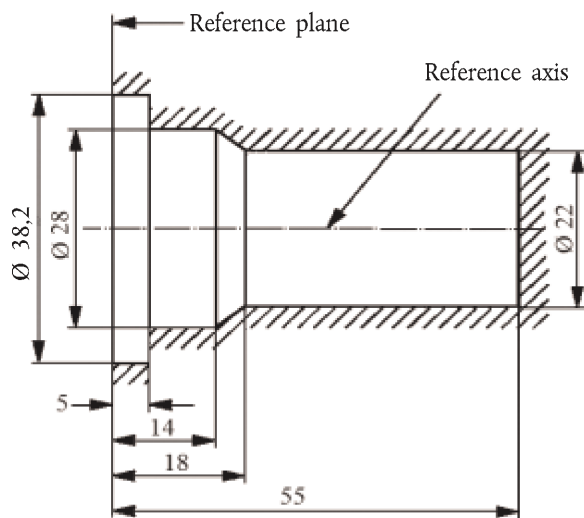


Figure 2

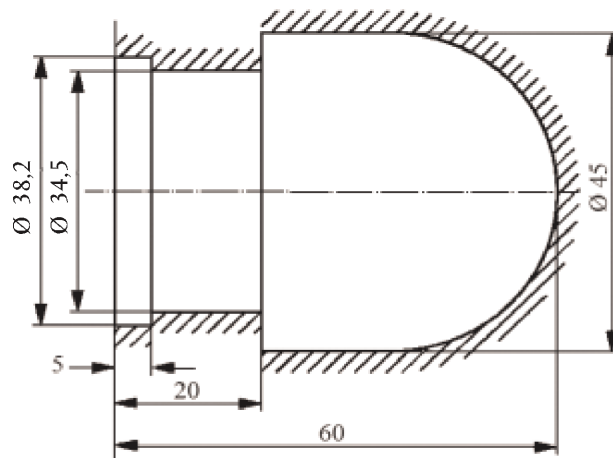
Maximum lamp outlines ⁽⁴⁾

Figure 3

⁽¹⁾ The reference plane is the plane formed by the seating points of the three lugs of the cap ring.

⁽²⁾ The reference axis is perpendicular to the reference plane and passes through the centre of the circle of diameter 'M'.

⁽³⁾ The colour of the light emitted shall be white or selective-yellow.

⁽⁴⁾ The bulb and supports shall not exceed the envelope as in Figure 2. However, where a selective-yellow outer bulb is used the bulb and supports shall not exceed the envelope as in Figure 3.

⁽⁵⁾ The obscuration shall extend at least as far as the cylindrical part of the bulb. It shall also overlap the internal shield when the latter is viewed in a direction perpendicular to the reference axis.

CATEGORY H4 — Sheet H4/2

Dimensions in mm	Filament lamps of normal production		Standard filament lamp
	12 V	24 V	12 V
e	28,5 + 0,35/– 0,25	29,0 ± 0,35	28,5 + 0,20/– 0,00
p	28,95	29,25	28,95
α	max. 40°		max. 40°

Cap P43t in accordance with IEC Publication 60061 (sheet 7004-39-6)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

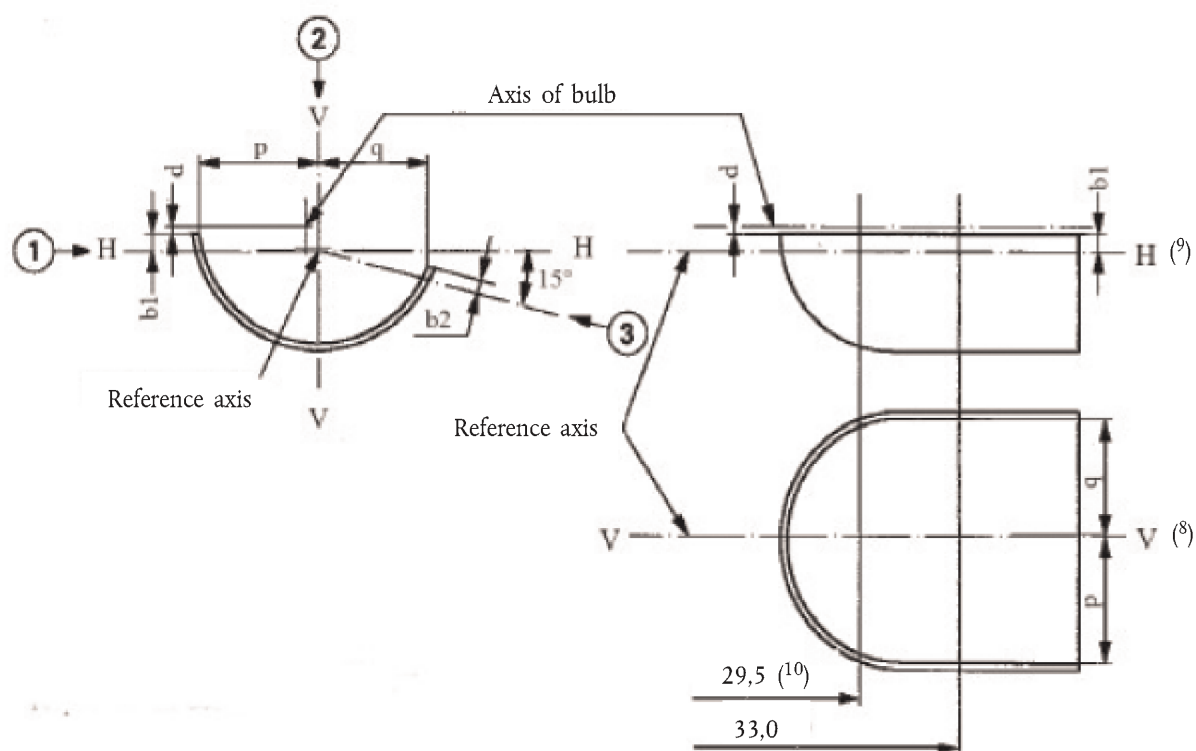
Rated values	Volts	12 ⁽⁶⁾		24 ⁽⁶⁾		12 ⁽⁶⁾	
	Watts	60	55	75	70	60	55
Test voltage	Volts	13,2		28,0		13,2	
Objective values	Watts	75 max.	68 max.	85 max.	80 max.	75 max.	68 max.
	Luminous flux ± %	1 650	1 000	1 900	1 200		
		15					
Measuring flux ⁽⁷⁾ lm		—	750	—	800		
Reference luminous flux at approximately					12 V	1 250	750
					13,2 V	1 650	1 000

⁽⁶⁾ The value indicated in the left hand column relate to the driving beam filament. Those indicated in the right-hand column relate to the passing beam filament.

⁽⁷⁾ Measuring luminous flux for measuring according to paragraph 3.9 of this Regulation.

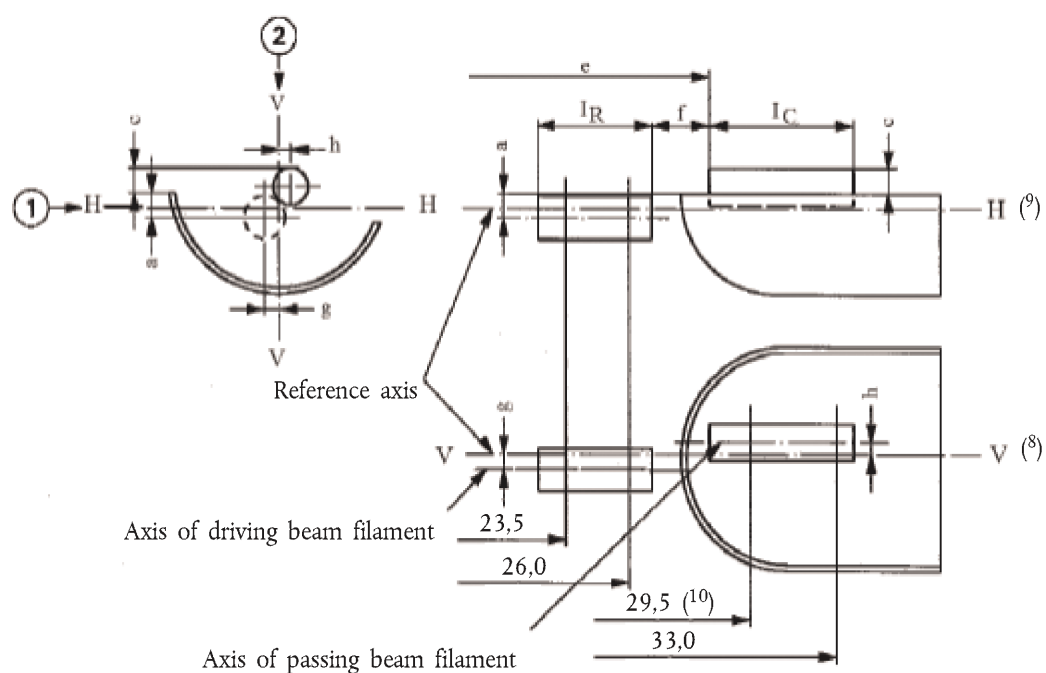
CATEGORY H4 — Sheet H4/3

Position of shield



The drawing is not mandatory with respect to the design of the shield

Position of filaments



CATEGORY H4 — Sheet H4/4

Table of the dimensions (in mm) referred to in the drawings on sheet H4/3

Reference (*)		Dimension (**)		Tolerance		
				Filaments lamps of normal production		Standard filament lamp
12 V	24 V	12 V	24 V	12 V	24 V	12 V
a/26		0,8		± 0,35		± 0,20
a/23,5		0,8		± 0,60		± 0,20
b1/29,5	30,0	0		± 0,30	± 0,35	± 0,20
b1/33		b1/29,5 mv	b1/30,0 mv	± 0,30	± 0,35	± 0,15
b2/29,5	30,0	0		± 0,30	± 0,35	± 0,20
b2/33		b2/29,5 mv	b2/30,0 mv	± 0,30	± 0,35	± 0,15
c/29,5	30,0	0,6	0,75	± 0,35		± 0,20
c/33		c/29,5 mv	c/30,0 mv	± 0,35		± 0,15
d		min. 0,1		—		—
e ⁽¹³⁾		28,5	29,0	+ 0,35 – 0,25	± 0,35	+ 0,20 – 0,00
f ^{(11), (12), (13)}		1,7	2,0	+ 0,50 – 0,30	± 0,40	+ 0,30 – 0,10
g/26		0		± 0,50		± 0,30
g/23,5		0		± 0,70		± 0,30
h/29,5	30,0	0		± 0,50		± 0,30
h/33		h/29,5 mv	h/30,0 mv	± 0,35		± 0,20
I _R ^{(11), (14)}		4,5	5,25	± 0,80		± 0,40
I _C ^{(11), (14)}		5,5	5,25	± 0,50	± 0,80	± 0,35
p/33		Depends on the shape of the shield		—		—
q/33		(p+q)/2		± 0,60		± 0,30

(*) '.../26' means dimension to be measured at the distance from the reference plane indicated in mm after the stroke.

(**) '29,5 mv' or '30,0 mv' means the value measured at a distance of 29,5 or 30,0 mm from the reference plane.

⁽⁸⁾ Plane V-V is the plane perpendicular to the reference plane and passing through the reference axis and through the intersection of the circle of diameter 'M' with the axis of the reference lug.⁽⁹⁾ Plane H-H is the plane perpendicular to both the reference plane and plane V-V and passing through the reference axis.⁽¹⁰⁾ 30,0 mm for the 24-Volt type.⁽¹¹⁾ The end turns of the filament are defined as being the first luminous turn and the last luminous turn that are at substantially the correct helix angle. For coiled-coil filaments, the turns are defined by the envelope of the primary coil.⁽¹²⁾ For the passing beam filament, the points to be measured are the intersections, seen in direction 1, of the lateral edge of the shield with the outside of the end turns defined under footnote 11.⁽¹³⁾ 'e' denotes the distance from the reference plane to the beginning of the passing beam filament as defined above.⁽¹⁴⁾ For the driving beam filament the points to be measured are the intersections, seen in direction 1, of a plane, parallel to plane H-H and situated at a distance of 0,8 mm below it, with the end turns defined under footnote 11.

CATEGORY H4 — Sheet H4/5*Additional explanations to sheet H4/3*

The dimensions below are measured in three directions:

1. For dimensions a, b1, c, d, e, f, I_R and I_C ;
2. For dimensions g, h, p and q;
3. For dimension b2.

Dimensions p and q are measured in planes parallel to and 33 mm away from the reference plane.

Dimensions b1, b2, c and h are measured in planes parallel to and 29,5 mm (30,0 mm for 24 V filament lamps) and 33 mm away from the reference plane.

Dimensions a and g are measured in planes parallel to and 26,0 mm and 23,5 mm away from the reference plane.

Note: For the method of measurement, see Appendix E of IEC Publication 60809.

CATEGORY H7 — Sheet H7/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

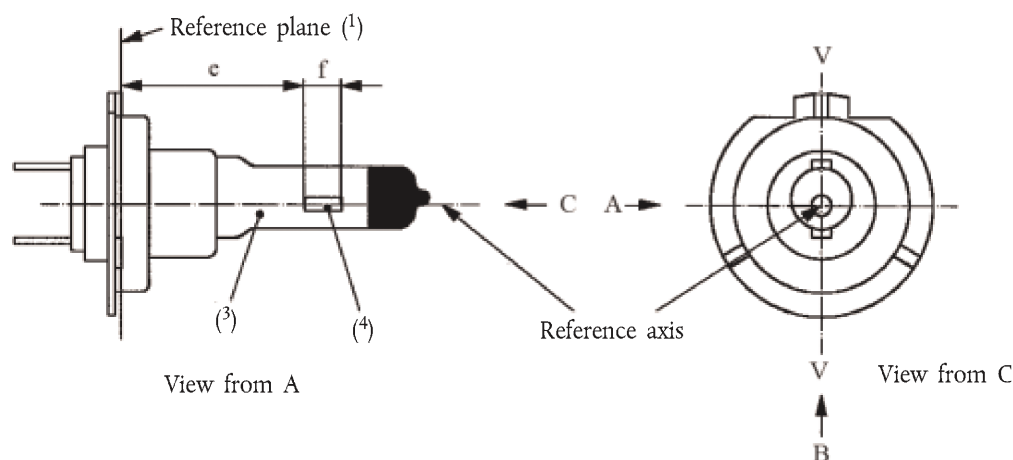


Figure 1
Main drawing

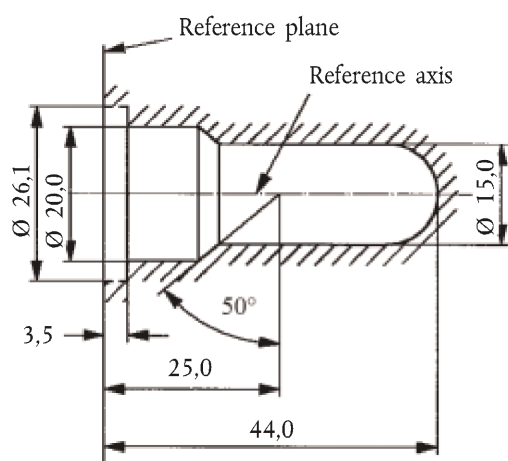


Figure 2
Maximum lamp outline (5)

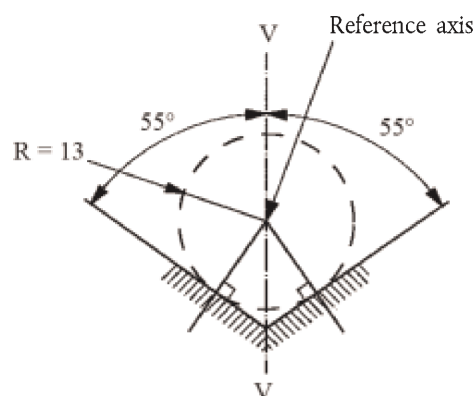
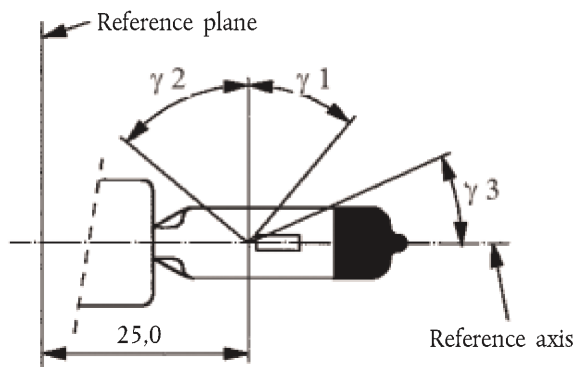


Figure 3
Definition of reference axis (2)

- (1) The reference plane is defined by the points on the surfaces of the holder on which the three supporting bosses of the cap ring will rest.
- (2) The reference axis is perpendicular to the reference plane and crosses the intersection of the two perpendiculars as indicated in Figure 3.
- (3) The colour of the light emitted shall be white or selective-yellow.
- (4) Notes concerning the filament diameter.
- (a) No actual diameter restrictions apply but the objective for future developments is to have $d_{\text{max.}} = 1,3 \text{ mm}$ for 12 V and $d_{\text{max.}} = 1,7$ for 24 V filament lamps.
- (b) For the same manufacturer, the design diameter of standard (étalon) filament lamp and filament lamp of normal production shall be the same.
- (5) Glass bulb and supports shall not exceed the envelope as indicated in Figure 2. The envelope is concentric to the reference axis.

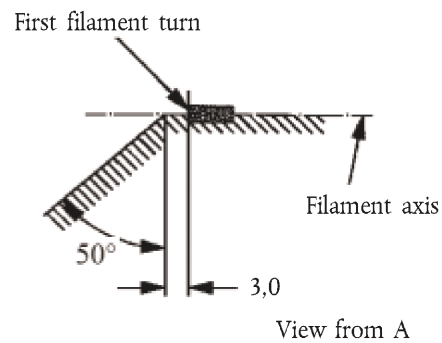
CATEGORY H7 — Sheet H7/2



View from B

Figure 4

Distortion free area and black top ⁽⁶⁾, ⁽⁷⁾



View from A

Figure 5

Metal free zone ⁽⁸⁾

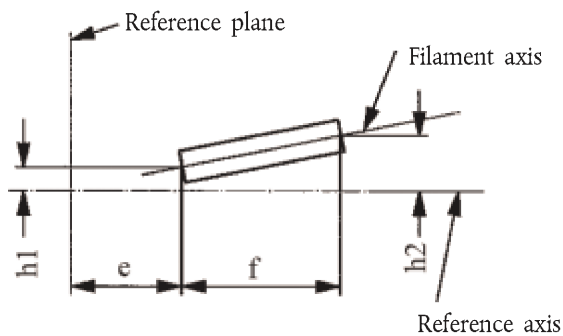
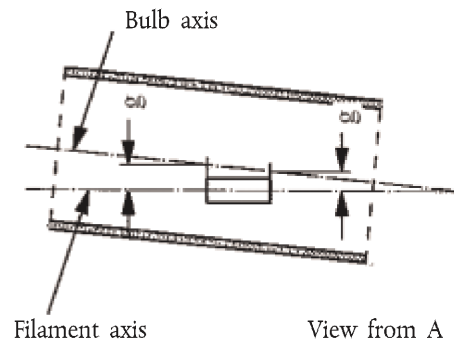


Figure 6

Permissible offset of filament axis
(for standard filament lamps only)



View from A

Figure 7

Bulb eccentricity

- ⁽⁶⁾ Glass bulb shall be optically distortion free within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 .
- ⁽⁷⁾ The obscuration shall extend at least to the cylindrical part of the bulb on the whole bulb top circumference. It shall moreover extend at least to a plane parallel to the reference plane where 3 crosses the outer bulb surface (view B as indicated on sheet H7/1).
- ⁽⁸⁾ The internal design of the lamp shall be such that stray light images and reflections are only located above the filament itself seen from the horizontal direction. (View A as indicated in Figure 1 on sheet H7/1).
- No metal parts other than filament turns shall be located in the shaded area as seen in Figure 5.

CATEGORY H7 — Sheet H7/3

Dimensions in mm	Filaments lamps of normal production		Standard filament lamp
	12 V	24 V	12 V
e ⁽⁹⁾	25,0 ⁽¹⁰⁾		25,0 ± 0,1
f ⁽⁹⁾	4,1 ⁽¹⁰⁾	4,9 ⁽¹⁰⁾	4,1 ± 0,1
g ⁽¹²⁾	0,5 min.		u.c.
h1 ⁽¹¹⁾	0 ⁽¹⁰⁾		0 ± 0,10
h2 ⁽¹¹⁾	0 ⁽¹⁰⁾		0 ± 0,15
γ1	40° min.		40° min.
γ2	50° min.		50° min.
γ3	30° min.		30° min.

Cap PX26d in accordance with IEC Publication 60061 (sheet 7004-5-6)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	24	12
	Watts	55	70	55
Test voltage	Volts	13,2	28,0	13,2
Objective values	Watts	58 max.	75 max.	58 max.
	Luminous flux	1 500 ± 10 %	1 750 ± 10 %	
Reference luminous flux at approximately			12 V	1 100
			13,2 V	1 500

⁽⁹⁾ The ends of the filament are defined as the points where, when the viewing direction is direction A as shown in Figure 1 on sheet H7/1, the projection of the outside of the end turns crosses the filament axis. (Special instructions for coiled-coil filaments are under consideration).

⁽¹⁰⁾ To be checked by means of a 'Box System', sheet H7/4.

⁽¹¹⁾ The offset of the filament with respect to the reference axis is measured only in viewing directions A and B as shown in Figure 1 in sheet H7/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

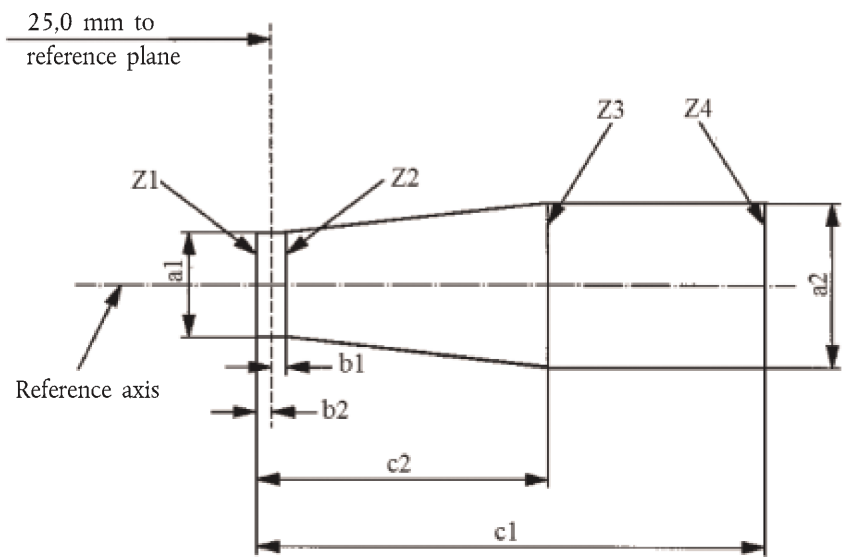
⁽¹²⁾ Offset of filament in relation to bulb axis measured in two planes parallel to the reference plane where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

CATEGORY H7 — Sheet H7/4

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.

Dimensions in mm



	a1	a2	b1	b2	c1	c2
12 V	d + 0,30	d + 0,50	0,2		4,6	4,0
24 V	d + 0,60	d + 1,00	0,25		5,9	4,4

d = diameter of filament

The filament position is checked solely in directions A and B as shown on sheet H7/1, Figure 1.

The filament shall lie entirely within the limits shown.

The ends of the filament as defined on sheet H7/3, footnote 9, shall lie between lines Z1 and Z2 and between Z3 and Z4.

CATEGORIES H8 AND H8B — Sheet H8/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

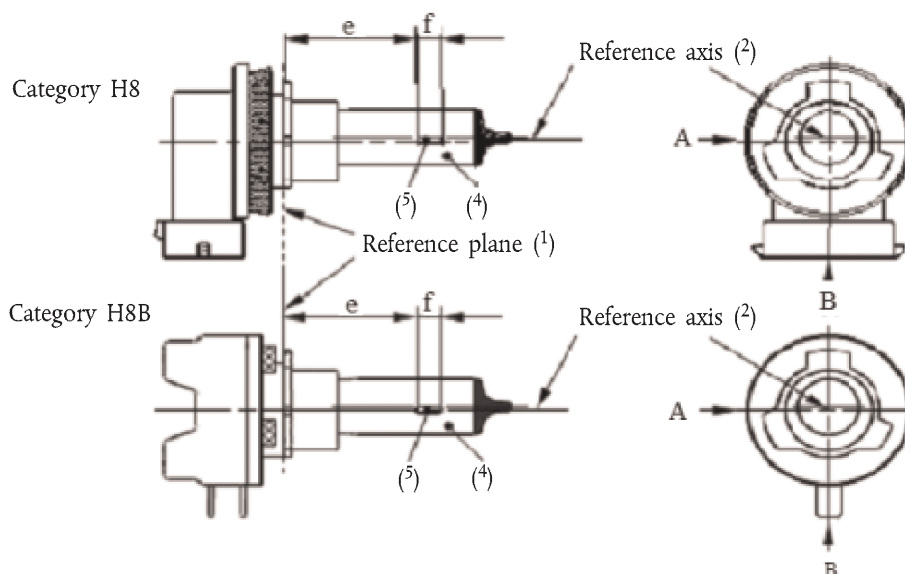


Figure 1

Main drawings

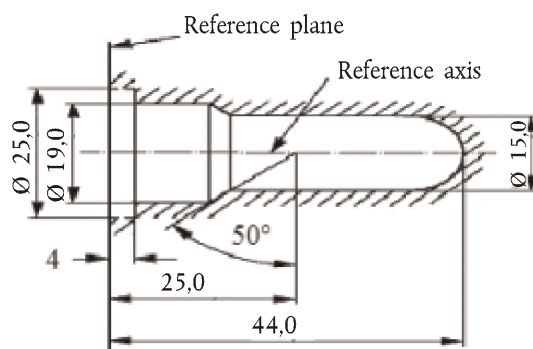


Figure 2

Maximum lamp outline ⁽³⁾

⁽¹⁾ The reference plane is the plane formed by the underside of the bevelled lead-in flange of the cap.

⁽²⁾ The reference axis is perpendicular to the reference plane and passing through the centre of the 19 mm cap diameter.

⁽³⁾ Glass bulb and supports shall not exceed the envelope as indicated in Figure 2. The envelope is concentric to the reference axis.

⁽⁴⁾ The colour of the light emitted shall be white or selective-yellow.

⁽⁵⁾ Notes concerning the filament diameter.

(a) No actual diameter restrictions apply but the objective for future developments is to have $d_{\text{max.}} = 1,2 \text{ mm}$.

(b) For the same manufacturer, the design diameter of standard (étalon) filament lamp and filament lamp of normal production shall be the same.

CATEGORIES H8 AND H8B — Sheet H8/2

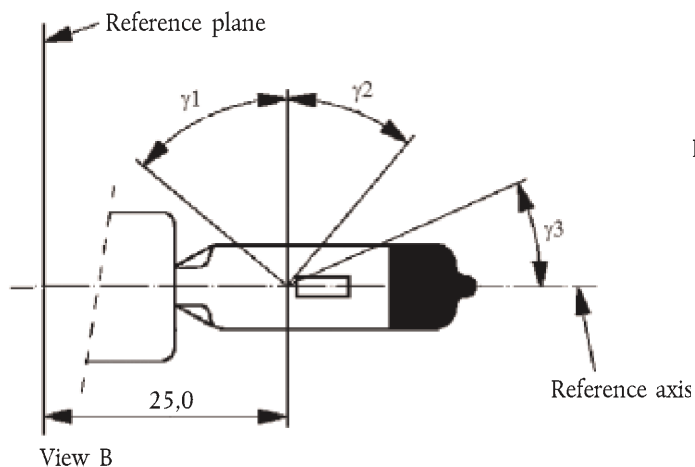


Figure 3

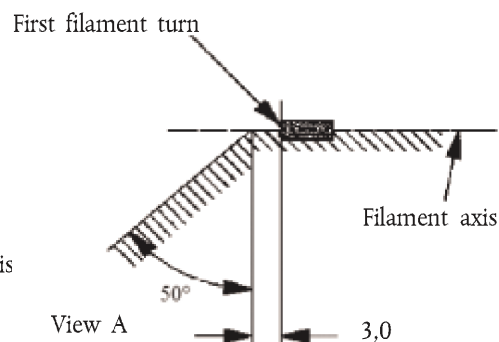
Distorsion free area ⁽⁶⁾ and black top ⁽⁷⁾

Figure 4

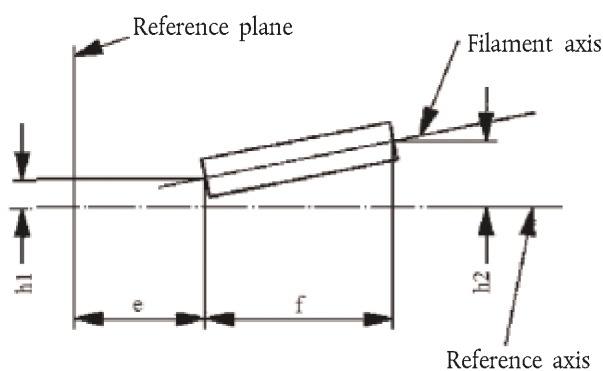
Metal free zone ⁽⁸⁾

Figure 5

Permissible offset of filament axis ⁽⁹⁾

(for standard filament lamps only)

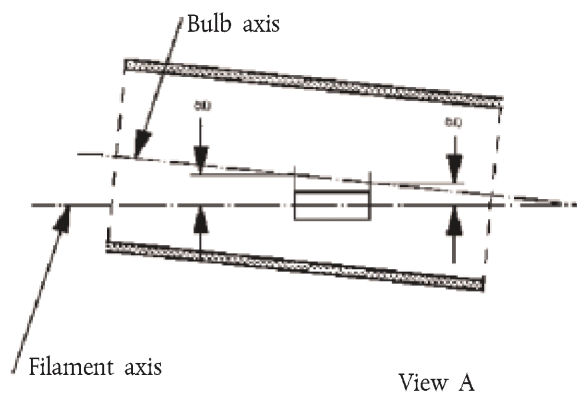


Figure 6

Bulb eccentricity ⁽¹⁰⁾

⁽⁶⁾ Glass bulb shall be optically distortion free within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 .

⁽⁷⁾ The obscuration shall extend at least to the cylindrical part of the bulb on the whole bulb top circumference. It shall moreover extend at least to a plane parallel to the reference plane where γ_3 crosses the outer bulb surface (view B as indicated on sheet H8/1).

⁽⁸⁾ The internal design of the lamp shall be such that stray light images and reflections are only located above the filament itself seen from the horizontal direction. (View A as indicated in Figure 1 on sheet H8/1). No metal parts other than filament turns shall be located in the shaded area as seen in Figure 4.

⁽⁹⁾ The offset of the filament with respect to the reference axis is measured only in viewing directions A and B as shown in Figure 1 in sheet H8/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

⁽¹⁰⁾ Offset of filament in relation to bulb axis measured in two planes parallel to the reference plane where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

CATEGORIES H8 AND H8B — Sheet H8/3

Dimensions in mm	Filaments lamps of normal production	Standard filament lamp
	12 V	12 V
e ⁽¹¹⁾	25,0 ⁽¹²⁾	25,0 ± 0,1
f ⁽¹¹⁾	3,7 ⁽¹²⁾	3,7 ± 0,1
g	0,5 min.	u.c.
h1	0 ⁽¹²⁾	0 ± 0,1
h2	0 ⁽¹²⁾	0 ± 0,15
γ1	50° min.	50° min.
γ2	40° min.	40° min.
γ3	30° min.	30° min.

Cap: H8: PGJ19-1 in accordance with IEC Publication 60061 (sheet 7004-110-2)

H8B: PGJY19-1 in accordance with IEC Publication 60061 (sheet 7004-146-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	35	35
Test voltage	Volts	13,2	13,2
Objective values	Watts	43 max.	43 max.
	Luminous flux	800 ± 15 %	
Reference luminous flux at approximately	12 V		600
	13,2 V		800

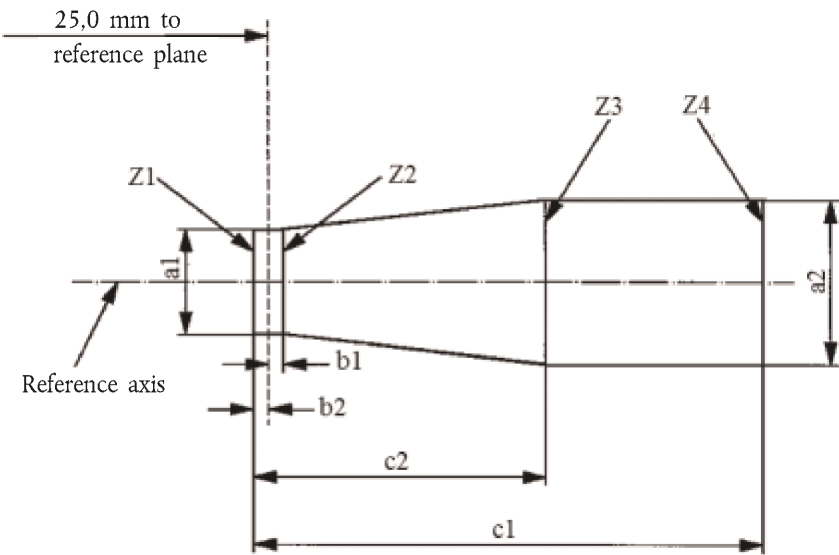
⁽¹¹⁾ The ends of the filament are defined as the points where, when the viewing direction is direction A as shown in Figure 1 on sheet H8/1, the projection of the outside of the end turns crosses the filament axis.

⁽¹²⁾ To be checked by means of a 'Box System'; sheet H8/4.

CATEGORIES H8 AND H8B — Sheet H8/4

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament complies with the requirements.



a1	a2	b1	b2	c1	c2
d + 0,50	d + 0,70	0,25		4,6	3,5

d = diameter of filament

The filament position is checked solely in directions A and B as shown on sheet H8/1, Figure 1.

The filament shall lie entirely within the limits shown.

The ends of the filament as defined on sheet H8/3, footnote 11, shall lie between lines Z1 and Z2 and between Z3 and Z4.

CATEGORIES H9 AND H9B — Sheet H9/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

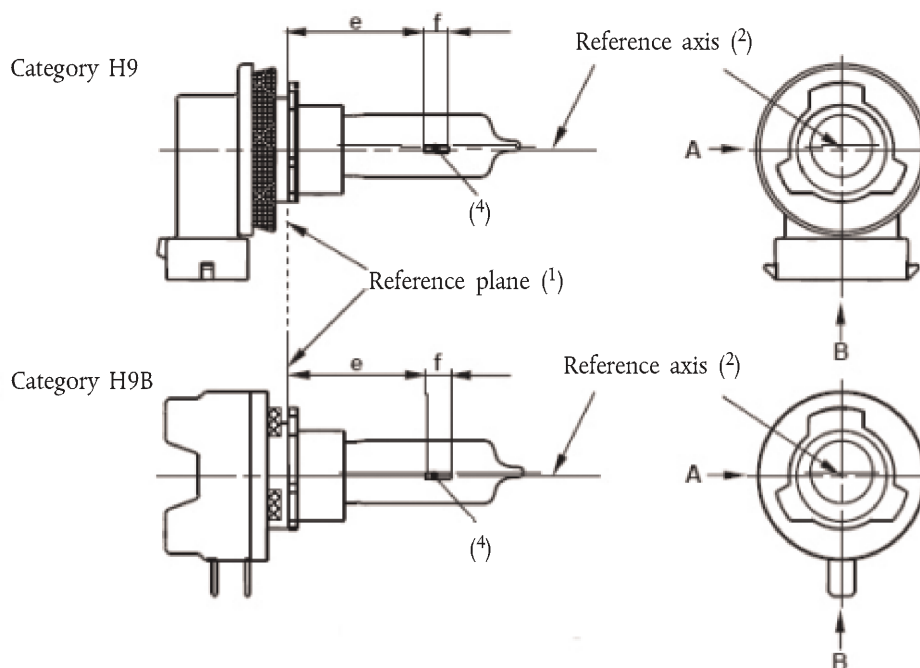


Figure 1

Main drawings

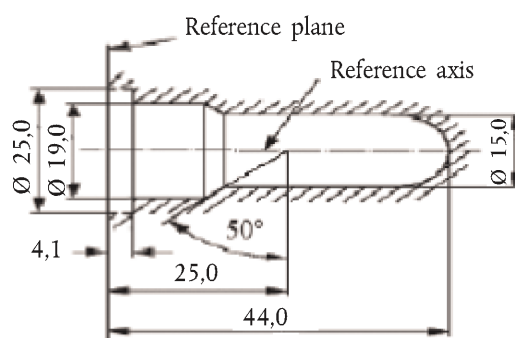


Figure 2

Maximum lamp outline ⁽³⁾

⁽¹⁾ The reference plane is the plane formed by the underside of the bevelled lead-in flange of the cap.

⁽²⁾ The reference axis is perpendicular to the reference plane and passing through the centre of the 19 mm cap diameter.

⁽³⁾ Glass bulb and supports shall not exceed the envelope as indicated in Figure 2. The envelope is concentric to the reference axis.

⁽⁴⁾ Notes concerning the filament diameter.

(a) No actual diameter restrictions apply but the objective for future developments is to have $d_{\text{max}} = 1,4 \text{ mm}$.

(b) For the same manufacturer, the design diameter of standard (étalon) filament lamp and filament lamp of normal production shall be the same.

CATEGORIES H9 AND H9B — Sheet H9/2

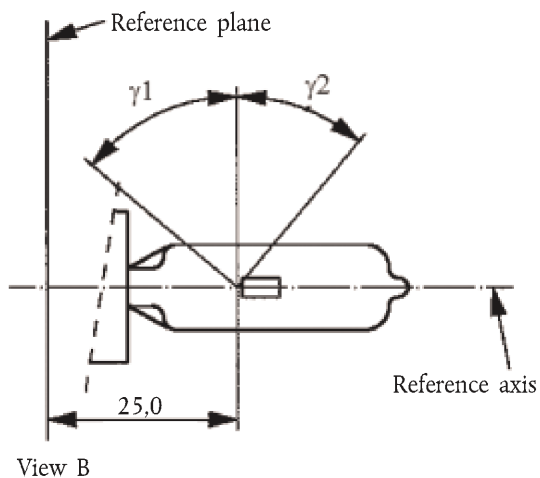


Figure 3
Distortion free area ⁽⁵⁾

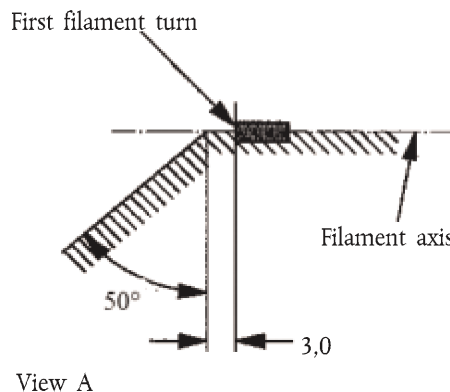


Figure 4
Metal free zone ⁽⁶⁾

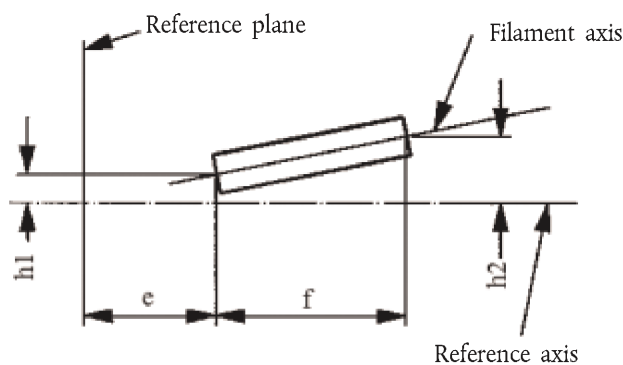


Figure 5
Permissible offset of filament axis ⁽⁷⁾
(for standard filament lamps only)

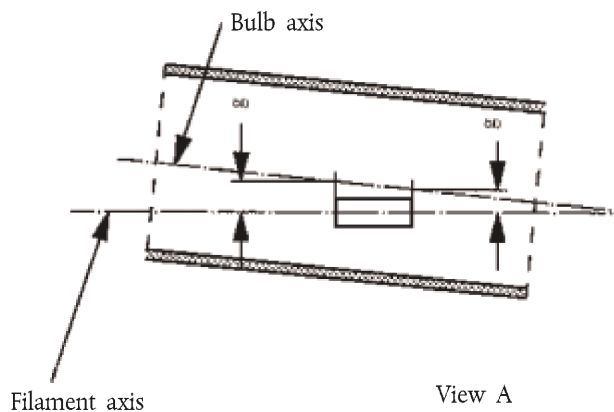


Figure 6
Bulb eccentricity ⁽⁸⁾

- ⁽⁵⁾ Glass bulb shall be optically distortion free within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 .
- ⁽⁶⁾ The internal design of the lamp shall be such that stray light images and reflections are only located above the filament itself seen from the horizontal direction. (View A as indicated in Figure 1, sheet H9/1). No metal parts other than filament turns shall be located in the shaded area as seen in Figure 4.
- ⁽⁷⁾ The offset of the filament with respect to the reference axis is measured only in viewing directions A and B as shown in Figure 1 on sheet H9/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.
- ⁽⁸⁾ Offset of filament in relation to bulb axis measured in two planes parallel to the reference plane where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

CATEGORIES H9 AND H9B — Sheet H9/3

Dimensions in mm		Tolerances	
		Filaments lamps of normal production	Standard filament lamp
		12 V	12 V
e ⁽⁹⁾ , ⁽¹⁰⁾	25	⁽¹¹⁾	± 0,10
f ⁽⁹⁾ , ⁽¹⁰⁾	4,8	⁽¹¹⁾	± 0,10
g ⁽⁹⁾	0,7	± 0,5	± 0,30
h1	0	⁽¹¹⁾	± 0,10 ⁽¹²⁾
h2	0	⁽¹¹⁾	± 0,15 ⁽¹²⁾
γ1	50° min.	—	—
γ2	40° min.	—	—

H9: PGJ19-5 in accordance with IEC Publication 60061 (sheet 7004-110-2)

Cap:

H9B: PGJY19-5 in accordance with IEC Publication 60061 (sheet 7004-146-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12		12	
	Watts	65		65	
Test voltage	Volts	13,2	12,2	13,2	12,2
Objective values	Watts	73 max.	65 max.	73 max.	65 max.
	Luminous flux	2 100 ± 10 %	1 650 ± 10 %		
Reference luminous flux at approximately			12 V	1 500	
			12,2 V	1 650	
			13,2 V	2 100	

⁽⁹⁾ The viewing direction is direction A as shown in Figure 1 on sheet H9/1.

⁽¹⁰⁾ The ends of the filament are defined as the points where, when the viewing direction is as defined in footnote 9 above, the projection of the outside of the end turns crosses the filament axis.

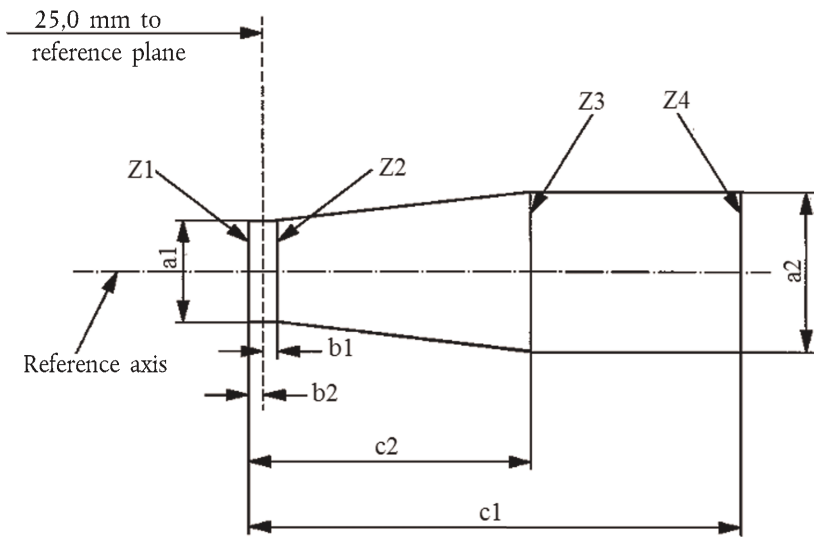
⁽¹¹⁾ To be checked by means of a 'Box System'; sheet H9/4.

⁽¹²⁾ The eccentricity is measured only in viewing directions A and B as shown in Figure 1 on sheet H9/1. The points to be measured are those where the projection of the outside of the end turns nearest or furthest from the reference plane crosses the filament axis.

CATEGORIES H9 AND H9B — Sheet H9/4

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament complies with the requirements.



a1	a2	b1	b2	c1	c2
d + 0,4	d + 0,7	0,25		5,7	4,6

d = diameter of filament

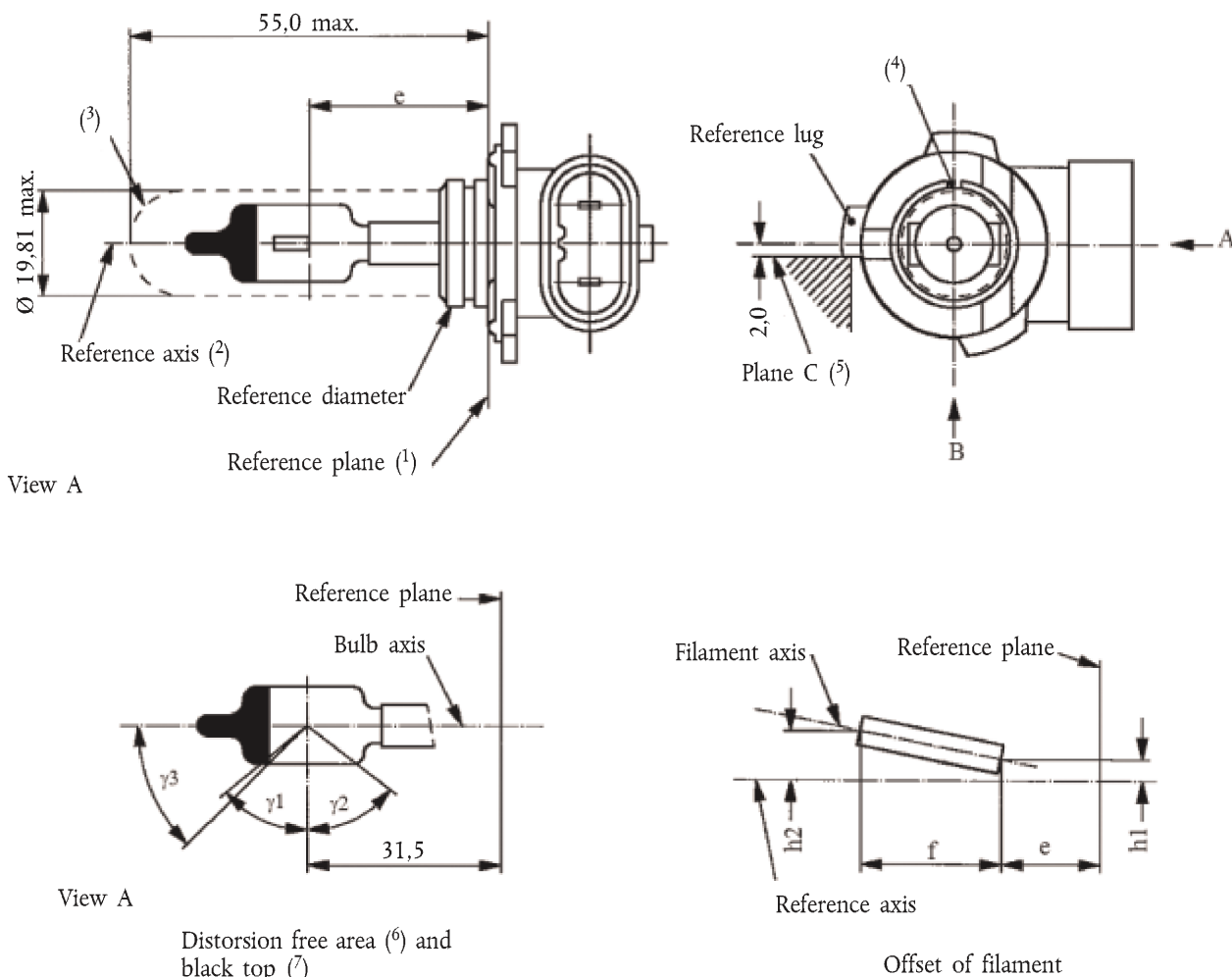
The filament position is checked solely in directions A and B as shown on sheet H9/1, Figure 1.

The filament shall lie entirely within the limits shown.

The ends of the filament as defined on sheet H9/3, footnote 10, shall lie between lines Z1 and Z2 and between Z3 and Z4.

CATEGORY H10 — Sheet H10/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



- (1) The reference plane is the plane defined by the meeting points of cap-holder fit.
- (2) The reference axis is perpendicular to the reference plane and concentric with the reference diameter of the cap.
- (3) Glass bulb and supports shall not exceed the envelope and shall not interfere with insertion past the lamp key. The envelope is concentric to the reference axis.
- (4) The keyway is mandatory.
- (5) The filament lamp shall be rotated in the measuring holder until the reference lug contacts plane C of the holder.
- (6) Glass bulb periphery shall be optically distortion-free axially and cylindrically within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 and does not need to be verified in the area covered by the obscuration.
- (7) The obscuration shall extend to at least angle γ_3 and shall be at least as far as the undistorted part of the bulb defined by angle γ_1 .

CATEGORY H10 — Sheet H10/2

Dimensions in mm ⁽⁸⁾		Tolerance	
		Filament lamps of normal production	Standard filament lamp
e ⁽⁹⁾ , ⁽¹⁰⁾	28,9	⁽¹¹⁾	± 0,16
f ⁽⁹⁾ , ⁽¹⁰⁾	5,2	⁽¹¹⁾	± 0,16
h1, h2	0	⁽¹¹⁾	± 0,15 ⁽¹²⁾
γ1	50° min.	—	—
γ2	52° min.	—	—
γ3	45°	± 5°	± 5°

Cap PY20d in accordance with IEC Publication 60061 (sheet 7004-31-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	42	42
Test voltage	Volts	13,2	13,2
Objective values	Watts	50 max.	50 max.
	Luminous flux	850 ± 15 %	
Reference luminous flux at approximately		12 V	600
		13,2 V	850

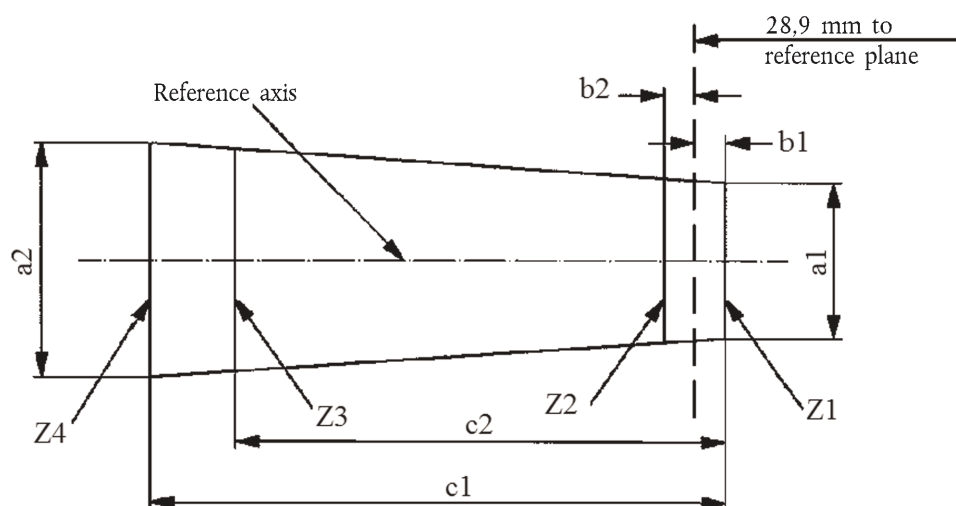
⁽⁸⁾ Dimensions shall be checked with O-ring removed.⁽⁹⁾ The viewing direction is direction (*) B as shown in the figure on sheet H10/1.⁽¹⁰⁾ The ends of the filament are defined as the points where, when the viewing direction (*) as defined in footnote 9 above, the projection of the outside of the end turns crosses the filament axis.⁽¹¹⁾ To be checked by means of a 'Box-System', sheet H10/3 (*).⁽¹²⁾ The eccentricity is measured only in viewing directions (*) A and B as shown in the figure on sheet H10/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

(*) Manufacturers may choose another set of perpendicular viewing directions. The viewing directions specified by the manufacturer are to be used by the testing laboratory when checking filament dimensions and position.

CATEGORY H10 — Sheet H10/3

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



	a1	a2	b1	b2	c1	c2
12 V	1,4 d	1,8 d	0,25		6,1	4,9

d = diameter of filament.

The filament position is checked solely in directions A and B as shown on sheet H10/1.

The filament shall lie entirely within the limits shown.

The ends of the filament as defined on sheet H10/2 footnote 10 shall lie between lines Z1 and Z2 and between lines Z3 and Z4.

CATEGORIES H11 AND H11B — Sheet H11/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

Category H11

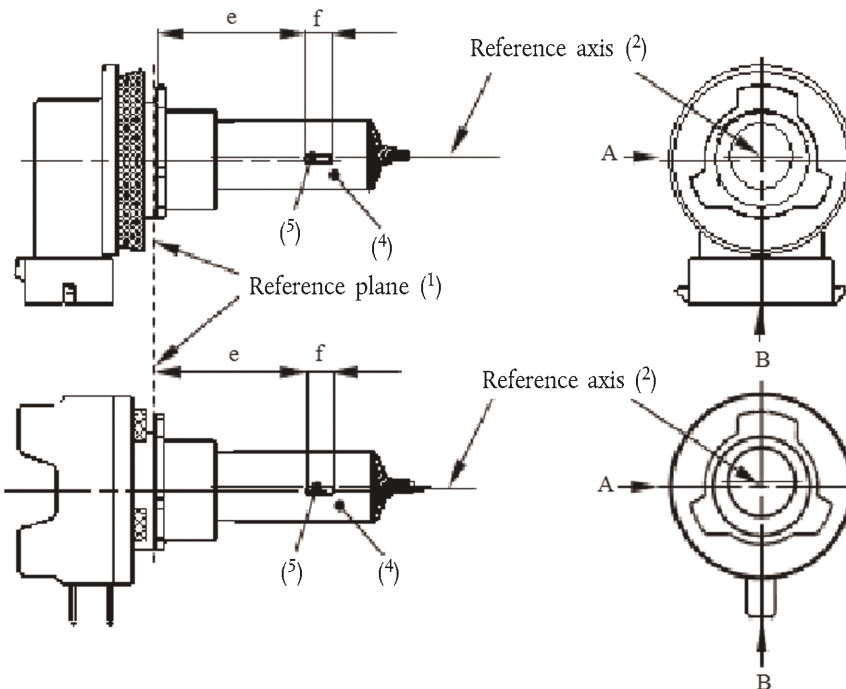


Figure 1

Main drawings

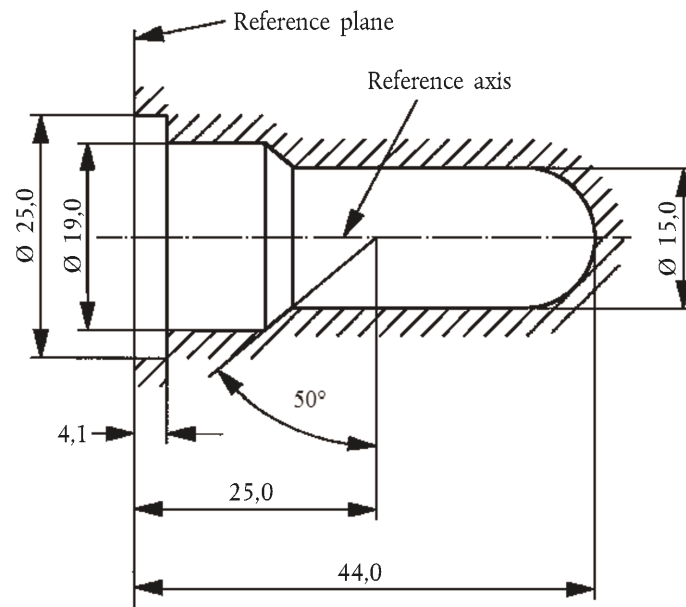


Figure 2

Maximum lamp outline ⁽³⁾

⁽¹⁾ The reference plane is the plane formed by the underside of the bevelled lead-in flange of the cap.

⁽²⁾ The reference axis is perpendicular to the reference plane and passing through the centre of the 19 mm cap diameter.

⁽³⁾ Glass bulb and supports shall not exceed the envelope as indicated in Figure 2. The envelope is concentric to the reference axis.

⁽⁴⁾ The colour of the light emitted shall be white or selective-yellow.

⁽⁵⁾ Notes concerning the filament diameter.

(a) No actual diameter restrictions apply but the objective for future developments is to have $d_{max} = 1,4$ mm.

(b) For the same manufacturer, the design diameter of standard (étalon) filament lamp and filament lamp of normal production shall be the same.

CATEGORIES H11 AND H11B — Sheet H11/2

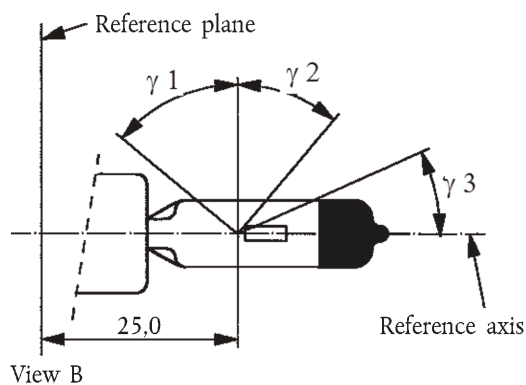


Figure 3

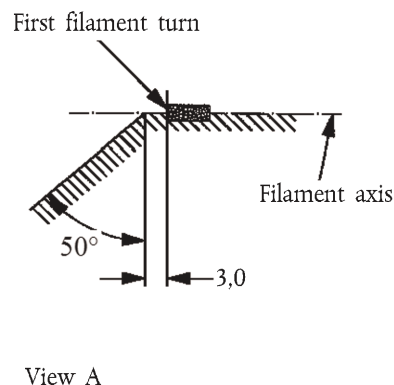
Distortion free area ⁽⁶⁾ and black top ⁽⁷⁾

Figure 4

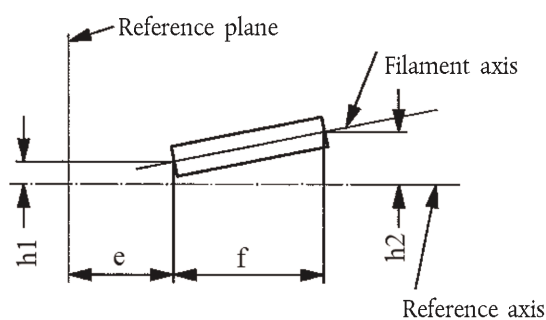
Metal free zone ⁽⁸⁾

Figure 5

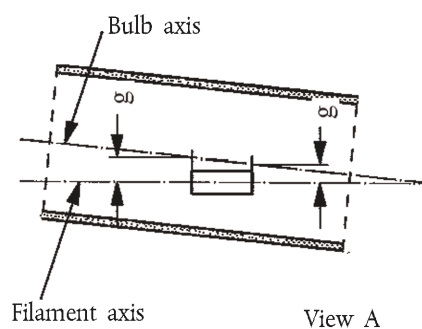
Permissible offset of filament axis ⁽⁹⁾
(for standard filament lamps only)

Figure 6

Bulb eccentricity ⁽¹⁰⁾

- ⁽⁶⁾ Glass bulb shall be optically distortion free within the angles $\gamma 1$ and $\gamma 2$. This requirement applies to the whole bulb circumference within the angles $\gamma 1$ and $\gamma 2$.
- ⁽⁷⁾ The obscuration shall extend at least to the cylindrical part of the bulb on the whole bulb top circumference. It shall, moreover, extend at least to a plane parallel to the reference plane where $\gamma 3$ crosses the outer bulb surface (view B as indicated on sheet H11/1).
- ⁽⁸⁾ The internal design of the lamp shall be such that stray light images and reflections are only located above the filament itself seen from the horizontal direction (view A as indicated in Figure 1 on sheet H11/1). No metal parts other than filament turns shall be located in the shaded area as seen in Figure 4.
- ⁽⁹⁾ The offset of the filament with respect to the reference axis is measured only in viewing directions A and B as shown in Figure 1 on sheet H11/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.
- ⁽¹⁰⁾ Eccentricity of bulb axis with respect to filament axis measured in two planes parallel to the reference plane where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

CATEGORIES H11 AND H11B — Sheet H11/3

Dimensions in mm	Filaments lamps of normal production		Standard filament lamp
	12 V	24 V	12 V
e ⁽¹¹⁾	25,0 ⁽¹²⁾		25,0 ± 0,1
f ⁽¹¹⁾	4,5	5,3 ⁽¹²⁾	4,5 ± 0,1
g	0,5 min.		u.c.
h1	0 ⁽¹²⁾		0 ± 0,1
h2	0 ⁽¹²⁾		0 ± 0,15
γ1	50° min.		50° min.
γ2	40° min.		40° min.
γ3	30° min.		30° min.

H11: PGJ19-2 in accordance with IEC Publication 60061 (sheet 7004-110-2)

Cap:

H11B: PGJY19-2 in accordance with IEC Publication 60061 (sheet 7004-146-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	24	12
	Watts	55	70	55
Test voltage	Volts	13,2	28,0	13,2
Objective values	Watts	62 max.	80 max.	62 max.
	Luminous flux	1 350 ± 10 %	1 600 ± 10 %	
Reference luminous flux at approximately			12 V	1 000
			13,2 V	1 350

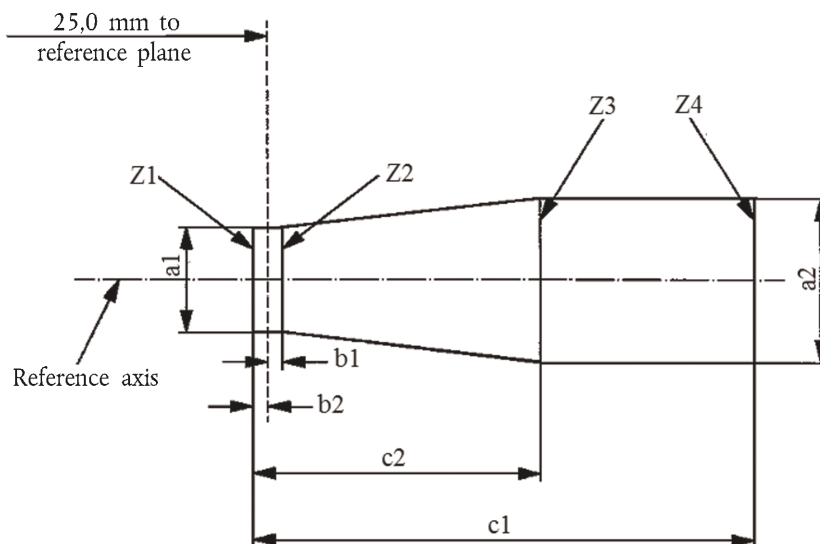
⁽¹¹⁾ The ends of the filament are defined as the points where, when the viewing direction is View A as shown in Figure 1 on sheet H11/1, the projection of the outside of the end turns crosses the filament axis.

⁽¹²⁾ To be checked by means of a 'Box System'; sheet H11/4.

CATEGORIES H11 AND H11B — Sheet H11/4

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament complies with the requirements.



	a1	a2	b1	b2	c1	c2
12 V	$d + 0,3$	$d + 0,5$	0,2		5,0	4,0
24 V	$d + 0,6$	$d + 1,0$	0,25		6,3	4,6

d = diameter of filament

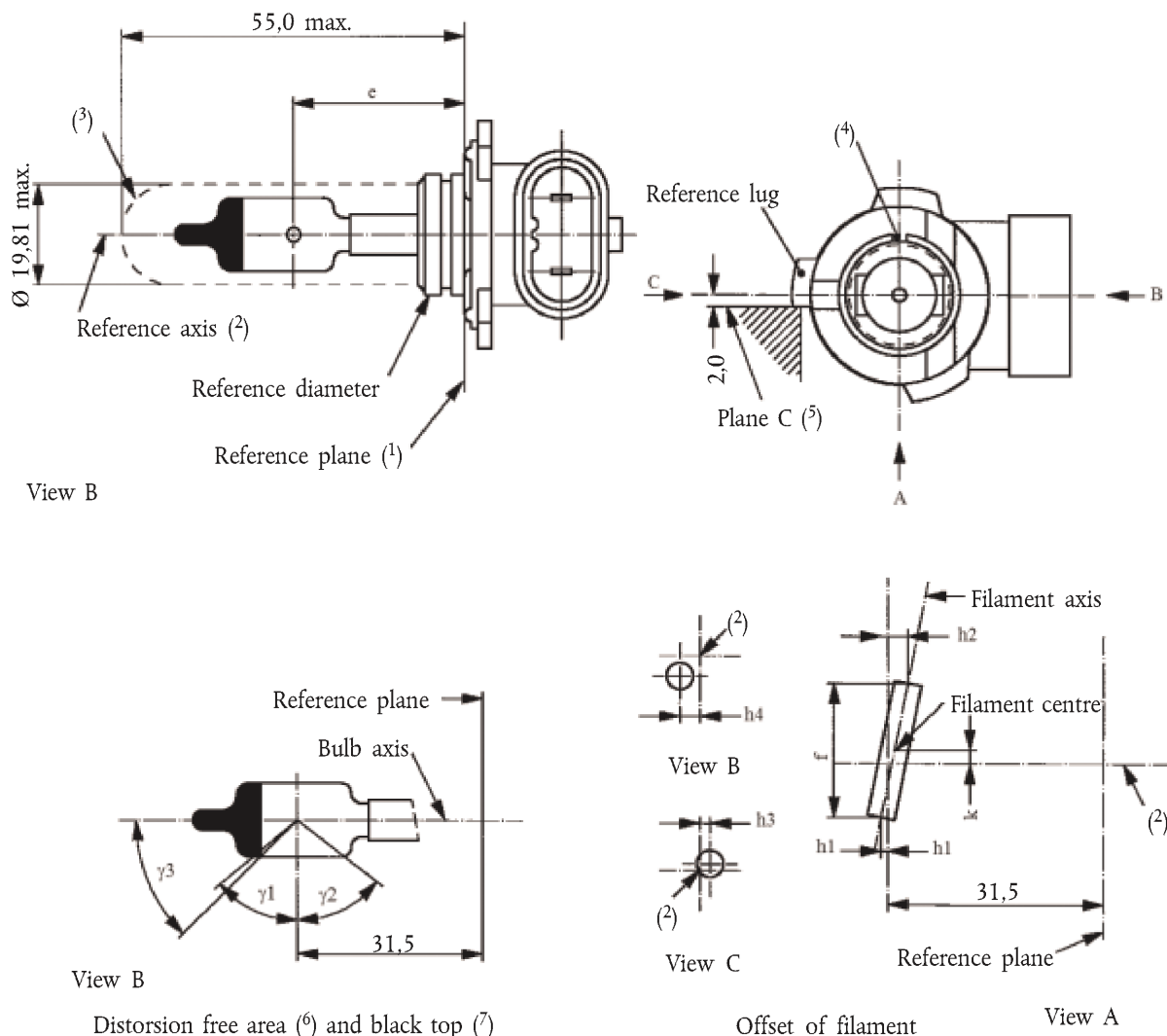
The filament position is checked solely in directions A and B as shown on sheet H11/1, Figure 1.

The filament shall lie entirely within the limits shown.

The ends of the filament as defined on sheet H11/3, footnote 11, shall lie between lines Z1 and Z2 and between Z3 and Z4.

CATEGORY H12 — Sheet H12/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Distorsion free area ⁽⁶⁾ and black top ⁽⁷⁾

Offset of filament

View A

⁽¹⁾ The reference plane is the plane defined by the meeting points of cap-holder fit.

⁽²⁾ The reference axis is perpendicular to the reference plane and concentric with the reference diameter of the cap.

⁽³⁾ Glass bulb and supports shall not exceed the envelope and shall not interfere with insertion past the lamp key. The envelope is concentric to the reference axis.

⁽⁴⁾ The keyway is mandatory.

⁽⁵⁾ The filament shall be rotated in the measuring holder until the reference lug contacts plane C of the holder.

⁽⁶⁾ Glass bulb periphery shall be optically distortion-free axially and cylindrically within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 and does not need to be verified in the area covered by the obscuration.

⁽⁷⁾ The obscuration shall extend to at least angle γ_3 and shall be at least as far as the undistorted part of the bulb defined by angle γ_1 .

CATEGORY H12 — Sheet H12/2

Dimensions in mm ⁽⁸⁾		Tolerance	
		Filament lamps of normal production	Standard filament lamp
e ⁽⁹⁾ , ⁽¹⁰⁾	31,5	⁽¹¹⁾	± 0,16
f ⁽⁹⁾ , ⁽¹⁰⁾	5,5	4,8 min	± 0,16
h1, h2, h3, h4	0	⁽¹¹⁾	± 0,15 ⁽¹²⁾
k	0	⁽¹¹⁾	± 0,15 ⁽¹³⁾
γ1	50° min.	—	—
γ2	52° min.	—	—
γ3	45°	± 5°	± 5°

Cap PZ20d in accordance with IEC Publication 60061 (sheet 7004-31-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

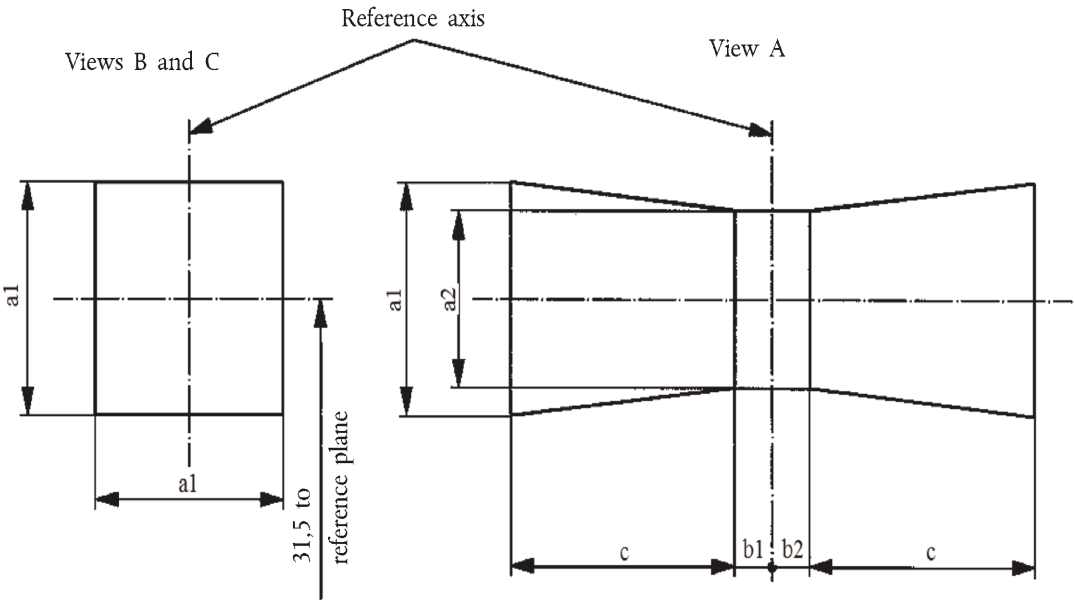
Rated values	Volts	12	12
	Watts	53	53
Test voltage	Volts	13,2	13,2
Objective values	Watts	61 max.	61 max.
	Luminous flux	1 050 ± 15 %	
Reference luminous flux at approximately		12 V	775
		13,2 V	1 050

⁽⁸⁾ Dimensions shall be checked with O-ring removed.⁽⁹⁾ The viewing direction is direction A as shown in the figure on sheet H12/1.⁽¹⁰⁾ The ends of the filament are defined as the points where, when the viewing direction as defined in footnote 9 above, the projection of the outside of the end turns crosses the filament axis.⁽¹¹⁾ To be checked by means of a 'Box-System'; sheet H12/3.⁽¹²⁾ Dimensions h1 and h2 are measured in viewing direction A, dimension h3 in direction C and dimension h4 in direction B as shown in the figure on sheet H12/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.⁽¹³⁾ Dimension k is measured only in viewing direction A.

CATEGORY H12 — Sheet H12/3

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



a1	a2	b1	b2	c
1,6 d	1,3 d	0,30	0,30	2,8

d = diameter of filament

For the directions of view A, B and C, see sheet H12/1.

The filament shall lie entirely within the limits shown.

The centre the filament shall lie between the limits of dimensions b_1 and b_2 .

CATEGORIES H13 AND H13A — Sheet H13/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

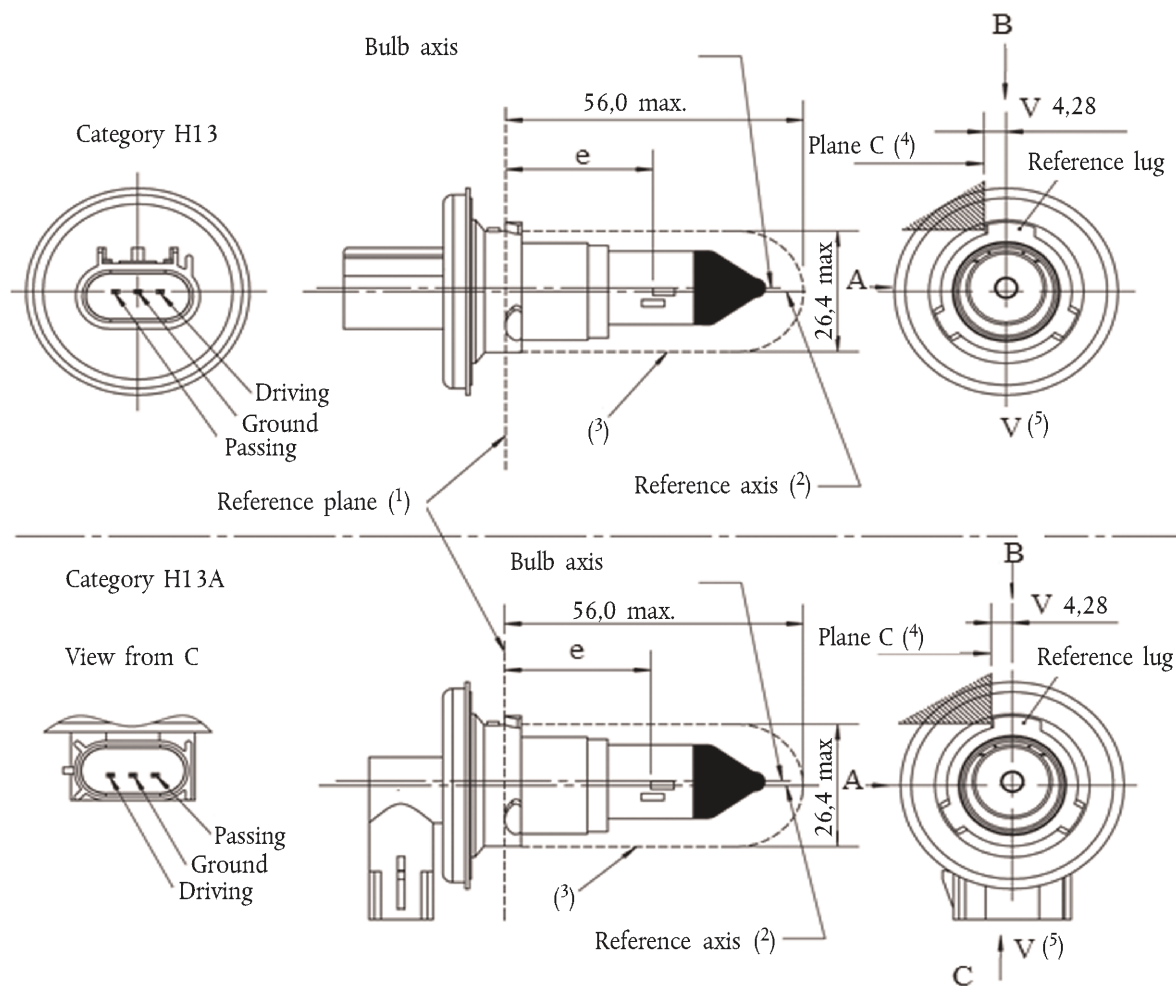


Figure 1

Main drawing

⁽¹⁾ The reference plane is the plane formed by the underside of the three radiused tabs of the cap.

⁽²⁾ The reference axis is perpendicular to the reference plane and crosses the intersection of the two perpendiculars as indicated in Figure 2 on sheet H13/2.

⁽³⁾ Glass bulb and supports shall not exceed the envelope as indicated. The envelope is concentric to the reference axis.

⁽⁴⁾ The filament lamp shall be rotated in the measuring holder until the reference lug contacts plane C of the holder.

⁽⁵⁾ Plane V-V is the plane perpendicular to the reference plane passing through the reference axis and parallel to plane C.

CATEGORIES H13 AND H13A — Sheet H13/2

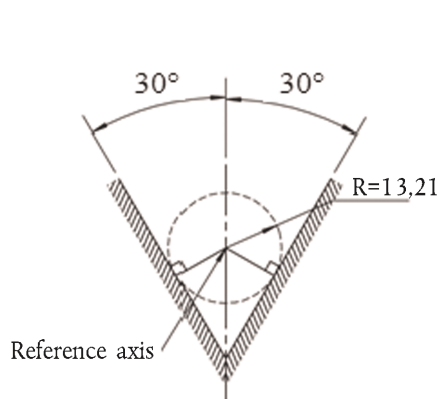


Figure 2

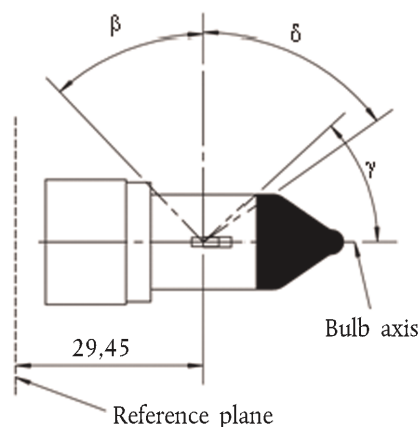
Definition of reference axis ⁽²⁾

Figure 3

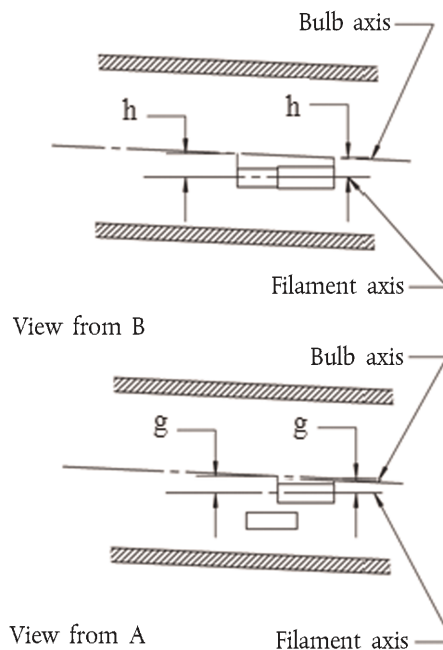
Undistorted area ⁽⁶⁾ and opaque coating ⁽⁷⁾

Figure 4

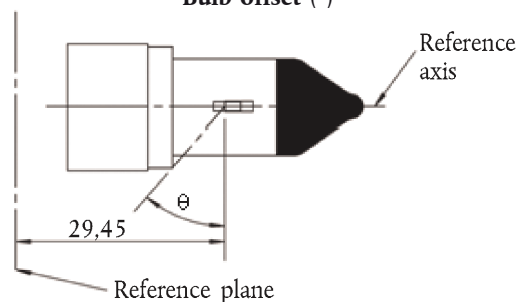
Bulb offset ⁽⁸⁾

Figure 5

Light blocking toward cap ⁽⁹⁾

⁽⁶⁾ Glass bulb shall be optically distortion-free axially and cylindrically within the angles β and δ . This requirement applies to the whole bulb circumference within the angles β and δ and does not need to be verified in the area covered by the opaque coating.

⁽⁷⁾ The opaque coating shall extend at least to the cylindrical part of the bulb on the whole bulb top circumference. It shall moreover extend at least to a plane parallel to the reference plane where γ crosses the outer bulb surface (view B as indicated on sheet H13/1).

⁽⁸⁾ Offset of passing beam filament in relation to the bulb axis is measured in two planes parallel to the reference plane where the projection of the outside end turns nearest to and farthest from the reference plane crosses the passing beam filament axis.

⁽⁹⁾ Light shall be blocked over the cap end of the bulb extending to angle ϑ . This requirement applies in all directions around the reference axis.

CATEGORIES H13 AND H13A — Sheet H13/3

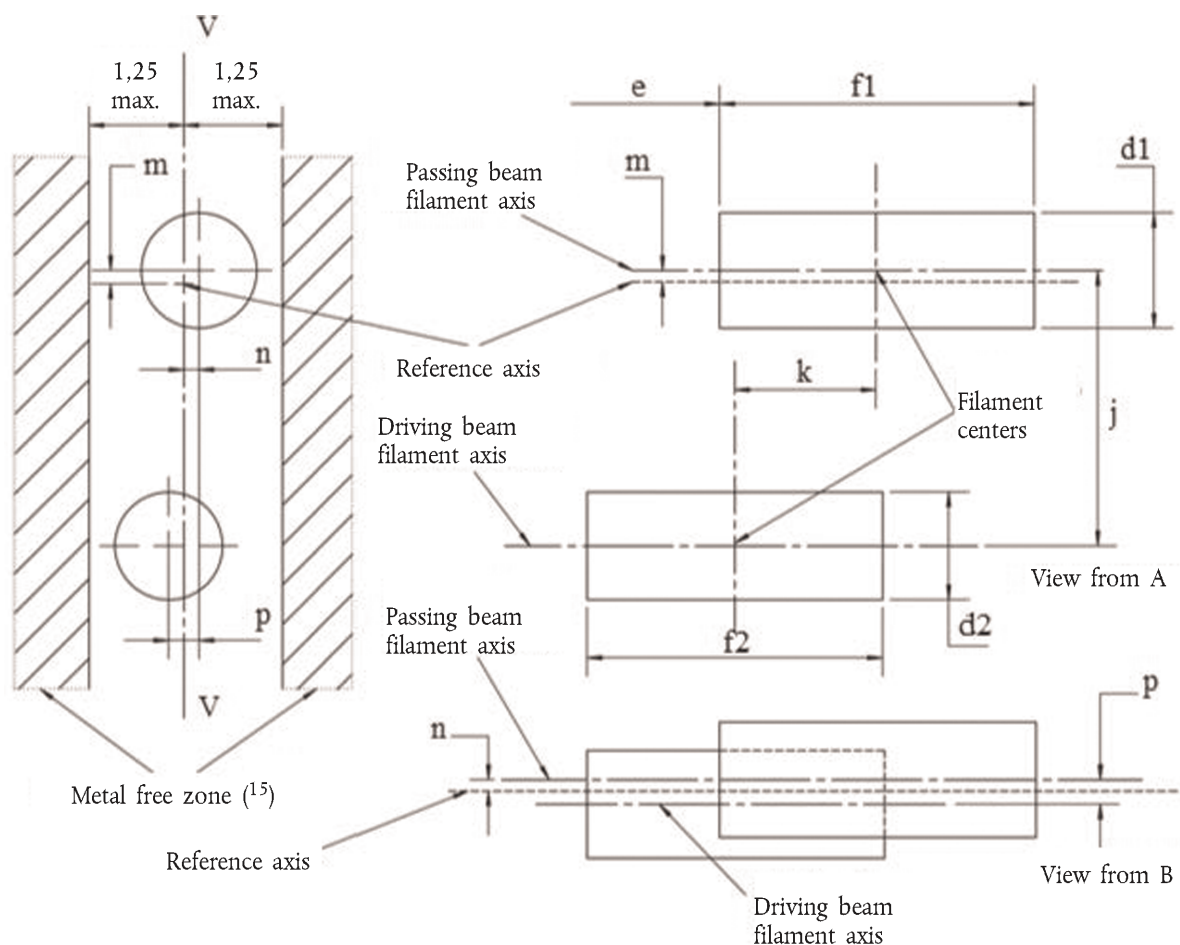


Figure 6

Position and dimensions of filaments ⁽¹⁰⁾, ⁽¹¹⁾, ⁽¹²⁾, ⁽¹³⁾, ⁽¹⁴⁾

- ⁽¹⁰⁾ Dimensions j, k and p are measured from the centre of the passing beam filament to the centre of the driving beam filament.
- ⁽¹¹⁾ Dimensions m and n are measured from the reference axis to the centre of the passing beam filament.
- ⁽¹²⁾ Both filaments axis are to be held within a 2° tilt with respect to the reference axis about the centre of the respective filament.
- ⁽¹³⁾ Note concerning the filament diameters.
For the same manufacturer, the design filament diameter of standard (étalon) filament lamp and filament lamp of normal production shall be the same.
- ⁽¹⁴⁾ For both the driving beam and the passing beam filament distortion shall not exceed ± 5 per cent of filament diameter from a cylinder.
- ⁽¹⁵⁾ The metal free zone limits the location of lead wires within the optical path. No metal parts shall be located in the shaded area as seen in Figure 6.

CATEGORIES H13 AND H13A — Sheet H13/4

Dimensions in mm		Tolerance	
		Filaments lamps of normal production	Standard filament lamp
d1 ⁽¹³⁾ , ⁽¹⁷⁾	1,8 max.	—	—
d2 ⁽¹³⁾ , ⁽¹⁷⁾	1,8 max.	—	—
e ⁽¹⁶⁾	29,45	± 0,20	± 0,10
f 1 ⁽¹⁶⁾	4,6	± 0,50	± 0,25
f 2 ⁽¹⁶⁾	4,6	± 0,50	± 0,25
g ⁽⁸⁾ , ⁽¹⁷⁾	0,5 d1	± 0,40	± 0,20
h ⁽⁸⁾	0	± 0,30	± 0,15
j ⁽¹⁰⁾	2,5	± 0,20	± 0,10
k ⁽¹⁰⁾	2,0	± 0,20	± 0,10
m ⁽¹⁰⁾	0	± 0,20	± 0,13
n ⁽¹⁰⁾	0	± 0,20	± 0,13
p ⁽¹⁰⁾	0	± 0,08	± 0,08
β	42° min.	—	—
δ	52° min.	—	—
γ	43°	+ 0°/– 5°	+ 0°/– 5°
ϑ ⁽⁹⁾	41°	± 4°	± 4°

H13: P26.4t in accordance with IEC Publication 60061 (sheet 7004-128-3)

Cap:

H13A: PJ26.4t

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS ⁽¹⁸⁾

Rated values	Volts	12		12	
	Watts	55	60	55	60
Test voltage	Volts	13,2		13,2	
Objective values	Watts	68 max.	75 max.	68 max.	75 max.
	Luminous flux	1 100 ± 15 %	1 700 ± 15 %		
Reference luminous flux at approximately			12 V	800	1 200
			13,2 V	1 100	1 700

⁽¹⁶⁾ The ends of the filament are defined as the points where, when the viewing direction is direction A as shown on sheet H13/1, the projection of the outside of the end turns crosses the filament axis.

⁽¹⁷⁾ d1 is the actual diameter of the passing beam filament. d2 is the actual diameter of the driving beam filament.

⁽¹⁸⁾ The values indicated in the left-hand columns relate to the passing beam filament and those indicated in the right-hand columns to the driving beam filament.

CATEGORY H14 — Sheet H14/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.

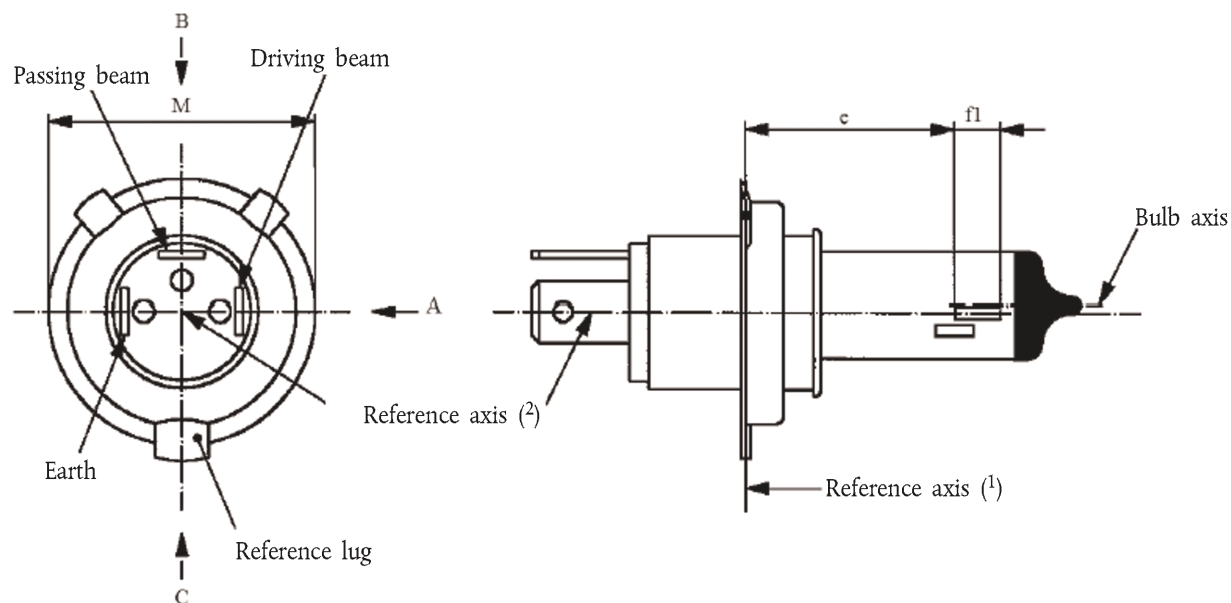


Figure 1

Main drawings

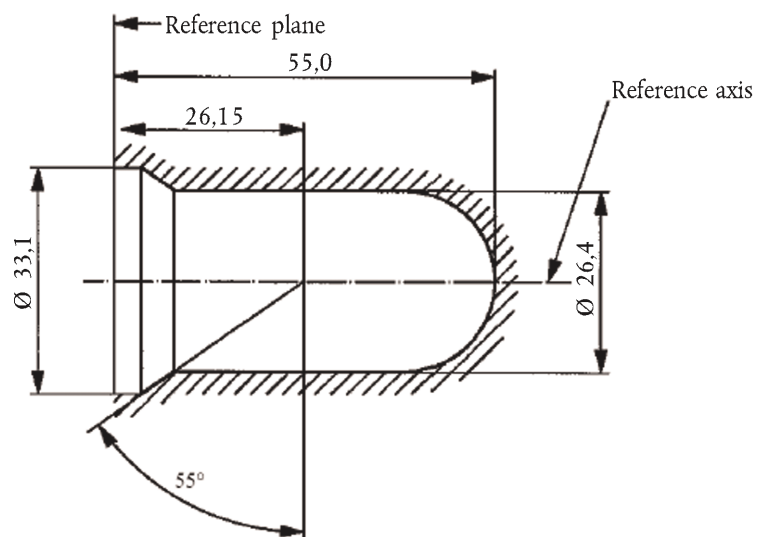


Figure 2

Maximum lamp outline ⁽³⁾

⁽¹⁾ The reference plane is defined by the points on the surface of the holder on which the three lugs of the cap ring will rest.

⁽²⁾ The reference axis is perpendicular to the reference plane and passing through the centre of the cap ring diameter 'M'.

⁽³⁾ Glass bulb and supports shall not exceed the envelope as indicated in Figure 2. The envelope is concentric to the reference axis.

CATEGORY H14 — Sheet H14/2

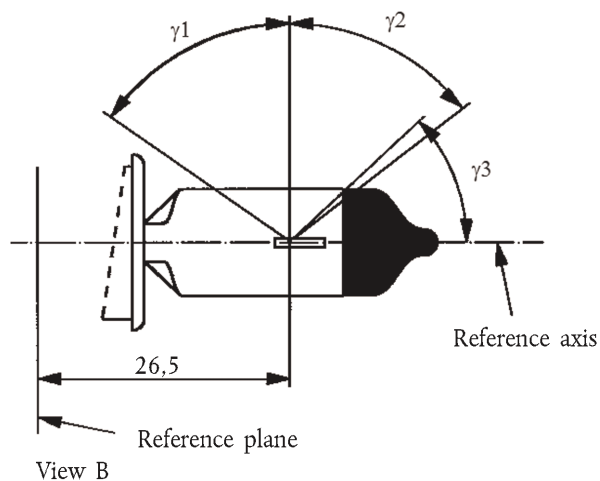


Figure 3

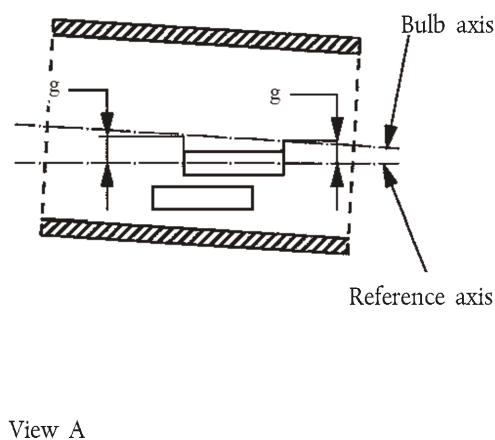
Distortion free area ⁽⁴⁾ and black top ⁽⁵⁾

Figure 4

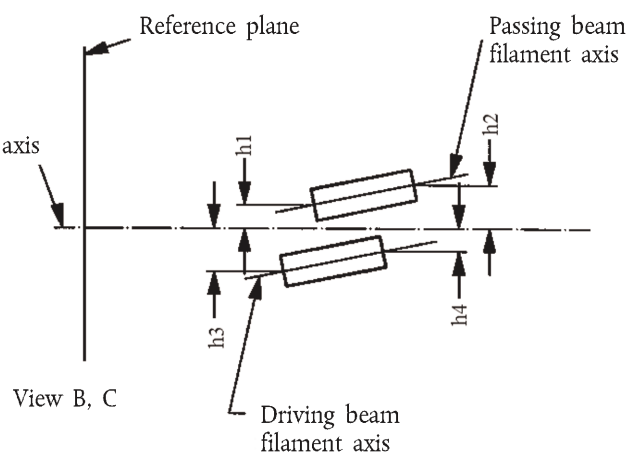
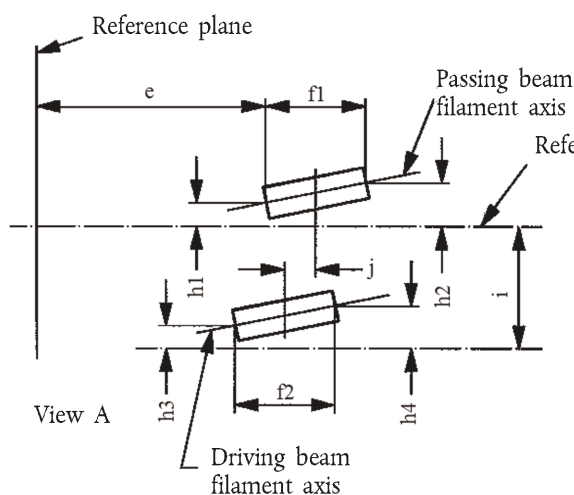
Bulb eccentricity ⁽⁶⁾

Figure 5

Offset of filament axis ⁽⁷⁾

(for standard filament lamps only)

- ⁽⁴⁾ Glass bulb shall be optically distortion free within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 and does not need to be verified in the area covered by the obscuration.
- ⁽⁵⁾ The obscuration shall extend at least to the cylindrical part of the bulb on the whole bulb top circumference. It shall, moreover, extend at least to a plane parallel to the reference plane where γ_3 crosses the outer bulb surface (view B as indicated on sheet H14/1).
- ⁽⁶⁾ Eccentricity of bulb with respect to passing beam filament axis is measured in two planes parallel to the reference plane where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the passing beam filament axis.
- ⁽⁷⁾ The offset of the filaments with respect to the reference axis is measured only in viewing direction A, B and C as shown in Figure 1 on sheet H14/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filaments axis.

CATEGORY H14 — Sheet H14/3

Dimensions in mm		Filament lamp of normal production	Standard filament lamps
e ⁽⁸⁾	26,15	(¹⁰)	± 0,1
f1 ⁽⁸⁾ , ⁽⁹⁾	5,3	(¹⁰)	± 0,1
f2 ⁽⁸⁾ , ⁽⁹⁾	5,0	(¹⁰)	± 0,1
g	0,3 min.		
h1	0	(¹⁰)	± 0,1
h2	0	(¹⁰)	± 0,15
h3	0	(¹⁰)	± 0,15
h4	0	(¹⁰)	± 0,15
i	2,7		—
j	2,5	(¹⁰)	± 0,1
γ1	55° min.	—	—
γ2	52° min.	—	—
γ3	43°	0/– 5°	0/– 5°

Cap P38t in accordance with IEC Publication 60061 (sheet 7004-133-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12		12	
	Watts	55	60	55	60
Test voltage	Volts	13,2		13,2	
Objective values	Watts	68 max.	75 max.	68 max.	75 max.
	Luminous flux	1 150 ± 15 %	1 750 ± 15 %		
Reference luminous flux at approximately			12 V	860	1 300
			13,2 V	1 150	1 750

⁽⁸⁾ The ends of the filaments are defined as the points where, when the viewing direction is direction A as shown in Figure 1 on sheet H14/1, the projection of the outside of the end turns crosses the filaments axis.

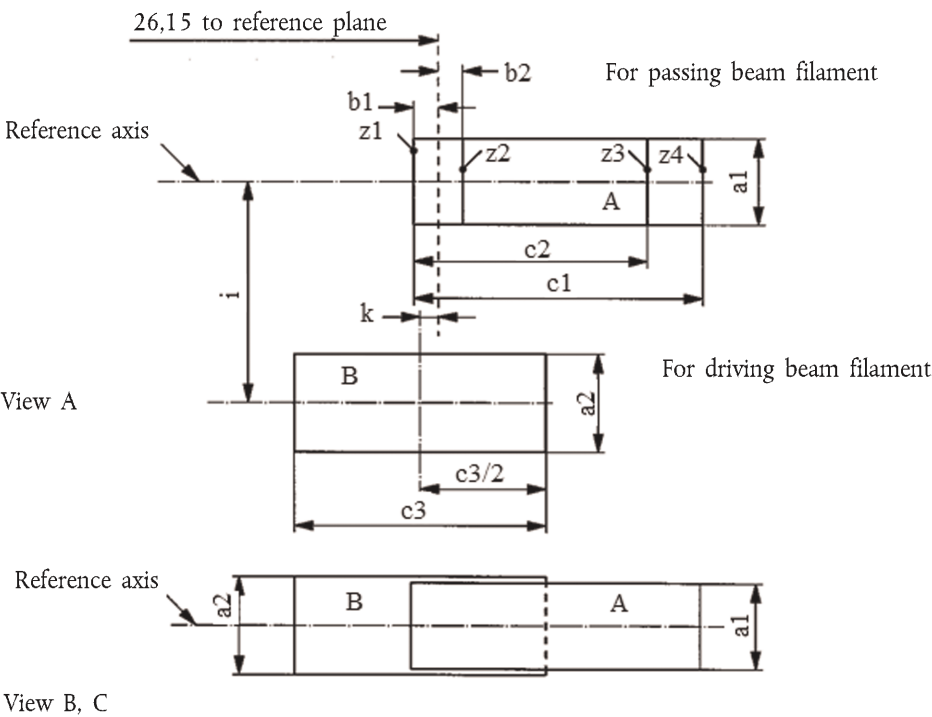
⁽⁹⁾ 'f1' represents the length of the passing beam filament and 'f2' represents the length of the driving beam filament.

⁽¹⁰⁾ To be checked by means of a 'Box system'; sheet H14/4.

CATEGORY H14 — Sheet H14/4

Screen projection requirements

This test is used to determine, by checking whether the filaments are correctly positioned relative to the reference axis and the reference plane, whether a filament lamp complies with the requirements.



a1	a2	b1	b2	c1	c2	c3	i	k
d1 + 0,5	1,6 × d2	0,2		5,8	5,1	5,75	2,7	0,15

d1 is diameter of the passing beam filament and d2 that of the driving beam filament.

Notes concerning the filaments diameter:

- (a) No actual diameter restrictions apply but the objective for future developments is to have d1 max. = 1,6 mm and d2 max. = 1,6 mm.
- (b) For the same manufacture, the design diameter of standard filament lamps and filament lamps of normal production shall be the same.

The positions of the filaments are checked solely in directions A, B and C as shown in Figure 1 on sheet H14/1.

The passing beam filament shall lie entirely in the rectangle A and the driving beam filament entirely in rectangle B.

The ends of the passing beam filament as defined on sheet H14/3, footnote 8 shall lie between lines Z1 and Z2 and between lines Z3 and Z4.

CATEGORY H15 — Sheet H15/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

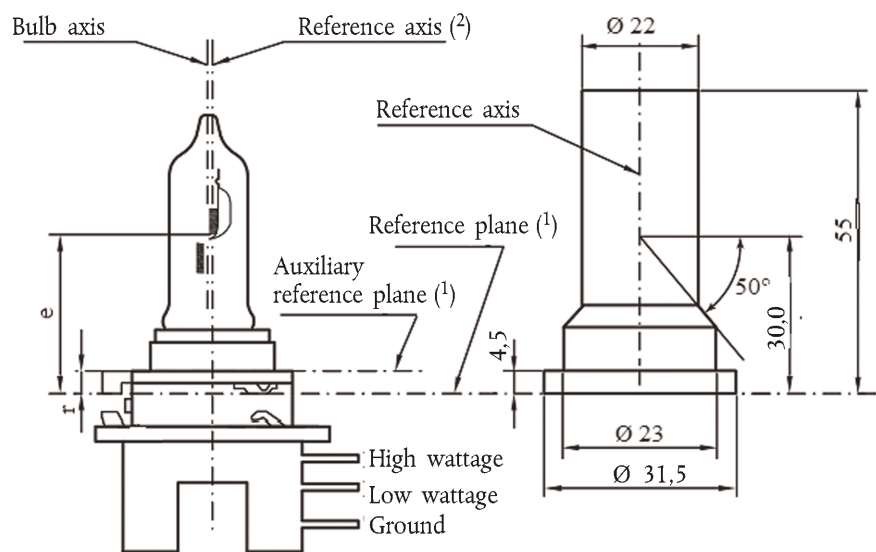


Figure 1
Main drawing

Figure 3
Maximum lamp outlines (3)

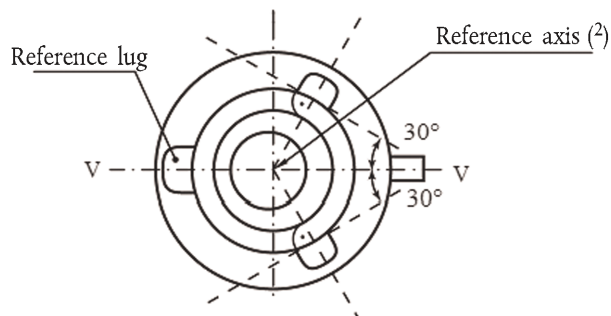


Figure 2
Definition of reference axis (2)

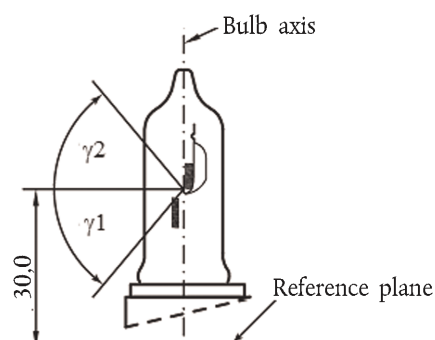


Figure 4
Distortion free area (4)

(1) The reference plane is defined by the points at which the holder touches the three lugs of the cap ring from the plug side. It is intended for use as an internal reference plane.

The auxiliary reference plane is defined by the points on the surface of the holder on which the three supporting bosses of the cap ring will rest. It is intended for use as an external reference plane.

The Cap is designed for use of the (internal) reference plane, but for certain applications the (external) auxiliary reference plane may be used instead.

(2) The reference axis is perpendicular to the reference plane and crosses the intersection of the two perpendiculars as indicated in figure 2 on sheet H15/1.

(3) Glass bulb and supports shall not exceed the envelope as indicated in figure 3. The envelope is concentric to the reference axis.

(4) Glass bulb shall be optically distortion free within the angles $\gamma 1$ and $\gamma 2$ as indicated in figure 4. This requirement applies to the whole bulb circumference within the angles $\gamma 1$ and $\gamma 2$.

CATEGORY H15 — Sheet H15/2

Dimensions in mm		Filament lamps of normal production		Standard filament lamp
		12 V	24 V	12 V
e		$30,0 + 0,35/- 0,25$	$30,0 + 0,35/- 0,25$	$30,0 + 0,20/- 0,15$
Y ₁		50° min	50° min	50° min
Y ₂		50° min	50° min	50° min
r	For details see cap sheet			

Cap PGJ23t-1 in accordance with IEC Publication 60061 (sheet 7004-155-1)

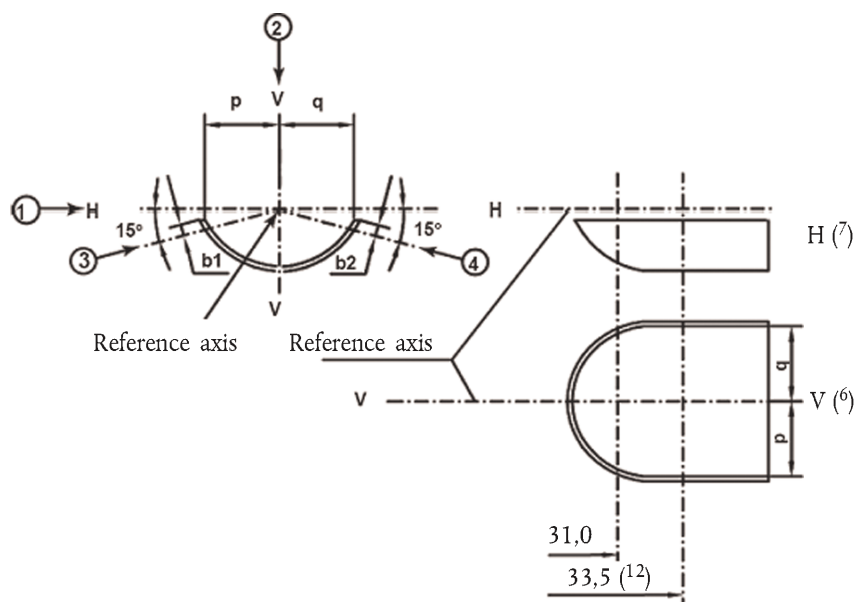
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12 (5)		24 (5)		12 (5)	
	Watts	15	55	20	60	15	55
Test voltage	Volts	13,2		28,0		13,2	13,2
Objective values	Watts	19 max.	64 max.	24 max.	73 max.	19 max.	64 max.
	Luminous flux	260	1 350	300	1 500		
		± 10 %					
Reference luminous flux at approximately 12 V							1 000
Reference luminous flux at approximately 13,2 V							1 350
Reference luminous flux at approximately 13,5 V						290	

⁽⁵⁾ The values indicated in the left-hand columns relate to the low wattage filament. Those indicated in the right-hand columns relate to the high wattage filament.

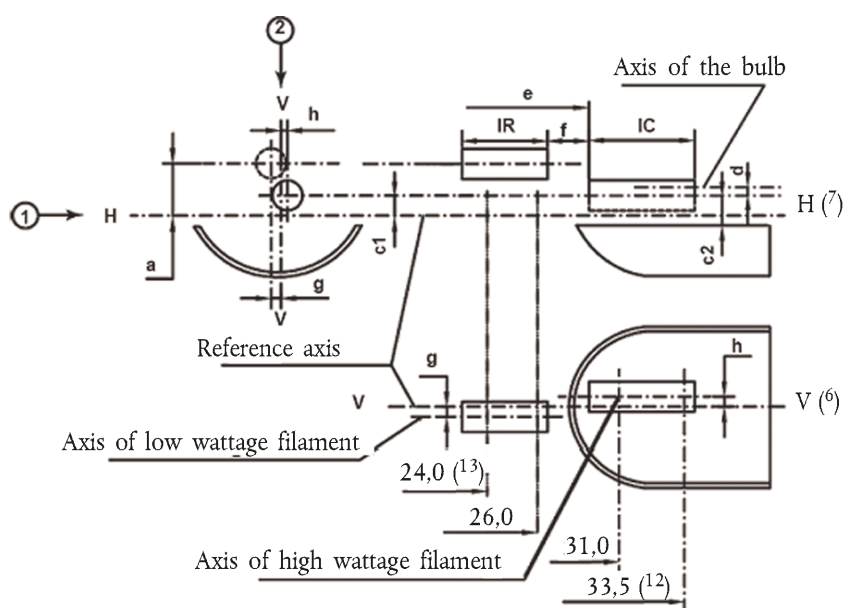
CATEGORY H15 — Sheet H15/3

Position of the shield



The drawing is not mandatory with respect to the design of the shield

Position of the filaments



CATEGORY H15 — Sheet H15/4

Table of the dimensions (in mm) referred to in the drawings on sheet H15/3

Reference (*)		Dimension (**)		Tolerance			
				Filament lamps of normal production		Standard filament lamp	
12 V	24 V	12 V	24 V	12 V	24 V	12 V	24 V
a/24,0	a/24,5	1,8		± 0,35		± 0,20	
a/26,0		1,8		± 0,35		± 0,20	
b1/31,0		0		± 0,30		± 0,15	
b1/33,5	b1/34,0	b1/31,0 mv		± 0,30		± 0,15	
b2/31,0		0		± 0,30		± 0,15	
b2/33,5	b2/34,0	b2/31,0 mv		± 0,30		± 0,15	
c1/31,0		0		± 0,30	± 0,50	± 0,15	± 0,25
c1/33,5	c1/34,0	c1/31,0 mv		± 0,30	± 0,50	± 0,15	± 0,25
c2/33,5	c2/34,0	1,1		± 0,30	± 0,50	± 0,15	± 0,25
d		min. 0,1		—		—	
f ⁽⁸⁾ , ⁽⁹⁾ , ⁽¹⁰⁾		2,7		± 0,30	± 0,40	+ 0,20 – 0,10	+ 0,25 – 0,15
g/24,0	g/24,5	0		± 0,50	± 0,70	± 0,25	± 0,35
g/26,0		0		± 0,50	± 0,70	± 0,25	± 0,35
h/31,0		0		± 0,50	± 0,60	± 0,25	± 0,30
h/33,5	h/34,0	h/31,0 mv		± 0,30	± 0,40	± 0,15	± 0,20
IR ⁽⁸⁾ , ⁽¹¹⁾		4,2	4,6	± 0,40	± 0,60	± 0,20	± 0,30
IC ⁽⁸⁾ , ⁽⁹⁾		4,4	5,4	± 0,40	± 0,60	± 0,20	± 0,30
p/33,5	p/34,0	Depends on the shape of the shield		—		—	
q/33,5	q/34,0	p/33,5	p/34,0	± 1,20		± 0,60	

(*) '.../26,0' means dimension to be measured at the distance from the reference plane indicated in mm after the stroke.

(**) '31,0 mv' means the value measured at a distance of 31,0 mm from the reference plane.

⁽⁶⁾ Plane V-V is the plane perpendicular to the reference plane and passing through the reference axis and through the axis of the reference lug.⁽⁷⁾ Plane H-H is the plane perpendicular to both the reference plane and plane V-V and passing through the reference axis.⁽⁸⁾ The end turns of the filament are defined as being the first luminous turn and the last luminous turn that are at substantially the correct helix angle.⁽⁹⁾ For the high wattage filament, the points to be measured are the intersections, seen in direction 1, of the lateral edge of the shield with the outside of the end turns defined under footnote 8.⁽¹⁰⁾ 'e' denotes the distance from the reference plane to the beginning of the driving beam filament as defined above.⁽¹¹⁾ For the low wattage filament the points to be measured are the intersections, seen in direction 1, of a plane, parallel to plane H-H and situated at a distance of 1,8 mm above it, with the end turns defined under footnote 8.⁽¹²⁾ 34,0 for the 24 V type.⁽¹³⁾ 24,5 for the 24 V type.

CATEGORY H15 — Sheet H15/5*Additional explanations to sheet H15/3*

The dimensions below are measured in four directions:

- (1) For dimensions a, c1, c2, d, e, f, IR and IC;
- (2) For dimensions g, h, p and q;
- (3) For dimension b1;
- (4) For dimension b2.

Dimensions b1, b2, c1 and h are measured in planes parallel to the reference plane at distances of 31,0 mm and 33,5 mm (34,0 mm for 24 V types).

Dimensions c2, p and q are measured in a plane parallel to the reference plane at a distance of 33,5 mm (34,0 mm for 24 V types).

Dimensions a and g are measured in planes parallel to the reference plane at distances of 24,0 mm (24,5 mm for 24 V types) and 26,0 mm.

CATEGORIES H16 AND H16B — Sheet H16/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

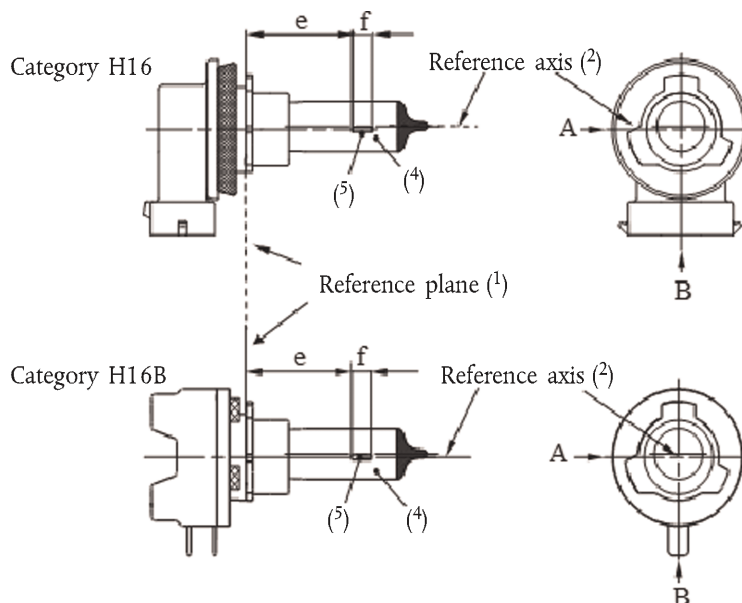


Figure 1

Main drawing

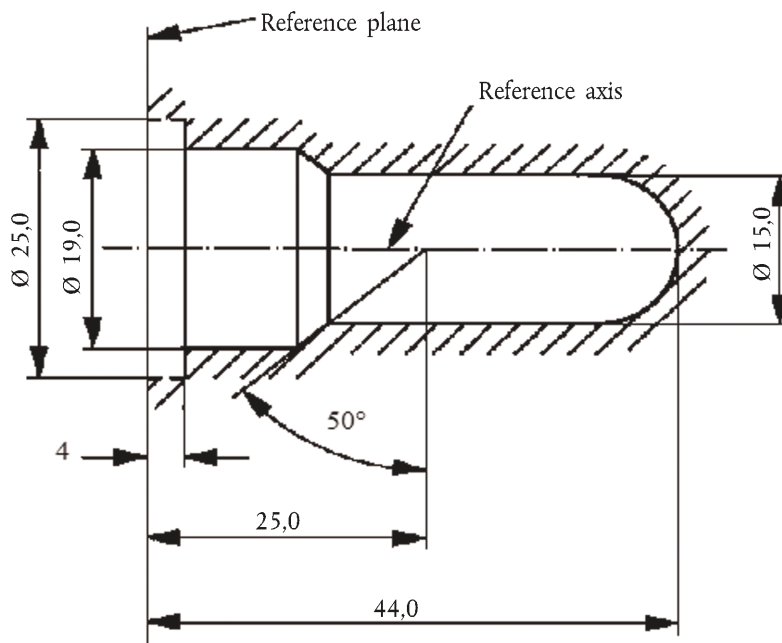


Figure 2

Maximum lamp outline ⁽³⁾

⁽¹⁾ The reference plane is the plane formed by the underside of the bevelled lead-in flange of the cap.

⁽²⁾ The reference axis is perpendicular to the reference plane and passing through the centre of the 19 mm cap diameter.

⁽³⁾ Glass bulb and supports shall not exceed the envelope as indicated in Figure 2. The envelope is concentric to the reference axis.

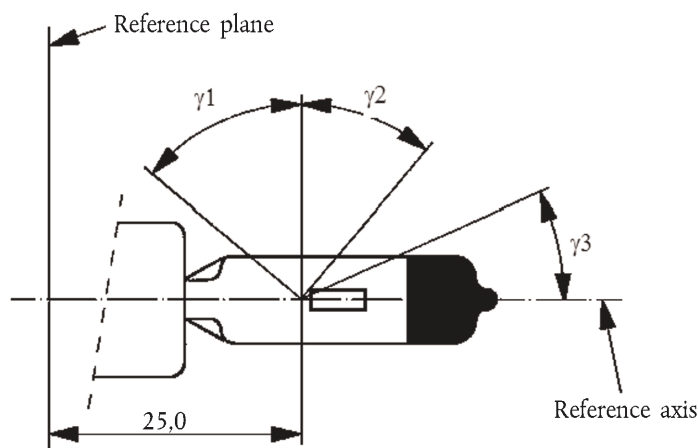
⁽⁴⁾ The light emitted shall be white or selective yellow.

⁽⁵⁾ Notes concerning the filament diameter.

(a) No actual diameter restrictions apply but the objective for future developments is to have $d_{\text{max.}} = 1,1$ mm.

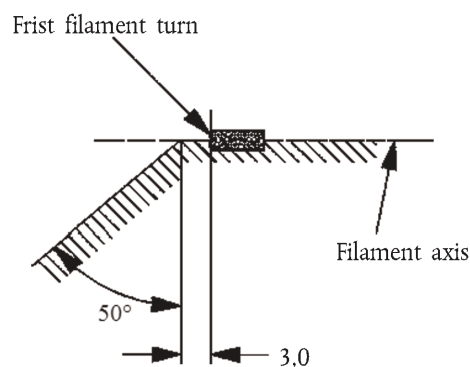
(b) For the same manufacturer, the design diameter of standard (étalon) filament lamp and filament lamp of normal production shall be the same.

CATEGORIES H16 AND H16B — Sheet H16/2



View B

Figure 3

Distortion free area ⁽⁶⁾ and black top ⁽⁷⁾

View A

Figure 4

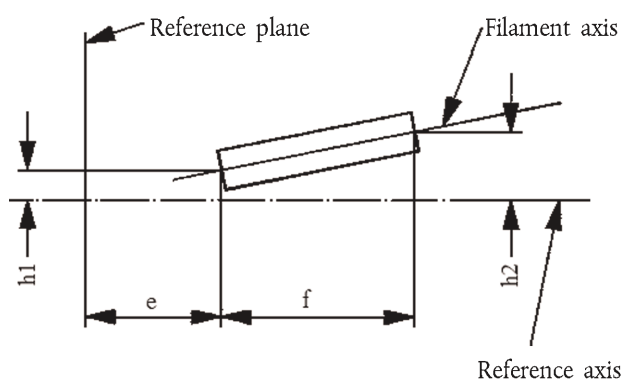
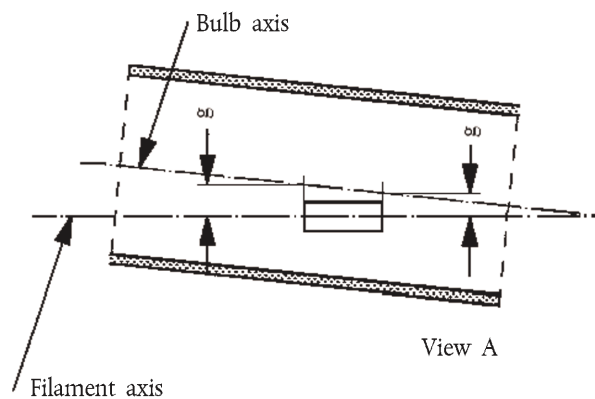
Metal free zone ⁽⁸⁾

Figure 5

Permissible offset of filament axis ⁽⁹⁾
(for standard filament lamps only)

View A

Figure 6

Bulb eccentricity ⁽¹⁰⁾

- ⁽⁶⁾ Glass bulb shall be optically distortion free within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 .
- ⁽⁷⁾ The obscuration shall extend at least to angle γ_3 and shall extend at least to the cylindrical part of the bulb on the whole bulb top circumference.
- ⁽⁸⁾ The internal design of the lamp shall be such that stray light images and reflections are only located above the filament itself seen from the horizontal direction. (View A as indicated in Figure 1 on sheet H16/1). No metal parts other than filament turns shall be located in the shaded area as seen in Figure 4.
- ⁽⁹⁾ The offset of the filament with respect to the reference axis is measured only in viewing directions A and B as shown in Figure 1 in sheet H16/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.
- ⁽¹⁰⁾ Offset of filament in relation to bulb axis measured in two planes parallel to the reference plane where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

CATEGORIES H16 AND H16B — Sheet H16/3

Dimensions in mm	Filaments lamps of normal production	Standard filament lamp
	12 V	12 V
e ⁽¹¹⁾	25,0 ⁽¹²⁾	25,0 ± 0,1
f ⁽¹¹⁾	3,2 ⁽¹²⁾	3,2 ± 0,1
g	0,5 min.	u.c.
h1	0 ⁽¹²⁾	0 ± 0,1
h2	0 ⁽¹²⁾	0 ± 0,15
γ1	50° min.	50° min.
γ2	40° min.	40° min.
γ3	30° min.	30° min.

H16: PGJ19-3 in accordance with IEC Publication 60061 (sheet 7004-110-2)

Cap:

H16B: PGJY19-3 in accordance with IEC Publication 60061 (sheet 7004-146-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	19	19
Test voltage	Volts	13,2	13,2
Objective values	Watts	26 max.	26 max.
	Luminous flux	500 + 10 %/- 15 %	
Reference luminous flux: 370 lm at approximately 12 V			370 lm
Reference luminous flux: 500 lm at approximately 13,2 V			500 lm
Reference luminous flux: 550 lm at approximately 13,5 V			550 lm

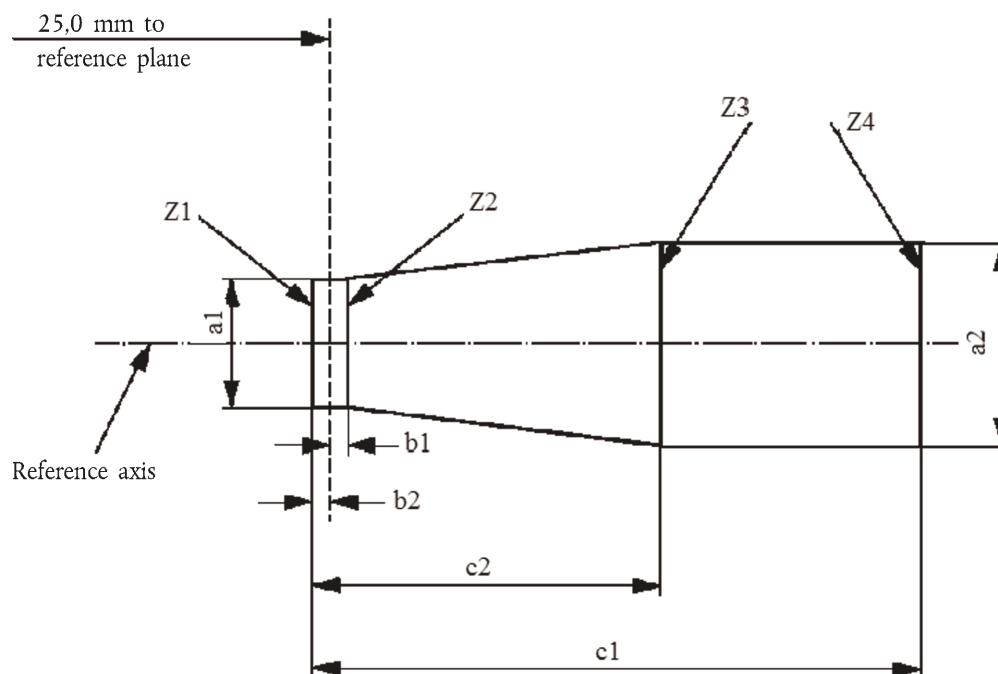
⁽¹¹⁾ The ends of the filament are defined as the points where, when the viewing direction is direction A as shown in Figure 1 on sheet H16/1, the projection of the outside of the end turns crosses the filament axis.

⁽¹²⁾ To be checked by means of a 'Box System'; sheet H16/4.

CATEGORIES H16 AND H16B — Sheet H16/4

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament complies with the requirements.



a1	a2	b1	b2	c1	c2
$d + 0,50$	$d + 0,70$	0,25		3,6	2,6

d = diameter of filament

The filament position is checked solely in directions A and B as shown on sheet H16/1, Figure 1.

The filament shall lie entirely within the limits shown.

The ends of the filament as defined on sheet H16/3, footnote 11, shall lie between lines Z1 and Z2 and between Z3 and Z4.

CATEGORY H17 — Sheet H17/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

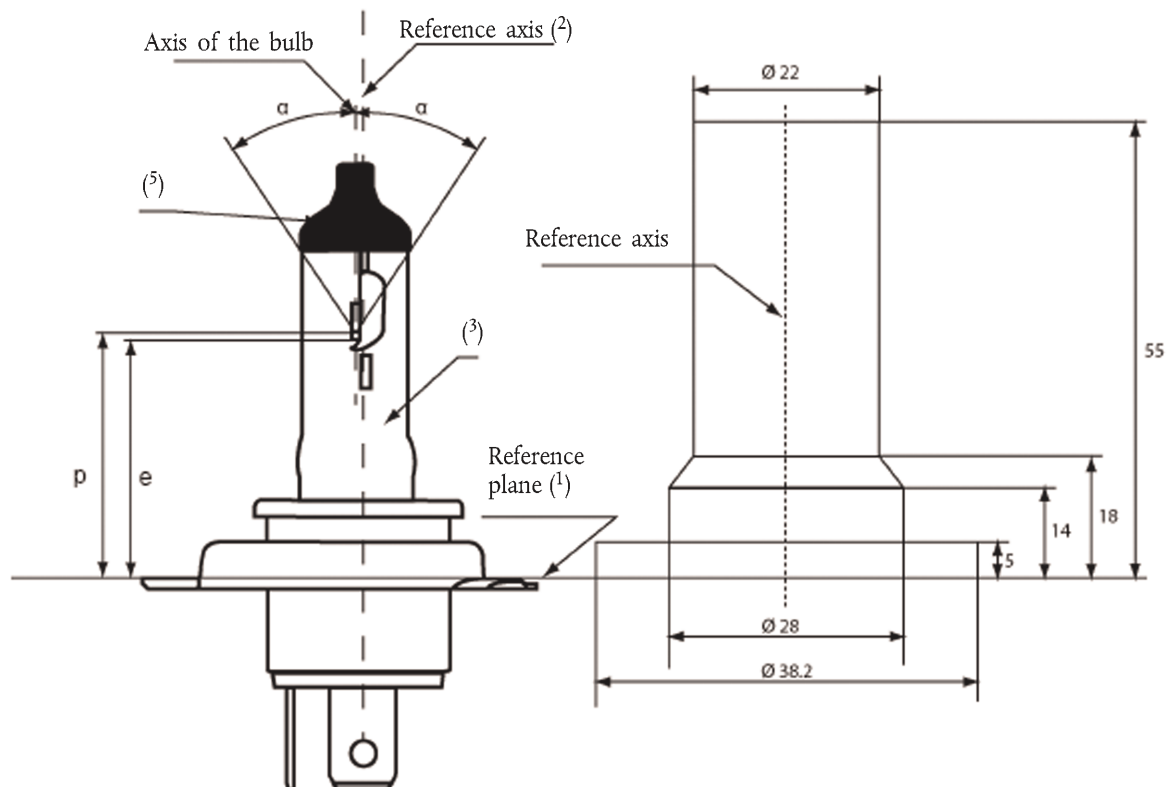
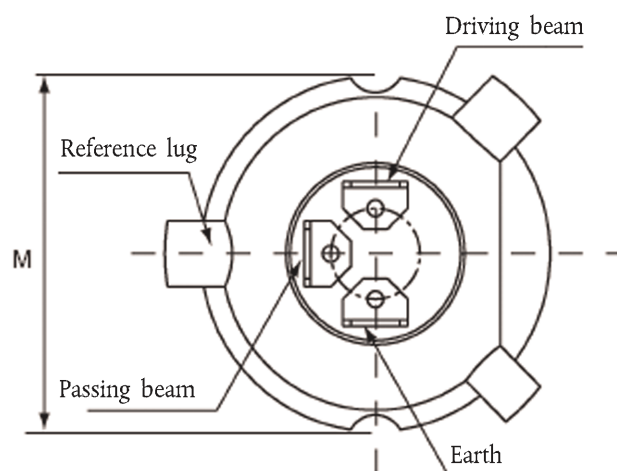


Figure 1

Main drawing

Figure 2

Maximum lamp outlines ⁽⁴⁾

For the notes see sheet H17/6

CATEGORY H17 — Sheet H17/2

Dimensions in mm	Filament lamps of normal production	Standard filament lamp
	12 V	12 V
e	$28,5 + 0,35/-0,15$	$28,5 + 0,20/-0,0$
p	28,95	28,95
α	max. 40°	max. 40°

Cap PU43t-4 in accordance with IEC Publication 60061 (sheet 7004-171-1)

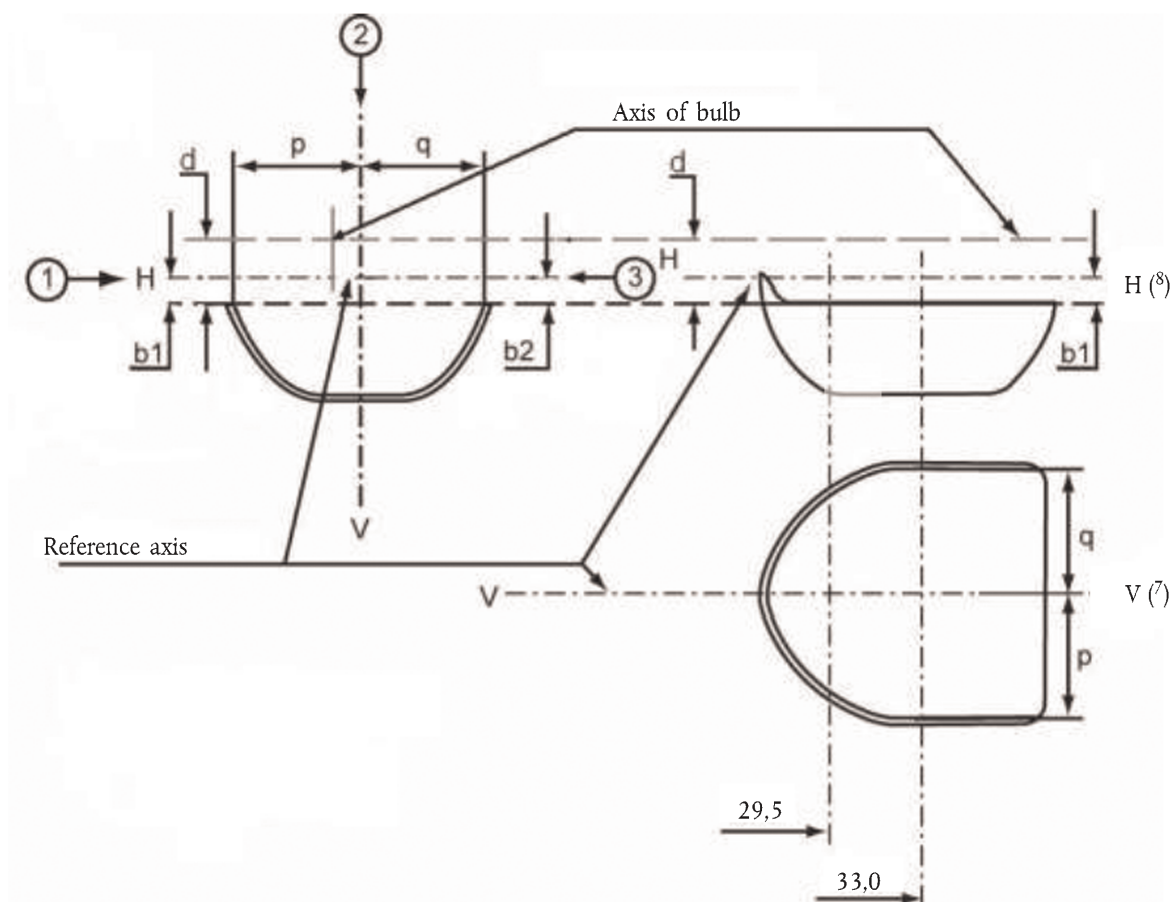
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12 ⁽⁶⁾		12 ⁽⁶⁾	
	Watts	35	35	35	35
Test voltage	Volts	13,2	13,2	13,2	13,2
Objective values	Watts	37 max.	37 max.	37 max.	37 max.
	Luminous flux	$900 \pm 10 \%$	$600 \pm 10 \%$		
Reference luminous flux at approximately			12,0 V	700	450
			13,2 V	900	600

For note 6 see sheet H17/6

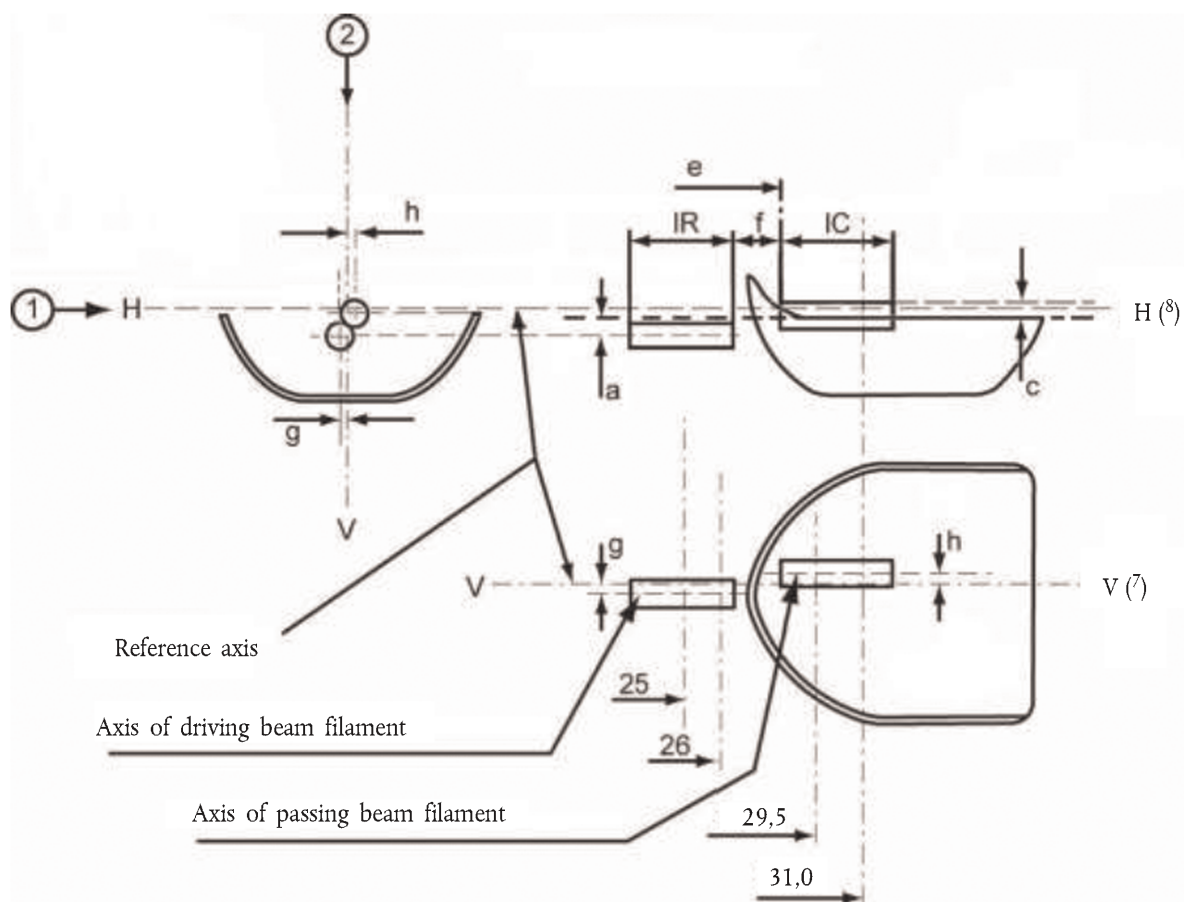
CATEGORY H17 — Sheet H17/3

Position of the shield



CATEGORY H17 — Sheet H17/4

Position of filaments



CATEGORY H17 — Sheet H17/5

Table of the dimensions (in mm) referred to in the drawings on sheets H17/3 and H17/4:

Reference (*)	Dimension (**)	Tolerance	
		Filament lamps of normal production	Standard filament lamp
a/25,0	0,3	± 0,40	± 0,20
a/26,0	0,3	± 0,35	± 0,20
b1/29,5	0,0	± 0,30	± 0,25
b1/33,0	b1/29,5 mv	± 0,30	± 0,15
b2/29,5	0,0	± 0,30	± 0,25
b2/33,0	b2/29,5 mv	± 0,30	± 0,15
c/29,5	0,5	± 0,25	± 0,15
c/31,0	c/29,5 mv	± 0,25	± 0,15
d	min. 0,1	—	—
e ⁽¹¹⁾	28,5	+ 0,35/– 0,15	+ 0,20/– 0,0
f ⁽⁹⁾ , ⁽¹⁰⁾ , ⁽¹¹⁾	1,7	± 0,30	± 0,15
g/25,0	0	± 0,50	± 0,30
g/26,0	0	± 0,40	± 0,25
h/29,5	0	± 0,40	± 0,25
h/31,0	h/29,5 mv	± 0,30	± 0,15
lR ⁽⁹⁾ , ⁽¹²⁾	4,0	± 0,40	± 0,20
lC ⁽⁹⁾ , ⁽¹²⁾	4,2	± 0,40	± 0,20
p/33,0	Depends on the shape of the shield	—	—
q/33,0	(p+q)/2	± 0,60	± 0,30

(*) '.../25,0' means dimension to be measured at the distance from the reference plane indicated in mm after the stroke.

(**) '29,5'mv means the value measured at a distance of 29,5 mm from the reference plane.

For the notes see sheet H17/6

CATEGORY H17 — Sheet H17/6

Notes:

- (¹) The reference plane is the plane formed by the seating points of the three lugs of the cap ring.
- (²) The reference axis is perpendicular to the reference plane and passes through the centre of the circle of diameter M.
- (³) The light emitted from standard filament lamps and from normal production lamps shall be white.
- (⁴) The bulb and supports shall not exceed the envelope as in Figure 2.
- (⁵) The obscuration shall extend at least as far as the cylindrical part of the bulb. It shall also overlap the internal shield when the latter is viewed in a direction perpendicular to the reference axis.
- (⁶) The value indicated in the left hand column relate to the driving-beam filament. Those indicated in the right-hand column relate to the passing beam filament.
- (⁷) Plane V-V is the plane perpendicular to the reference plane and passing through the reference axis and through the intersection of the circle of diameter M with the axis of the reference lug.
- (⁸) Plane H-H is the plane perpendicular to both the reference plane and plane V-V and passing through the reference axis.
- (⁹) The end turns of the filament are defined as being the first luminous turn and the last luminous turn that are at substantially the correct helix angle.
- (¹⁰) For the passing-beam filament, the points to be measured are the intersections, seen in direction 1, of the lateral edge of the shield with the outside of the end turns defined under note 9.
- (¹¹) e denotes the distance from the reference plane to the beginning of the passing filament as defined above.
- (¹²) For the driving-beam filament the points to be measured are the intersections, seen in direction 1, of a plane, parallel to plane H-H and situated at a distance of 0,3 mm below it, with the end turns defined under note 9.

Additional explanations to sheets H17/3 and H17/4

The dimensions below are measured in three directions:

- 1 For dimensions b1, a, c, d, e, f, lR and lC.
- 2 For dimensions g, h, p and q.
- 3 For dimension b2.

Dimensions p and q are measured in planes parallel to and 33,0 mm away from the reference plane.

Dimensions b1, b2 are measured in planes parallel to and 29,5 mm and 33,0 mm away from the reference plane.

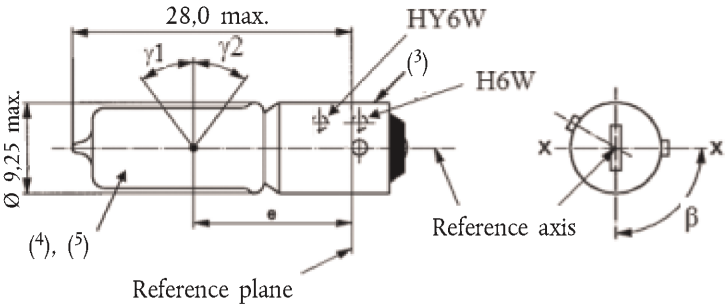
Dimensions c and h are measured in planes parallel to and 29,5 mm and 31,0 mm away from the reference plane.

Dimensions a and g are measured in planes parallel to and 25,0 mm and 26,0 mm away from the reference plane.

Note: For the method of measurement, see Appendix E of IEC Publication 60809.

CATEGORIES H6W AND HY6W — Sheet H6W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e	14,25	15,0	15,75	15,0 ± 0,25
Lateral deviation ⁽¹⁾			0,75	0,4 max
β	82,5°	90°	97,5°	90° ± 5°
γ_1, γ_2 ⁽²⁾	30°			30° min.

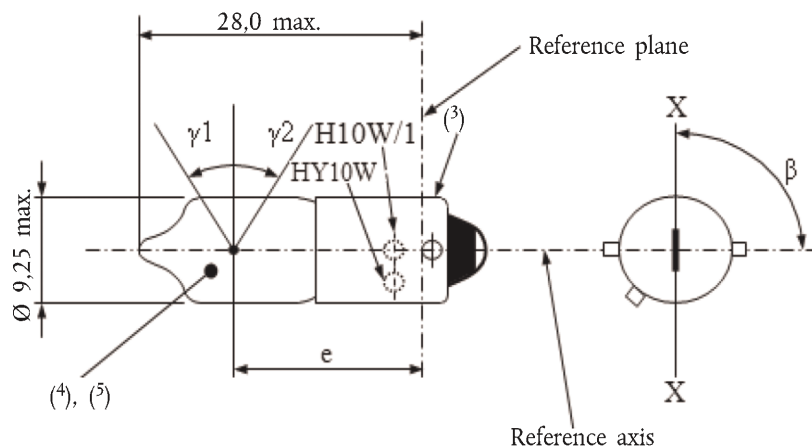
H6W: BAX9s in accordance with IEC Publication 60061 (sheet 7004-8-1)
Cap: HY6W: BAZ9s in accordance with IEC Publication 60061 (sheet 7004-150-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS				
Rated values	Volts		12	12
	Watts		6	6
Test voltage	Volts		13,5	13,5
Objective values	Watts		7,35 max.	7,35 max.
	Luminous flux	H6W	125 ± 12 %	
		HY6W	75 ± 17 %	
Reference luminous flux at approximately 13,5 V				White: 125 lm Amber: 75 lm

⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.
⁽²⁾ 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 not less than 50 per cent of the actual bulb diameter.
⁽³⁾ Over the entire length of the cap there shall be no projections or soldering exceeding the permissible maximum diameter of the cap.
⁽⁴⁾ The light emitted from filament lamps of normal production shall be white for category H6W and amber for category HY6W.
⁽⁵⁾ The light emitted from standard filament lamps shall be white for category H6W and amber or white for category HY6W.

CATEGORIES H10W/1 AND HY10W — Sheet H10W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e	14,25	15,0	15,75	15,0 ± 0,25
Lateral deviation ⁽¹⁾			0,75	0,4 max
β	82,5°	90°	97,5°	90° ± 5°
γ_1, γ_2 ⁽²⁾	30°			30° min.

Cap: H10W/1 BAU9s in accordance with IEC Publication 60061 (sheet 7004-150A-1)
 HY10W BAUZ9s in accordance with IEC Publication 60061 (sheet 7004-150B-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts		12	12
	Watts		10	10
Test voltage	Volts		13,5	13,5
Objective values	Watts		12 max.	12 max.
	Luminous flux	H10W/1	200 ± 12 %	
		HY10W	120 ± 17 %	
Reference luminous flux at approximately 13,5 V				White: 200 lm Amber: 120 lm

⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

⁽²⁾ 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 not less than 50 per cent of the actual bulb diameter.

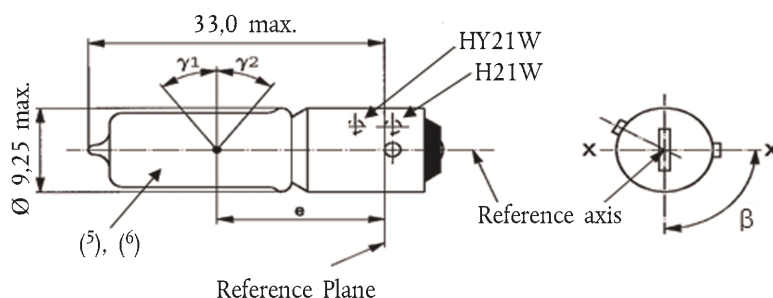
⁽³⁾ Over the entire length of the cap there shall be no projections or soldering exceeding the permissible maximum diameter of the cap.

⁽⁴⁾ The light emitted from filament lamps of normal production shall be white for category H10W/1 and amber for category HY10W.

⁽⁵⁾ The light emitted from standard filament lamps shall be white for category H10W/1 and amber or white for category HY10W.

CATEGORIES H21W AND HY21W — Sheet H21W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.



Dimensions in mm		Filament lamps of normal production			Standard filament lamp
		min.	nom.	max.	
e			20,0 ⁽¹⁾		20,0 ± 0,25
f	12 V			3,8	3,8 + 0/- 1
	24 V			4,5	
Lateral deviation ⁽²⁾				⁽¹⁾	0,0 ± 0,15 ⁽³⁾
β		82,5°	90°	97,5°	90° ± 5°
γ1, γ2 ⁽⁴⁾		45°			45° min.

H21W: BAY9s in accordance with IEC Publication 60061 (sheet 7004-9-1)

Cap:

HY21W: BAW9s in accordance with IEC Publication 60061 (sheet 7004-149-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts		12	24	12
	Watts		21	21	21
Test voltage	Volts		13,5	28,0	13,5
Objective values	Watts		26,25 max.	29,4 max.	26,25 max.
	Luminous flux	H21W	600 ± 12 %	600 ± 15 %	
		HY21W	300 ± 17 %	300 ± 20 %	
Reference luminous flux at approximately				12 V	White: 415 lm
				13,2 V	White: 560 lm
				13,5 V	White: 600 lm Amber: 300 lm

⁽¹⁾ To be checked by means of a 'Box system', sheet H21W/2.

⁽²⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

⁽³⁾ The lateral deviation with respect to the plane perpendicular to axis X-X is measured in the position described in paragraph 1. of the test procedure specified on sheet H21W/2.

⁽⁴⁾ In the area between the outer legs of the angles γ1 and γ2, the bulb shall have no optical distorting areas and the curvature of the bulb shall have a radius not less than 50 per cent of the actual bulb diameter.

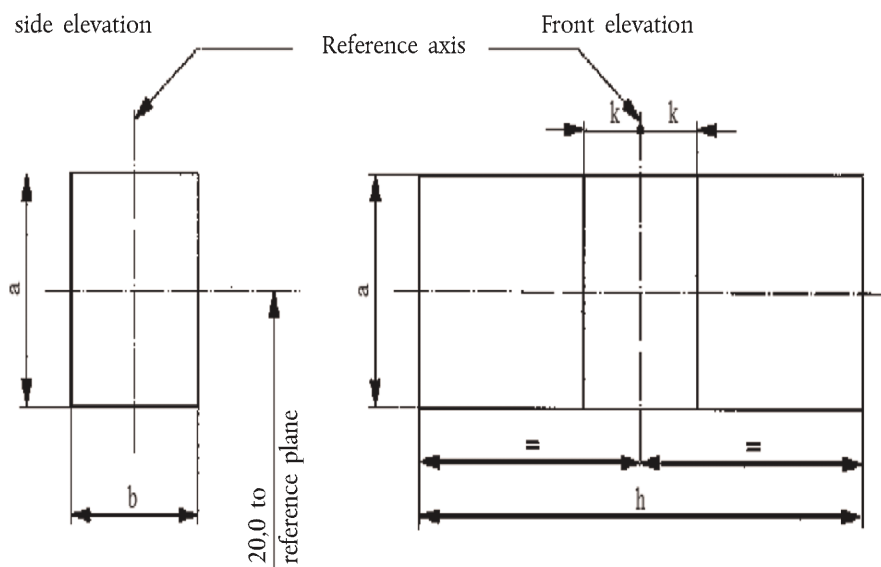
⁽⁵⁾ The light emitted from filament lamps of normal production shall be white for category H21W and amber for category HY21W.

⁽⁶⁾ The light emitted from standard filament lamps shall be white for category H21W and amber or white for category HY21W.

CATEGORIES H21W AND HY21W — Sheet H21W/2

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 7,5^\circ$, to the plane through the centre line of the reference pin and the reference axis, whether a filament lamp complies with the requirements



Reference	a	b	h	k
Dimension	$d + 1,0$	$d + 1,0$	$f + 1,2$	0,50

d = actual filament diameter

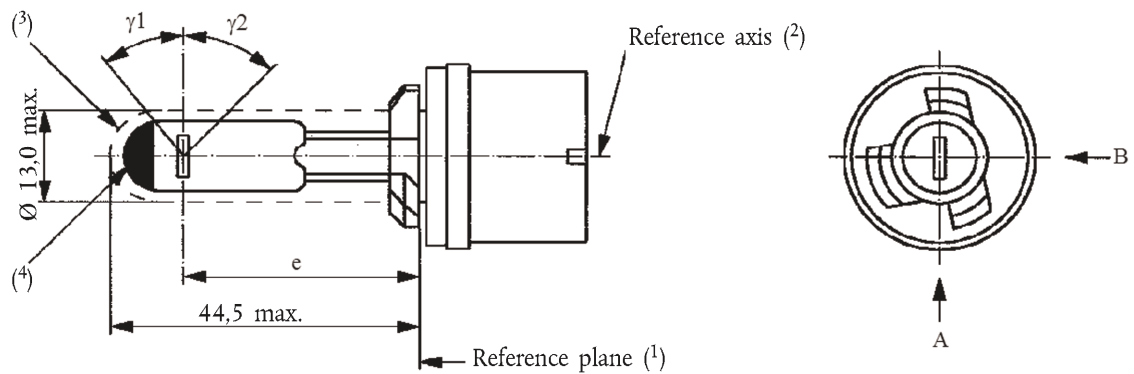
f = actual filament length

Test procedures and requirements

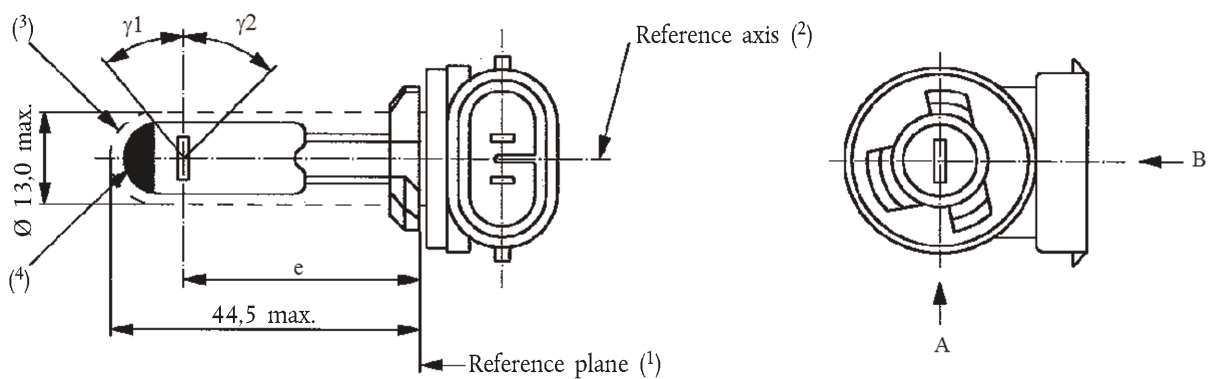
1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits. The holder is then so rotated that an end view of the filament is seen on the screen on to which the image of the filament is projected. The end view of the filament shall be obtained within the angular displacements tolerance limits.
2. Side elevation
The filament lamp placed with the cap down, the reference axis vertical and the filament seen end-on, the projection of the filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament.
3. Front elevation
The filament lamp placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to the filament axis:
 - 3.1. The projection of the filament shall lie entirely within a rectangle of height 'a' and width 'h', having its centre at the theoretical position of the centre of the filament;
 - 3.2. The centre of the filament shall not be offset by more than distance 'k' from the reference axis.

CATEGORIES H27W/1 AND H27W/2 — Sheet H27W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



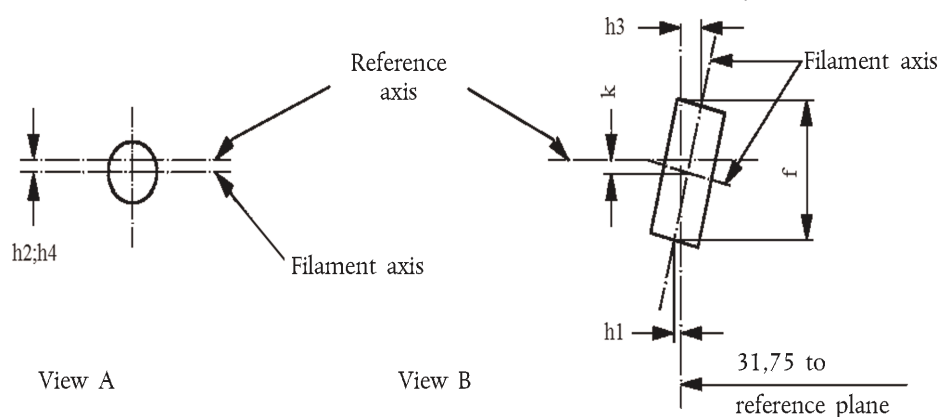
Category H27W/1



Category H27W/2

- (1) The reference plane is defined by the plane formed by the underside of the bevelled lead-in flange of the cap.
 (2) The reference axis is perpendicular to the reference plane and passes through the centre of the 13,10 mm cap diameter.
 (3) Glass bulb and supports shall not exceed the size of a theoretical cylinder centred on the reference axis.
 (4) The obscuration shall extend over the whole bulb top including the bulb cylindrical portion up to the intersection with γ_1 .

CATEGORIES H27W/1 AND H27W/2 — Sheet H27W/2



Filament dimensions and position

(Dimensions f for all filament lamps)

(Dimensions h1, h2, h3, h4 and k for standard filament lamps only)

Dimensions in mm	Filament lamp of normal production	Standard filament lamp
e	31,75 ⁽⁶⁾	31,75 ± 0,25
f ⁽⁸⁾	4,8 max.	4,2 ± 0,20
k	0 ⁽⁶⁾	0,0 ± 0,25
h1, h2, h3, h4 ⁽⁷⁾	0 ⁽⁶⁾	0,0 ± 0,25
γ1 ⁽⁵⁾	38° nom.	38° nom.
γ2 ⁽⁵⁾	44° nom.	44° nom.

H27W/1: PG13 in accordance with IEC Publication 60061 (sheet 7004-107-4)

Cap:

H27W/2: PG13

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	27	27
Test voltage	Volts	13,5	13,5
Objective values	Watts	31 max.	31 max.
	Luminous flux	477 ± 15 %	
Reference luminous flux at approximately	12 V		350 lm
	13,2 V		450 lm
	13,5 V		477 lm

⁽⁵⁾ Glass bulb shall be optically distortion free within the angles γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2.

⁽⁶⁾ To be checked by means of a 'Box System', sheet H27W/3.

⁽⁷⁾ For standard filament lamps, the points to be measured are those where the projection of the outside of the end turns crosses the filament axis.

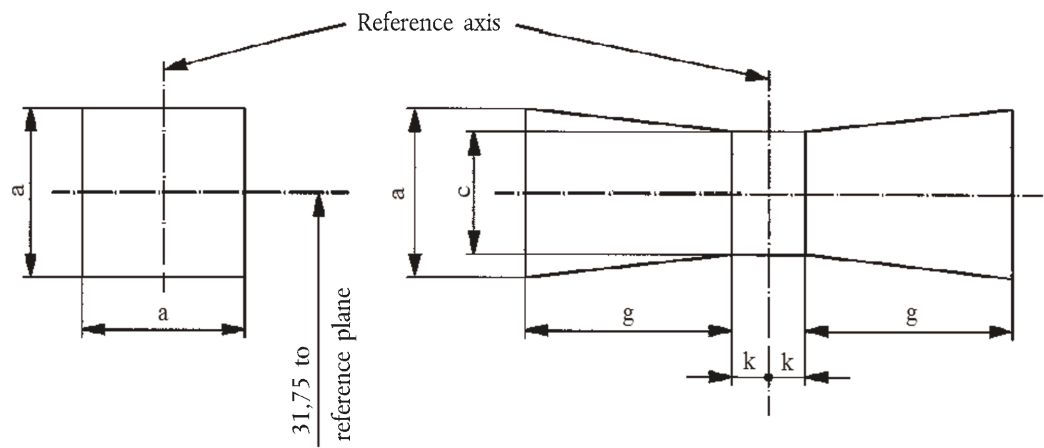
⁽⁸⁾ The ends of the filament are defined by the intersections of the outside of the first and of the last light emitting turn, respectively, with the plane parallel to and 31,75 mm from the reference plane.

CATEGORIES H27W/1 AND H27W/2 — Sheet H27W/3

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.

Dimensions in mm



Reference	a	c	k	g
Dimensions	d + 1,2	d + 1,0	0,5	2,4

d = actual diameter of filament

The filament shall lie entirely within the limits shown.

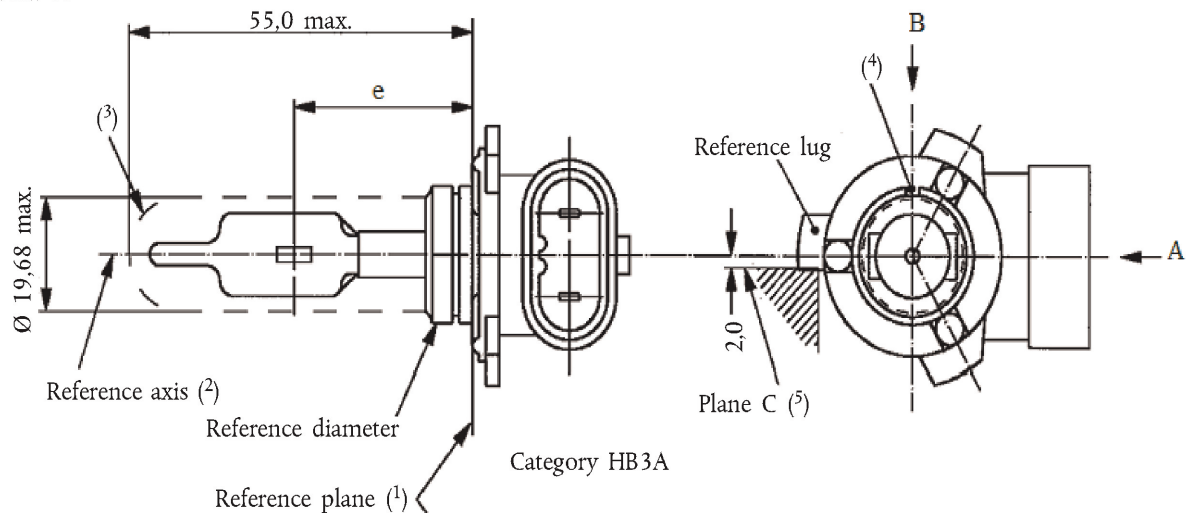
The centre of the filament shall lie within the limits of dimension k.

CATEGORIES HB3 AND HB3A — Sheet HB3/1

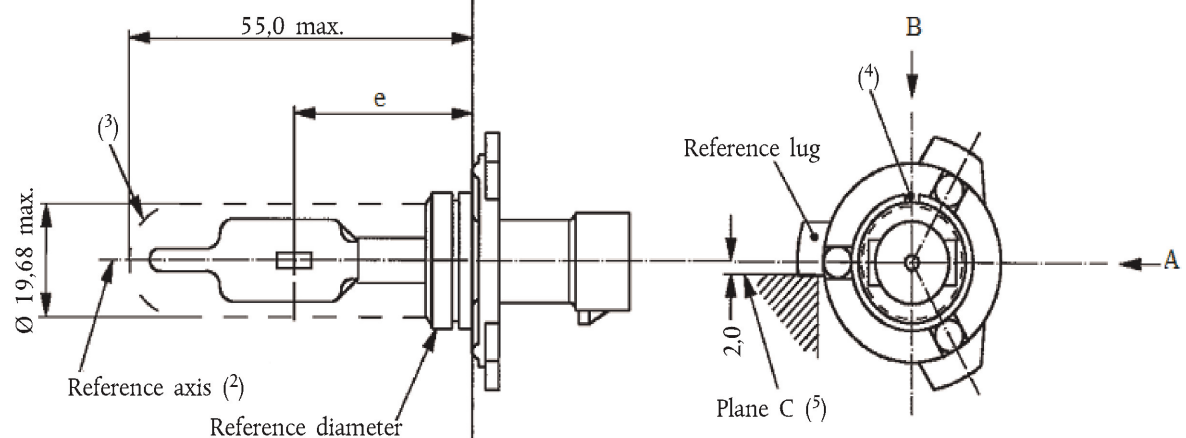
The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

Category HB3

View A



View A



(1) The reference plane is the plane defined by the meeting points of cap-holder fit.

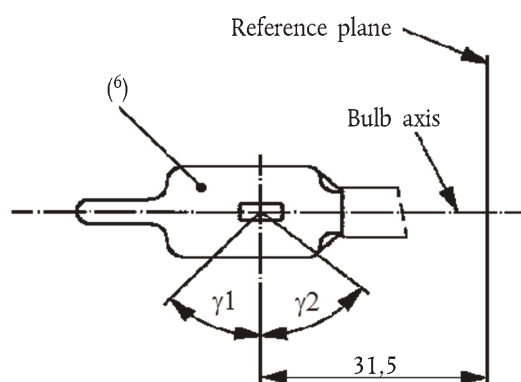
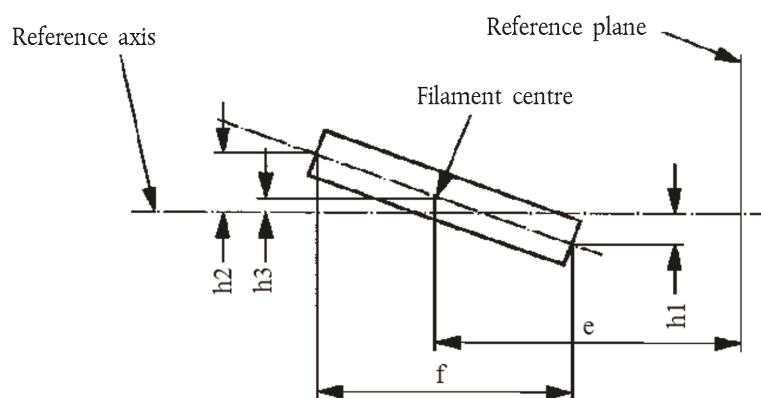
(2) The reference axis is perpendicular to the reference plane and concentric with the reference diameter of the cap.

(3) Glass bulb and supports shall not exceed the envelope and shall not interfere with insertion past the lamp key.

(4) The keyway is mandatory for category HB3A and optional for category HB3.

(5) The filament lamp shall be rotated in the measuring holder until the reference lug contacts plane C of the holder.

CATEGORIES HB3 AND HB3A — Sheet HB3/2

Distorsion free area ⁽⁷⁾

Filament position and dimensions

⁽⁶⁾ The colour of the light emitted shall be white or selective-yellow.

⁽⁷⁾ Glass bulb periphery shall be optically distortion-free axially within the angles γ_1 and γ_2 .
This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 .

CATEGORIES HB3 AND HB3A — Sheet HB3/3

Dimensions in mm ⁽¹²⁾		Tolerances	
		Filament lamps of normal production	Standard filament lamp
e ⁽⁹⁾ , ⁽¹¹⁾	31,5	⁽¹⁰⁾	± 0,16
f ⁽⁹⁾ , ⁽¹¹⁾	5,1	⁽¹⁰⁾	± 0,16
h1, h2	0	⁽¹⁰⁾	± 0,15 ⁽⁸⁾
h3	0	⁽¹⁰⁾	± 0,08 ⁽⁸⁾
γ1	45° min.	—	—
γ2	52° min.	—	—

Cap P20d in accordance with IEC Publication 60061 (sheet 7004-31-2) ⁽¹³⁾

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	60	60
Test voltage	Volts	13,2	13,2
Objective values	Watts	73 max.	73 max.
	Luminous flux	1 860 ± 12 %	
Reference luminous flux at approximately		12 V	1 300
		13,2 V	1 860

⁽⁸⁾ The eccentricity is measured only in viewing directions (*) A and B as shown in the figure on sheet HB3/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

⁽⁹⁾ The viewing direction is direction (*) B as shown in the figure on sheet HB3/1.

⁽¹⁰⁾ To be checked by means of a 'Box-System'; sheet HB3/4 (*).

⁽¹¹⁾ The ends of the filament are defined as the points where, when the viewing direction (*) as defined in footnote 9 above, the projection of the outside of the end turns crosses the filament axis.

⁽¹²⁾ Dimensions shall be checked with O-ring removed.

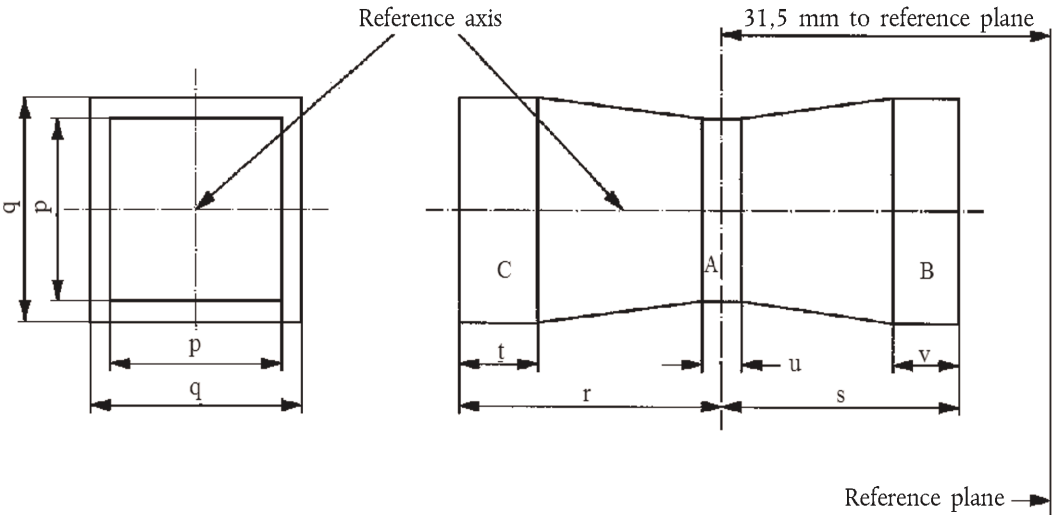
⁽¹³⁾ Filament lamp HB3 shall be equipped with the right-angle cap and filament lamp HB3A with the straight cap.

(*) Manufacturers may choose another set of perpendicular viewing directions. The viewing directions specified by the manufacturer are to be used by the testing laboratory when checking filament dimensions and position.

CATEGORIES HB3 AND HB3A — Sheet HB3/4

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



	p	q	r	s	t	u	v
12 V	1,3 d	1,6 d	3,0	2,9	0,9	0,4	0,7

d = diameter of filament

The filament position is checked solely in directions A and B as shown on sheet HB3/1.

The filament shall lie entirely within the limits shown.

The beginning of the filament, as defined on sheet HB3/3, footnote 11, shall lie in volume 'B' and the end of the filament in volume 'C'.

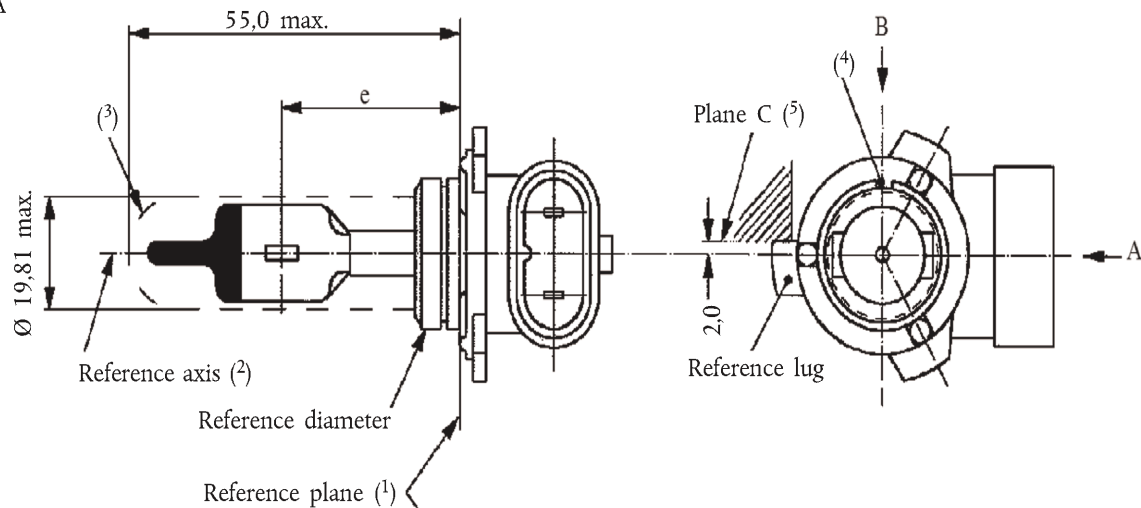
Volume 'A' does not involve any filament centre requirement.

CATEGORIES HB4 AND HB4A — Sheet HB4/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

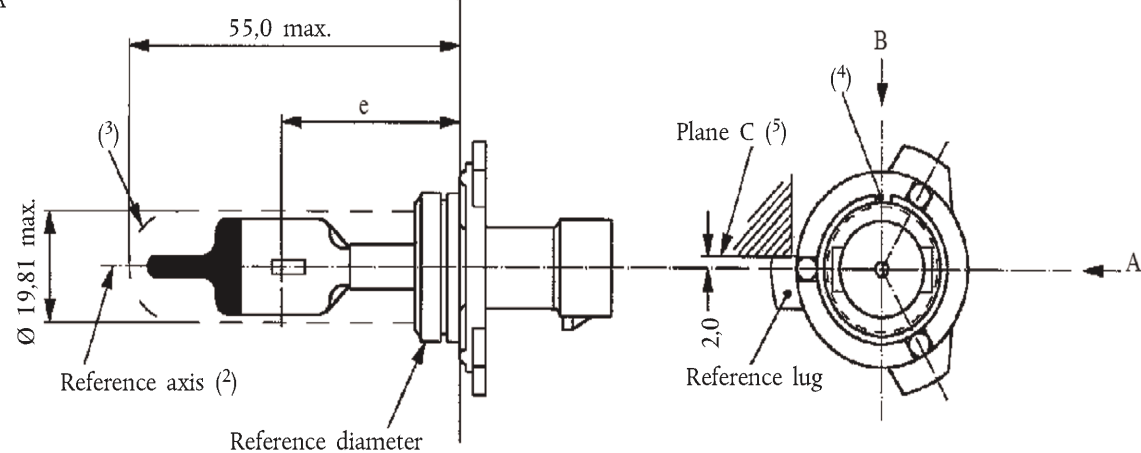
Category HB4

View A



Category HB4A

View A



(1) The reference plane is the plane defined by the meeting points of cap-holder fit.

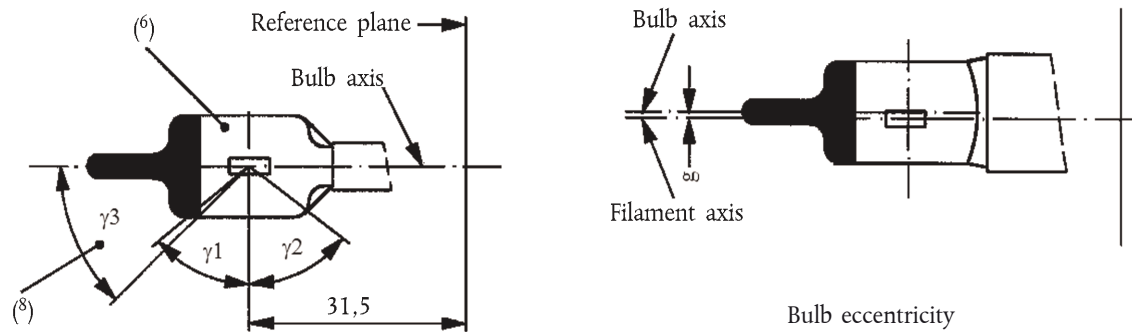
(2) The reference axis is perpendicular to the reference plane and concentric with the reference diameter of the cap.

(3) Glass bulb and supports shall not exceed the envelope and shall not interfere with insertion past the lamp key. The envelope is concentric to the reference axis.

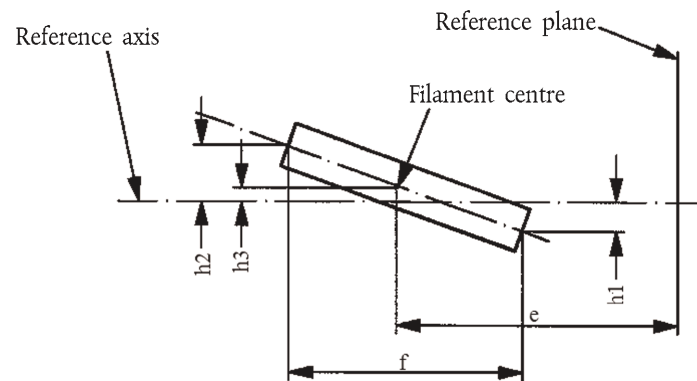
(4) The keyway is mandatory for category HB4A and optional for category HB4.

(5) The filament shall be rotated in the measuring holder until the reference lug contacts plane C of the holder.

CATEGORIES HB4 AND HB4A — Sheet HB4/2



Distortion free area ⁽⁷⁾ and black top ⁽⁸⁾



Filament position and dimensions

⁽⁶⁾ The colour of the light emitted shall be white or selective-yellow.

⁽⁷⁾ Glass bulb periphery shall be optically distortion-free axially and cylindrically within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 and does not need to be verified in the area covered by the obscuration.

⁽⁸⁾ The obscuration shall extend to at least angle γ_3 and shall be at least as far as the undistorted part of the bulb defined by angle γ_1 .

CATEGORIES HB4 AND HB4A — Sheet HB4/3

Dimensions in mm ⁽¹³⁾		Tolerances	
		Filament lamps of normal production	Standard filament lamp
e ⁽¹⁰⁾ , ⁽¹²⁾	31,5	⁽¹¹⁾	± 0,16
f ⁽¹⁰⁾ , ⁽¹²⁾	5,1	⁽¹¹⁾	± 0,16
h1, h2	0	⁽¹¹⁾	± 0,15 ⁽⁹⁾
h3	0	⁽¹¹⁾	± 0,08 ⁽⁹⁾
g ⁽¹⁰⁾	0,75	± 0,5	± 0,3
γ1	50° min.	—	—
γ2	52° min.	—	—
γ3	45°	± 5°	± 5°

Cap P22d in accordance with IEC Publication 60061 (sheet 7004-32-2) ⁽¹⁴⁾

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	51	51
Test voltage	Volts	13,2	13,2
Objective values	Watts	62 max.	62 max.
	Luminous flux	1 095 ± 15 %	
Reference luminous flux at approximately		12 V	825
		13,2 V	1 095

⁽⁹⁾ The eccentricity is measured only in viewing directions (*) A and B as shown in the figure on sheet HB4/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

⁽¹⁰⁾ The viewing direction is direction (*) B as shown in the figure on sheet HB4/1.

⁽¹¹⁾ To be checked by means of a 'Box-System'; sheet HB4/4 (*).

⁽¹²⁾ The ends of the filament are defined as the points where, when the viewing direction (*) as defined in footnote 10 above, the projection of the outside of the end turns crosses the filament axis.

⁽¹³⁾ Dimensions shall be checked with O-ring removed.

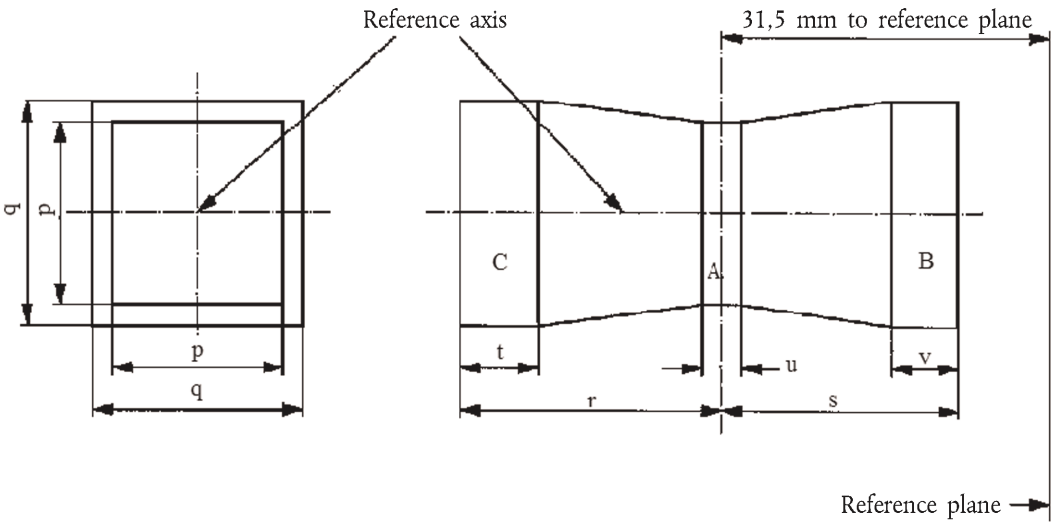
⁽¹⁴⁾ Filament lamp HB4 shall be equipped with the right-angle cap and filament lamp HB4A with the straight cap.

(*) Manufacturers may choose another set of perpendicular viewing directions. The viewing directions specified by the manufacturer are to be used by the testing laboratory when checking filament dimensions and position.

CATEGORIES HB4 AND HB4A — Sheet HB4/4

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



	p	q	r	s	t	u	v
12 V	1,3 d	1,6 d	3,0	2,9	0,9	0,4	0,7

d = diameter of filament

The filament position is checked solely in directions A and B as shown on sheet HB4/1.

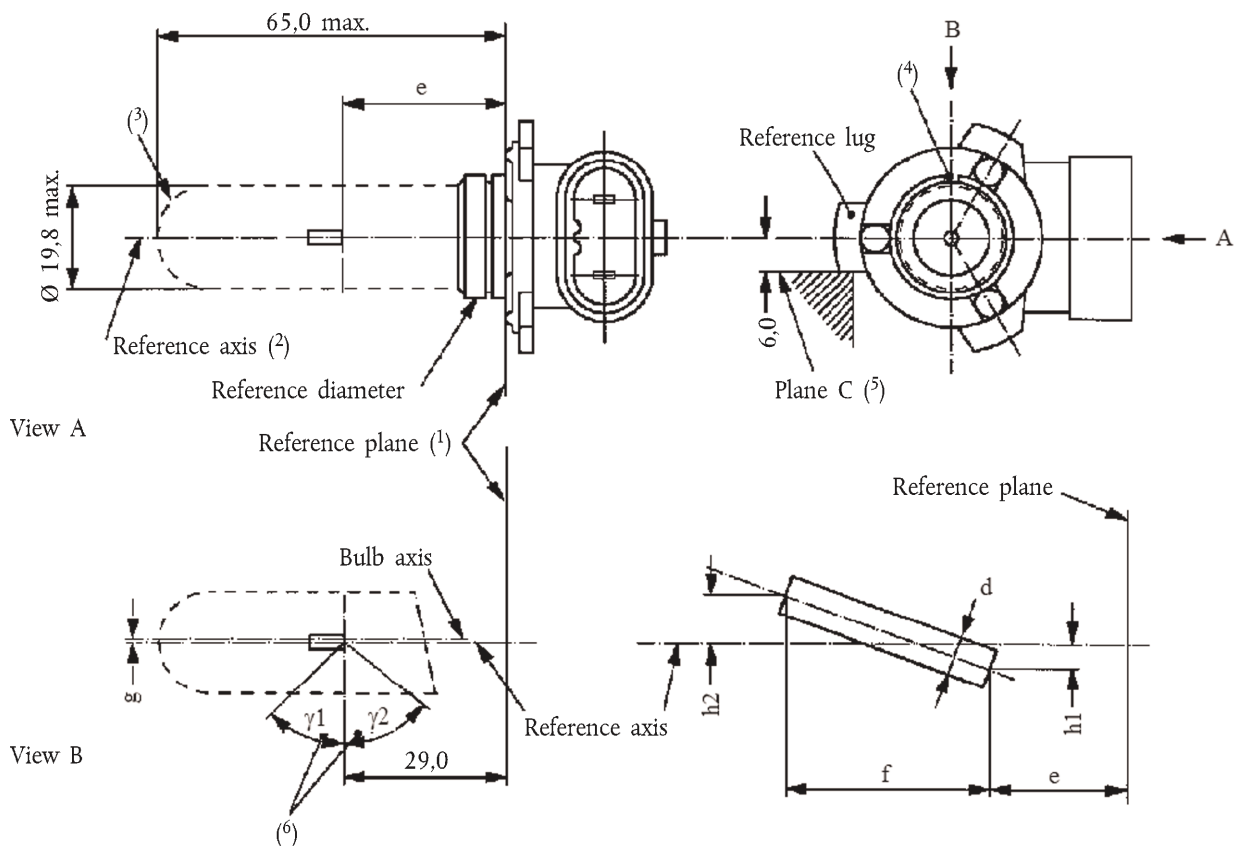
The filament shall lie entirely within the limits shown.

The beginning of the filament as defined on sheet HB4/3 footnote 12 shall lie in volume 'B' and the end of the filament in volume 'C'.

Volume 'A' does not involve any filament centre requirement.

CATEGORY HIR1 — Sheet HIR1/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



(1) The reference plane is the plane defined by the three supporting bosses on the cap flange.

(2) The reference axis is perpendicular to the reference plane and concentric with the reference diameter of the cap.

(3) Glass bulb and supports shall not exceed the envelope. The envelope is concentric to the reference axis.

(4) The keyway is mandatory.

(5) The filament shall be rotated in the measuring holder until the reference lug contacts plane C of the holder.

(6) Glass bulb periphery shall be optically distortion-free axially within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 .

CATEGORY HIR1 — Sheet HIR1/2

Dimensions in mm ⁽¹¹⁾		Tolerances	
		Filament lamps of normal production	Standard filament lamp
e ⁽⁸⁾ , ⁽¹⁰⁾	29	⁽⁹⁾	± 0,16
f ⁽⁸⁾ , ⁽¹⁰⁾	5,1	⁽⁹⁾	± 0,16
g ⁽⁸⁾	0	+ 0,7/– 0,0	+ 0,4/– 0,0
h1, h2	0	⁽⁹⁾	± 0,15 ⁽⁷⁾
d	1,6 max.		
γ1	50° min.	—	—
γ2	50° min.	—	—

Cap PX20d in accordance with IEC Publication 60061 (sheet 7004-31-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	65	65
Test voltage	Volts	13,2	13,2
Objective values	Watts	73 max.	73 max.
	Luminous flux	2 500 ± 15 %	
Reference luminous flux at approximately		12 V	1 840
		13,2 V	2 500

⁽⁷⁾ The eccentricity is measured only in viewing directions A and B as shown in the figure on sheet HIR1/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

⁽⁸⁾ The viewing direction is direction B as shown in the figure on sheet HIR1/1.

⁽⁹⁾ To be checked by means of a 'Box-System'; sheet HIR1/3.

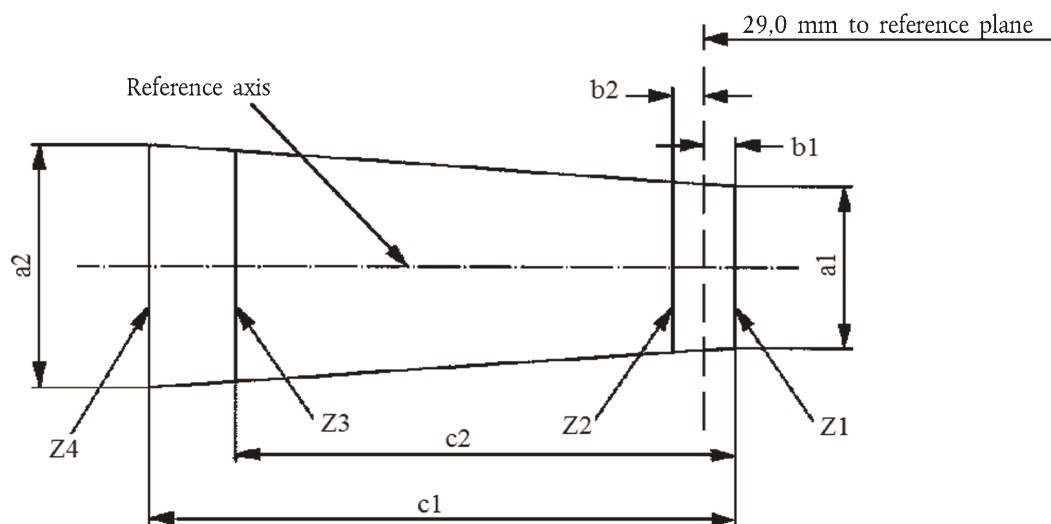
⁽¹⁰⁾ The ends of the filament are defined as the points where, when the viewing direction as defined in footnote 8 above, the projection of the outside of the end turns crosses the filament axis.

⁽¹¹⁾ Dimensions shall be checked with O-ring mounted.

CATEGORY HIR1 — Sheet HIR1/3

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



	a1	a2	b1	b2	c1	c2
12 V	$d + 0,4$	$d + 0,8$	0,35		6,1	5,2

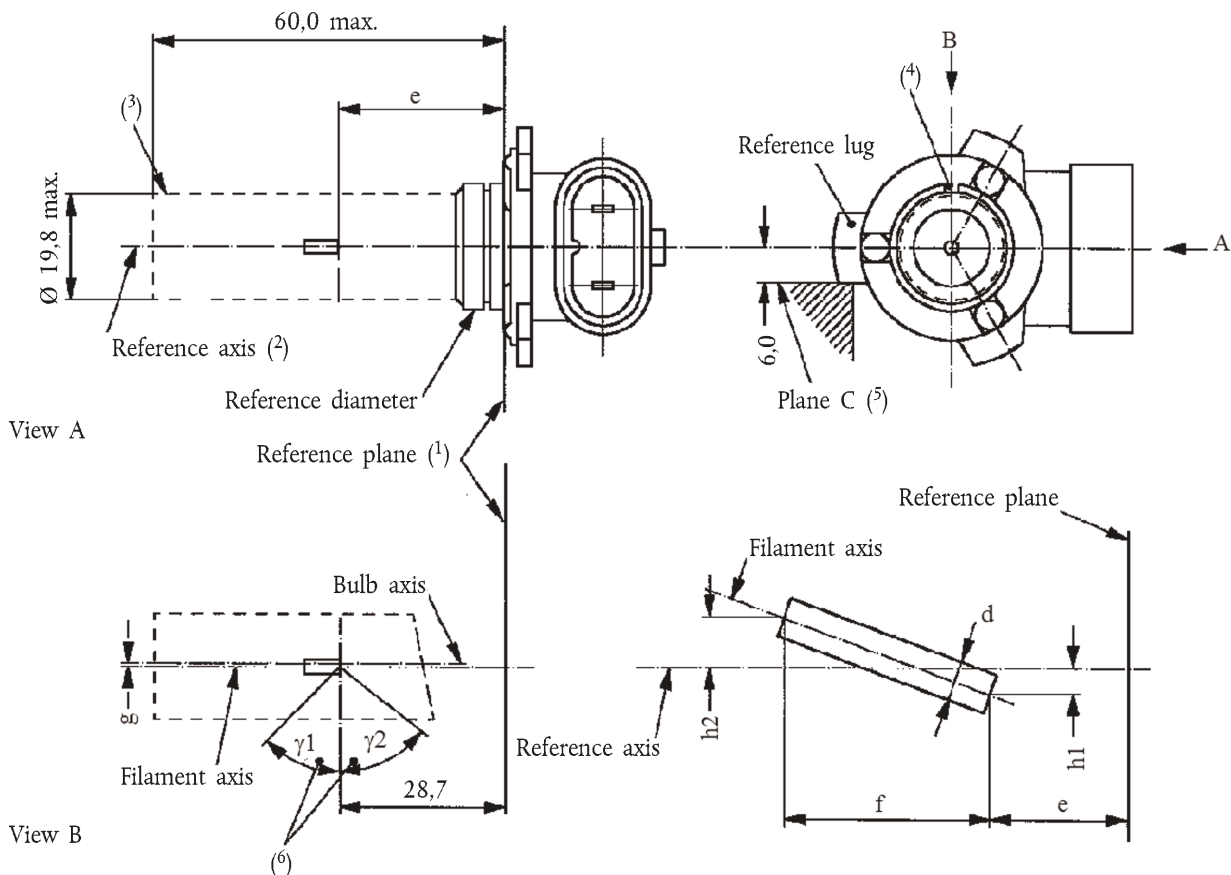
d = diameter of filament

The filament position is checked solely in directions A and B as shown on sheet HIR1/1.

The ends of the filament as defined on sheet HIR1/2 footnote 10 shall lie between lines Z1 and Z2 and between lines Z3 and Z4.

CATEGORY HIR2 — Sheet HIR2/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



- (1) The reference plane is the plane defined by the three meeting points of the cap holder fit.
- (2) The reference axis is perpendicular to the reference plane and passes through the centre of the reference diameter of the cap.
- (3) Glass bulb and supports shall not exceed the envelope. The envelop is concentric to the reference axis.
- (4) The keyway is mandatory.
- (5) The filament lamp shall be rotated in the measuring holder until the reference lug contacts plane C of the holder.
- (6) Glass bulb periphery shall be optically distortion-free axially within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 .

CATEGORY HIR2 — Sheet HIR2/2

Dimensions in mm ⁽¹¹⁾		Tolerances	
		Filament lamps of normal production	Standard filament lamp
e ⁽⁸⁾ , ⁽¹⁰⁾	28,7	⁽⁹⁾	± 0,16
f ⁽⁸⁾ , ⁽¹⁰⁾	5,3	⁽⁹⁾	± 0,16
g ⁽⁸⁾	0	+ 0,7/– 0,0	+ 0,4/– 0,0
h1, h2	0	⁽⁹⁾	± 0,15 ⁽⁷⁾
d	1,6 max.	—	—
γ1	50° min.	—	—
γ2	50° min.	—	—

Cap PX22d in accordance with IEC Publication 60061 (sheet 7004-32-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	55	55
Test voltage	Volts	13,2	13,2
Objective values	Watts	63 max.	63 max.
	Luminous flux	1 875 ± 15 %	
Reference luminous flux at approximately		12 V	1 355
		13,2 V	1 875

⁽⁷⁾ The eccentricity is measured only in viewing directions A and B as shown in the figure on sheet HIR2/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

⁽⁸⁾ The viewing direction is direction B as shown in the figure on sheet HIR2/1.

⁽⁹⁾ To be checked by means of a 'Box-System'; sheet HIR2/3.

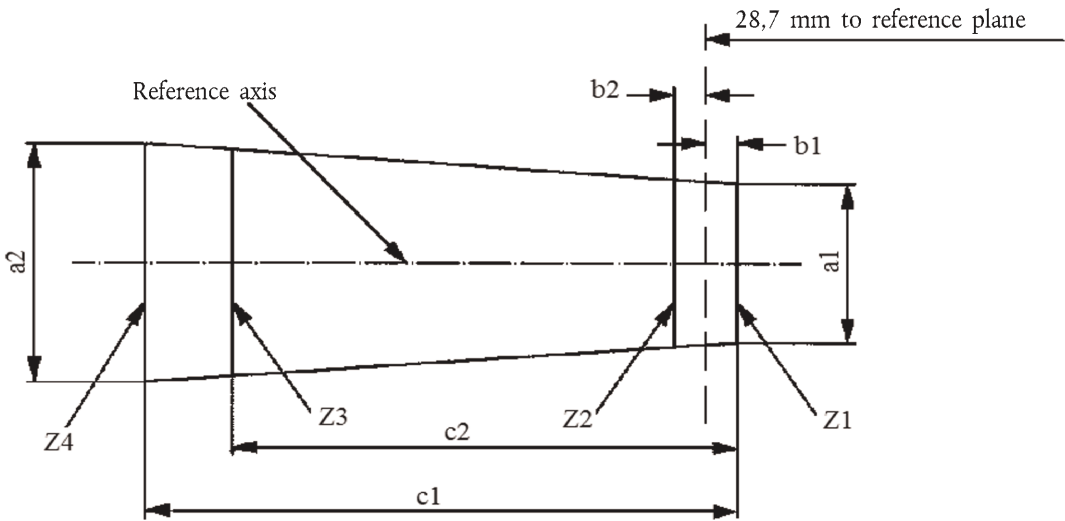
⁽¹⁰⁾ The ends of the filament are defined as the points where, when the viewing direction as defined in footnote 8 above, the projection of the outside of the end turns crosses the filament axis.

⁽¹¹⁾ Dimensions shall be checked with O-ring removed.

CATEGORY HIR2 — Sheet HIR2/3

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



	a1	a2	b1	b2	c1	c2
12 V	d + 0,4	d + 0,8	0,35		6,6	5,7

d = diameter of filament

The filament position is checked solely in directions A and B as shown on sheet HIR2/1.

The ends of the filament as defined on sheet HIR2/2 footnote 10 shall lie between lines Z1 and Z2 and between lines Z3 and Z4.

CATEGORY HS1 — Sheet HS1/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

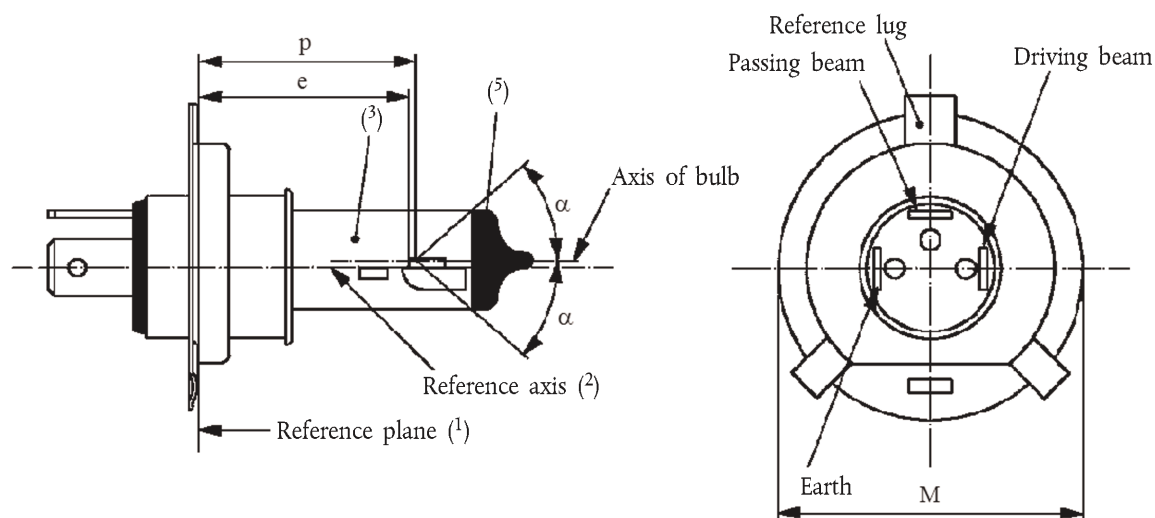


Figure 1

Main drawing

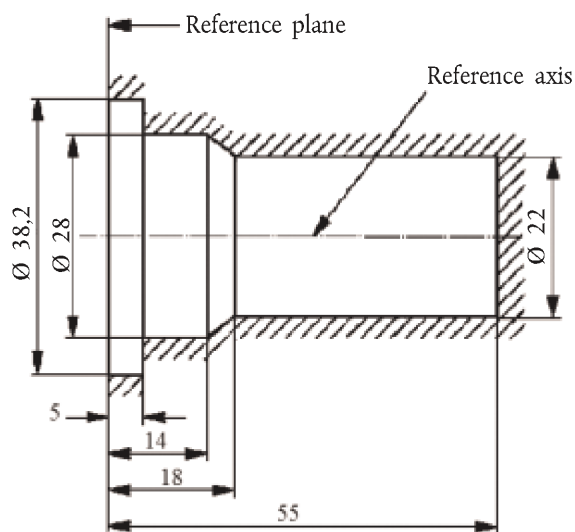


Figure 2

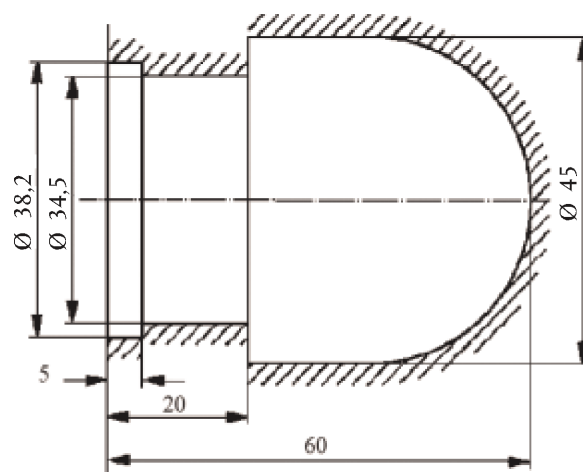
Maximum lamp outlines ⁽⁴⁾

Figure 3

⁽¹⁾ The reference plane is the plane formed by the seating points of the three lugs of the cap ring.

⁽²⁾ The reference axis is perpendicular to the reference plane and passes through the centre of the circle of diameter 'M'.

⁽³⁾ The colour of the light emitted shall be white or selective-yellow.

⁽⁴⁾ The bulb and supports shall not exceed the envelope as in Figure 2. However, where a selective-yellow outer bulb is used the bulb and supports shall not exceed the envelope as in Figure 3.

⁽⁵⁾ The obscuration shall extend at least as far as the cylindrical part of the bulb. It shall also overlap the internal shield when the latter is viewed in a direction perpendicular to the reference axis.

CATEGORY HS1 — Sheet HS1/2

Dimensions in mm	Filament lamps of normal production		Standard filament lamp
	6 V	12 V	12 V
e	28,5 + 0,45/– 0,25		28,5 + 0,20/– 0,00
p	28,95		28,95
α	max. 40°		max. 40°

Cap PX43t in accordance with IEC Publication 60061 (sheet 7004-34-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

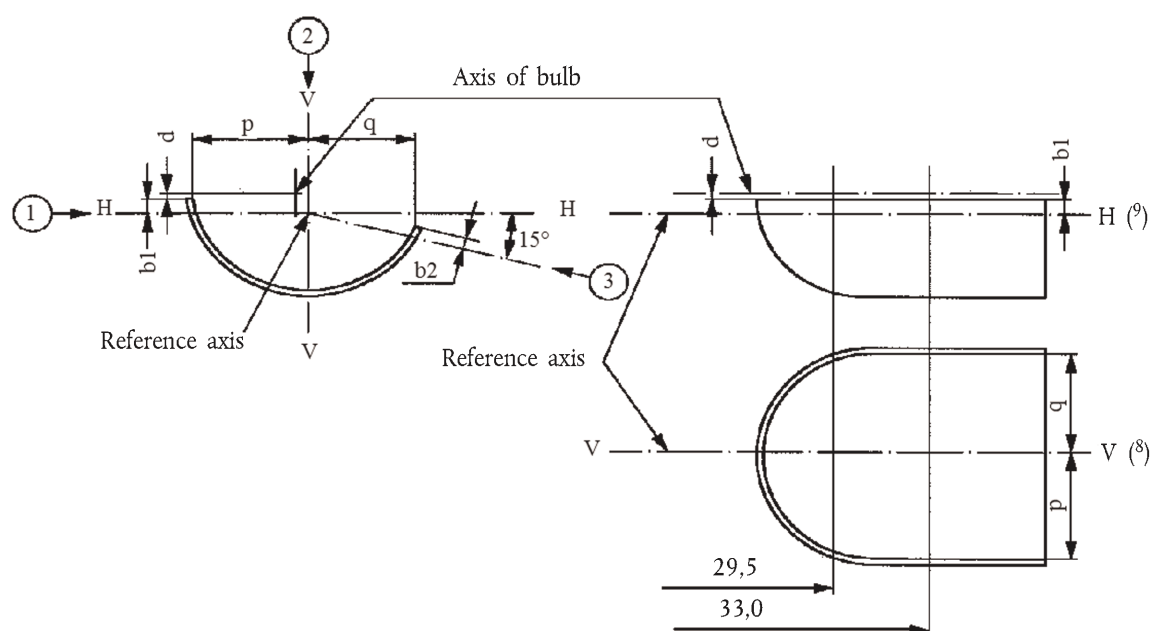
Rated values	Volts	6 ⁽⁶⁾		12 ⁽⁶⁾		12 ⁽⁶⁾	
	Watts	35	35	35	35	35	35
Test voltage	Volts	6,3		13,2		13,2	
Objective values	Watts	35	35	35	35	35	35
	± %	5				5	
	Luminous flux	700	440	825	525		
	± %	15					
Measuring flux ⁽⁷⁾ lm		—		—	450		
Reference luminous flux at approximately					12 V	700	450
					13,2 V	825	525

⁽⁶⁾ The values indicated in the left hand column relate to the driving beam. Those indicated in the right-hand column relate to the passing beam.

⁽⁷⁾ Measuring luminous flux according to paragraph 3.9 of this Regulation.

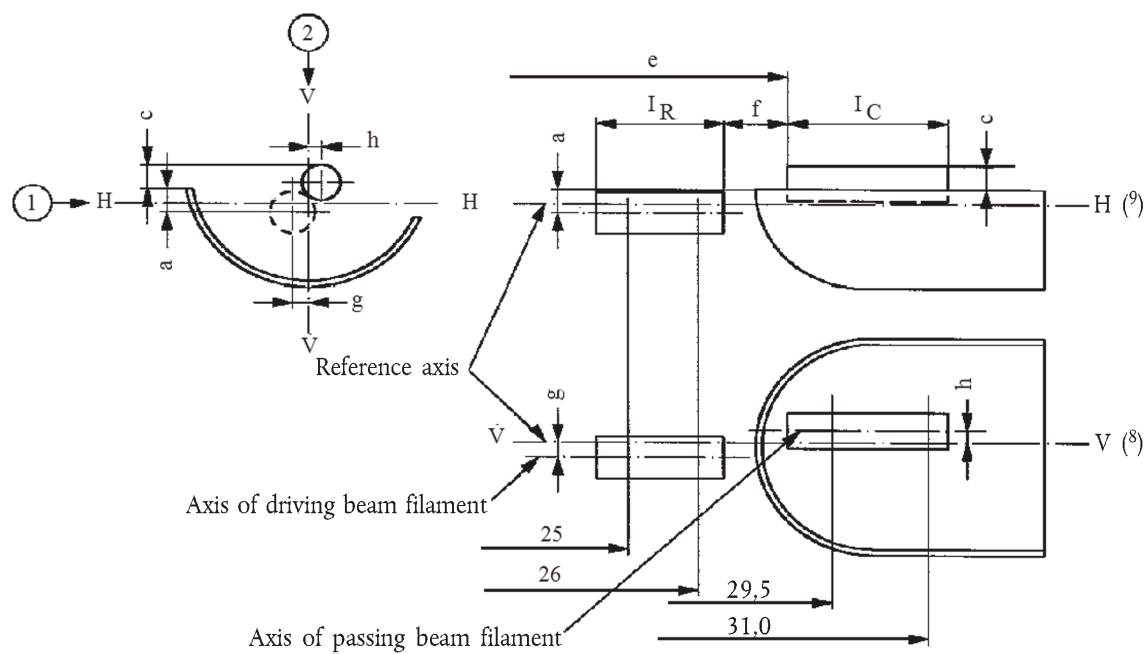
CATEGORY HS1 — Sheet HS1/3

Position of shield



The drawing is not mandatory with respect to the design of the shield

Position of filaments



CATEGORY HS1 — Sheet HS1/4

Table of the dimensions (in mm) referred to in the drawings on sheet HS1/3

Reference (*)		Dimensions (**)		Tolerance		
				Filaments lamps of normal production		Standard filament lamp
6 V	12 V	6 V	12 V	6 V	12 V	12 V
a/26		0,8		± 0,35		± 0,20
a/25		0,8		± 0,55		± 0,20
b1/29,5		0		± 0,35		± 0,20
b1/33		b1/29,5 mv		± 0,35		± 0,15
b2/29,5		0		± 0,35		± 0,20
b2/33		b2/29,5 mv		± 0,35		± 0,15
c/29,5		0,6		± 0,35		± 0,20
c/31		c/29,5 mv		± 0,30		± 0,15
d		min. 0,1/max. 1,5		—		—
e ⁽¹³⁾		28,5		+ 0,45/− 0,25		+ 0,20/− 0,00
f ⁽¹¹⁾ , ⁽¹²⁾ , ⁽¹³⁾		1,7		+ 0,50/− 0,30		+ 0,30/− 0,10
g/26		0		± 0,50		± 0,30
g/25		0		± 0,70		± 0,30
h/29,5		0		± 0,50		± 0,30
h/31		h/29,5 mv		± 0,30		± 0,20
l _R ⁽¹¹⁾ , ⁽¹⁴⁾		3,5	4,0	± 0,80		± 0,40
l _C ⁽¹¹⁾ , ⁽¹²⁾		3,3	4,5	± 0,80		± 0,35
p/33		Depends on the shape of the shield		—		—
q/33		(p+q)/2		± 0,60		± 0,30

(*) '.../26' means dimension to be measured at the distance from the reference plane indicated in mm after the stroke.

(**) '29,5 mv' means the value measured at a distance of 29,5 mm from the reference plane.

⁽⁸⁾ Plane V-V is the plane perpendicular to the reference plane and passing through the reference axis and through the intersection of the circle of diameter 'M' with the axis of the reference lug.⁽⁹⁾ Plane H-H is the plane perpendicular to both the reference plane and plane V-V and passing through the reference axis.⁽¹⁰⁾ (Blank).⁽¹¹⁾ The end turns of the filament are defined as being the first luminous turn and the last luminous turn that are at substantially the correct helix angle. For coiled-coil filaments, the turns are defined by the envelope of the primary coil.⁽¹²⁾ For the passing beam filament, the points to be measured are the intersections, seen in direction 1, of the lateral edge of the shield with the outside of the end turns defined under footnote 11.⁽¹³⁾ 'e' denotes the distance from the reference plane to the beginning of the passing beam filament as defined above.⁽¹⁴⁾ For the driving beam filament the points to be measured are the intersections, seen in direction 1, of a plane, parallel to plane H-H and situated at a distance of 0,8 mm below it, with the end turns defined under footnote 11.

CATEGORY HS1 — Sheet HS1/5*Additional explanations to sheet HS1/3*

The dimensions below are measured in three directions:

- 1 For dimensions a, b1, c, d, e, f, I_R and I_C ;
- 2 For dimensions g, h, p and q;
- 3 For dimension b2.

Dimensions p and q are measured in planes parallel to and 33 mm away from the reference plane.

Dimensions b1 and b2 are measured in planes parallel to and 29,5 mm and 33 mm away from the reference plane.

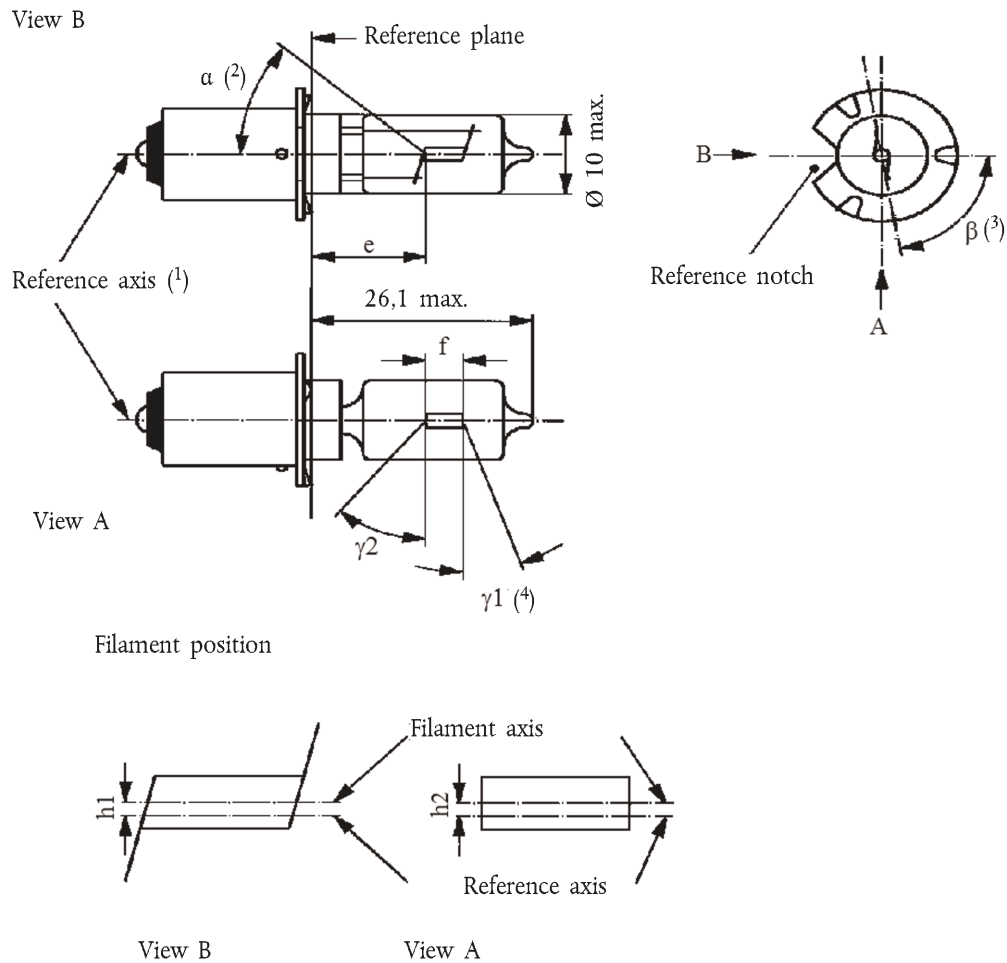
Dimensions a and g are measured in planes parallel to and 25,0 mm and 26,0 mm away from the reference plane.

Dimensions c and h are measured in planes parallel to and 29,5 mm and 31 mm away from the reference plane.

Note: For the method of measurement, see Appendix E of IEC Publication 60809.

CATEGORY HS2 — Sheet HS2/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



⁽¹⁾ The reference axis is perpendicular to the reference plane and passes through the intersection of this plane with the axis of the cap ring.

⁽²⁾ All parts which may obscure the light or may influence the light beam shall lie within angle α .

⁽³⁾ Angle β denotes the position of the plane through the inner leads with reference to the reference notch.

⁽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 not less than 50 per cent of the actual bulb diameter.

CATEGORY HS2 — Sheet HS2/2

Dimensions in mm		Filament lamps of normal production			Standard filament lamp
		min.	nom.	max.	
e			11,0 ⁽⁵⁾		11,0 ± 0,15
f ⁽⁶⁾	6 V	1,5	2,5	3,0	2,5 ± 0,15
	12 V	2,0	3,0	4,0	
h1, h2			⁽⁵⁾		0 ± 0,15
α ⁽²⁾				40°	
β ⁽³⁾		75°	90°	105°	90° ± 5°
γ1 ⁽⁴⁾		15°			15° min.
γ2 ⁽⁴⁾		40°			40° min.

Cap PX13.5s in accordance with IEC Publication 60061 (sheet 7004-35-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	6	12	6
	Watts	15		15
Test voltage	Volts	6,75	13,5	6,75
Objective values	Watts	15 ± 6 %		15 ± 6 %
	Luminous flux	320 ± 15 %		

Reference luminous flux: 320 lm at approximately 6,75 V

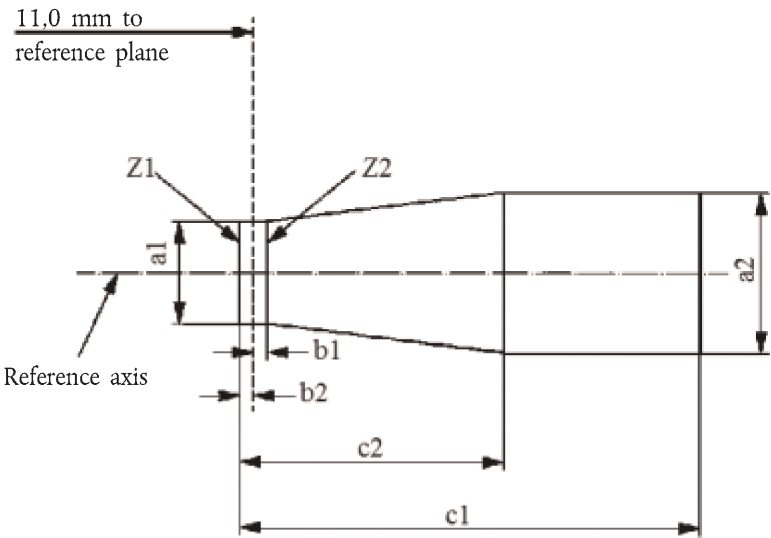
⁽⁵⁾ To be checked by means of the 'box system', sheet HS2/3.

⁽⁶⁾ In order to avoid rapid filament failure, the supply voltage shall not exceed 8,5 V for 6 V filament lamps and 15 V for 12 V types.

CATEGORY HS2 — Sheet HS2/3

Screen projection requirements

This test is used to determine, by checking whether the filament lamp complies with the requirements by checking whether the filament lamp is correctly positioned relative to the reference axis and reference plane.



Reference	a1	a2	b1	b2	c1 (6 V)	c1 (12 V)	c2
Dimension	d + 1,0	d + 1,4	0,25	0,25	4,0	4,5	1,75

d = actual filament diameter

The filament shall lie entirely within the limits shown.

The beginning of the filament shall lie between the lines Z1 and Z2.

CATEGORY HS5 — Sheet HS5/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

FILAMENT LAMP FOR MOTORCYCLES

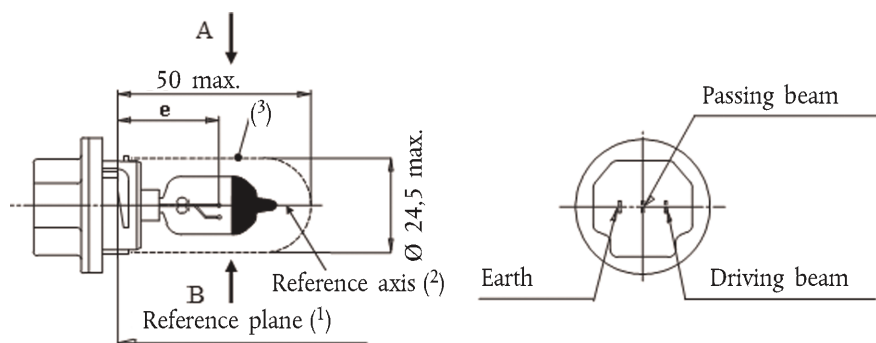


Figure 1

Main drawing

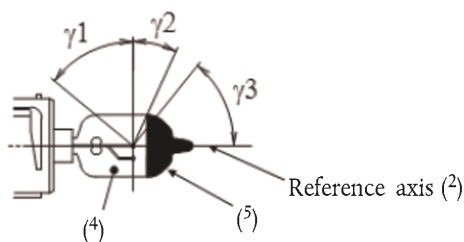


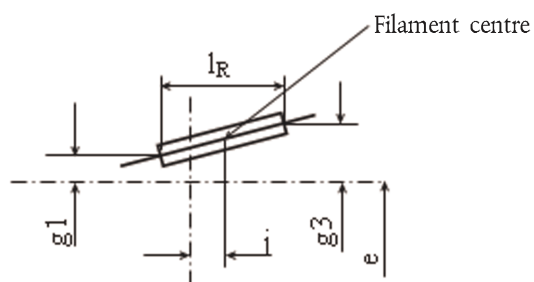
Figure 2

Distortion free area ⁽⁴⁾ and black top ⁽⁵⁾

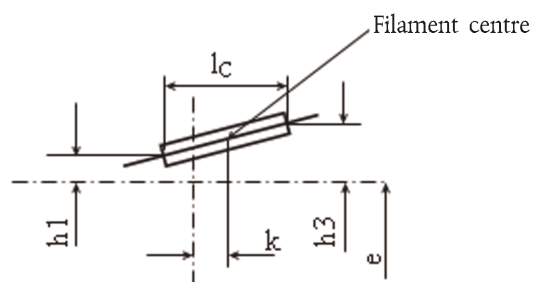
- ⁽¹⁾ The reference plane is defined by the three ramp inside surface.
- ⁽²⁾ The reference axis is perpendicular to the reference plane and passing through the centre of the 23 mm cap diameter.
- ⁽³⁾ Glass bulb and supports shall not exceed the envelope as indicated in Figure 1. The envelope is concentric to the reference axis.
- ⁽⁴⁾ Glass bulb shall be optically distortion free within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 .
- ⁽⁵⁾ The obscuration shall extend at least to angle γ_3 and shall extend at least to the cylindrical part of the bulb on the whole top circumference.

CATEGORY HS5 — Sheet HS5/2

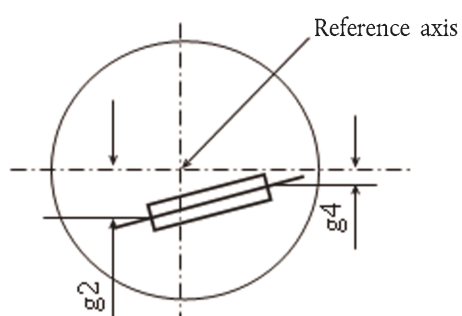
View B of driving beam filament



View A of passing beam filament



Top view of driving beam filament



Top view of passing beam filament

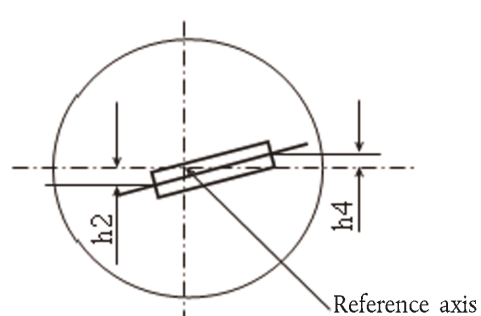


Figure 3

Filament position and dimensions

CATEGORY HS5 — Sheet HS5/3

Dimensions in mm		Filament lamps of normal production	Standard filament lamp
		12 V	12 V
e	26	(6)	± 0,15
l _C (7)	4,6		± 0,3
k	0		± 0,2
h1, h3	0		± 0,15
h2, h4	0		± 0,20
l _R (7)	4,6		± 0,3
j	0		± 0,2
g1, g3	0		± 0,30
g2, g4	2,5		± 0,40
γ1	50° min.	—	—
γ2	23° min.	—	—
γ3	50° min.	—	—

Cap P23t in accordance with IEC Publication 60061 (sheet 7004-138-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Voltage	V	12		12	
	Wattage	W	35	30	35	30
Test voltage		V	13,2		13,2	
Objective Values	Wattage	W	40 max.	37 max.	40 max.	37 max.
	Luminous flux	lm	620	515		
		± %	15	15		
Reference luminous at approximately				12 V	460	380
				13,2 V	620	515

(6) To be checked by means of a 'Box-System'. Sheet HS5/4.

(7) The positions of the first and the last turn of the filament are defined by the intersections of the outside of the first and the outside of the last light-emitting turn, respectively, with the plane parallel to and 26 mm distant from the reference plane.

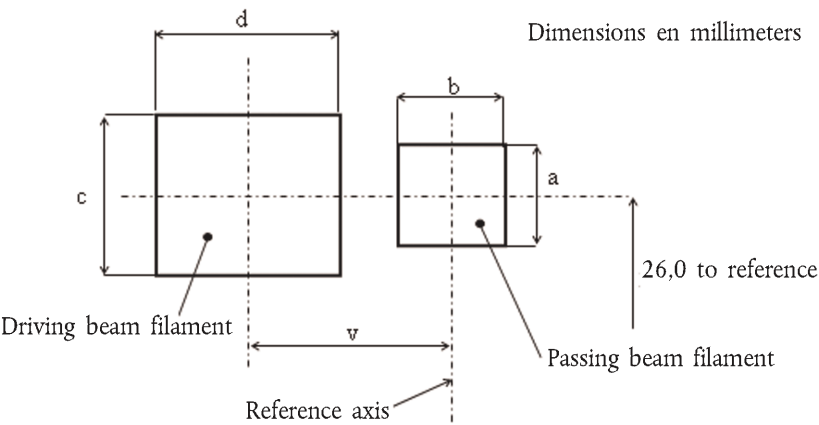
CATEGORY HS5 — Sheet HS5/4

Screen projection requirement

This test is used to determine whether a filament lamp complies with the requirements by checking whether:

- (a) The passing beam filament is correctly positioned relative to the reference axis and the reference plane; and whether
- (b) The driving beam filament is correctly positioned relative to the passing beam filament.

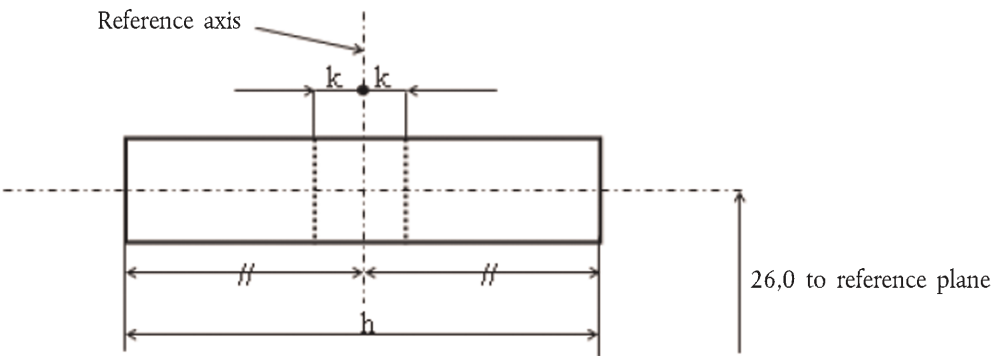
Side elevation



Reference	a	b	c	d	v
Dimensions	$d1 + 0,6$	$d1 + 0,8$	$d2 + 1,2$	$d2 + 1,6$	2,5

d1: Diameter of the passing beam filament
d2: Diameter of the driving beam filament

Front elevation



Reference	h	k
Dimensions	6,0	6,0

The filaments shall lie entirely within the limits shown.
The centre of the filament shall lie within the limits of dimension k.

CATEGORY HS5A — Sheet HS5A/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

FILAMENT LAMP FOR MOTORCYCLES

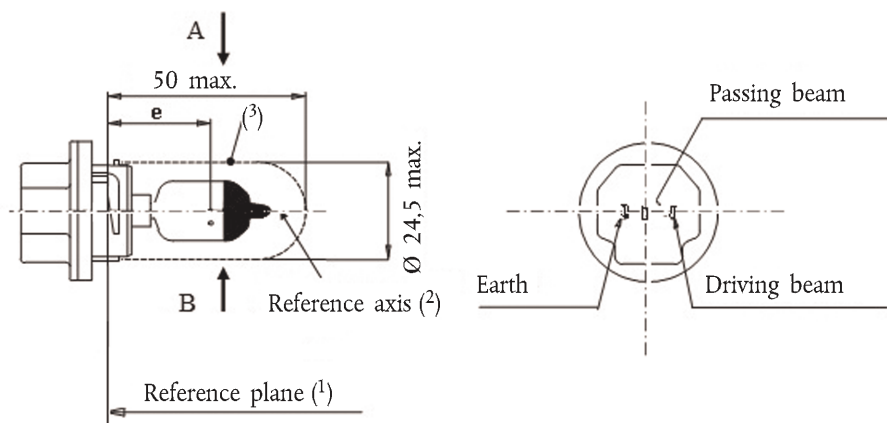


Figure 1

Main drawing

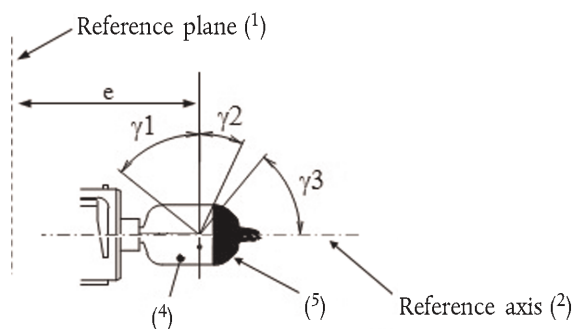


Figure 2

Distortion free area (4) and black top (5)

⁽¹⁾ The reference plane is defined by three ramps inside surface.

⁽²⁾ The reference axis is perpendicular to the reference plane and passing through the centre of the 23 mm cap diameter.

⁽³⁾ Glass bulb and supports shall not exceed the envelope as indicated in Figure 1. The envelope is concentric to the reference axis.

⁽⁴⁾ Glass bulb shall be optically distortion free within the angles γ_1 and γ_2 . This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2 .

⁽⁵⁾ The obscuration shall extend at least to angle γ_3 and shall extend at least to the cylindrical part of the bulb on the whole top circumference.

CATEGORY HS5A — Sheet HS5A/2

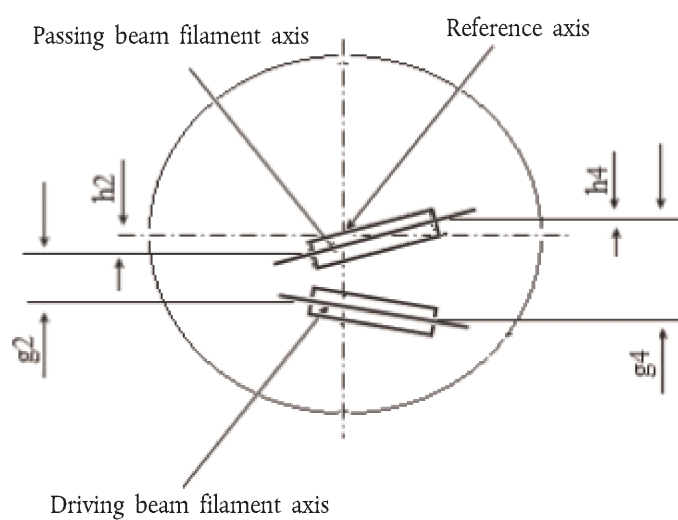
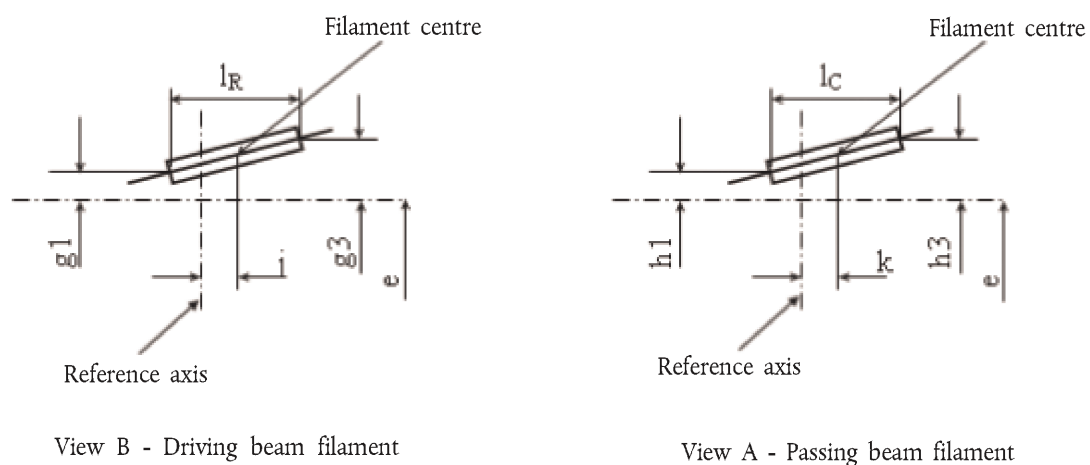


Figure 3

Filament position and dimensions

CATEGORY HS5A — Sheet HS5A/3

Dimensions in mm		Filament lamps of normal production	Standard filament lamp
		12 V	12 V
e	26	—	—
l_C ⁽⁶⁾	4,6	± 0,5	± 0,3
k	0	± 0,4	± 0,2
h1, h3	0	± 0,3	± 0,15
h2, h4	0	± 0,4	± 0,2
l_R ⁽⁶⁾	4,6	± 0,5	± 0,3
j	0	± 0,6	± 0,3
g1, g3	0	± 0,6	± 0,3
g2, g4	2,5	± 0,4	± 0,2
γ_1	50° min.	—	—
γ_2	23° min.	—	—
γ_3	50° min.	—	—

Cap PX23t in accordance with IEC Publication 60061 (sheet 7004-138A-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Voltage	V	12 (7)		12 (7)	
	Wattage	W	45	40	45	40
Test voltage		V	13,2		13,2	
Objective Values	Wattage	W	50 max.	45 max.	50 max.	45 max.
	Luminous flux	lm	750	640		
		± %	15	15		
Reference luminous at approximately			12 V		550 lm	470 lm
			13,2 V		750 lm	640 lm

⁽⁶⁾ The positions of the first and the last turn of the filament are defined by the intersections of the outside of the first and the outside of the last light-emitting turn, respectively, with the plane parallel to and 26 mm distant from the reference plane.

⁽⁷⁾ The values indicated in the left-hand columns relate to the driving beam filament and those indicated in the right-hand columns to the passing beam filament.

CATEGORY HS6 — Sheet HS6/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.

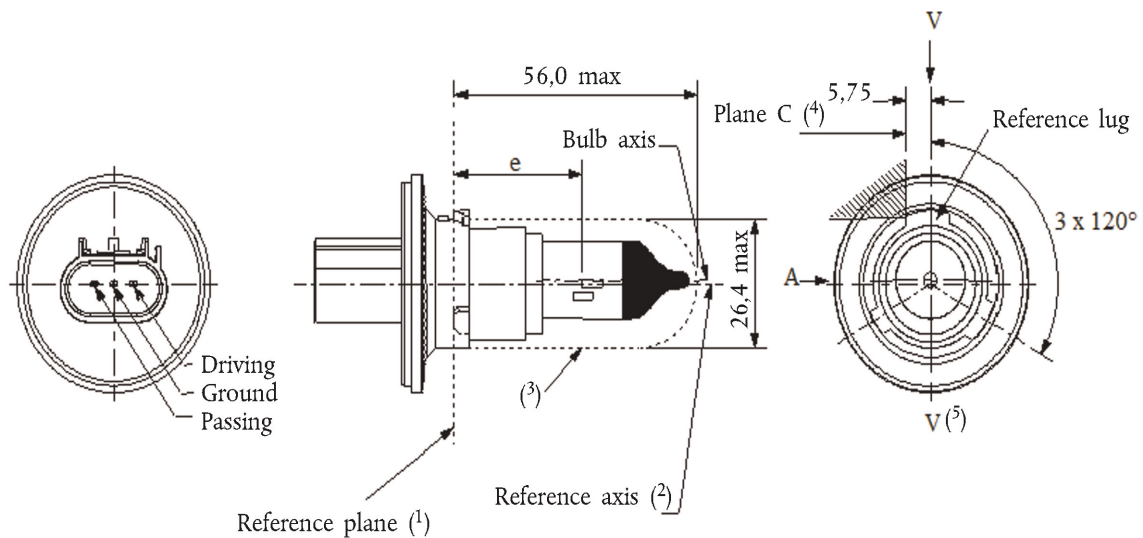


Figure 1

Main drawings

- ⁽¹⁾ The reference plane is the plane formed by the underside of the three radiused tabs of the cap.
- ⁽²⁾ The reference axis is perpendicular to the reference plane and crosses the intersection of the two perpendiculars as indicated in Figure 2 on sheet HS6/2.
- ⁽³⁾ Glass bulb and supports shall not exceed the envelope as indicated. The envelope is concentric to the reference axis.
- ⁽⁴⁾ The filament lamp shall be rotated in the measuring holder until the reference lug contacts plane C of the holder.
- ⁽⁵⁾ Plane V-V is the plane perpendicular to the reference plane passing through the reference axis and parallel to plane C.

CATEGORY HS6 — Sheet HS6/2

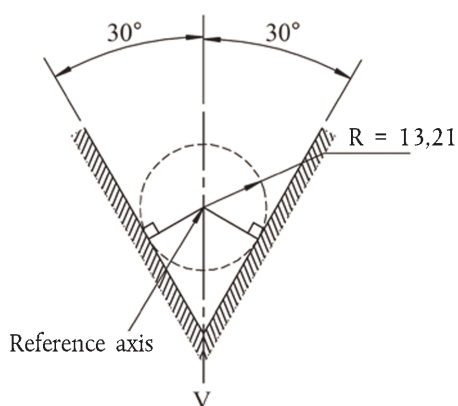


Figure 2

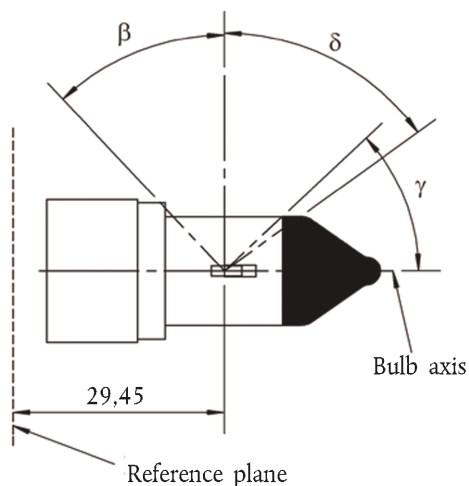
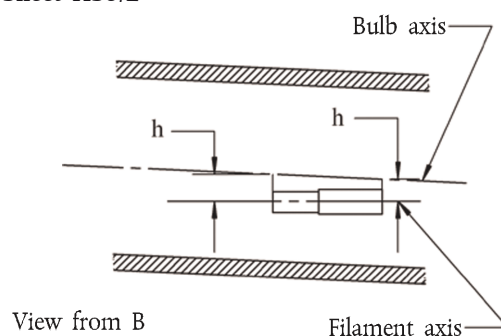
Definition of reference axis ⁽²⁾

Figure 3

Undistorted area ⁽⁶⁾ and opaque coating ⁽⁷⁾

View from A

Figure 4

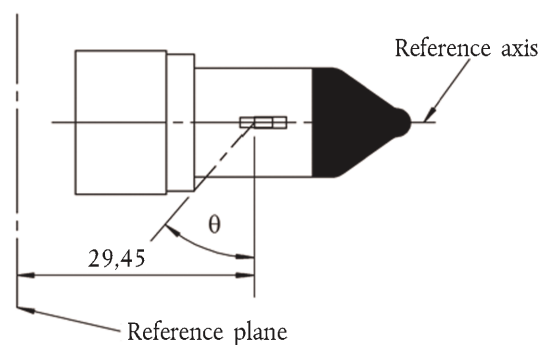
Bulb offset ⁽⁸⁾

Figure 5

Light blocking toward cap ⁽⁹⁾

- ⁽⁶⁾ Glass bulb shall be optically distortion-free axially and cylindrically within the angles β and δ . This requirement applies to the whole bulb circumference within the angles β and δ and does not need to be verified in the area covered by the opaque coating.
- ⁽⁷⁾ The opaque coating shall extend at least to the cylindrical part of the bulb on the whole bulb top circumference. It shall moreover extend at least to a plane parallel to the reference plane where γ crosses the outer bulb surface as shown in Figure 3 (view in direction B as indicated on sheet HS6/1).
- ⁽⁸⁾ Offset of passing beam filament in relation to the bulb axis is measured in two planes parallel to the reference plane where the projection of the outside end turns nearest to and farthest from the reference plane crosses the passing beam filament axis.
- ⁽⁹⁾ Light shall be blocked over the cap end of the bulb extending to angle ϑ . This requirement applies in all directions around the reference axis.

CATEGORY HS6 — Sheet HS6/3

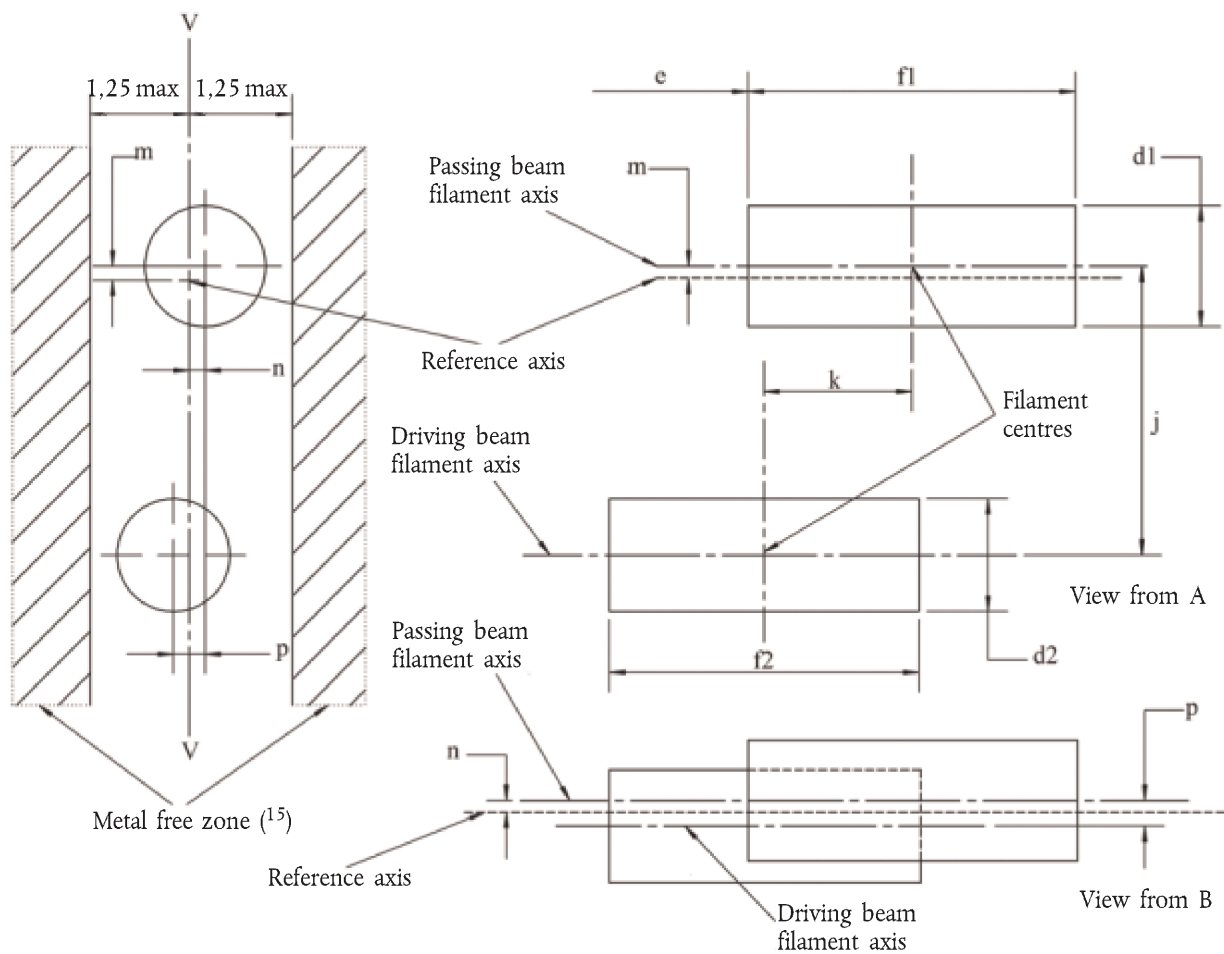


Figure 6

Position and dimensions of filaments ⁽¹⁰⁾, ⁽¹¹⁾, ⁽¹²⁾, ⁽¹³⁾, ⁽¹⁴⁾

- ⁽¹⁰⁾ Dimensions j, k and p are measured from the centre of the passing beam filament to the centre of the driving beam filament.
- ⁽¹¹⁾ Dimensions m and n are measured from the reference axis to the centre of the passing beam filament.
- ⁽¹²⁾ Both filaments axis are to be held within a 2° tilt with respect to the reference axis about the centre of the respective filament.
- ⁽¹³⁾ Note concerning the filament diameters: for the same manufacturer, the design filament diameter of standard (étalon) filament lamp and filament lamp of normal production shall be the same.
- ⁽¹⁴⁾ For both the driving beam and the passing beam filament distortion shall not exceed ± 5 per cent of filament diameter from a cylinder.
- ⁽¹⁵⁾ The metal free zone limits the location of lead wires within the optical path. No metal parts shall be located in the shaded area as seen in Figure 6.

CATEGORY HS6 — Sheet HS6/4

Dimensions in mm		Tolerance	
		Filaments lamps of normal production	Standard filament lamp
d1 ⁽¹³⁾ , ⁽¹⁷⁾	1,4 max.	—	—
d2 ⁽¹³⁾ , ⁽¹⁷⁾	1,4 max.	—	—
e ⁽¹⁶⁾	29,45	± 0,20	± 0,10
f1 ⁽¹⁶⁾	4,4	± 0,50	± 0,25
f2 ⁽¹⁶⁾	4,4	± 0,50	± 0,25
g ⁽⁸⁾ , ⁽¹⁷⁾	0,5 d1	± 0,50	± 0,30
h ⁽⁸⁾	0	± 0,40	± 0,20
j ⁽¹⁰⁾	2,5	± 0,30	± 0,20
k ⁽¹⁰⁾	2,0	± 0,20	± 0,10
m ⁽¹¹⁾	0	± 0,24	± 0,20
n ⁽¹¹⁾	0	± 0,24	± 0,20
p ⁽¹⁰⁾	0	± 0,30	± 0,20
β	42° min.	—	—
δ	52° min.	—	—
γ	43°	+ 0°/– 5°	+ 0°/– 5°
ϑ ⁽⁹⁾	41°	± 4°	± 4°

Cap PX26.4t in accordance with IEC Publication 60061 (sheet 7004-128-3)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS ⁽¹⁸⁾

Rated values	Volts	12		12	
	Watts	40	35	40	35
Test voltage	Volts	13,2		13,2	
Objective values	Watts	45 max.	40 max.	45 max.	40 max.
	Luminous flux	900 ± 15 %	600 ± 15 %		
Reference luminous flux at approximately		12 V		630/420	
		13,2 V		900/600	

⁽¹⁶⁾ The ends of the filament are defined as the points where, when the viewing direction is direction A as shown on sheet HS6/1, the projection of the outside of the end turns crosses the filament axis.

⁽¹⁷⁾ d1 is the actual diameter of the passing beam filament.

d2 is the actual diameter of the driving beam filament.

⁽¹⁸⁾ The values indicated in the left-hand columns relate to the driving beam filament and those in the right-hand columns to the passing beam filament.

CATEGORIES P13W AND PW13W — Sheet P13W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

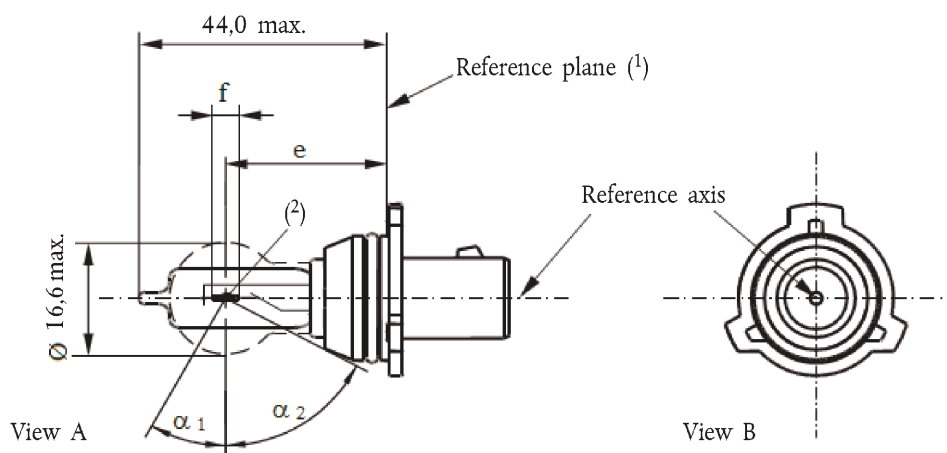


Figure 1

Main drawing P13W

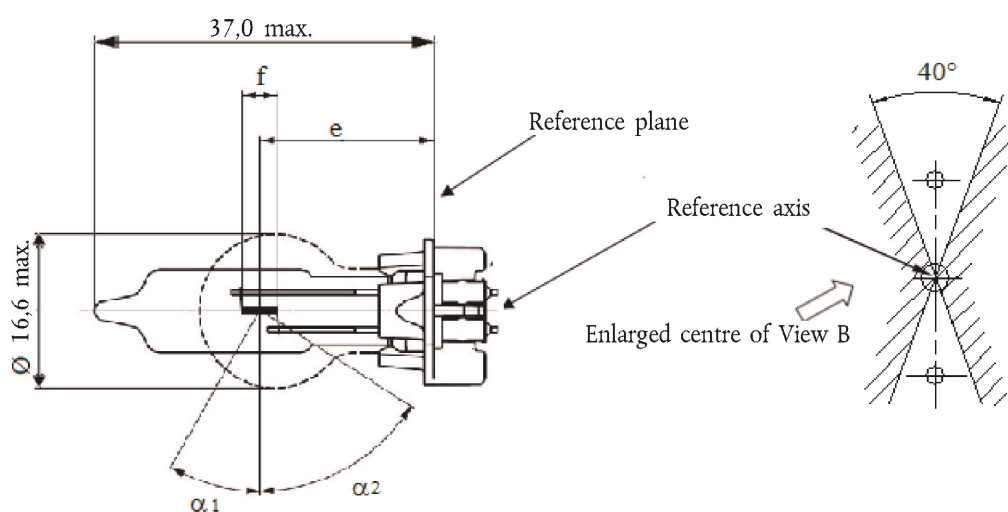


Figure 2

Metal free zone (3)

Figure 3

Main drawing PW13W

(1) The reference plane is defined by the meeting points of the cap-holder fit

(2) No actual filament diameter restrictions apply but the objective is $d_{\text{max.}} = 1,0 \text{ mm}$.

(3) No opaque parts other than filament turns shall be located in the shaded area indicated in Figure 2. This applies to the rotational body within the angles $\alpha_1 + \alpha_2$.

CATEGORIES P13W AND PW13W — Sheet P13W/2

Dimensions in mm		Filament lamps of normal production	Standard filament lamp
e ⁽⁵⁾	P13W	25,0 ⁽⁴⁾	25,0 ± 0,25
	PW13W	19,25 ⁽⁴⁾	19,25 ± 0,25
f ⁽⁵⁾		4,3 ⁽⁴⁾	4,3 ± 0,25
α_1 ⁽⁶⁾		30,0° min.	30,0° min.
α_2 ⁽⁶⁾		58,0° min.	58,0° min.

P13W Cap PG18.5d-1 in accordance with IEC Publication 60061 (sheet 7004-147-1)

PW13W Cap WP3.3x14.5-7 in accordance with IEC Publication 60061 (sheet 7004-164-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Voltage	V	12	12
	Wattage	W	13	13
Test voltage		V	13,5	13,5
Objective values	Wattage	W	19 max.	19 max.
	Luminous flux	lm	250	
		±	+ 15 %/– 20 %	
Reference luminous flux at approximately 13,5 V				250 lm

⁽⁴⁾ To be checked by means of a 'Box-System'; sheet P13W/3.

⁽⁵⁾ The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires, the projection of the outside of the end turns crosses the filament axis.

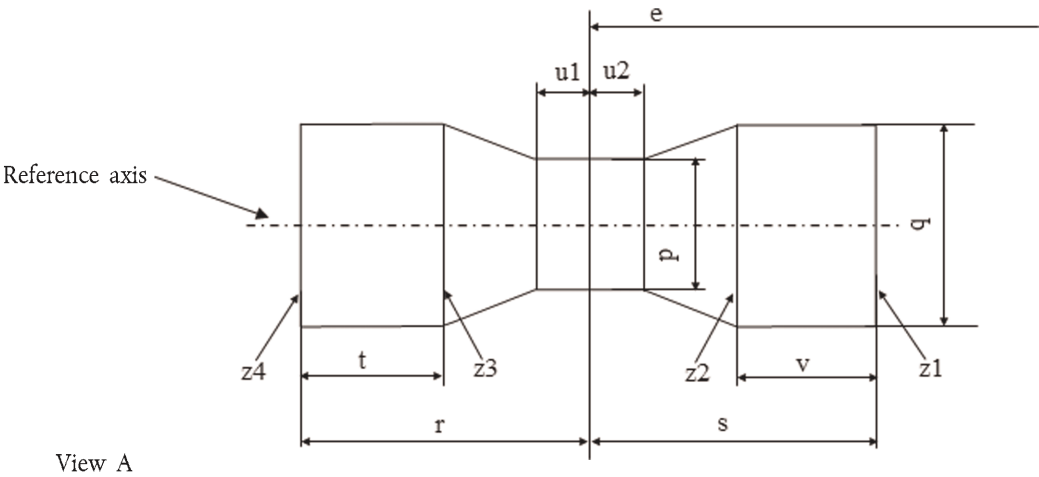
⁽⁶⁾ No part of the cap beyond the reference plane shall interfere with angle α_2 as shown in Figure 1 on sheet P13W/1. The bulb shall be optically distortion free within the angles $\alpha_1 + \alpha_2$.

These requirements apply to the whole bulb circumference.

CATEGORIES P13W AND PW13W — Sheet P13W/3

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



	p	q	u1, u2	r, s	t, v
Filament lamps of normal production	1,7	1,9	0,3	2,6	0,9
Standard filament lamps	1,5	1,7	0,25	2,45	0,6

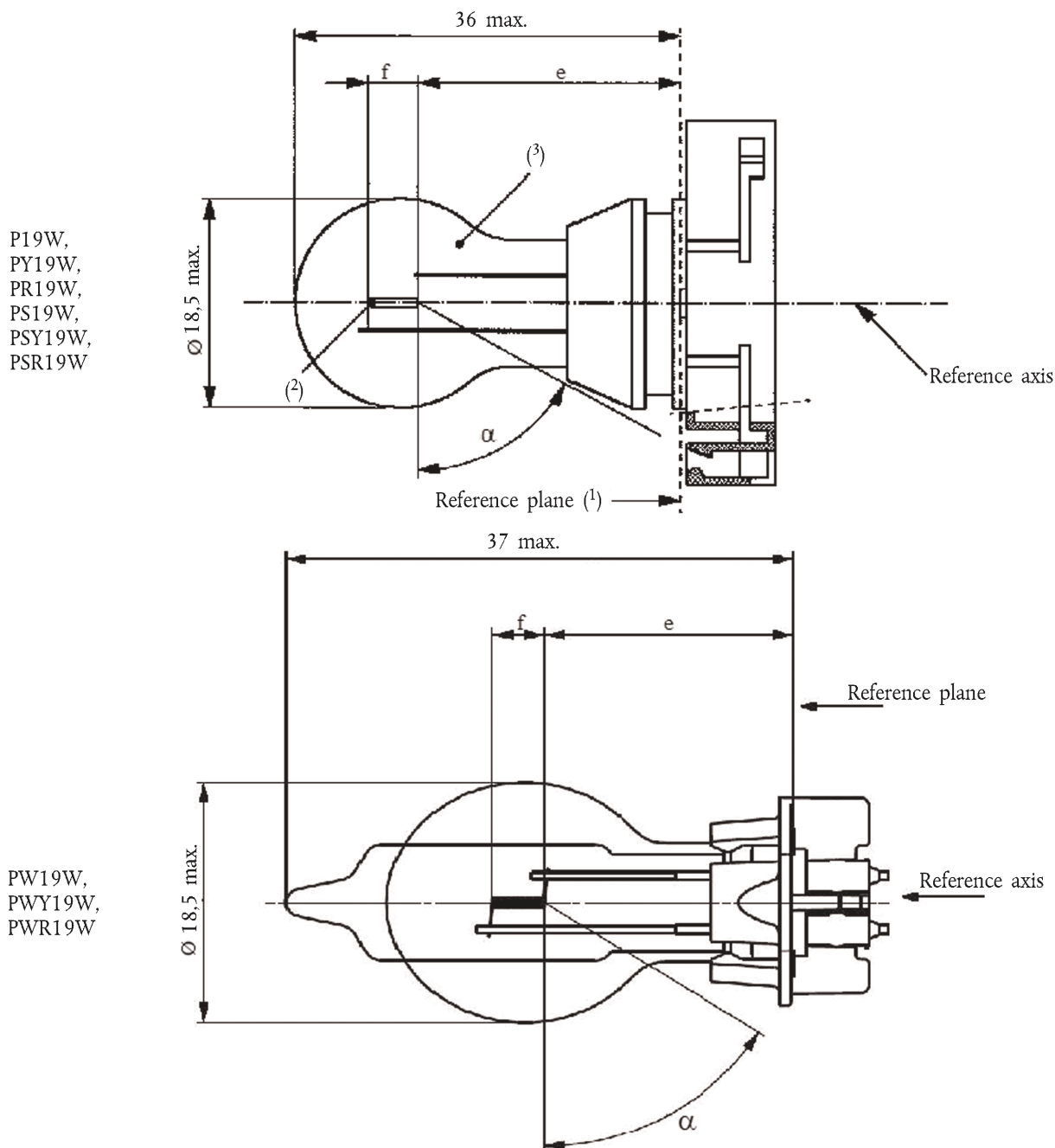
The filament position is checked in two mutually perpendicular planes, one of them being the plane through the lead-in wires.

The ends of the filament as defined on sheet P13W/2, footnote 4, shall lie between Z1 and Z2 and between the lines Z3 and Z4.

The filament shall lie entirely within the limits shown.

CATEGORIES P19W, PY19W, PR19W, PS19W, PSY19W, PSR19W, PW19W, PWY19W AND PWR19W — Sheet P19W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



(1) The reference plane is defined by the meeting points of the cap-holder fit.

(2) No actual filament diameter restrictions apply but the objective is $d \text{ max.} = 1,1 \text{ mm}$.

(3) The light emitted from normal production lamps shall be white for categories P19W, PS19W and PW19W; amber for categories PY19W, PSY19W and PWY19W; red for categories PR19W, PSR19W and PWR19W (see also footnote 8).

CATEGORIES P19W, PY19W, PR19W, PS19W, PSY19W, PSR19W, PW19W, PWY19W AND PWR19W — Sheet P19W/2

Dimensions in mm ⁽⁴⁾			Filament lamps of normal production			Standard filament lamp
			min.	nom.	max.	⁽⁸⁾
e ⁽⁵⁾ , ⁽⁶⁾	P19W, PS19W, PY19W, PSY19W, PR19W, PSR19W			24,0		24,0
	PW19W, PWY19W, PWR19W			18,1		18,1
f ⁽⁵⁾ , ⁽⁶⁾				4,0		4,0 ± 0,2
α ⁽⁷⁾			58°			58° min.
P19W	Cap PGU20-1		in accordance with IEC Publication 60061 (sheet 7004-127-2)			
PY19W	Cap PGU20-2					
PR19W	Cap PGU20-5					
PS19W	Cap PG20-1					
PSY19W	Cap PG20-2					
PSR19W	Cap PG20-5					
PW19W	Cap WP3.3x14.5-1		in accordance with IEC Publication 60061 (sheet 7004-164-1)			
PWY19W	Cap WP3.3x14.5-2					
PWR19W	Cap WP3.3x14.5-5					
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS						
Rated values	Volts		12			12
	Watts		19			19
Test voltage	Volts		13,5			13,5
Objective values	Watts		20 max.			20 max.
	Luminous flux	P19W PS19W PW19W	350 ± 15 %			
		PY19W PSY19W PWY19W	215 ± 20 %			
		PR19W PSR19W PWR19W	80 ± 20 %			
Reference luminous flux at approximately 13,5 V						White: 350 lm Amber: 215 lm Red: 80 lm

⁽⁴⁾ For categories PS19W, PSY19W and PSR19W, dimensions may be checked with O-ring removed to assure the correct mounting during testing.

⁽⁵⁾ The filament position is checked by means of a 'Box-System'; sheet P19W/3.

⁽⁶⁾ The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires as showed in the drawing on sheet P19W/1, the projection of the outside of the end turns crosses the filament axis.

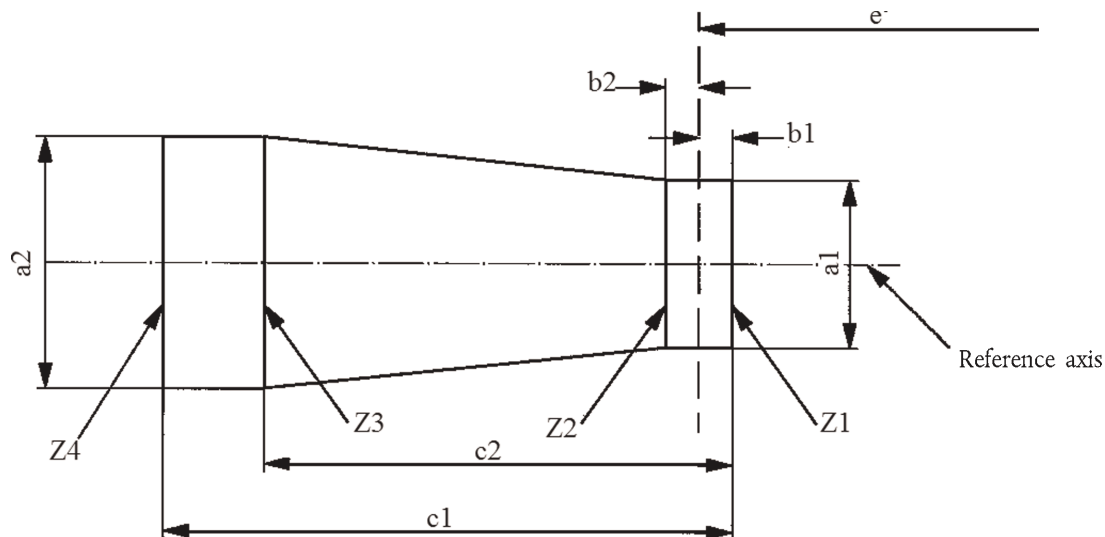
⁽⁷⁾ No part of the cap beyond the reference plane shall interfere with angle α. The bulb shall be optically distortion free within the angle 2α + 180°.

⁽⁸⁾ The light emitted from standard filament lamps shall be white for categories P19W, PS19W and PW19W; white or amber for categories PY19W, PSY19W and PWY19W; white or red for categories PR19W, PSR19W and PWR19W.

CATEGORIES P19W, PY19W, PR19W, PS19W, PSY19W, PSR19W, PW19W, PWY19W AND PWR19W — Sheet P19W/3

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



P19W, PY19W, PR19W, PS19W, PSY19W, PSR19W	a1	a2	b1, b2	c1	c2
Filament lamps of normal production	2,9	3,9	0,5	5,2	3,8
Standard filament lamps	1,5	1,7	0,25	4,7	3,8

PW19W, PWY19W and PWR19W	a1	a2	b1, b2	c1	c2
Filament lamps of normal production	2,5	2,5	0,4	5,2	3,8
Standard filament lamps	1,5	1,7	0,25	4,7	3,8

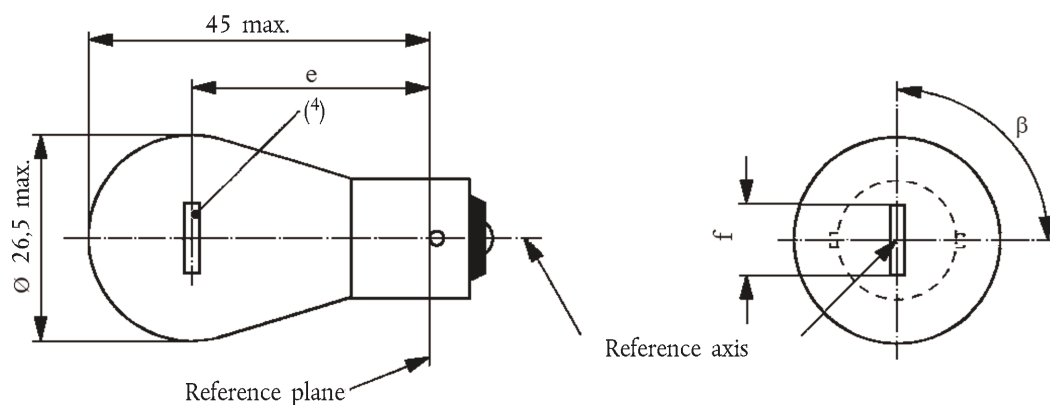
The filament position is checked in two mutually perpendicular planes, one of them being the plane through the lead-in wires.

The ends of the filament as defined on sheet P19W/2, footnote 6, shall lie between Z1 and Z2 and between the lines Z3 and Z4.

The filament shall lie entirely within the limits shown.

CATEGORY P21W — Sheet P21W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm		Filament lamps of normal production			Standard filament lamp
		min.	nom.	max.	
e	6,12 V		31,8 ⁽³⁾		31,8 ± 0,3
	24 V	30,8	31,8	32,8	
f	12 V	5,5	6,0	7,0	6,0 ± 0,5
	6 V			7,0	
Lateral deviation ⁽¹⁾	6,12 V			⁽³⁾	0,3 max.
	24 V			1,5	
β		75°	90°	105°	90° ± 5°

Cap BA15s in accordance with IEC Publication 60061 (sheet 7004-11A-9) ⁽²⁾

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	6	12	24	12
	Watts	21			21
Test voltage	Volts	6,75	13,5	28,0	13,5
Objective values	Watts	27,6 max.	26,5 max.	29,7 max.	26,5 max.
	Luminous flux	460 ± 15 %			

Reference luminous flux: 460 lm at approximately 13,5 V

⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the pins.

⁽²⁾ Filament lamps with cap BA15d may be used for special purposes; they have the same dimensions.

⁽³⁾ To be checked by means of a 'Box-System'; sheet P21W/2.

⁽⁴⁾ In this view the filament of the 24 V type may be straight or V-shaped. This shall be indicated in the application of approval. If it is straight, the screen projection requirements, sheet P21W/2, apply. If it is V-shaped, the filament ends shall be at the same distance within ± 3 mm from the reference plane.

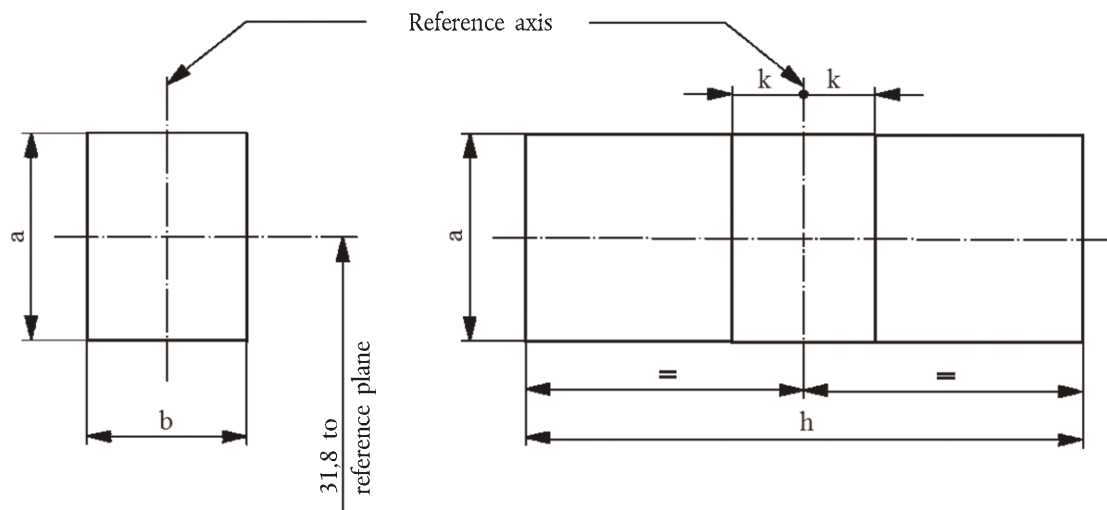
CATEGORY P21W — Sheet P21W/2

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the centre line of the pins (P21W) or of the reference pin (PY21W and PR21W) and the reference axis, whether a filament lamp complies with the requirements.

Side elevation

Front elevation



Reference	a	b	h	k
Dimension	3,5	3,0	9,0	1,0

Test procedures and requirements

1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits. The holder is then so rotated that an end view of the filament is seen on the screen on to which the image of the filament is projected. The end view of the filament shall be obtained within the angular displacements tolerance limits.
2. Side elevation

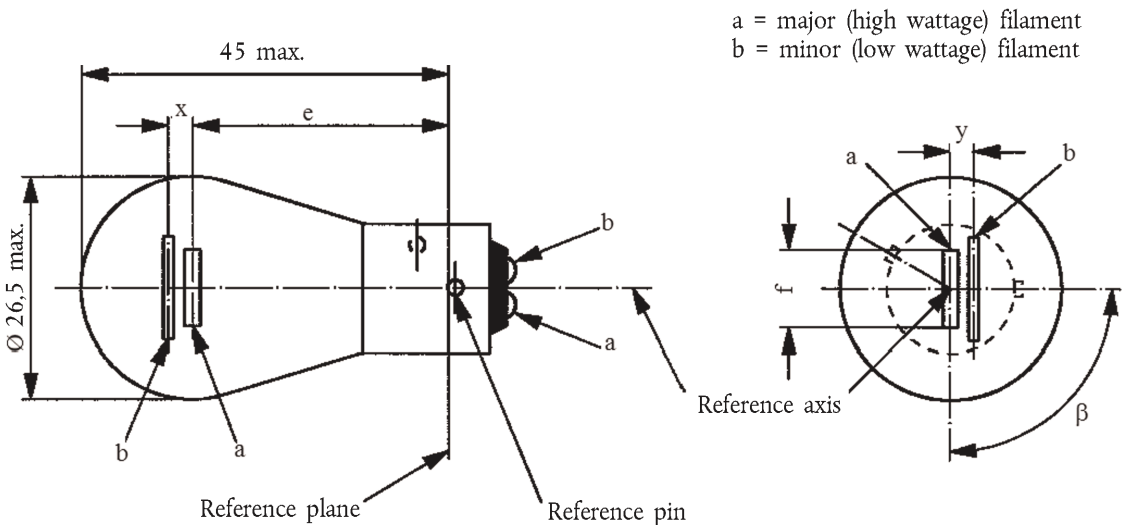
The filament lamp placed with the cap down, the reference axis vertical and the filament seen end-on, the projection of the filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament.
3. Front elevation

The filament lamp placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to the filament axis:

 - 3.1. The projection of the filament shall lie entirely within a rectangle of height 'a' and width 'h', having its centre at the theoretical position of the centre of the filament.
 - 3.2. The centre of the filament shall not be offset by more than distance 'k' from the reference axis.

CATEGORY P21/4W — Sheet P21/4W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e		31,8 ⁽¹⁾		31,8 ± 0,3
f			7,0	7,0 + 0/- 2
Lateral deviation			(¹)	0,3 max. ⁽²⁾
x, y		(1)		2,8 ± 0,5
β		75° (¹)	90° (¹) 105° (¹)	90° ± 5°

Cap BAZ15d in accordance with IEC Publication 60061 (sheet 7004-11C-3)

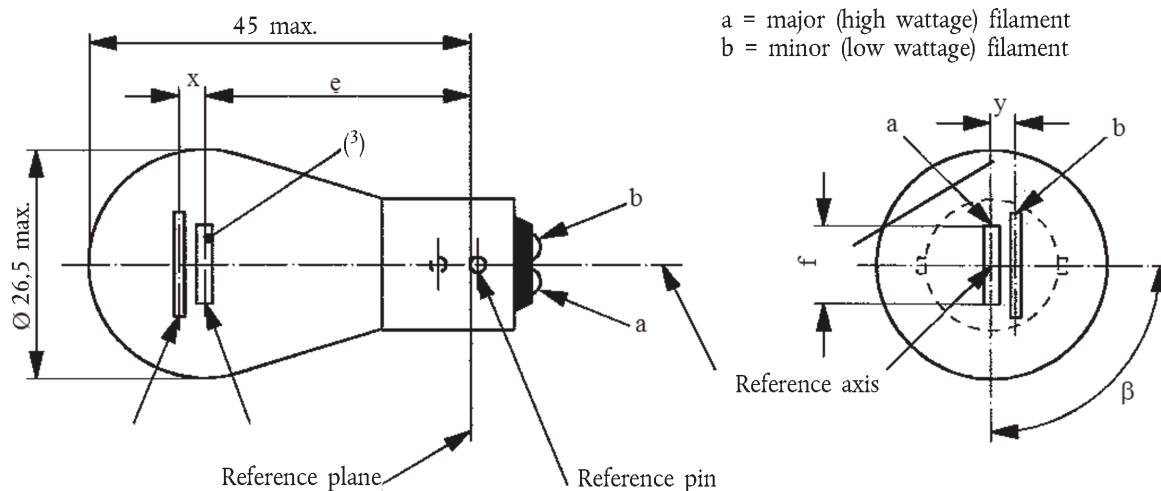
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS						
Rated values	Volts	12		24		12
	Watts	21	4	21	4	21/4
Test voltage	Volts	13,5		28,0		13,5
Objective values	Watts	26,5 max.	5,5 max.	29,7 max.	8,8 max.	26,5/5,5 max.
	Luminous flux	440	15	440	20	
	± %	15	20	15	20	

Reference luminous flux: 440 lm and 15 lm at approximately 13,5 V

- (¹) These dimensions shall be checked by means of a 'Box-System' (³) based on the dimensions and tolerances shown above. 'x' and 'y' refer to the major (high-wattage) filament, not to the reference axis. Means of increasing the positioning accuracy of the filament and of the cap-holder assembly are under consideration.
- (²) Maximum lateral deviation of the major filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the reference pin.
- (³) The 'Box-System' is the same as for filament lamp P21/5W.

CATEGORY P21/5W — Sheet P21/5W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm		Filament lamps of normal production			Standard filament lamp
		min.	nom.	max.	
e	6,12 V		31,8 ⁽¹⁾		31,8 ± 0,3
	24 V	30,8	31,8	32,8	
f	6,12 V			7,0	7,0 + 0/- 2
Lateral deviation ⁽²⁾	6,12 V			⁽¹⁾	0,3 max.
	24 V			1,5	
x, y	6,12 V		⁽¹⁾		2,8 ± 0,3
x	24 V ⁽³⁾	- 1,0	0	1,0	
y	24 V ⁽³⁾	1,8	2,8	3,8	
β		75°	90°	105°	90° ± 5°

Cap BAY15d in accordance with IEC Publication 60061 (sheet 7004-11B-7)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	6		12		24		12
	Watts	21	5	21	5	21	5	21/5
Test voltage	Volts	6,75		13,5		28,0		13,5
Objective values	Watts	27,6 max.	6,6 max.	26,5 max.	6,6 max.	29,7 max.	11,0 max.	26,5 and 6,6 max.
	Luminous flux	440	35	440	35	440	40	
	± %	15	20	15	20	15	20	

Reference luminous flux: 440 and 35 lm at approximately 13,5 V

For the notes see sheet P21/5W/2

CATEGORY P21/5W — Sheet P21/5W/2*Notes:*

- (¹) These dimensions shall be checked by means of a 'box-system'. See sheets P21/5W/2 and P21/5W/3. 'x' and 'y' refer to the major (high-wattage) filament, not to the reference axis.
- (²) Maximum lateral deviation of the major (high wattage) filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the reference pin.
- (³) In this view the filaments of the 24 V type may be straight or V-shaped. This shall be indicated in the application of approval. If the filaments are straight, the screen projection requirements apply. If they are V-shaped, the ends of each filament shall be at the same distance within ± 3 mm from the reference plane.

Screen projection requirements

This test is used to determine, by checking whether:

- (a) The major (high wattage) filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the centres of the pins and the reference axis; and whether
- (b) The minor (low wattage) filament is correctly positioned relative to the major (high wattage) filament, whether a filament lamp complies with the requirements.

Test procedure and requirements

1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits. (i.e. 15°). The holder is then so rotated that an end view of the major filament is seen on the screen on which the image of the filament is projected. The end view of that filament shall be obtained within the angular displacement tolerance limits.
2. Side elevation

The filament lamp placed with the cap down, the reference axis vertical, the reference pin to the right and the major filament seen end-on:

 - 2.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament;
 - 2.2. The projection of the minor filament shall lie entirely:
 - 2.2.1. Within a rectangle of width 'c' and height 'd' having its centre at a distance 'v' to the right of and at a distance 'u' above the theoretical position of the centre of the major filament;
 - 2.2.2. Above a straight line tangential to the upper edge of the projection of the major filament and rising from left to right at an angle of 25° .
 - 2.2.3. To the right of the projection of the major filament.
3. Front elevation

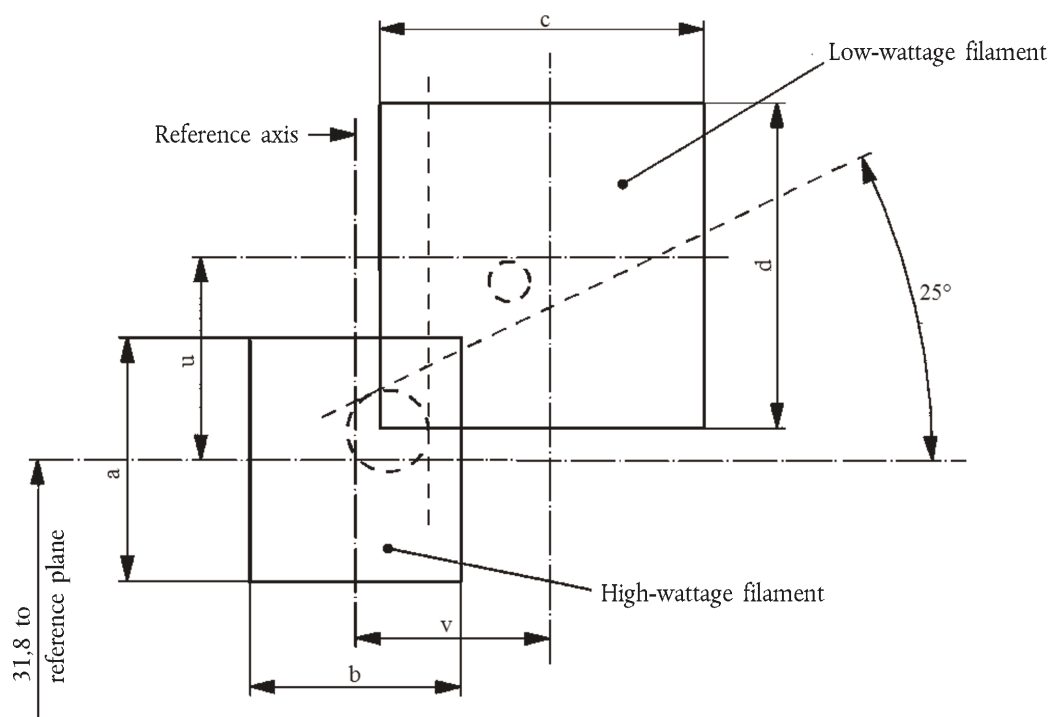
The filament lamp being placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to axis of the major filament:

 - 3.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'h', centred on the theoretical position of the centre of the filament;
 - 3.2. The centre of the major filament shall not be offset by more than distance 'k' from the reference axis.
 - 3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ± 2 mm ($\pm 0,4$ mm for standard filament lamps).

CATEGORY P21/5W — Sheet P21/5W/3

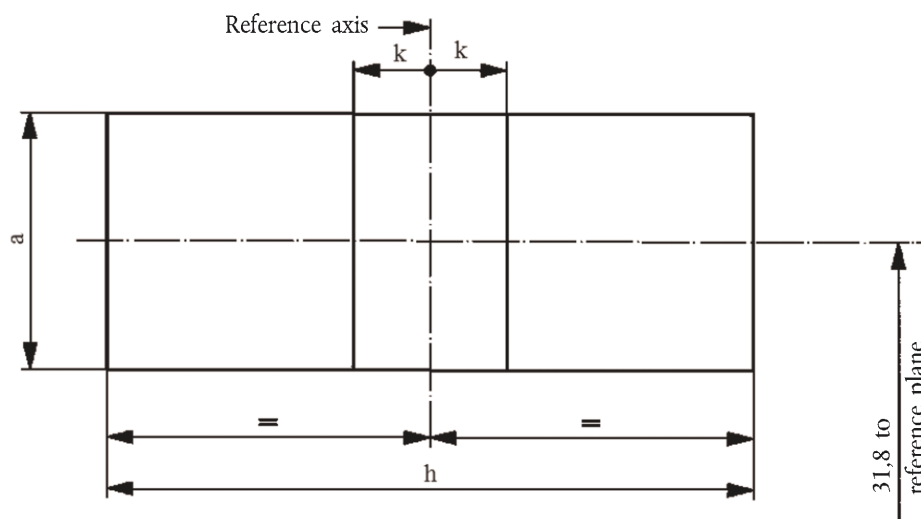
Dimensions in mm

Side elevation



Reference	a	b	c	d	u	v
Dimensions	3,5	3,0	4,8		2,8	

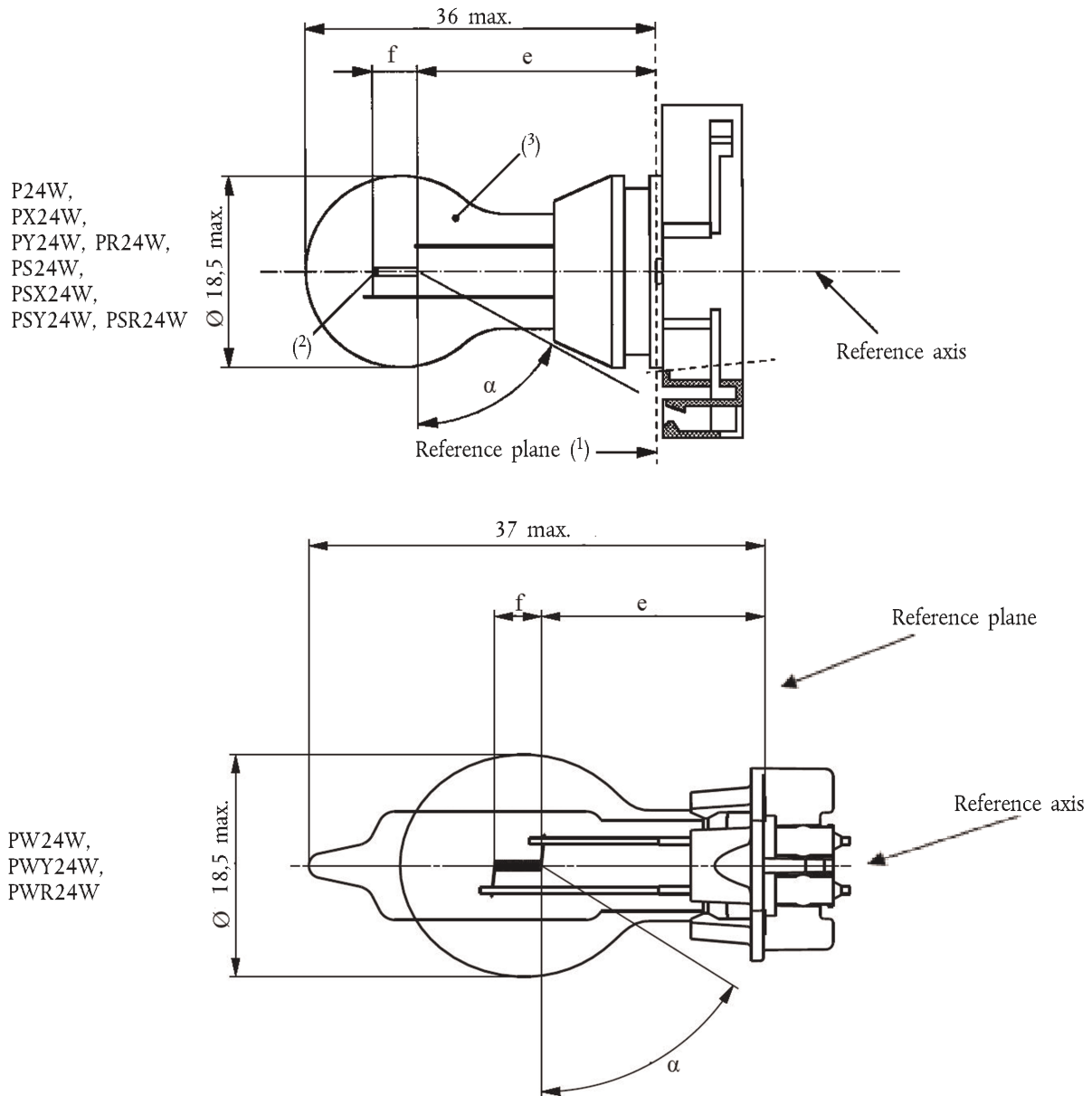
Front elevation



Reference	a	h	k
Dimensions	3,5	9,0	1,0

**CATEGORIES P24W, PX24W, PY24W, PR24W, PS24W, PSX24W, PSY24W, PSR24W, PW24W, PWY24W AND PWR24W —
Sheet P24W/1**

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



⁽¹⁾ The reference plane is defined by the meeting points of the cap-holder fit.

⁽²⁾ No actual filament diameter restrictions apply but the objective is $d_{\text{max.}} = 1,1$ mm.

⁽³⁾ The light emitted from normal production lamps shall be white for categories P24W, PX24W, PS24W, PSX24W and PW24W; amber for categories PY24W, PSY24W and PWY24W; red for categories PR24W, PSR24W and PWR24W (see also footnote 8).

**CATEGORIES P24W, PX24W, PY24W, PR24W, PS24W, PSX24W, PSY24W, PSR24W, PW24W, PWY24W AND PWR24W —
Sheet P24W/2**

Dimensions in mm ⁽⁴⁾		Filament lamps of normal production			Standard filament lamp
		min.	nom.	max.	⁽⁸⁾
e ⁽⁵⁾ , ⁽⁶⁾	P24W, PY24W, PR24W, PS24W, PSY24W, PSR24W, PX24W, PSX24W		24,0		24,0
	PW24W, PWY24W, PWR24W		18,1		18,1
f ⁽⁵⁾ , ⁽⁶⁾	P24W, PY24W, PR24W, PS24W, PSY24W, PSR24W, PW24W, PWY24W, PWR24W		4,0		4,0
	PX24W, PSX24W		4,2		4,2
α ⁽⁷⁾		58,0°			58,0° min.
P24W	Cap PGU20-3	in accordance with IEC Publication 60061 (sheet 7004-127-2)			
PX24W	Cap PGU20-7				
PY24W	Cap PGU20-4				
PR24W	Cap PGU20-6				
PS24W	Cap PG20-3				
PSX24W	Cap PG20-7				
PSY24W	Cap PG20-4				
PSR24W	Cap PG20-6				
PW24W	Cap WP3.3x14.5-3	in accordance with IEC Publication 60061 (sheet 7004-164-1)			
PWY24W	Cap WP3.3x14.5-4				
PWR24W	Cap WP3.3x14.5-6				

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts		12	12
	Watts		24	24
Test voltage	Volts		13,5	13,5
Objective values	Watts		25 max.	25 max.
	Luminous Flux	P24W PS24W PW24W	500 + 10/- 20 %	
		PX24W PSX24W	500 + 10/- 15 %	
		PY24W PSY24W PWY24W	300 + 15/- 25 %	
		PR24W PSR24W PWR24W	115 + 15/- 25 %	

Dimensions in mm ⁽⁴⁾	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	⁽⁸⁾
Reference luminous flux at approximately				12 V
				White: 345 lm
				13,2 V
				White: 465 lm
				13,5 V
				White: 500 lm Amber: 300 lm Red: 115 lm

⁽⁴⁾ For categories PS24W, PSX24W, PSY24W and PSR24W, dimensions may be checked with O-ring removed to assure the correct mounting during testing.

⁽⁵⁾ The filament position is checked by means of a 'box-system'; sheet P24W/3.

⁽⁶⁾ The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires as showed in the drawing on sheet P24W/1, the projection of the outside of the end turns crosses the filament axis.

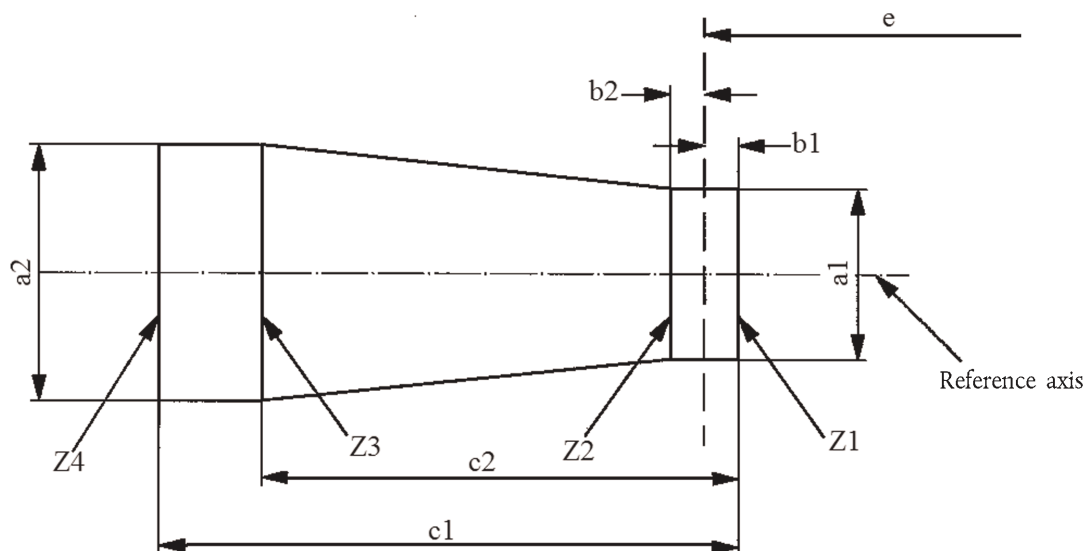
⁽⁷⁾ No part of the cap beyond the reference plane shall interfere with angle α . The bulb shall be optically distortion free within the angle $2\alpha + 180^\circ$.

⁽⁸⁾ The light emitted from standard filament lamps shall be white for categories P24W, PX24W, PS24W, PSX24W and PW24W; white or amber for categories PY24W, PSY24W and PWY24W; white or red for categories PR24W, PSR24W and PWR24W.

**CATEGORIES P24W, PX24W, PY24W, PR24W, PS24W, PSX24W, PSY24W, PSR24W, PW24W, PWY24W AND PWR24W —
Sheet P24W/3**

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



P24W, PY24W, PR24W, PS24W, PSY24W, PSR24W	a1	a2	b1, b2	c1	c2
Filament lamps of normal production	2,9	3,9	0,5	5,2	3,8
Standard filament lamps	1,5	1,7	0,25	4,7	3,8

PW24W, PWY24W, PWR24W	a1	a2	b1, b2	c1	c2
Filament lamps of normal production	2,5	2,5	0,4	5,0	3,8
Standard filament lamps	1,5	1,7	0,25	4,7	3,8

PX24W, PSX24W	a1	a2	b1, b2	c1	c2
Filament lamps of normal production	1,9	1,9	0,35	5,0	4,0
Standard filament lamps	1,5	1,5	0,25	4,7	4,0

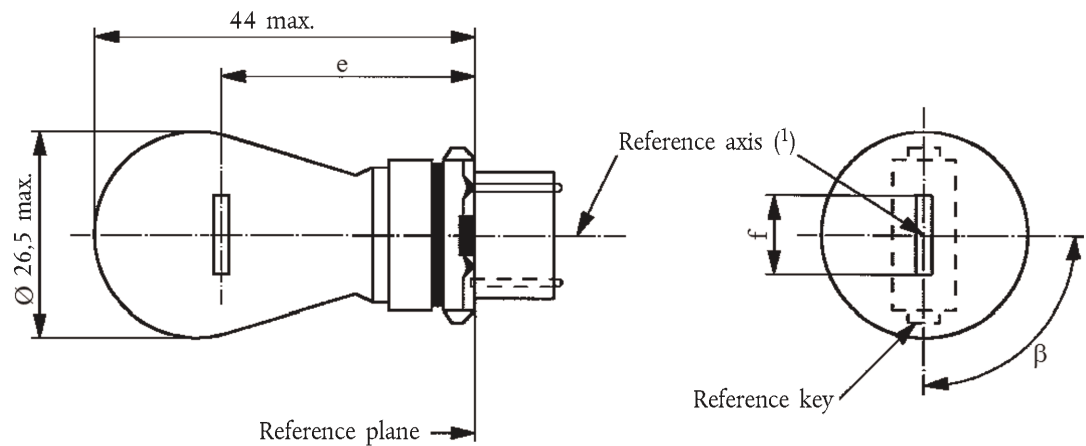
The filament position is checked in two mutually perpendicular planes, one of them being the plane through the lead-in wires.

The ends of the filament as defined on sheet P24W/2, footnote 6, shall lie between Z1 and Z2 and between the lines Z3 and Z4.

The filament shall lie entirely within the limits shown.

CATEGORY P27W — Sheet P27W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e		27,9 ⁽³⁾		27,9 ± 0,3
f			9,9	9,9 + 0/- 2
Lateral deviation ⁽²⁾			⁽³⁾	0,0 ± 0,4
β	75° ⁽³⁾	90°	105° ⁽³⁾	90° ± 5°

Cap W2.5x16d in accordance with IEC Publication 60061 (sheet 7004-104-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	27	27
Test voltage	Volts	13,5	13,5
Objective values	Watts	32,1 max.	32,1 max.
	Luminous flux	475 ± 15 %	

Reference luminous flux: 475 lm at approximately 13,5 V

⁽¹⁾ The reference axis is defined with respect to the reference keys and is perpendicular to the reference plane.
⁽²⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis through the reference keys.
⁽³⁾ To be checked by means of a 'Box System', sheet P27W/2.

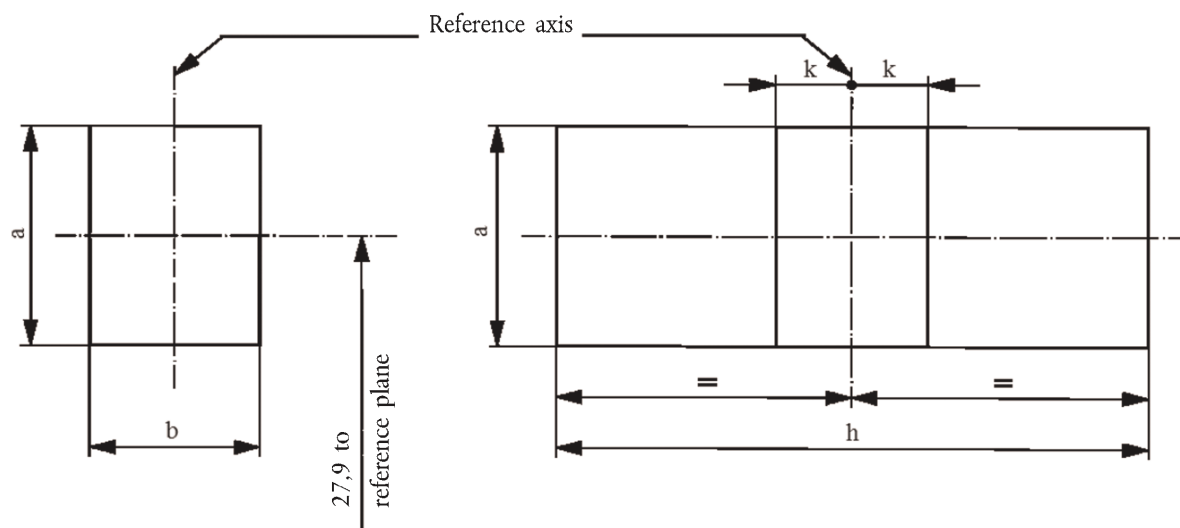
CATEGORY P27W — Sheet P27W/2

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the centres of the keys and the reference axis, whether a filament lamp complies with the requirements.

Side elevation

Front elevation



Reference	a	b	h	k
Dimension	3,5	3,0	11,9	1,0

Test procedures and requirements.

1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits. The holder is then so rotated that an end view of the filament is seen on the screen on to which the image of the filament is projected. The end view of the filament shall be obtained within the angular displacements tolerance limits.
2. Side elevation

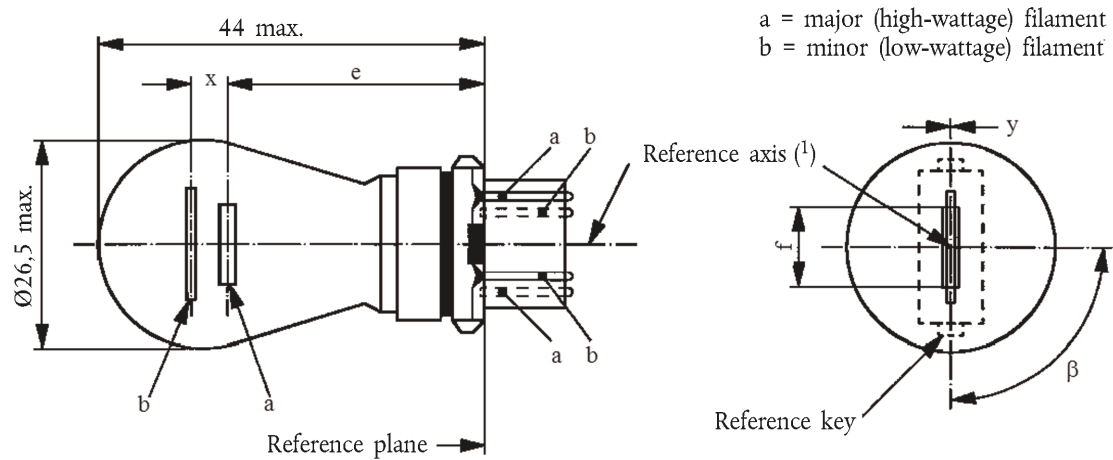
The filament lamp placed with the cap down, the reference axis vertical and the filament seen end-on, the projection of the filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament.
3. Front elevation

The filament lamp placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to the filament axis:

 - 3.1. The projection of the filament shall lie entirely within a rectangle of height 'a' and width 'h', having its centre at the theoretical position of the centre of the filament.
 - 3.2. The centre of the filament shall not be offset by more than distance 'k' from the reference axis.

CATEGORY P27/7W — Sheet P27/7W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e		27,9 ⁽³⁾		27,9 ± 0,3
f			9,9	9,9 + 0/- 2
Lateral deviation ⁽²⁾			⁽³⁾	0,0 ± 0,4
x ⁽⁴⁾		5,1 ⁽³⁾		5,1 ± 0,5
y ⁽⁴⁾		0,0 ⁽³⁾		0,0 ± 0,5
β	75° ⁽³⁾	90°	105° ⁽³⁾	90° ± 5°

Cap W2,5x16q in accordance with IEC Publication 60061 (sheet 7004-104-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS					
Rated values	Volts	12		12	
	Watts	27	7	27	7
Test voltage	Volts	13,5		13,5	
Objective values	Watts	32,1 max.	8,5 max.	32,1 max.	8,5 max.
	Luminous flux	475 ± 15 %	36 ± 15 %		

Reference luminous flux: 475 and 36 lm at approximately 13,5 V

⁽¹⁾ The reference axis is defined with respect to the reference keys and is perpendicular to the reference plane.
⁽²⁾ Maximum lateral deviation of the major (high wattage) filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis through the reference keys.
⁽³⁾ To be checked by means of a 'Box-System', sheets P27/7W/2 and 3.
⁽⁴⁾ 'x' and 'y' denote the offset of the axis of the minor (low wattage) filament with respect to the axis of the major (high wattage) filament.

CATEGORY P27/7W — Sheet P27/7W/2

Screen projection requirements

This test is used to determine, by checking whether:

- (a) The major (high wattage) filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the centres of the keys and the reference axis; and whether:
- (b) The minor (low wattage) filament is correctly positioned relative to the major (high wattage) filament, whether a filament lamp complies with the requirements.

Test procedure and requirements.

1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits. The holder is then so rotated that an end view of the major filament is seen on the screen on which the image of the filament is projected. The end view of that filament shall be obtained within the angular displacement tolerance limits.

2. Side elevation

The filament lamp placed with the cap down, the reference axis vertical, the reference key to the right and the major filament seen end-on:

- 2.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament;
- 2.2. The projection of the minor filament shall lie entirely within a rectangle of width 'c' and height 'd' having its centre at a distance 'u' above the theoretical position of the centre of the major filament.

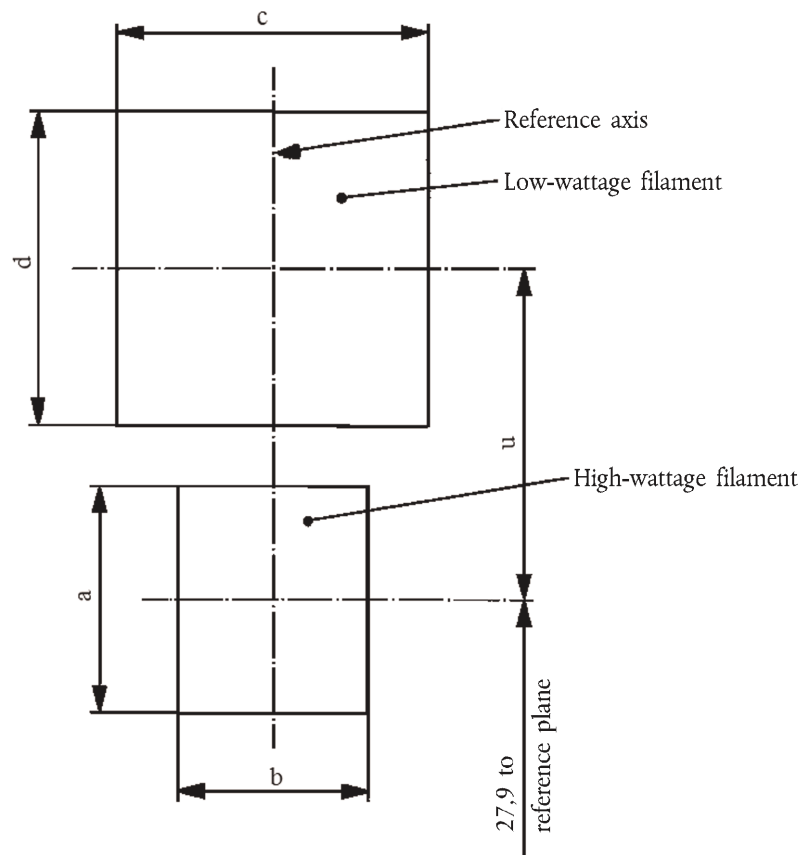
3. Front elevation

The filament lamp being placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to axis of the major filament:

- 3.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'h', centred on the theoretical position of the centre of the filament;
- 3.2. The centre of the major filament shall not be offset by more than distance 'k' from the reference axis;
- 3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ± 2 mm ($\pm 0,4$ mm for standard filament lamps).

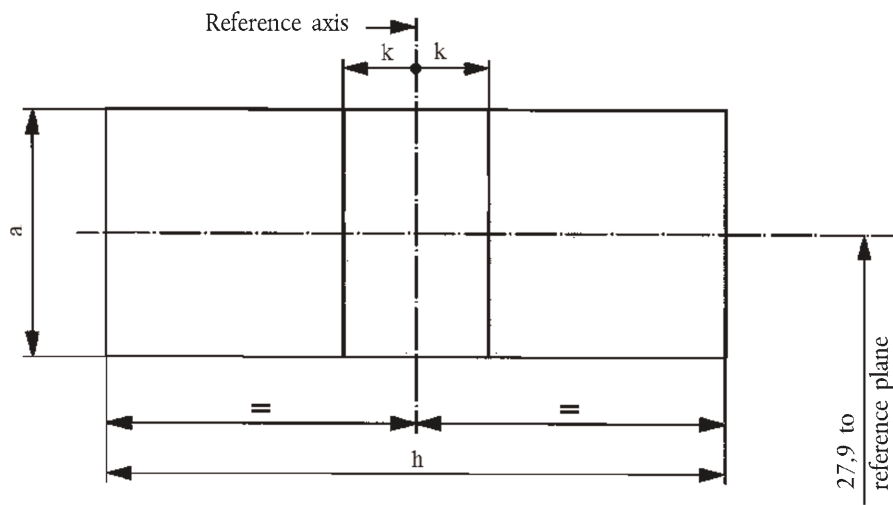
CATEGORY P27/7W — Sheet P27/7W/3

Side elevation



Reference	a	b	c	d	u
Dimension	3,5	3,0	4,8		5,1

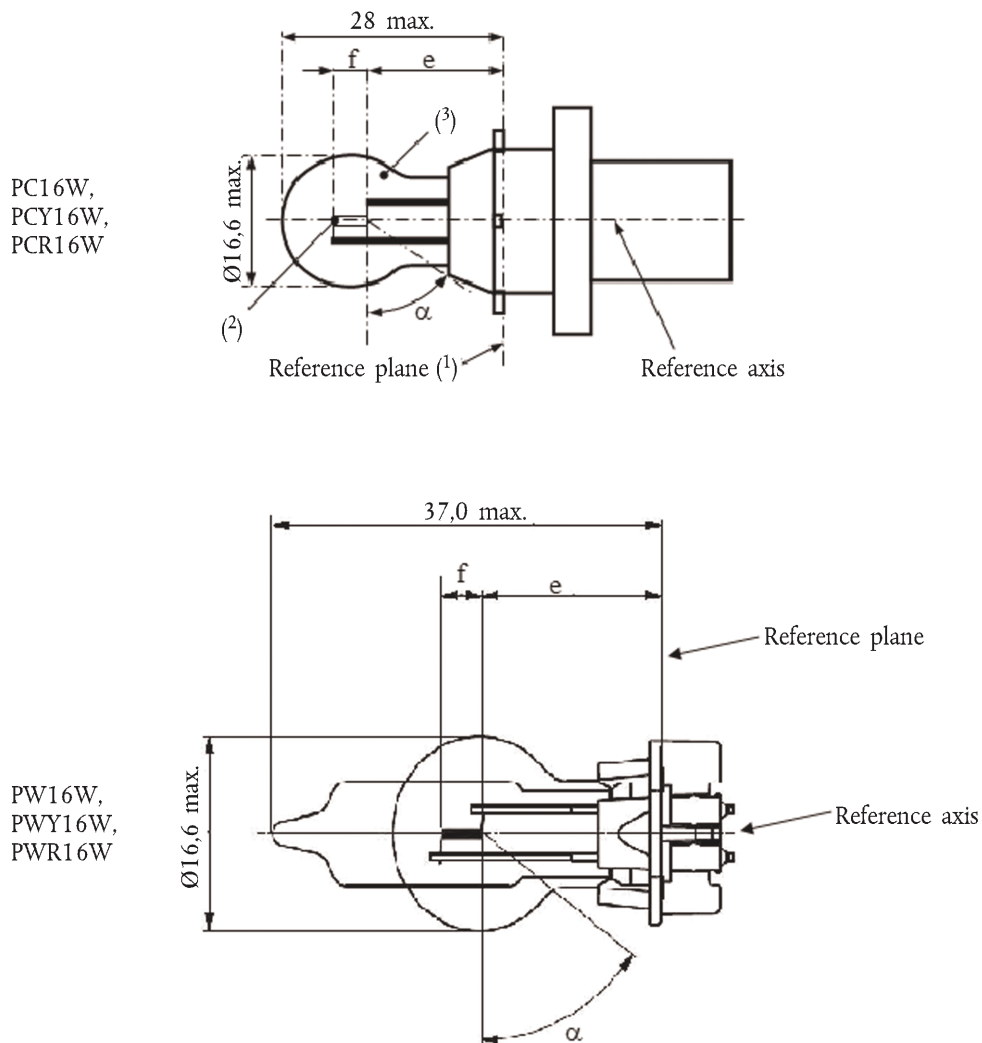
Front elevation



Reference	a	h	k
Dimension	3,5	11,9	1,0

CATEGORIES PC16W, PCY16W, PCR16W, PW16W, PWY16W AND PWR16W — Sheet PC16W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



⁽¹⁾ The reference plane is defined by the meeting points of the cap-holder fit.

⁽²⁾ No actual filament diameter restrictions apply but the objective is $d_{max} = 1,1 \text{ mm}$.

⁽³⁾ The light emitted from normal production lamps shall be white for category PC16W and PW16W; amber for category PCY16W and PWY16W; red for category PCR16W and PWR16W.

(see also footnote 7).

CATEGORIES PC16W, PCY16W, PCR16W, PW16W, PWY16W AND PWR16W — Sheet PC16W/2

Dimensions in mm			Filament lamps of normal production			Standard filament lamp
			min.	nom.	max.	(⁷)
e (⁴), (⁵)	PC16W PCY16W PCR16W			18,5		18,5
	PW16W PWY16W PWR16W			17,1		17,1
f (⁴), (⁵)				4,0		4,0 ± 0,2
α (⁶)			54°			54° min.
PC16W	Cap PU20d-1	in accordance with IEC Publication 60061 (sheet 7004-157-1)				
PCY16W	Cap PU20d-2					
PCR16W	Cap PU20d-7					
PW16W	Cap WP3.3x14.5-8	in accordance with IEC Publication 60061 (sheet 7004-164-1)				
PWY16W	Cap WP3.3x14.5-9					
PWR16W	Cap WP3.3x14.5-10					
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS						
Rated values	Volts		12			12
	Watts		16			16
Test voltage	Volts		13,5			13,5
Objective values	Watts		17 max.			17 max.
	Luminous flux	PC16W PW16W	300 ± 15 %			
		PCY16W PWY16W	180 ± 20 %			
		PCR16W PWR16W	70 ± 20 %			
Reference luminous flux at approximately				13,5 V	White: 300 lm Amber: 180 lm Red: 70 lm	

(⁴) The filament position is checked by means of a 'Box-System'; sheet PC16W/3.

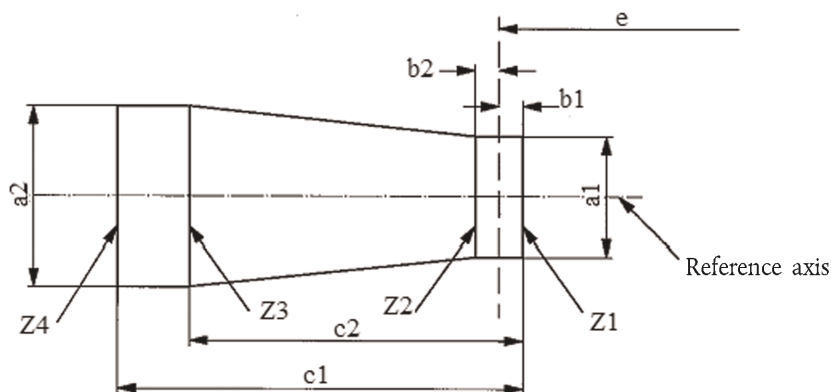
(⁵) The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires as showed in the drawing on sheet PC16W/1, the projection of the outside of the end turns crosses the filament axis.

(⁶) No part of the cap beyond the reference plane shall interfere with angle. The bulb shall be optically distortion free within the angle $2\alpha + 180^\circ$.

(⁷) The light emitted from standard filament lamps shall be white for category PC16W and PW16W; white or amber for category PCY16W and PWY16W; white or red for category PCR16W and PWR16W.

CATEGORIES PC16W, PCY16W, PCR16W, PW16W, PWY16W AND PWR16W — Sheet PC16W/3
Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



PC16W, PCY16W, PCR16W	a1	a2	b1, b2	c1	c2
Filament lamps of normal production	2,9	3,9	0,5	5,2	3,8
Standard filament lamps	1,5	1,7	0,25	4,7	3,8

PW16W, PWY16W and PWR16W	a1	a2	b1, b2	c1	c2
Filament lamps of normal production	2,5	2,5	0,4	5,2	3,8
Standard filament lamps	1,5	1,7	0,25	4,7	3,8

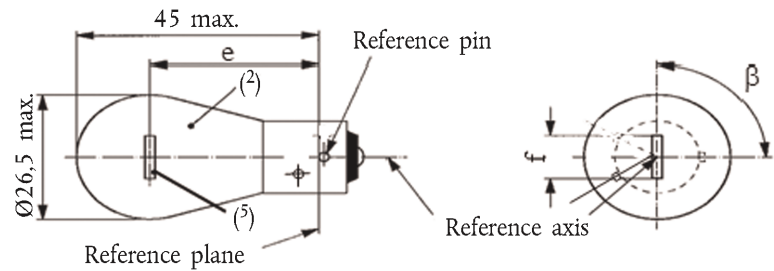
The filament position is checked in two mutually perpendicular planes, one of them being the plane through the lead-in wires.

The ends of the filament as defined on sheet PC16W/2, footnote 5, shall lie between Z1 and Z2 and between the lines Z3 and Z4.

The filament shall lie entirely within the limits shown.

CATEGORY PR21W — Sheet PR21W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm		Filament lamps of normal production			Standard filament lamp
		min.	nom.	max.	(⁴)
e	12 V		31,8 (³)		31,8 ± 0,3
	24 V	30,8	31,8	32,8	
f	12 V	5,5	6,0	7,0	6,0 ± 0,5
Lateral deviation (¹)	12 V			(³)	0,3 max
	24 V			1,5	
β		75°	90°	105°	90° ± 5°

Cap BAW15s in accordance with IEC Publication 60061 (sheet 7004-11E-1)

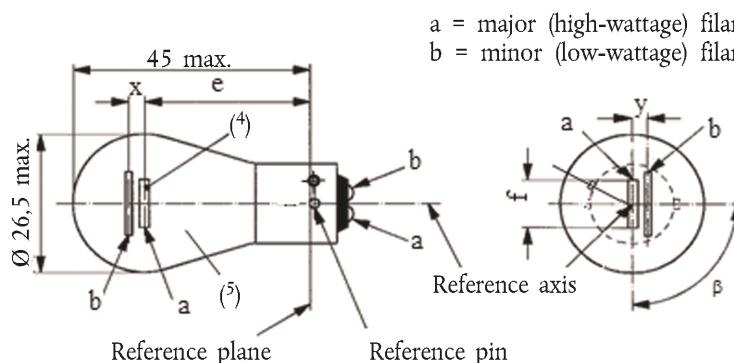
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values:	Volts	12	24	12
	Watts	21		21
Test voltage:	Volts	13,5	28,0	
Objective values:	Watts	26,5 max.	29,7 max.	26,5 max.
	Luminous flux:	110 ± 20 %		
Reference luminous flux at approximately 13,5 V:				White: 460 lm Red: 110 lm

(¹) Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the reference pin.
(²) The light emitted from normal production lamps shall be red (see also footnote 4).
(³) To be checked by means of a 'Box-System', sheet P21W/2.
(⁴) The light emitted from standard filament lamps shall be white or red.
(⁵) In this view the filament of the 24 V type may be straight or V-shaped. This shall be indicated in the application of approval. If it is straight, the screen projection requirements, sheet P21W/2, apply. If it is V-shaped, the filament ends shall be at the same distance within ± 3 mm from the reference plane.

CATEGORY PR21/4W — Sheet PR21/4W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production ⁽⁵⁾			Standard filament lamp
	min.	nom.	max.	⁽⁶⁾
e		31,8 ⁽¹⁾		31,8 ± 0,3
f			7,0	7,0 + 0/- 2
Lateral deviation			⁽¹⁾	0,3 max. ⁽²⁾
x,y	⁽¹⁾			2,8 ± 0,5
β	75° ⁽¹⁾	90° ⁽¹⁾	105° ⁽¹⁾	90° ± 5°

Cap BAU15d in accordance with IEC Publication 60061 (sheet 7004-19-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12		24 ⁽⁴⁾		12
	Watts	21	4	21	4	21/4
Test voltage	Volts	13,5		28,0		13,5
Objective values	Watts	26,5 max.	5,5 max.	29,7 max.	8,8 max.	26,5/5,5 max.
	Luminous flux	105	4	105	5	
	± %	20	25	20	25	
Reference luminous flux at approximately 13,5 V:				White: 440 lm and 15 lm		
				Red: 105 lm and 4 lm		

⁽¹⁾ These dimensions shall be checked by means of a 'Box-System' ⁽³⁾ based on the dimensions and tolerances shown above. 'x' and 'y' refer to the major (high-wattage) filament, not to the reference axis. Means of increasing the positioning accuracy of the filament and of the cap-holder assembly are under consideration.

⁽²⁾ Maximum lateral deviation of the major filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the reference pin.

⁽³⁾ The 'Box-System' is the same as for filament lamp P21/5W.

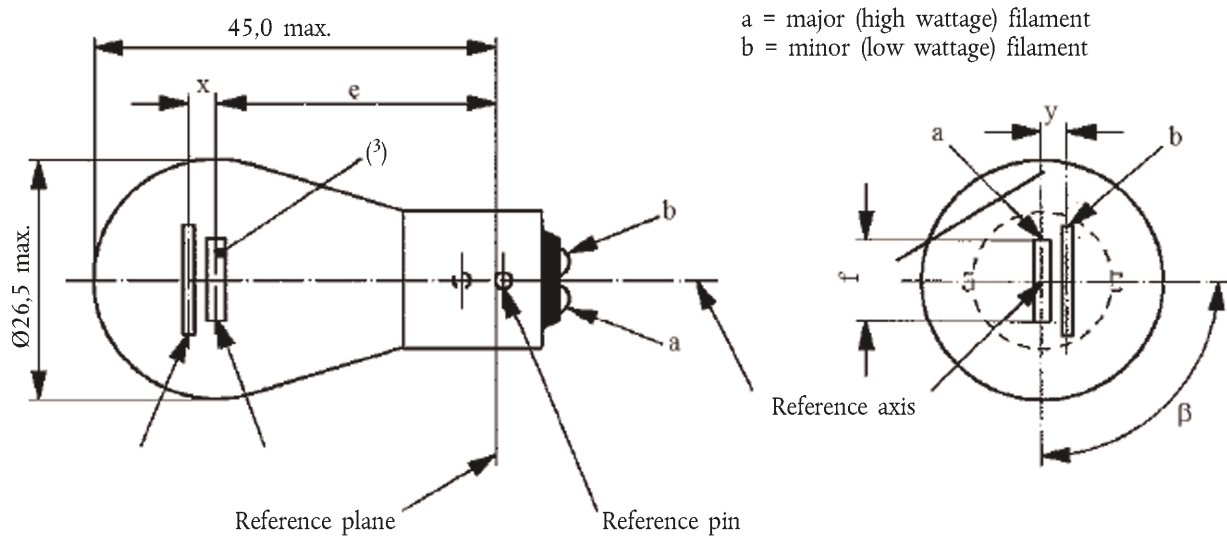
⁽⁴⁾ The 24-Volt filament lamp is not recommended for future embodiments.

⁽⁵⁾ The light emitted from normal production lamps shall be red (see also footnote 6).

⁽⁶⁾ The light emitted from standard filament lamps shall be white or red.

CATEGORY PR21/5W — Sheet PR21/5W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm		Filament lamps of normal production ⁽⁴⁾			Standard filament lamp
		min.	nom.	max.	⁽⁵⁾
e	12 V		31,8 ⁽¹⁾		31,8 ± 0,3
	24 V	30,8	31,8	32,8	
f	12 V			7,0	7,0 + 0/- 2
Lateral deviation ⁽²⁾	12 V			⁽¹⁾	0,3 max.
	24 V			1,5	
x, y	12 V		⁽¹⁾		2,8 ± 0,3
x	24 V ⁽³⁾	- 1,0	0	1,0	
y	24 V ⁽³⁾	1,8	2,8	3,8	
β		75°	90°	105°	90° ± 5°

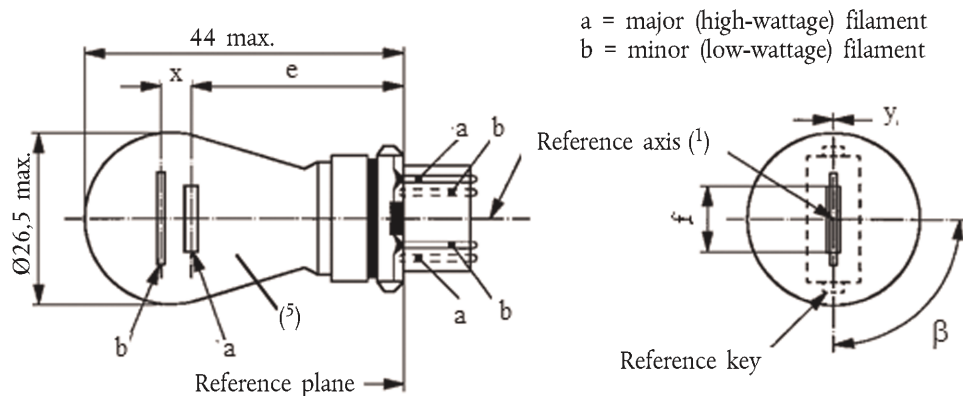
Cap BAW15d in accordance with IEC Publication 60061 (sheet 7004-11E-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS						
Rated values	Volts	12		24		12
	Watts	21	5	21	5	21/5
Test voltage	Volts	13,5		28,0		13,5
Objective values	Watts	26,5 max.	6,6 max.	29,7 max.	11,0 max.	26,5 and 6,6 max.
	Luminous flux ± %	105	8	105	10	
	± %	20	25	20	25	
Reference luminous flux at approximately 13,5 V:				White: 440 lm and 35 lm		
				Red: 105 lm and 8 lm		

⁽¹⁾ See footnote 1 on sheet P21/5W/2.
⁽²⁾ See footnote 2 on sheet P21/5W/2.
⁽³⁾ See footnote 3 on sheet P21/5W/2.
⁽⁴⁾ The light emitted from normal production lamps shall be red (see also footnote 5).
⁽⁵⁾ The light emitted from standard filament lamps shall be white or red.

CATEGORY PR27/7W — Sheet PR27/7W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	(⁶)
e		27,9 (³)		27,9 ± 0,3
f			9,9	9,9 + 0/- 2
Lateral deviation (²)			(³)	0,0 ± 0,4
x (⁴)		5,1 (³)		5,1 ± 0,5
y (⁴)		0,0 (³)		0,0 ± 0,5
β	75° (³)	90°	105° (³)	90° ± 5°

Cap WU2.5x16q in accordance with IEC Publication 60061 (sheet 7004-104D-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12		12	
	Watts	27	7	27	7
Test voltage	Volts	13,5		13,5	
Objective values	Watts	32,1 max.	8,5 max.	32,1 max.	8,5 max.
	Luminous flux	110 ± 20 %	9 ± 20 %		
Reference luminous flux at approximately 13,5 V:			White: 475 and 36 lm		
			Red: 110 and 9 lm		

(¹) The reference axis is defined with respect to the reference keys and is perpendicular to the reference plane.

(²) Maximum lateral deviation of the major (high wattage) filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis through the reference keys.

(³) To be checked by means of a 'Box-System', sheets P27/7W/2 and 3.

(⁴) 'x' and 'y' denote the offset of the axis of the minor (low wattage) filament with respect to the axis of the major (high wattage) filament.

(⁵) The light emitted from normal production lamps shall be red (see also footnote 6).

(⁶) The light emitted from standard filament lamps shall be white or red.

CATEGORY PSX26W — Sheet PSX26W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

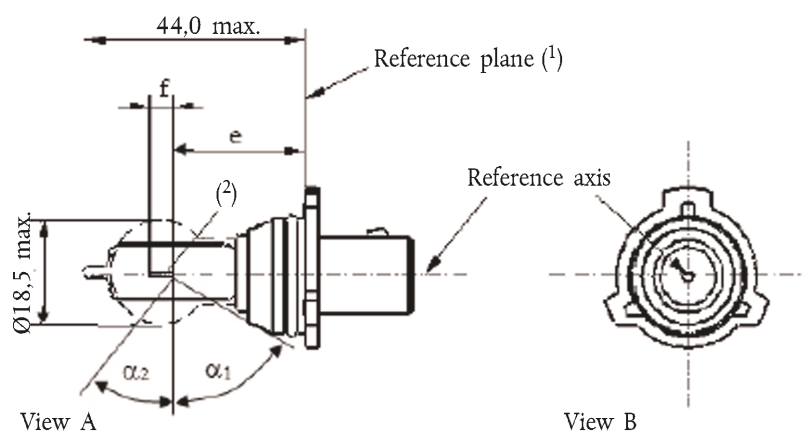


Figure 1
Main drawing

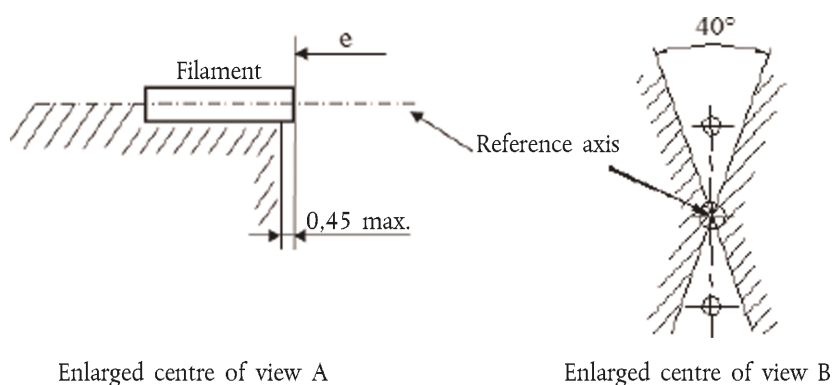


Figure 2
Metal free zone ⁽³⁾

⁽¹⁾ The reference plane is defined by the meeting points of the cap-holder fit.

⁽²⁾ No actual filament diameter restrictions apply but the objective is d max. = 1,1 mm.

⁽³⁾ No opaque parts other than filament turns shall be located in the shaded area indicated in Figure 2. This applies to the rotational body within the angles $\alpha_1 + \alpha_2$.

CATEGORY PSX26W — Sheet PSX26W/2

Dimensions in mm	Filament lamps of normal production	Standard filament lamp
e ⁽²⁾	24,0 ⁽¹⁾	24,0 ± 0,25
f ⁽²⁾	4,2 ⁽¹⁾	4,2 ± 0,25
α ₁ ⁽³⁾	35,0° min.	35,0° min.
α ₂ ⁽³⁾	58,0° min.	58,0° min.

Cap PG18.5d-3 in accordance with IEC Publication 60061 (sheet 7004-147-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Voltage	V	12	12
	Wattage	W	26	26
Test voltage		V	13,5	13,5
Objective values	Wattage	W	26 max.	26 max.
	Luminous flux	lm	500	
		±	+ 10 %/- 10 %	
Reference luminous flux at approximately 12 V				345 lm
Reference luminous flux at approximately 13,2 V				465 lm
Reference luminous flux at approximately 13,5 V				500 lm

⁽¹⁾ To be checked by means of a 'Box-System'; sheet PSX26W/3.

⁽²⁾ The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires, the projection of the outside of the end turns crosses the filament axis.

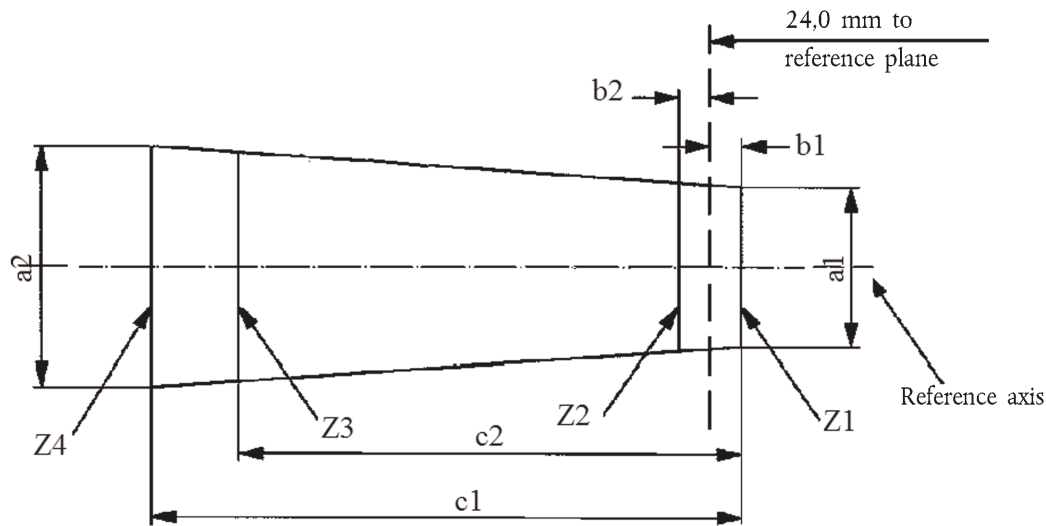
⁽³⁾ No part of the cap beyond the reference plane shall interfere with angle α₂ as shown in Figure 1 on sheet PSX26W/1. The bulb shall be optically distortion free within the angles α₁ + α₂.

These requirements apply to the whole bulb circumference.

CATEGORY PSX26W — Sheet PSX26W/3

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane, whether a filament lamp complies with the requirements.



	a1	a2	b1,b2	c1	c2
Filament lamps of normal production	1,7	1,7	0,30	5,0	4,0
Standard filament lamps	1,5	1,5	0,25	4,7	4,0

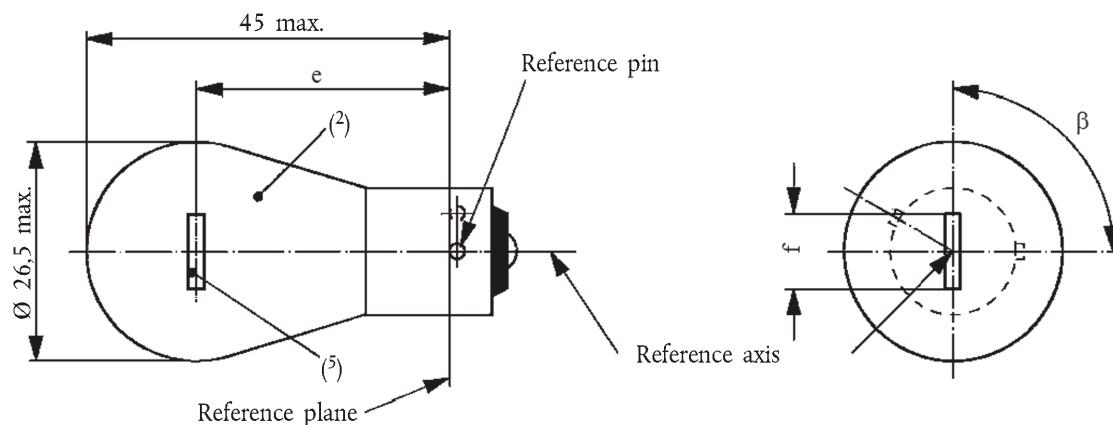
The filament position is checked in two mutually perpendicular planes, one of them being the plane through the lead-in wires.

The ends of the filament as defined on sheet PSX26W/2, footnote 4, shall lie between Z1 and Z2 and between the lines Z3 and Z4.

The filament shall lie entirely within the limits shown.

CATEGORY PY21W — Sheet PY21W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm		Filament lamps of normal production			Standard filament lamp
		min.	nom.	max.	(⁴)
e	12 V		31,8 (³)		31,8 ± 0,3
	24 V	30,8	31,8	32,8	
f	12 V			7,0	7,0 + 0/- 2
Lateral deviation (¹)	12 V			(³)	0,3 max.
	24 V			1,5	
β		75°	90°	105°	90° ± 5°

Cap BAU15s in accordance with IEC Publication 60061 (sheet 7004-19-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	24	12
	Watts	21		21
Test voltage	Volts	13,5	28,0	13,5
Objective values	Watts	26,5 max.	29,7 max.	26,5 max.
	Luminous flux	280 ± 20 %		
Reference luminous flux at approximately 13,5 V:				White: 460 lm Amber: 280 lm

(¹) Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the reference pin.

(²) The light emitted from production lamps shall be amber (see also footnote 4).

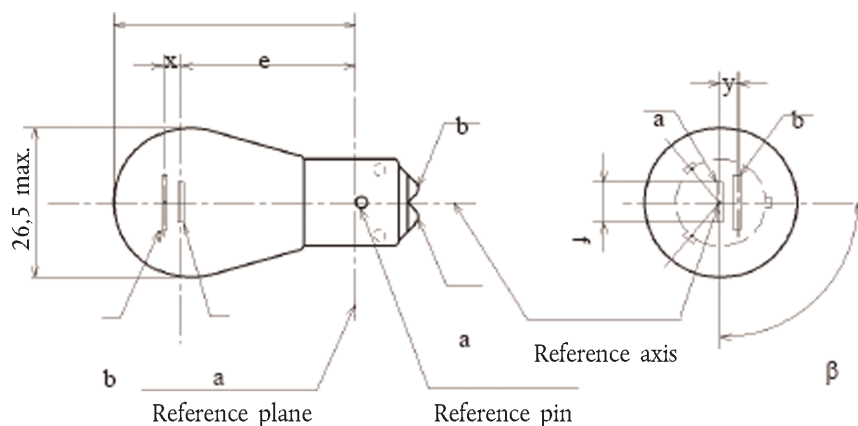
(³) To be checked by means of a 'Box-System'; sheet P21W/2.

(⁴) The light emitted from standard filament lamps shall be amber or white.

(⁵) In this view the filament of the 24 V type may be straight or V-shaped. This shall be indicated in the application of approval. If it is straight, the screen projection requirements, sheet P21W/2, apply. If it is V-shaped, the filament ends shall be at the same distance within ± 3 mm from the reference plane.

CATEGORY PY21/5W — Sheet PY21/5W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production ⁽³⁾			Standard filament lamp
	min.	nom.	max.	⁽⁴⁾
e		28,6 ⁽¹⁾		28,6 ± 0,3
f			7,0	7,0 + 0/- 2
Lateral deviation ⁽²⁾			⁽¹⁾	0,3 max.
x, y		⁽¹⁾		2,8 ± 0,3
β	75°	90°	105°	90° ± 5°

Cap BA15d-3 (100°/130°) in accordance with IEC Publication 60061 (sheet 7004-173-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12		12
	Watts	21	5	21/5
Test voltage	Volts	13,5		13,5
Objective values	Watts	26,5 max.	6,6 max.	26,5 and 6,6 max.
	Luminous flux	270	21	
	± %	20	20	
Reference luminous flux at approximately 13,5 V				White: 440 lm and 35 lm Amber: 270 lm and 21 lm

⁽¹⁾ These dimensions shall be checked by means of a 'box-system'. See sheets PY21/5W/2 and PY21/5W/3. 'x' and 'y' refer to the major (high-wattage) filament, not to the reference axis.

⁽²⁾ Maximum lateral deviation of the major (high wattage) filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the reference pin.

⁽³⁾ The light emitted from normal production lamps shall be amber (see also note 4).

⁽⁴⁾ The light emitted from standard filament lamps shall be white or amber.

CATEGORY PY21/5W — Sheet PY21/5W/2

Screen projection requirements

This test is used to determine, by checking whether:

- (a) The major (high wattage) filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the centres of the pins and the reference axis; and whether
- (b) The minor (low wattage) filament is correctly positioned relative to the major (high wattage) filament, whether a filament lamp complies with the requirements.

Test procedure and requirements

1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits. (i.e. 15°). The holder is then so rotated that an end view of the major filament is seen on the screen on which the image of the filament is projected. The end view of that filament shall be obtained within the angular displacement tolerance limits.
2. Side elevation

The filament lamp placed with the cap down, the reference axis vertical, the reference pin to the right and the major filament seen end-on:

 - 2.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament;
 - 2.2. The projection of the minor filament shall lie entirely:
 - 2.2.1. within a rectangle of width 'c' and height 'd' having its centre at a distance 'v' to the right of and at a distance 'u' above the theoretical position of the centre of the major filament;
 - 2.2.2. Above a straight line tangential to the upper edge of the projection of the major filament and rising from left to right at an angle of 25° .
 - 2.2.3. To the right of the projection of the major filament
3. Front elevation

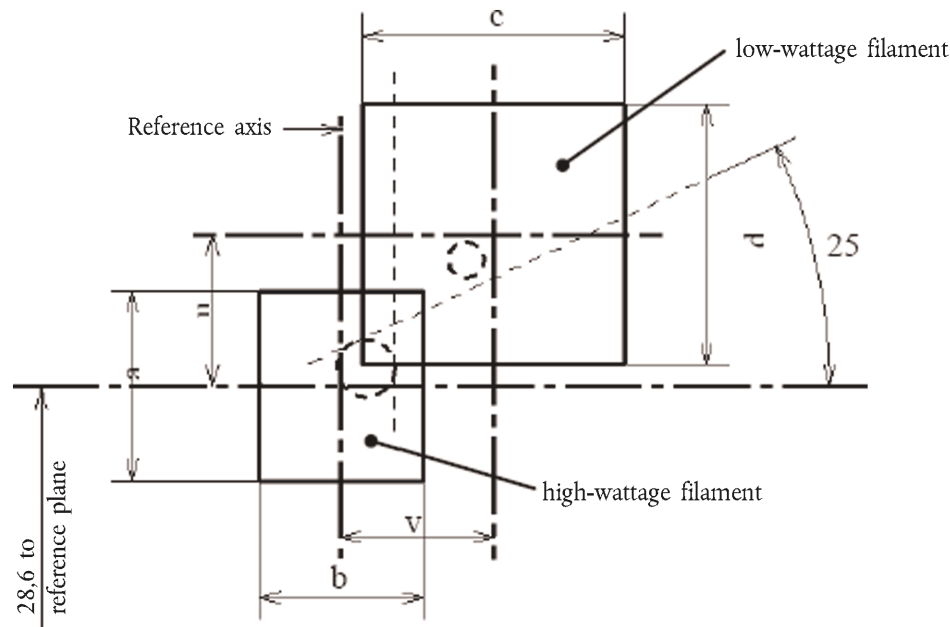
The filament lamp being placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to axis of the major filament:

 - 3.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'h', centred on the theoretical position of the centre of the filament;
 - 3.2. The centre of the major filament shall not be offset by more than distance 'k' from the reference axis.
 - 3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ± 2 mm ($\pm 0,4$ mm for standard filament lamps).

CATEGORY PY21/5W — Sheet PY21/5W/3

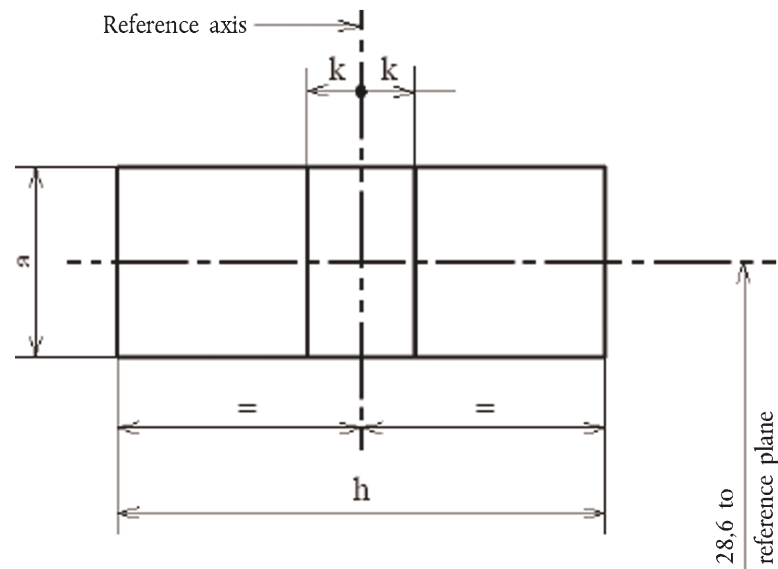
Dimensions in mm

Side elevation



Reference	a	b	c	d	u	v
Dimensions	3,5	3,0	4,8		2,8	

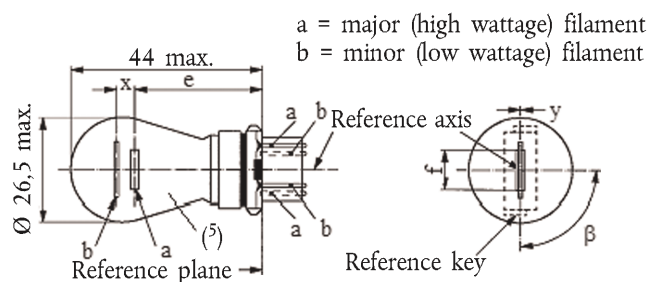
Front elevation



Reference	a	h	k
Dimensions	3,5	9,0	1,0

CATEGORY PY27/7W — Sheet PY27/7W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	(⁶)
e		27,9 (³)		27,9 ± 0,3
f			9,9	9,9 + 0/- 2
Lateral deviation (²)			(³)	0,0 ± 0,4
x (⁴)		5,1 (³)		5,1 ± 0,5
y (⁴)		0,0 (³)		0,0 ± 0,5
β	75° (³)	90°	105° (³)	90° ± 5°

Cap WX2.5x16q in accordance with IEC Publication 60061 (sheet 7004-104A-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12		12	
	Watts	27	7	27	7
Test voltage	Volts	13,5		13,5	
Objective values	Watts	32,1 max.	8,5 max.	32,1 max.	8,5 max.
	Luminous flux	280 ± 15 %	21 ± 15 %		

Reference luminous flux at approximately 13,5 V:

White: 475 and 36 lm

Amber: 280 and 21 lm

(¹) The reference axis is defined with respect to the reference keys and is perpendicular to the reference plane.

(²) Maximum lateral deviation of the major (high wattage) filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis through the reference keys.

(³) To be checked by means of a 'Box-System', sheets P27/7W/2 and 3.

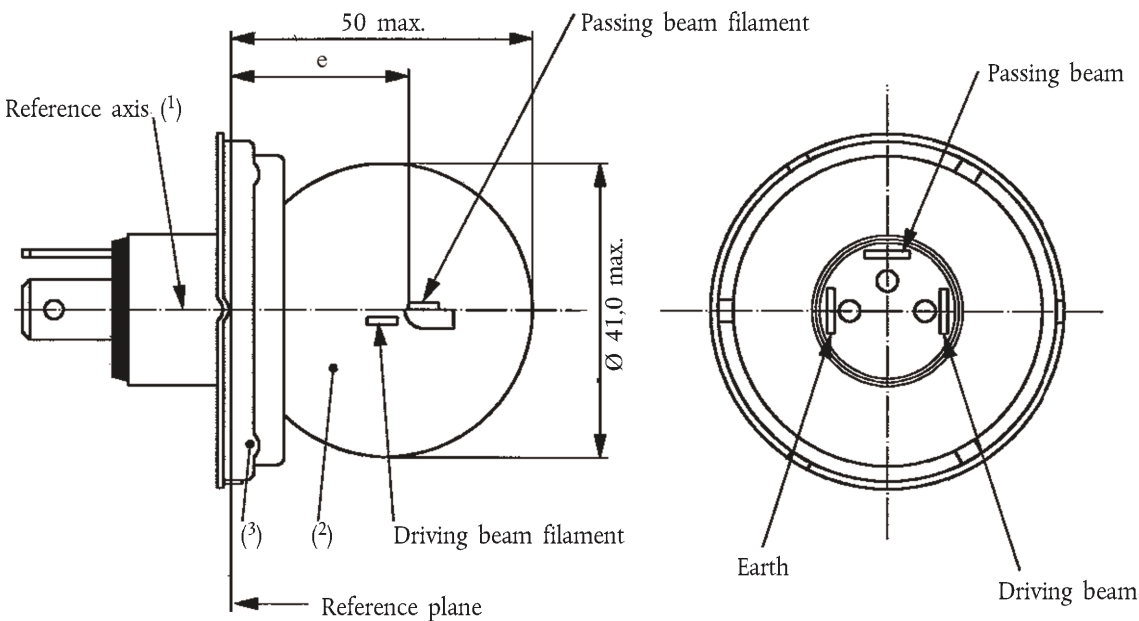
(⁴) 'x' and 'y' denote the offset of the axis of the minor (low wattage) filament with respect to the axis of the major (high wattage) filament.

(⁵) The light emitted from filament lamps of normal production shall be amber (see also footnote 6).

(⁶) The light emitted from standard filament lamps shall be amber or white.

CATEGORY R2 — Sheet R2/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS									
		Filament lamps of normal production						Standard filament lamp	
Rated values	Volts	6 ⁽⁴⁾		12 ⁽⁴⁾		24 ⁽⁴⁾		12 ⁽⁴⁾	
	Watts	45	40	45	40	55	50	45	40
Test voltage	Volts	6,3		13,2		28,0		13,2	
Objective values	Watts	53 max.	47 max.	57 max.	51 max.	76 max.	69 max.	52 + 0 % - 10 %	46 ± 5 %
	Luminous flux	720 min.	570 ± 15 %	860 min.	675 ± 15 %	1 000 m-in.	860 ± 15 %		
Measuring flux ⁽⁵⁾		—	450	—	450	—	450		
Reference luminous flux at approximately 12 V								700	450

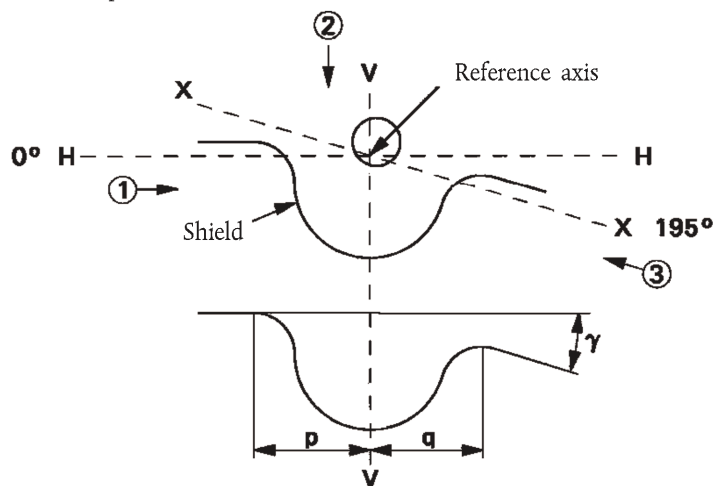
(1) The reference axis is perpendicular to the reference plane and passes through the centre of the 45 mm cap diameter.
(2) The colour of the light emitted shall be white or selective-yellow.
(3) No part of the cap shall, by reflection of light emitted by the passing beam filament, throw any stray rising ray when the filament lamp is in the normal operating position on the vehicle.
(4) The values indicated on the left and on the right refer to the driving beam filament and the passing beam filament respectively.
(5) Measuring luminous flux for measurements according to paragraph 3.9. of this Regulation.

CATEGORY R2 — Sheet R2/2

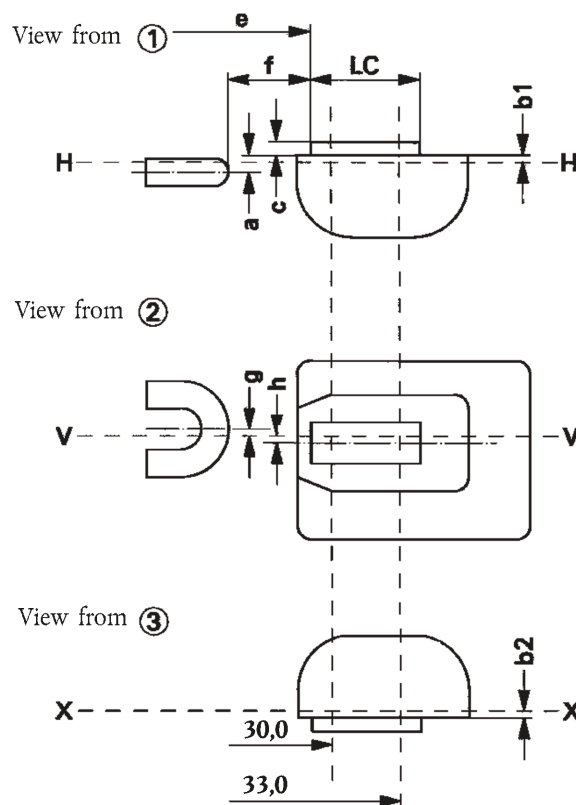
Position and dimensions (in mm) of shield and filaments

The drawings are not mandatory with respect to the design of the shield and filaments

Top view



Reference plane



CATEGORY R2 — Sheet R2/3

Filaments and shield position and dimensions ⁽¹⁾				
Dimensions in mm			Tolerance	
			Filament lamps of normal production	Standard filament lamp
			6 V 12 V 24 V	12 V
a		0,60	± 0,35	± 0,15
b1/30,0 ⁽²⁾ b1/33,0		0,20 b1/30,0 mv ⁽³⁾	± 0,35	± 0,15
b2/30,0 ⁽²⁾ b2/33,0		0,20 b2/30,0 mv ⁽³⁾	± 0,35	± 0,15
c/30,0 ⁽²⁾ c/33,0		0,50 c/30,0 mv ⁽³⁾	± 0,30	± 0,15
e	6, 12 V 24 V	28,5 28,8	± 0,35	± 0,15
f	6, 12 V 24 V	1,8 2,2	± 0,40	± 0,20
g		0	± 0,50	± 0,30
h/30,0 ⁽²⁾ h/33,0		0 h/30,0 mv ⁽³⁾	± 0,50	± 0,30
1/2(p-q)		0	± 0,60	± 0,30
I _C		5,5	± 1,50	± 0,50
γ ⁽⁴⁾		15° nom.		

Cap P45t-41 in accordance with IEC Publication 60061 (sheet 7004-95-5)

⁽¹⁾ The position and dimensions of the shield and filaments shall be checked by means of the method of measurement as described in IEC Publication 60809.

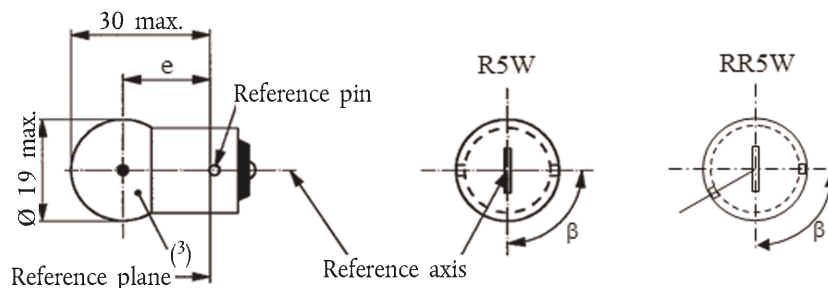
⁽²⁾ To be measured at the distance from the reference plane indicated in millimetres behind the stroke.

⁽³⁾ mv = measured value.

⁽⁴⁾ The angle is only for shield design and has not to be checked on finished filament lamps.

CATEGORY R5W AND RR5W — Sheet R5W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	(⁴)
e	17,5	19,0	20,5	19,0 ± 0,3
Lateral deviation (²)			1,5	0,3 max.
β	60°	90°	120°	90° ± 5°
Cap: R5W: BA15s in accordance with IEC Publication 60061 (sheet 7004-11A-9) (⁵) RR5W: BAW15s (sheet 7004-11E-1)				

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values		Volts	6 (⁵)	12	24	12
		Watts	5			5
Test voltage		Volts	6,75	13,5	28,0	13,5
Objective values	Watts		5,5 max.		7,7 max.	5,5 max.
	Luminous flux	R5W	50 ± 20 %			
		RR5W	(⁵)	12 ± 25 %		
Reference luminous flux at approximately 13,5 V:						White: 50 lm Red: 12 lm

(¹) Filament lamps with cap BA15d may be used for special purposes; they have the same dimensions.

(²) Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the reference pin.

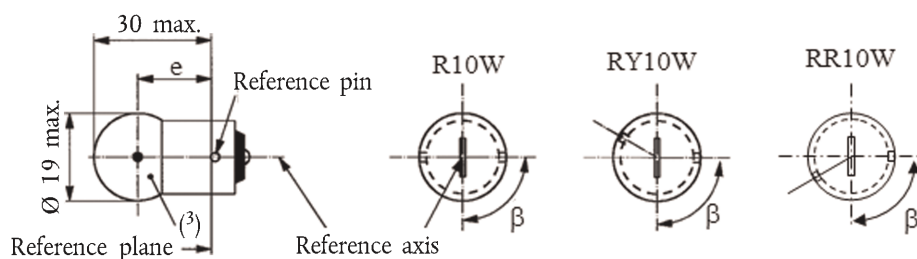
(³) The light emitted from filament lamps of normal production shall be white for category R5W and red for category RR5W (see also footnote 4).

(⁴) The light emitted from standard filament lamps shall be white for category R5W; white or red for category RR5W.

(⁵) Within RR5W no 6 V rated voltage type specified.

CATEGORIES R10W, RY10W AND RR10W — Sheet R10W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	(⁴)
e	17,5	19,0	20,5	19,0 ± 0,3
Lateral deviation (²)			1,5	0,3 max.
β	60°	90°	120°	90° ± 5°
Cap:	R10W: BA15s RY10W: BAU15s RR10W: BAW15s			in accordance with IEC Publication 60061 (sheet 7004-11A-9) (⁵) (sheet 7004-19-2) (sheet 7004-11E-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values		Volts	6 (⁵)	12	24	12
		Watts	10			10
Test voltage		Volts	6,75	13,5	28	13,5
Objective values	Watts	R10W RY10W	11 max.		14 max.	11 max.
		RR10W	(⁵)	11 max.		11 max.
	Luminous flux	R10W	125 ± 20 %			
		RY10W	75 ± 20 %			
		RR10W	(⁵)	30 ± 25 %		
	Reference luminous flux at approximately 13,5 V:					White: 125 lm Amber: 75 lm Red: 30 lm

(¹) Filament lamps R10W with cap BA15d may be used for special purposes; they have the same dimensions.

(²) Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the reference pin.

(³) The light emitted from filament lamps of normal production shall be white for category R10W, amber for category RY10W and red for category RR10W (see also footnote 4)

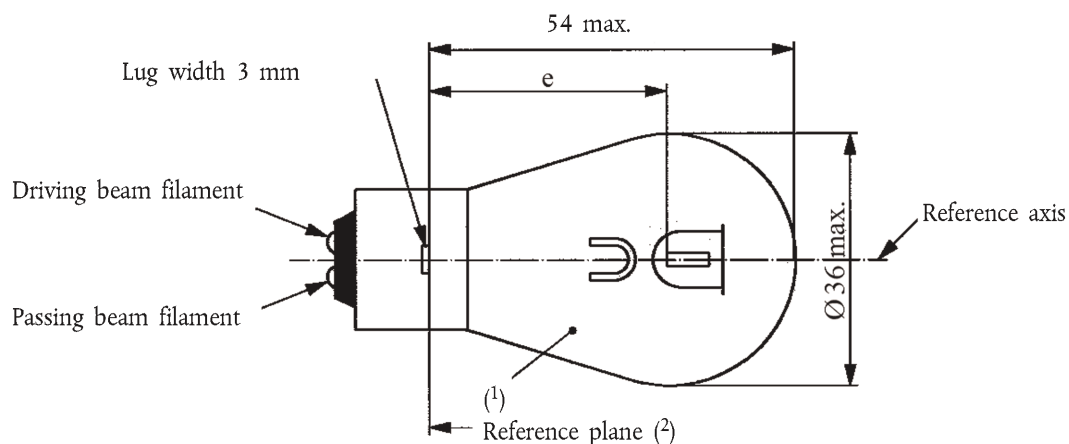
(⁴) The light emitted from standard filament lamps shall be white for category R10W; white or amber for category RY10W; white or red for category RR10W.

(⁵) Within RR10W no 6 V rated voltage type specified.

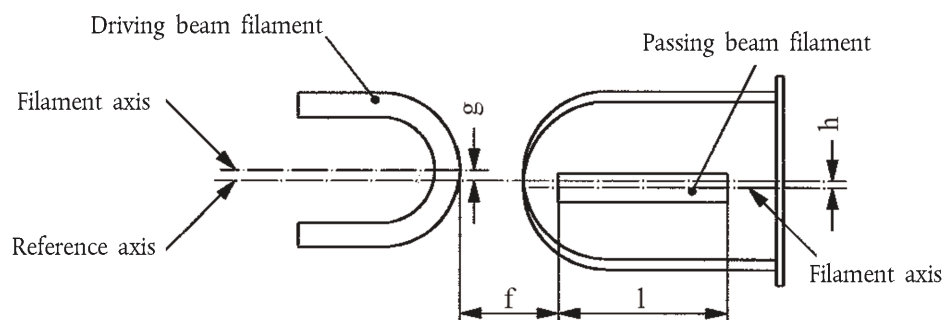
CATEGORIES S1 AND S2 — Sheet S1/S2/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.

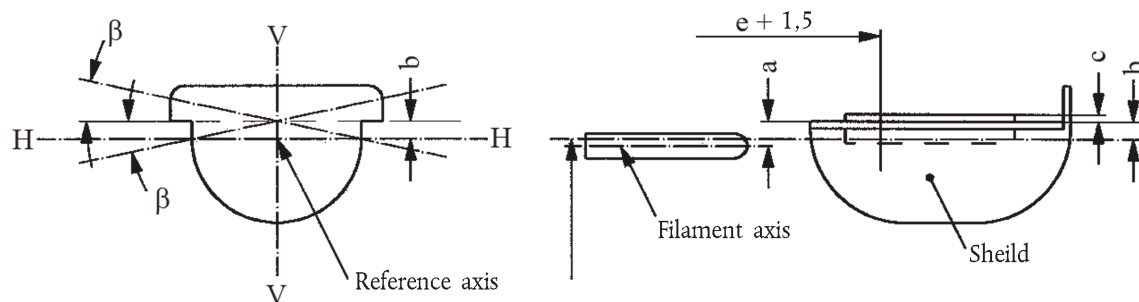
Filament lamps for motorcycles



Position and Dimensions of filaments



Position of shield (3), (4)



(1) The colour of the light emitted shall be white or selective-yellow.

(2) The reference plane is perpendicular to the reference axis and touches the upper surface of the lug having a width of 4,5 mm.

(3) Plane V-V contains the reference axis and the centre line of the lugs.

(4) Plane H-H (the normal position of the shield) is perpendicular to plane V-V and contains the reference axis.

CATEGORIES S1 AND S2 — Sheet S1/S2/2

Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e	32,35	32,70	33,05	32,7 ± 0,15
f	1,4	1,8	2,2	1,8 ± 0,2
l	4,0	5,5	7,0	5,5 ± 0,5
c ⁽⁵⁾	– 0,2	0,5	0,8	0,5 ± 0,15
b ⁽⁵⁾	– 0,15	0,2	0,55	0,2 ± 0,15
a ⁽⁵⁾	0,25	0,6	0,95	0,6 ± 0,15
h	– 0,5	0	0,5	0 ± 0,2
g	– 0,5	0	0,5	0 ± 0,2
β ⁽⁵⁾ , ⁽⁶⁾	– 2°30'	0°	+ 2°30'	0° ± 1°

Cap BA20d in accordance with IEC Publication 60061 (sheet 7004-12-7)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	S1	6 (7)		12 (7)		6	
		S2					12	
	Watts	S1	25	25	25	25	25	25
		S2	35	35	35	35	35	35
Test voltage	Volts	S1	6,75		13,5		6,75	
		S2	6,3		13,5		13,5	
Objective values	Watts	S1	25 ± 5 %	25 ± 5 %	25 ± 5 %	25 ± 5 %	25 ± 5 %	25 ± 5 %
		S2	35 ± 5 %	35 ± 5 %	35 ± 5 %	35 ± 5 %	35 ± 5 %	35 ± 5 %
	Luminous flux	S1	435 ± 20 %	315 ± 20 %	435 ± 20 %	315 ± 20 %		
		S2	650 ± 20 %	465 ± 20 %	650 ± 20 %	465 ± 20 %		
Reference luminous flux		S1	at approximately			6 V	398	284
		S2	at approximately			12 V	568	426
						13,2 V	634	457
						13,5 V	650	465

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

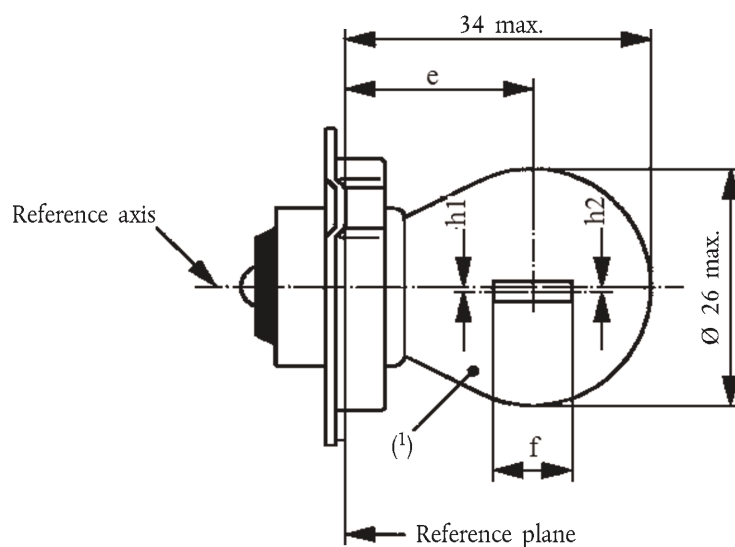
⁽⁶⁾ Admissible angular deviation of the shield plane position from the normal position.

⁽⁷⁾ Values in the left-hand column refer to the driving beam filament. Values in the right-hand column to the passing beam filament.

CATEGORY S3 — Sheet S3/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

Filament lamp for mopeds



Dimensions in mm		Filament lamps of normal production			Standard filament lamp
		min.	nom.	max.	
e ⁽²⁾		19,0	19,5	20,0	19,5 ± 0,25
f	6 V			3,0	2,5 ± 0,5
	12 V			4,0	
h1, h2 ⁽³⁾		- 0,5	0	0,5	0 ± 0,3

Cap P26s in accordance with IEC Publication 60061 (sheet 7004-36-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	6	12	6
	Watts	15		15
Test voltage	Volts	6,75	13,5	6,75
Objective values	Watts	15 ± 6 %		15 ± 6 %
	Luminous flux	240 ± 15 %		

Reference luminous flux: 240 lm at approximately 6,75 V

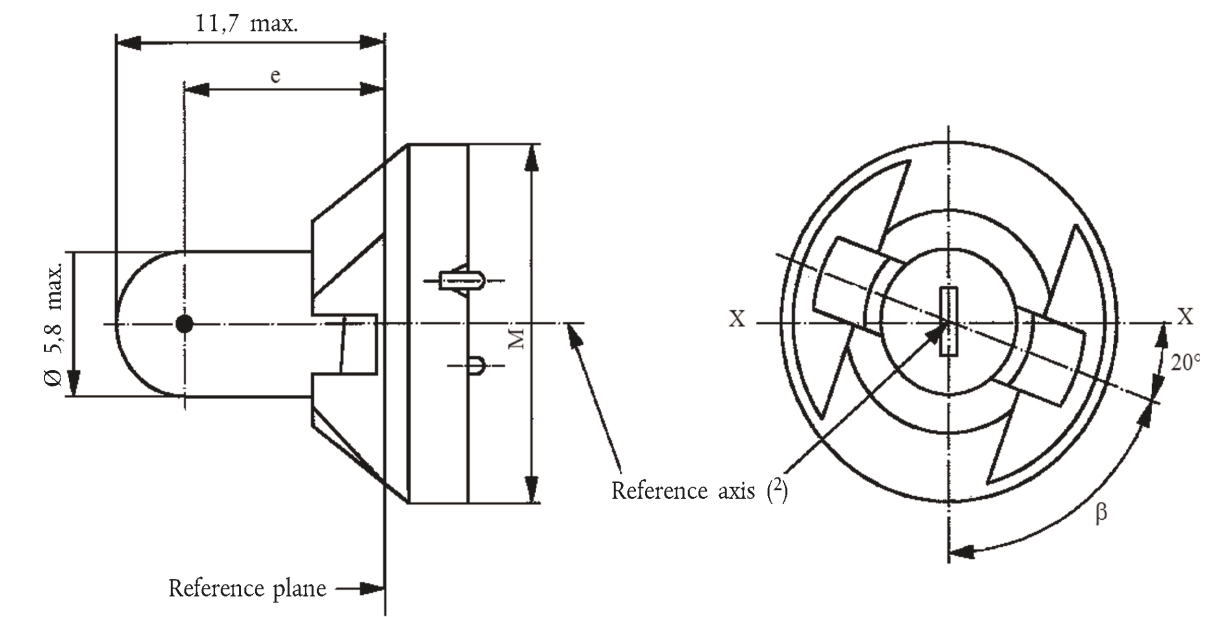
⁽¹⁾ The colour of the light emitted shall be white or selective-yellow.

⁽²⁾ Distance related to the luminous centre.

⁽³⁾ Lateral deviation of filament axis with respect to the reference axis. It is sufficient to check this deviation in two mutually perpendicular planes.

CATEGORY T1.4W — Sheet T1.4W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e	7,6	8,3	9,0	8,3 ± 0,35
Lateral deviation (1)			0,7	0,35 max
β	55°	70°	85°	70° ± 5°

Cap P11.5d in accordance with IEC Publication 60061 (sheet 7004-79-1)

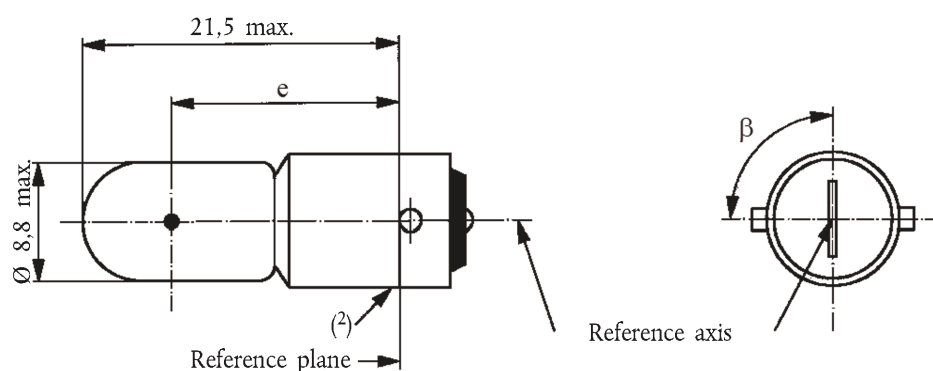
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS			
Rated values	Volts	12	12
	Watts	1,4	1,4
Test voltage	Volts	13,5	13,5
Objective values	Watts	1,54 max.	1,54 max.
	Luminous flux	8 ± 15 %	

Reference luminous flux: 8 lm at approximately 13,5 V

(1) Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.
(2) The reference axis is perpendicular to the reference plane and passes through the centre of the circle of diameter 'M'.

CATEGORY T4W — Sheet T4W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e	13,5	15,0	16,5	$15,0 \pm 0,3$
Lateral deviation ⁽¹⁾			1,5	0,5 max
β		90°		$90^\circ \pm 5^\circ$

Cap BA9s in accordance with IEC Publication 60061 (sheet 7004-14-9)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	6	12	24	12
	Watts	4			4
Test voltage	Volts	6,75	13,5	28,0	13,5
Objective values	Watts	4,4 max.		5,5 max.	4,4 max.
	Luminous flux	$35 \pm 20 \%$			

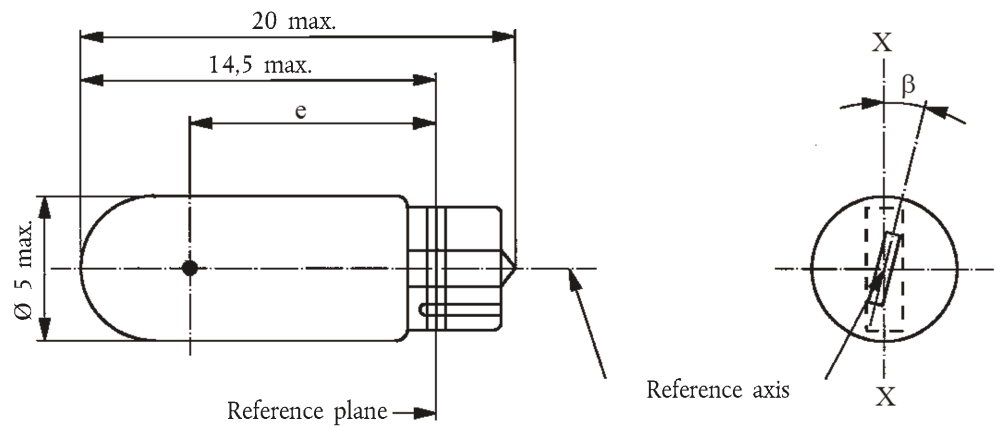
Reference luminous flux: 35 lm at approximately 13,5 V

⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of pins.

⁽²⁾ Over the entire length of the cap there shall be no projections or soldering extending beyond the permissible maximum diameter of the cap.

CATEGORY W2.3W — Sheet W2.3W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e	10,3	10,8	11,3	10,8 ± 0,3
Lateral deviation ⁽¹⁾			1,0	0,5 max
β	- 15°	0°	+ 15°	0° ± 5°

Cap W2x4.6d in accordance with IEC Publication 60061 (sheet 7004-94-2)

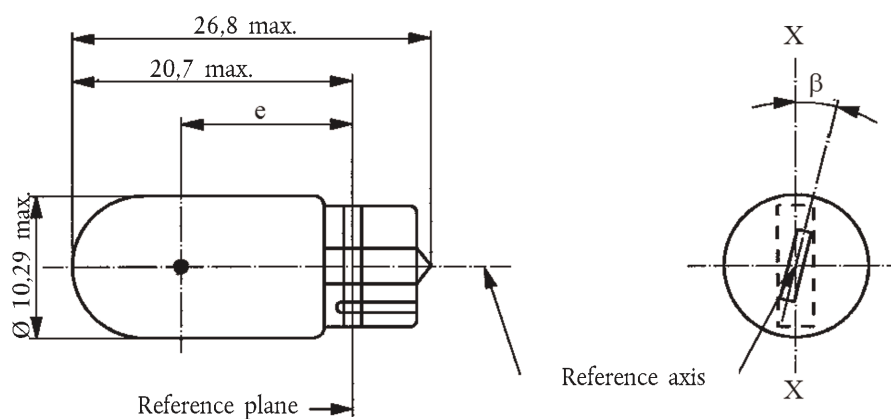
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS			
Rated values	Volts	12	12
	Watts	2,3	2,3
Test voltage	Volts	13,5	13,5
Objective values	Watts	2,5 max.	2,5 max.
	Luminous flux	18,6 ± 20 %	

Reference luminous flux: 18,6 lm at approximately 13,5 V

⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

CATEGORY W3W — Sheet W3W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e	11,2	12,7	14,2	$12,7 \pm 0,3$
Lateral deviation ⁽¹⁾			1,5	0,5 max
β	- 15°	0°	+ 15°	$0^\circ \pm 5^\circ$

Cap W2.1x9.5d in accordance with IEC Publication 60061 (sheet 7004-91-3)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

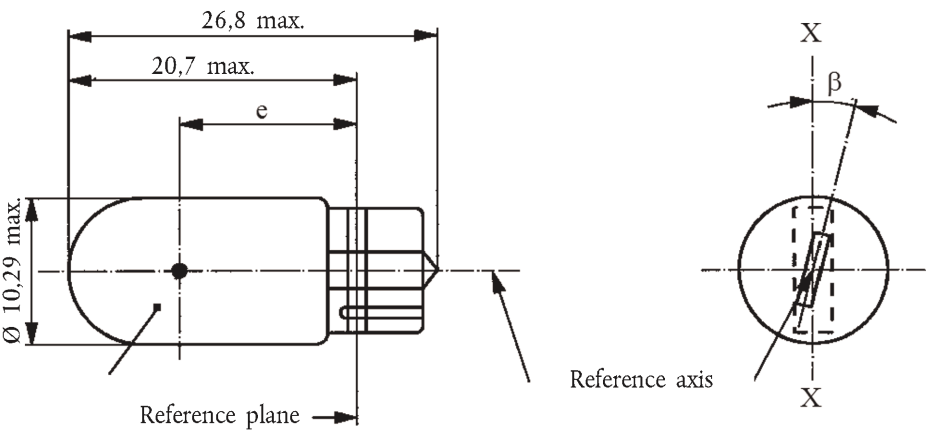
Rated values	Volts	6	12	24	12
	Watts	3			3
Test voltage	Volts	6,75	13,5	28,0	13,5
Objective values	Watts	3,45 max.		4,6 max.	3,45 max.
	Luminous flux	$22 \pm 30 \%$			

Reference luminous flux: 22 lm at approximately 13,5 V

⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

CATEGORY W5W, WY5W AND WR5W — Sheet W5W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	(³)
e	11,2	12,7	14,2	12,7 ± 0,3
Lateral deviation (¹)			1,5	0,5 max.
β	– 15°	0°	+ 15°	0° ± 5°

Cap W2.1x9.5d in accordance with IEC Publication 60061 (sheet 7004-91-3)

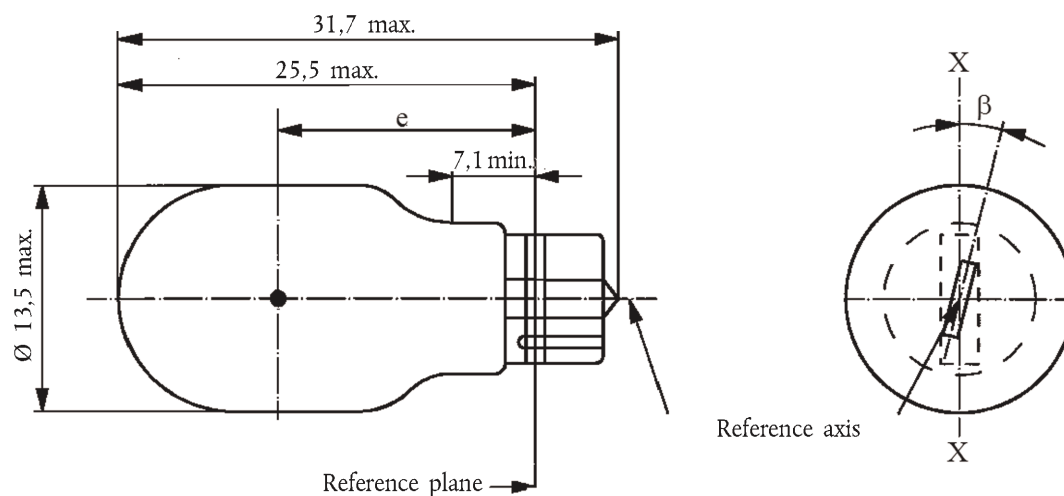
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS					
Rated values	Volts	6 (⁴)	12	24	12
	Watts	5			5
Test voltage	Volts	6,75	13,5	28,0	13,5
Objective values	Watts	5,5 max.		7,7 max.	5,5 max.
	Luminous flux	W5W	50 ± 20 %		
		WY5W	30 ± 20 %		
		WR5W	(⁴)	12 ± 25 %	

Reference luminous flux at approximately 13,5 V:					White: 50 lm
					Amber: 30 lm
					Red: 12 lm

(¹) Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.
(²) The light emitted from filament lamps of normal production shall be white for category W5W, amber for category WY5W and red for category WR5W (see also footnote 3).
(³) The light emitted from standard filament lamps shall be white for category W5W; white or amber for category WY5W; white or red for category WR5W.
(⁴) Within WR5W no 6 V rated voltage type specified.

CATEGORIES W10W AND WY10W — Sheet W10W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e	15,5	17,0	18,5	17,0 ± 0,3
Lateral deviation ⁽¹⁾			1,0	0,5 max.
β	- 15°	0°	+ 15°	0° ± 5°

Cap W2.1x9.5d in accordance with IEC Publication 60061 (sheet 7004-91-3)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts		6	12	12
	Watts		10		10
Test voltage	Volts		6,75	13,5	13,5
Objective values	Watts		11 max.		11 max.
	Luminous flux	White	125 ± 20 %		
		Amber	75 ± 20 %		

Reference luminous flux at approximately 13,5 V:

White: 125 lm
Amber: 75 lm

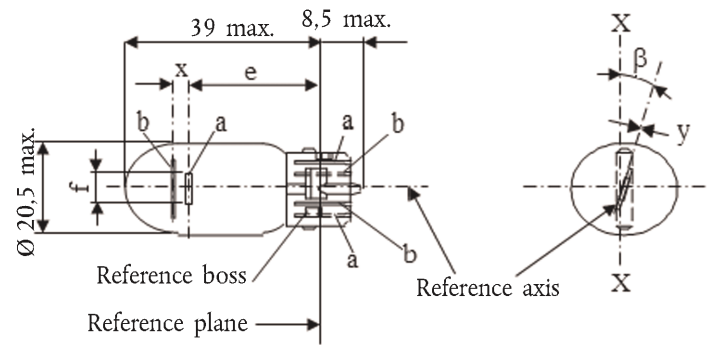
⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

CATEGORY W15/5W — Sheet W15/5W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

Filament lamp for motorcycles

a = major (high wattage) filament
b = minor (low wattage) filament



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e		25,0 ⁽¹⁾		25,0 ± 0,3
f			7,5	7,5 + 0/- 2
Lateral deviation ⁽²⁾			⁽¹⁾	0,3 max.
x ⁽³⁾		2,8 ⁽¹⁾		2,8 ± 0,3
y ⁽³⁾		0,0 ⁽¹⁾		0,0 ± 0,3
β	- 15° ⁽¹⁾	0°	+ 15° ⁽¹⁾	0° ± 5°

Cap WZ3x16q in accordance with IEC Publication 60061 (sheet 7004-151-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS					
Rated values	Volts	12		12	
	Watts	15	5	15	5
Test voltage	Volts	13,5		13,5	
Objective values	Watts	19,1 max.	6,6 max.	19,1 max.	6,6 max.
	Luminous flux	280 ± 15 %	35 ± 20 %		

Reference luminous flux: 280 lm and 35 lm at approximately 13,5 V

⁽¹⁾ To be checked by means of a 'Box-System'; sheets W15/5W/2 and 3.
⁽²⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.
⁽³⁾ 'x' and 'y' denote the offset of the axis of the minor filament with respect to the axis of the major filament.

CATEGORY W15/5W — Sheet W15/5W/2

Screen projection requirements

This test is used to determine, by checking whether:

- (a) The major filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the axis X-X and the reference axis; and whether:
- (b) The minor filament is correctly positioned relative to the major filament, whether a filament lamp complies with the requirements.

Test procedure and requirements.

1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits. The holder is then so rotated that an end view of the major filament is seen on the screen on which the image of the filament is projected. The end view of that filament shall be obtained within the angular displacement tolerance limits ($\pm 15^\circ$).

2. Side elevation

The filament lamp placed with the cap down, the reference axis vertical and the major filament seen end-on:

- 2.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament;
- 2.2. The projection of the minor filament shall lie entirely within a rectangle of width 'c' and height 'd' having its centre at a distance 'u' above the theoretical position of the centre of the major filament.

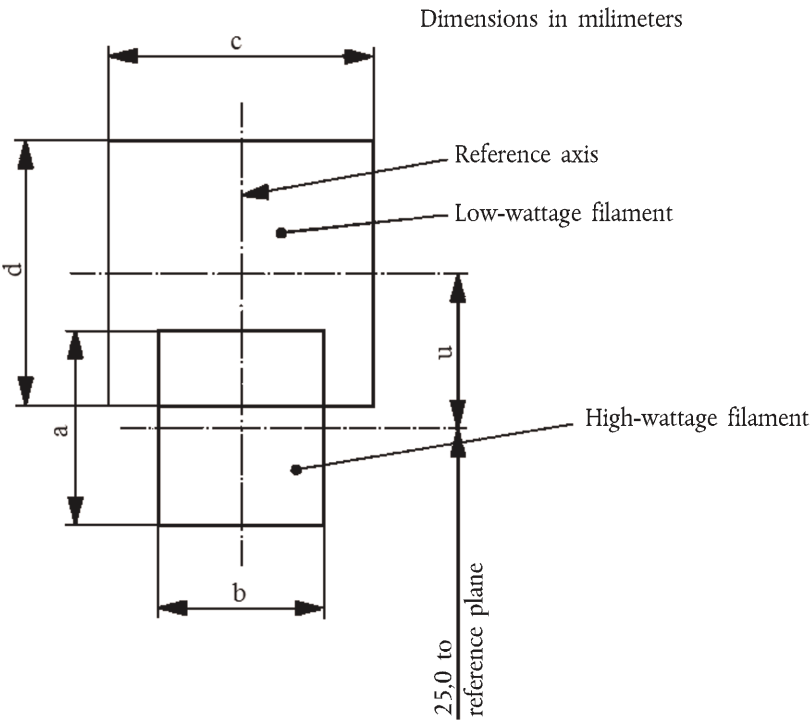
3. Front elevation

The filament lamp being placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to axis of the major filament:

- 3.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'h', centred on the theoretical position of the centre of the filament;
- 3.2. The centre of the major filament shall not be offset by more than distance 'k' from the reference axis.
- 3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ± 2 mm ($\pm 0,4$ mm for standard filament lamps).

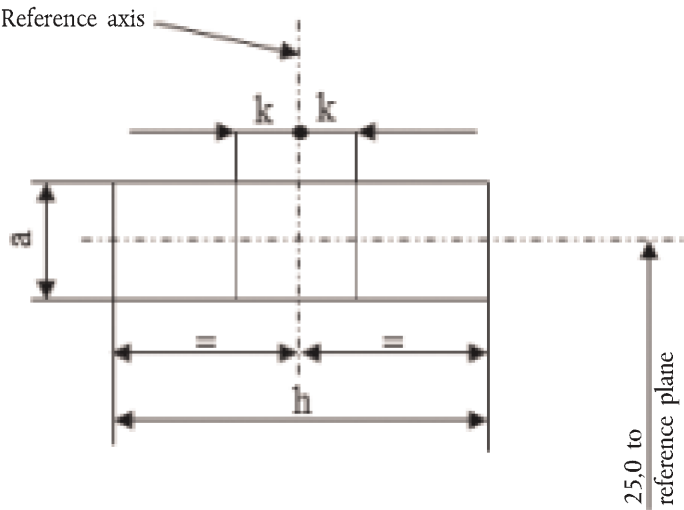
CATEGORY W15/5W — Sheet W15/5W/3

Side elevation



Reference	a	b	c	d	u
Dimensions	3,3	2,8	4,8		2,8

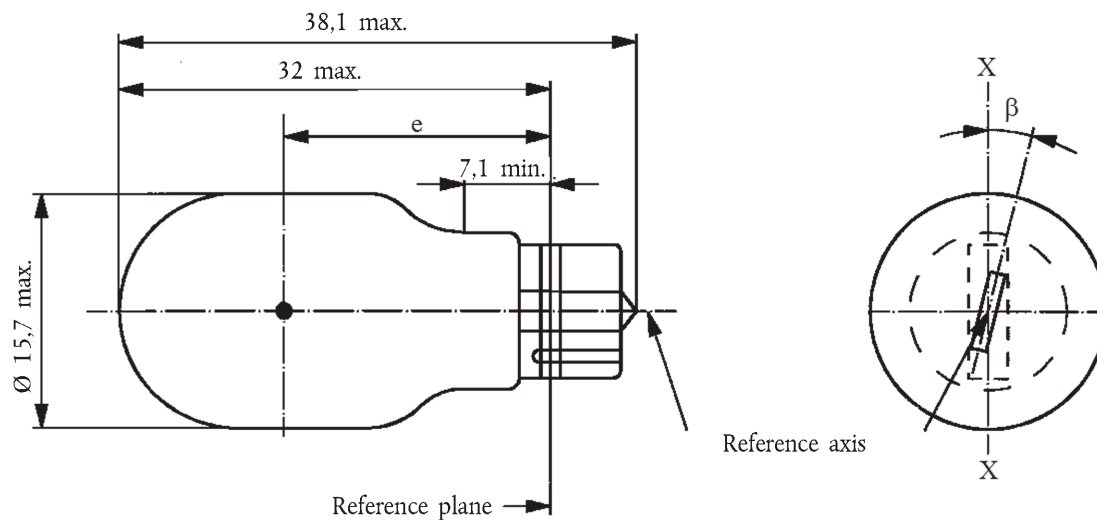
Front elevation



Reference	a	h	k
Dimensions	3,3	9,5	1,0

CATEGORIES W16W AND WY16W — Sheet W16W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e	18,3	20,6	22,9	$20,6 \pm 0,3$
Lateral deviation ⁽¹⁾			1,0	0,5 max.
β	-15°	0°	$+15^\circ$	$0 \pm 5^\circ$

Cap W2.1x9.5d in accordance with IEC Publication 60061 (sheet 7004-91-3)

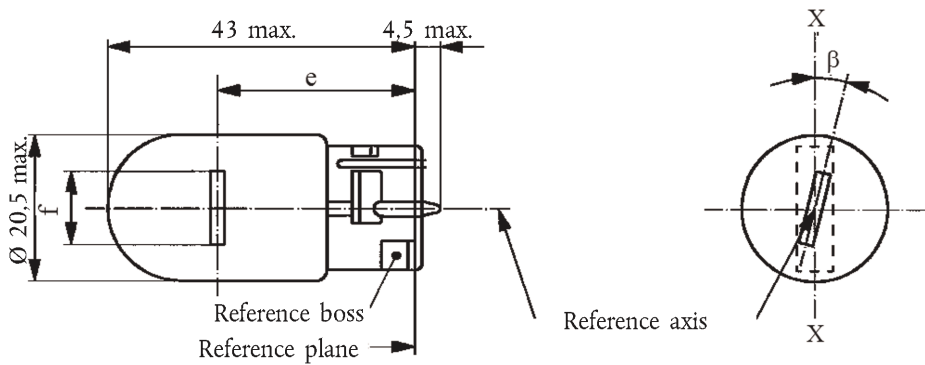
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts		12	12
	Watts		16	16
Test voltage	Volts		13,5	13,5
Objective values	Watts		21,35 max.	21,35 max.
	Luminous flux	White	310 ± 20 %	
		Amber	190 ± 20 %	
Reference luminous flux at approximately 13,5 V:				White: 310 lm Amber: 190 lm

⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X

CATEGORY W21W — Sheet W21W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e		29,0 ⁽²⁾		29,0 ± 0,3
f			7,5	7,5 + 0/- 2
Lateral deviation ⁽¹⁾			⁽²⁾	0,5 max.
β	- 15° ⁽²⁾	0°	+ 15° ⁽²⁾	0° ± 5°

Cap W3x16d in accordance with IEC Publication 60061 (sheet 7004-105-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS			
Rated values	Volts	12	12
	Watts	21	21
Test voltage	Volts	13,5	13,5
Objective values	Watts	26,5 max.	26,5 max.
	Luminous flux	460 ± 15 %	

Reference luminous flux: 460 lm at approximately 13,5 V

⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.
⁽²⁾ To be checked by means of a 'Box-System'; see sheet W21W/2.

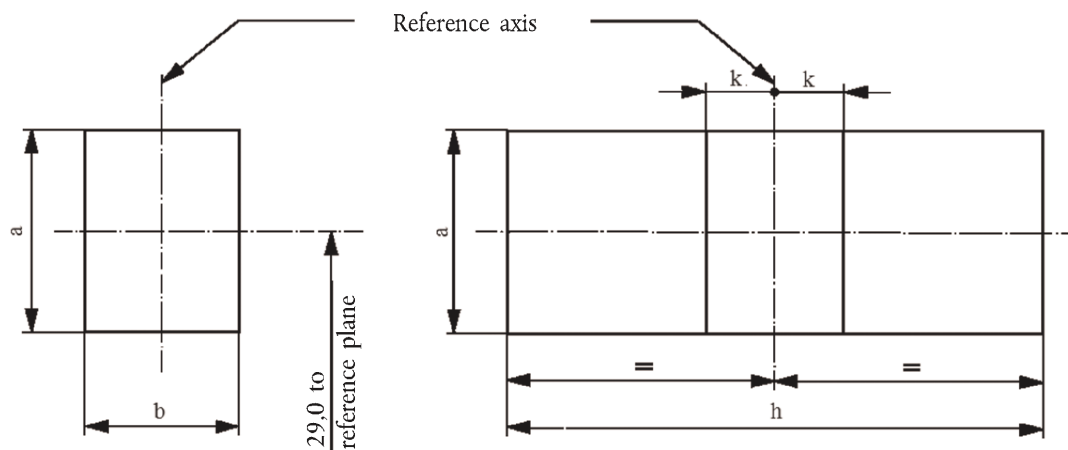
CATEGORY W21W — Sheet W21W/2

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the axis X-X and the reference axis, whether a filament lamp complies with the requirements.

Side elevation

Front elevation



Reference	a	b	h	k
Dimension	3,5	3,0	9,5	1,0

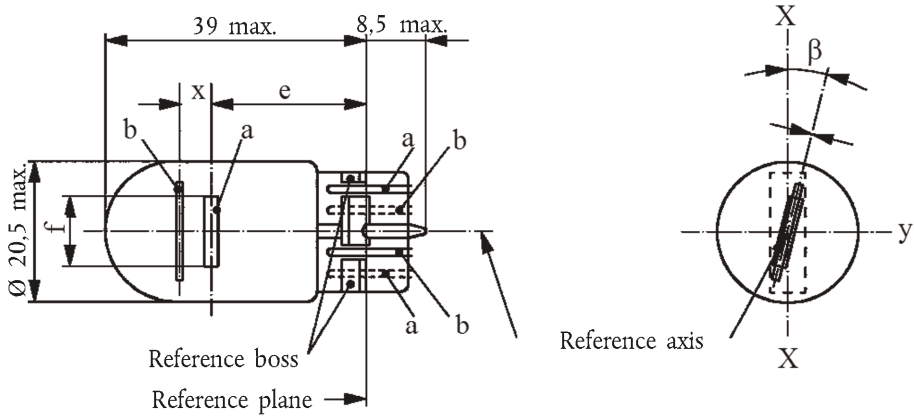
Test procedures and requirements

- The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits, i.e. $\pm 15^\circ$. The holder is then so rotated that an end view of the filament is seen on the screen on to which the image of the filament is projected. The end view of the filament shall be obtained within the angular displacements tolerance limits ($\pm 15^\circ$).
- Side elevation
The filament lamp placed with the cap down, the reference axis vertical and the filament seen end-on, the projection of the filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament.
- Front elevation
The filament lamp placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to the filament axis:
 - The projection of the filament shall lie entirely within a rectangle of height 'a' and width 'h', having its centre at the theoretical position of the centre of the filament;
 - The centre of the filament shall not be offset by more than distance 'k' from the reference axis.

CATEGORY W21/5W — Sheet W21/5W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp

a = major (high wattage) filament
b = minor (low wattage) filament



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e		25,0 ⁽¹⁾		25,0 ± 0,3
f			7,5	7,5 + 0/- 2
Lateral deviation ⁽²⁾			⁽¹⁾	0,3 max.
x ⁽³⁾		2,8 ⁽¹⁾		2,8 ± 0,3
y ⁽³⁾		0,0 ⁽¹⁾		0,0 ± 0,3
β	- 15° ⁽¹⁾	0°	+ 15° ⁽¹⁾	0° ± 5°

Cap W3x16q in accordance with IEC Publication 60061 (sheet 7004-106-3)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12		12	
	Watts	21	5	21	5
Test voltage	Volts	13,5		13,5	
Objective values	Watts	26,5 max.	6,6 max.	26,5 max.	6,6 max.
	Luminous flux	440 ± 15 %	35 ± 20 %		

Reference luminous flux: 440 and 35 lm at approximately 13,5 V

⁽¹⁾ To be checked by means of a 'Box-System'; sheets W21/5W/2 and 3.
⁽²⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.
⁽³⁾ 'x' and 'y' denote the offset of the axis of the minor filament with respect to the axis of the major filament.

CATEGORY W21/5W — Sheet W21/5W/2

Screen projection requirements

This test is used to determine, by checking whether:

- (a) The major filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the axis X-X and the reference axis; and whether:
- (b) The minor filament is correctly positioned relative to the major filament, whether a filament lamp complies with the requirements.

Test procedure and requirements.

1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits. The holder is then so rotated that an end view of the major filament is seen on the screen on which the image of the filament is projected. The end view of that filament shall be obtained within the angular displacement tolerance limits ($\pm 15^\circ$).

2. Side elevation

The filament lamp placed with the cap down, the reference axis vertical and the major filament seen end-on:

- 2.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament;
- 2.2. The projection of the minor filament shall lie entirely within a rectangle of width 'c' and height 'd' having its centre at a distance 'u' above the theoretical position of the centre of the major filament.

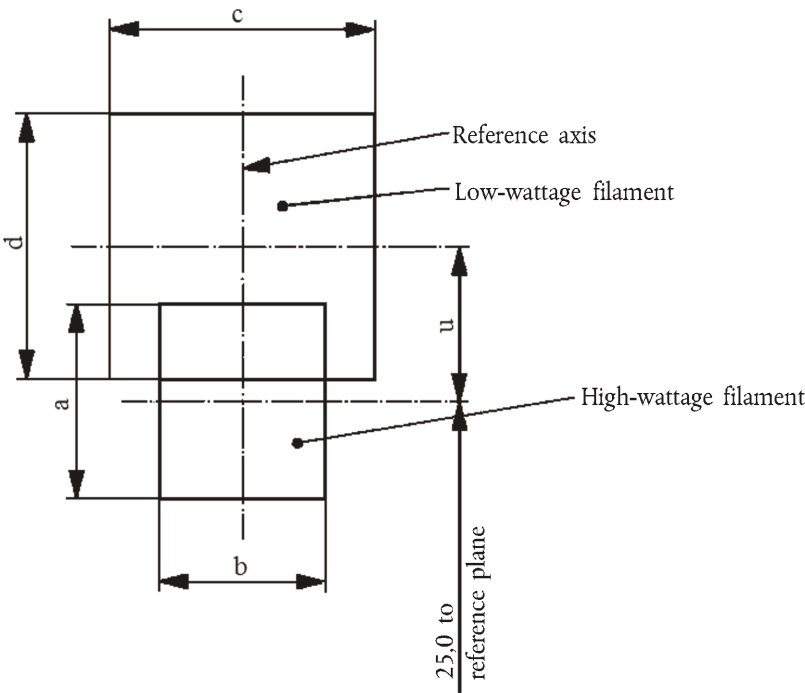
3. Front elevation

The filament lamp being placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to axis of the major filament:

- 3.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'h', centred on the theoretical position of the centre of the filament;
- 3.2. The centre of the major filament shall not be offset by more than distance 'k' from the reference axis;
- 3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ± 2 mm ($\pm 0,4$ mm for standard filament lamps).

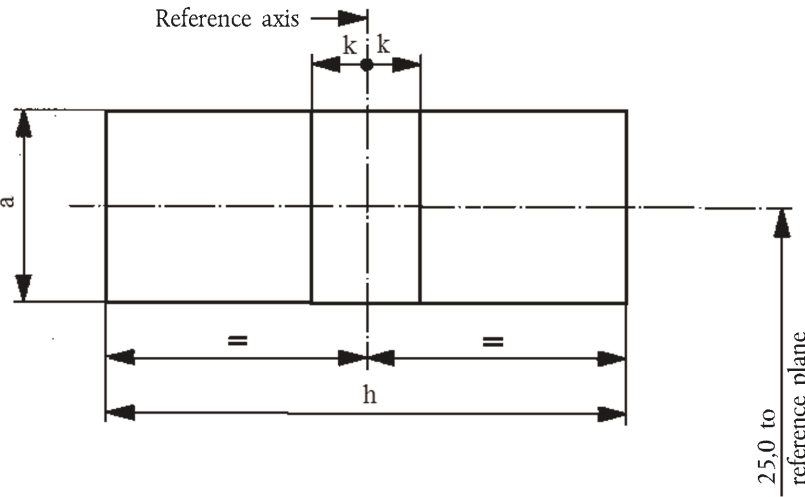
CATEGORY W21/5W — Sheet W21/5W/3

Side elevation



Reference	a	b	c	d	u
Dimension	3,5	3,0	4,8		2,8

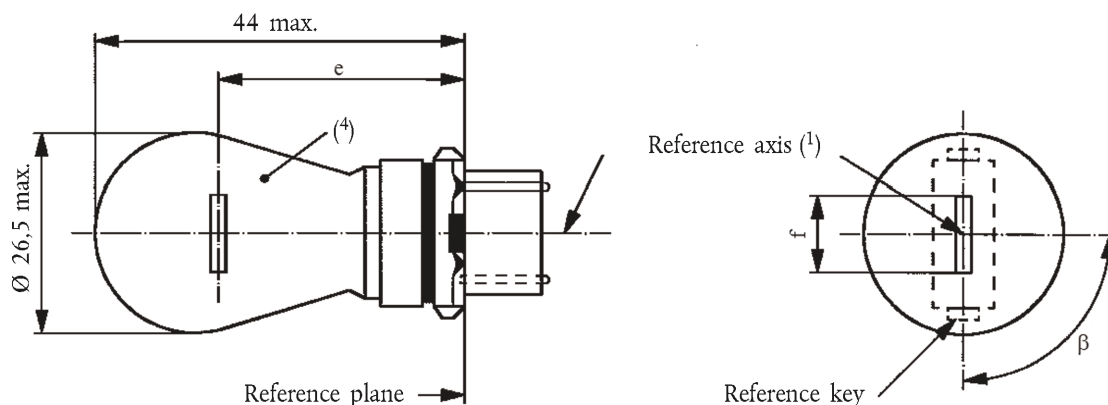
Front elevation



Reference	a	h	k
Dimension	3,5	9,5	1,0

CATEGORIES WP21W AND WPY21W — Sheet WP21W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e		27,9 ⁽³⁾		27,9 ± 0,3
f	5,5	6,0	7,0	6,0 ± 0,5
Lateral deviation ⁽²⁾			⁽³⁾	0,0 ± 0,4
β	75° ⁽³⁾	90°	105° ⁽³⁾	90° ± 5°

Cap: WP21W: WY2.5x16d in accordance with IEC Publication 60061 (sheet 7004-104B-1)
 WPY21W: WZ2.5x16d (sheet 7004-104C-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	21	21
Test voltage	Volts	13,5	13,5
Objective values	Watts	26,5 max.	26,5 max.
	Luminous flux	WP21W	460 ± 15 %
		WPY21W	280 ± 20 %
Reference luminous flux at approximately 13,5 V			White: 460 lm Amber: 280 lm

⁽¹⁾ The reference axis is defined with respect to the reference keys and is perpendicular to the reference plane.

⁽²⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis through the reference keys.

⁽³⁾ To be checked by means of a 'Box-System'; sheet WP21W/2.

⁽⁴⁾ The light emitted from filament lamps of normal production shall be white for category WP21W and amber for category WPY21W (see also footnote 5)

⁽⁵⁾ The light emitted from standard filament lamps shall be white for category WP21W and white or amber for category WPY21W.

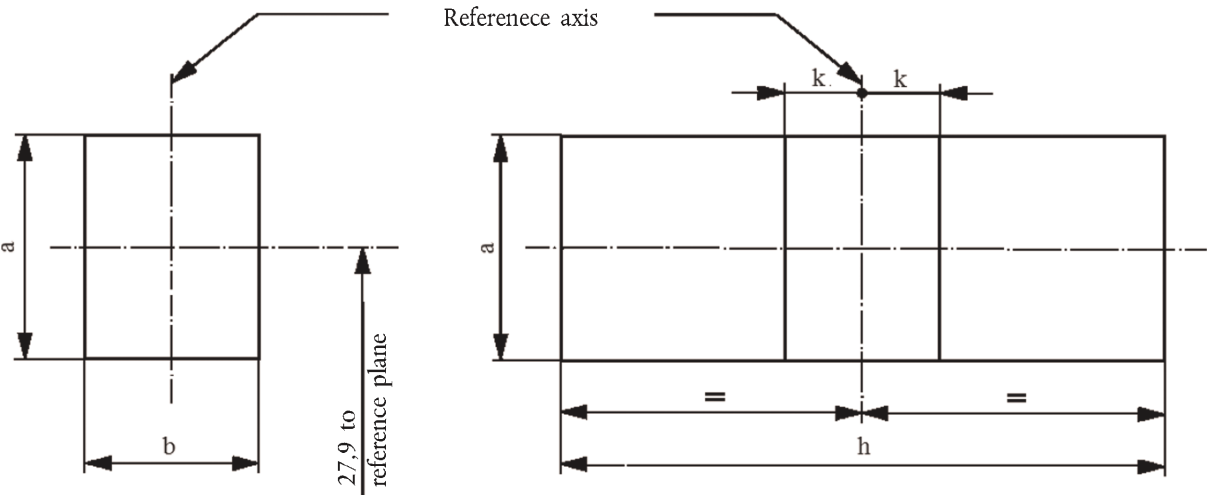
CATEGORIES WP21W AND WPY21W — Sheet WP21W/2

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the centre line of the keys and the reference axis, whether a filament lamp complies with the requirements.

Side elevation

Front elevation



Reference	a	b	h	k
Dimension	3,5	3,0	9,0	1,0

Test procedures and requirements

1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits. The holder is then so rotated that an end view of the filament is seen on the screen on to which the image of the filament is projected. The end view of the filament shall be obtained within the angular displacements tolerance limits.
2. Side elevation

The filament lamp placed with the cap down, the reference axis vertical and the filament seen end-on, the projection of the filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament.
3. Front elevation

The filament lamp placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to the filament axis:

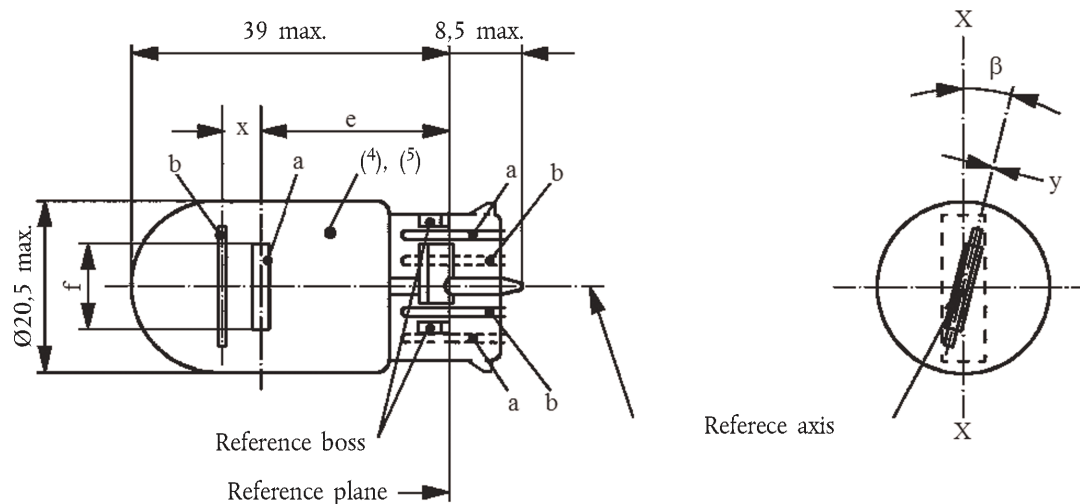
 - 3.1. The projection of the filament shall lie entirely within a rectangle of height 'a' and width 'h', having its centre at the theoretical position of the centre of the filament.
 - 3.2. The centre of the filament shall not be offset by more than distance 'k' from the reference axis.

CATEGORY WR21/5W — Sheet WR21/5W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.

a = major (high wattage) filament

b = minor (low wattage) filament



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e		25,0 ⁽¹⁾		25,0 ± 0,3
f			7,5	7,5 + 0/- 2
Lateral deviation ⁽²⁾			⁽¹⁾	0,3 max.
x ⁽³⁾		2,8 ⁽¹⁾		2,8 ± 0,3
y ⁽³⁾		0,0 ⁽¹⁾		0,0 ± 0,3
β	- 15° ⁽¹⁾	0°	15° ⁽¹⁾	0° ± 5°

Cap WY3x16q in accordance with IEC Publication 60061 (sheet 7004-106-3)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12		12	
	Watts	21	5	21	5
Test voltage	Volts	13,5		13,5	
Objective values	Watts	26,5 max.	6,6 max.	26,5 max.	6,6 max.
	Luminous flux	105 ± 20 %	8 ± 25 %		
Reference luminous flux at approximately 13,5 V			White: 440 lm and 35 lm		
			Red: 105 lm and 8 lm		

⁽¹⁾ To be checked by means of a 'Box-System'; sheets W21/5W/2 and 3.

⁽²⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

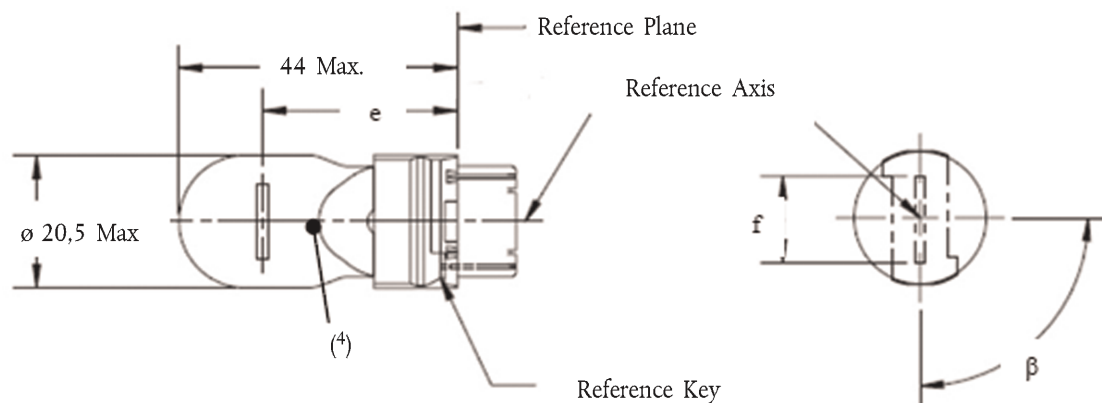
⁽³⁾ 'x' and 'y' denote the offset of the axis of the minor filament with respect to the axis of the major filament.

⁽⁴⁾ The light emitted from normal production lamps shall be red (see also footnote 5).

⁽⁵⁾ The light emitted from standard filament lamps shall be white or red.

CATEGORY WT21W AND WTY21W — Sheet WT21W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.



Dimensions in mm		Filament lamps of normal production			Standard filament lamp ⁽³⁾
		min.	nom.	max.	
e	12 V		27,9 ⁽³⁾		27,9 ± 0,3
	24 V	26,9	27,9	28,9	
f				7,5	7,5 + 0/- 2
Lateral deviation ⁽²⁾	12 V			⁽³⁾	0,0 ± 0,4
	24 V			1,5	
β		75° ⁽³⁾	90°	105° ⁽³⁾	90° ± 5°

Cap: WT21W: WUX2.5x16d in accordance with IEC Publication 60061 (sheet 7004-[...]-1)
 WTY21W: WUY2.5x16d (sheet 7004-[...]-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts		12	24	12
	Watts		21		21
Test voltage	Volts		13,5	28,0	13,5
	Watts		26,5 max.	29,7 max.	26,5 max.
Objective values	Luminous flux	WT21W	460 ± 15 %		
		WTY21W	280 ± 20 %		

Reference luminous flux at approximately 13,5 V:

White: 460 lm

Amber: 280 lm

⁽¹⁾ The reference axis is defined with respect to the reference keys and is perpendicular to the reference plane.

⁽²⁾ Maximum lateral deviation of the major (high wattage) filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis through the reference keys.

⁽³⁾ To be checked by means of a 'Box-System', sheets WT21W/2.

⁽⁴⁾ The light emitted from filament lamps of normal production shall be white for category WT21W and amber for category WTY21W (see also note 5).

⁽⁵⁾ The light emitted from standard filament lamps shall be white for category WT21W and white or amber for category WTY21W.

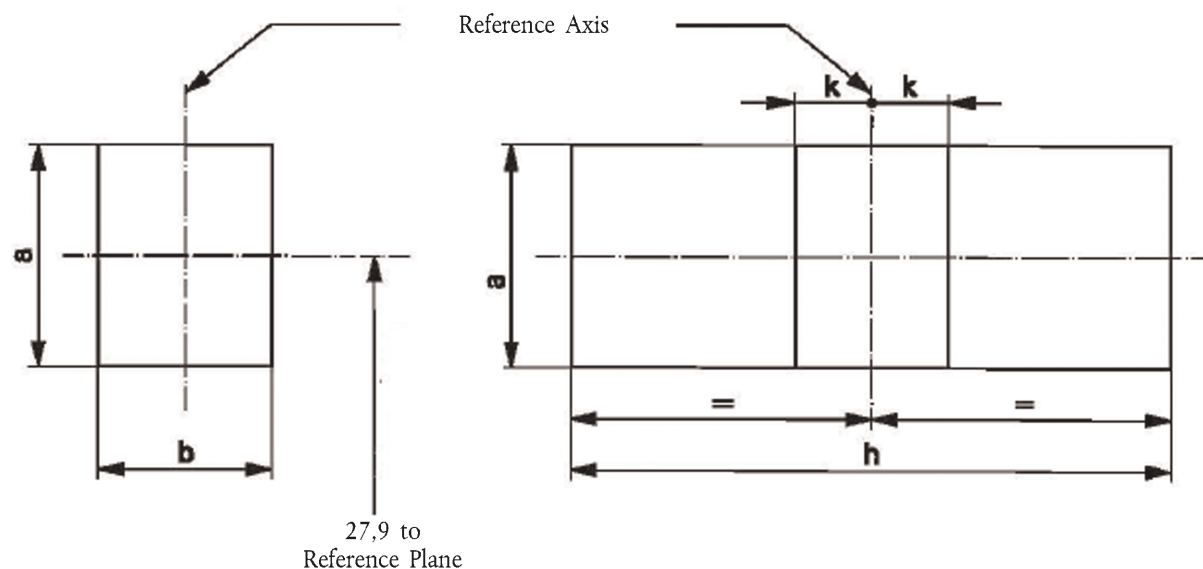
CATEGORY WT21W AND WTY21W — Sheet WT21W/2

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the axis X-X and the reference axis, whether a filament lamp complies with the requirements.

Side elevation

Front elevation

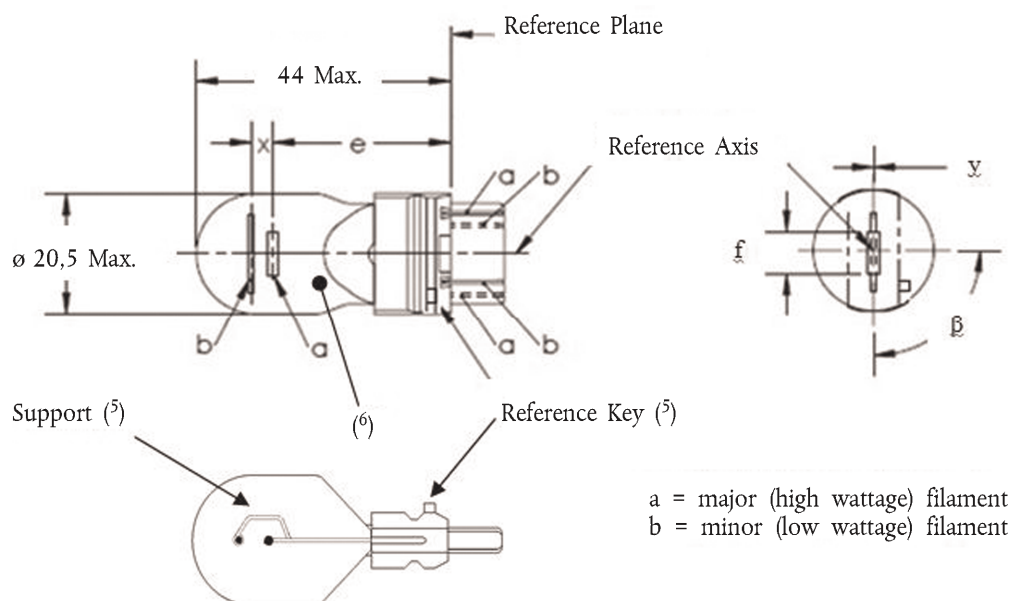


Reference	a	b	h	k
Dimension	3,5	3,0	9,5	1,0

1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits, i.e. $\pm 15^\circ$. The holder is then so rotated that an end view of the filament is seen on the screen on to which the image of the filament is projected. The end view of the filament shall be obtained within the angular displacements tolerance limits ($\pm 15^\circ$).
2. Side elevation
The filament lamp placed with the cap down, the reference axis vertical and the filament seen end-on, the projection of the filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament.
3. Front elevation
The filament lamp placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to the filament axis:
 - 3.1. The projection of the filament shall lie entirely within a rectangle of height 'a' and width 'h', having its centre at the theoretical position of the centre of the filament;
 - 3.2. The centre of the filament shall not be offset by more than distance 'k' from the reference axis.

CATEGORY WT21/7W AND WTY21/7W — Sheet WT21/7W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.



Dimensions in mm	Filament lamps of normal production (6)			Standard filament lamp (7)
	min.	nom.	max.	
e		27,9 (3)		27,9 ± 0,3
f			7,5	7,5 + 0/- 2
Lateral deviation (2)			(3)	0,0 ± 0,4
x (4)		5,1 (3)		5,1 ± 0,5
y (4)		0,0 (3)		0,0 ± 0,5
β	75° (3)	90°	105° (3)	90° ± 5°

Cap: WT21/7W: WZX2.5x16q in accordance with IEC Publication 60061 (sheet 7004-[...]-1)
 WTY21/7W: WZY2.5x16q (sheet 7004-[...]-1)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12		12	
	Watts	21	7	21	7
Test	Volts	13,5		13,5	
Objective values	Watts	26,5 max.	8,5 max.	26,5 max.	8,5 max.
	Luminous flux	440 ± 15 %	35 ± 20 %		
		280 ± 20 %	22 ± 20 %		

Reference luminous flux at approximately 13,5 V:

White: 440 and 35 lm

Amber: 280 and 22 lm

For the notes see sheet WT21/7W/2.

CATEGORY WT21/7W AND WTY21/7W — Sheet WT21/7W/2

Notes:

- (¹) The reference axis is defined with respect to the reference keys and is perpendicular to the reference plane.
- (²) Maximum lateral deviation of the major (high wattage) filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis through the reference keys.
- (³) To be checked by means of a 'Box-System', sheets WT21/7W/2 and 3.
- (⁴) 'x' and 'y' denote the offset of the axis of the minor (low wattage) filament with respect to the axis of the major (high wattage) filament.
- (⁵) If the minor filament is positioned using an asymmetric support similar to the one shown then the reference key and support structure must be located on the same side of the filament lamp.
- (⁶) The light emitted from filament lamps of normal production shall be white for category WT21/7W and amber for category WTY21/7W (see also note 7).
- (⁷) The light emitted from standard filament lamps shall be white for category WT21/7W and white or amber for category WTY21/7W.

Screen projection requirements

This test is used to determine, by checking whether:

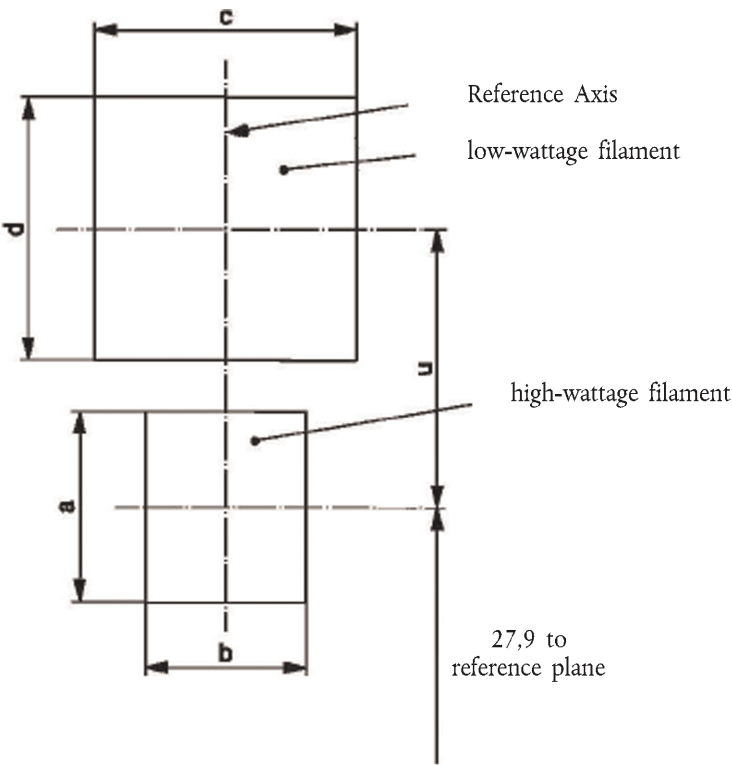
- (a) The major (high wattage) filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the centres of the keys and the reference axis; and whether:
- (b) The minor (low wattage) filament is correctly positioned relative to the major (high wattage) filament, whether a filament lamp complies with the requirements.

Test procedure and requirements.

1. The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits. The holder is then so rotated that an end view of the major filament is seen on the screen on which the image of the filament is projected. The end view of that filament shall be obtained within the angular displacement tolerance limits.
2. Side elevation
The filament lamp placed with the cap down, the reference axis vertical, the reference key to the right and the major filament seen end-on:
 - 2.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament;
 - 2.2. The projection of the minor filament shall lie entirely within a rectangle of width 'c' and height 'd' having its centre at a distance 'u' above the theoretical position of the centre of the major filament.
3. Front elevation
The filament lamp being placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to axis of the major filament:
 - 3.1. The projection of the major filament shall lie entirely within a rectangle of height 'a' and width 'h', centred on the theoretical position of the centre of the filament;
 - 3.2. The centre of the major filament shall not be offset by more than distance 'k' from the reference axis;
 - 3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ± 2 mm ($\pm 0,4$ mm for standard filament lamps).

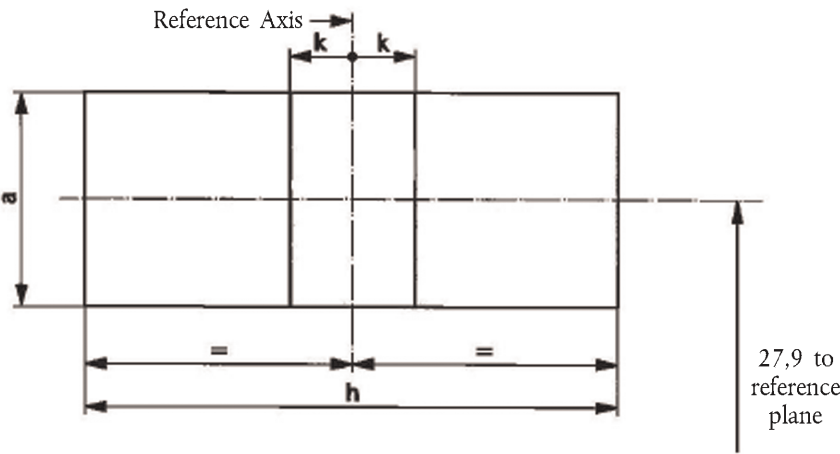
CATEGORY WT21/7W AND WTY21/7W — Sheet WT21/7W/3

Side Elevation



Reference	a	b	c	d	u
Dimensions	3,5	3,0	4,8		5,1

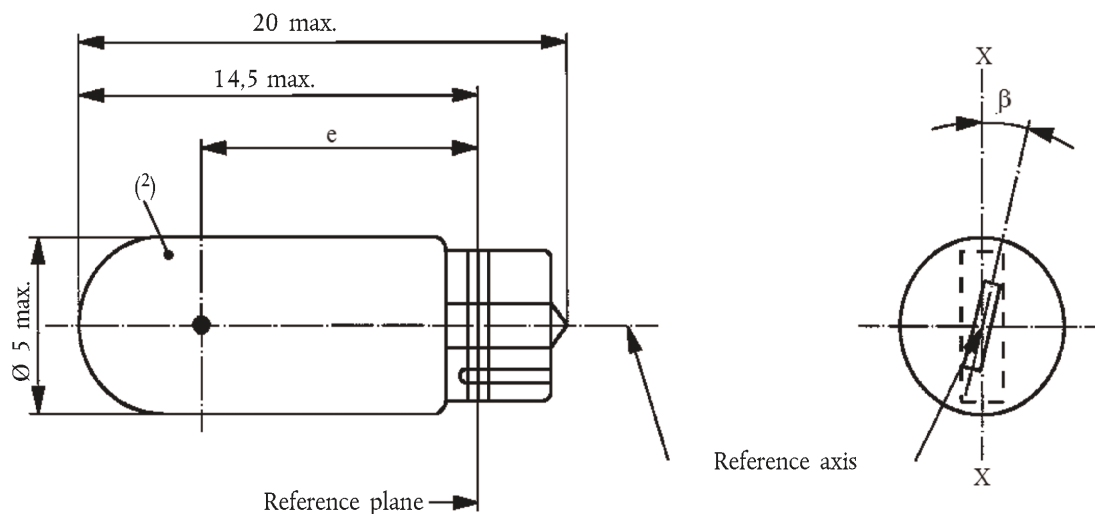
Front Elevation



Reference	a	h	k
Dimensions	3,5	9,5	1,0

CATEGORY WY2.3W — Sheet WY2.3W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e	10,3	10,8	11,3	10,8 ± 0,3
Lateral deviation ⁽¹⁾			1,0	0,5 max
β	- 15°	0°	+ 15°	0° ± 5°

Cap W2x4.6d in accordance with IEC Publication 60061 (sheet 7004-94-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated values	Volts	12	12
	Watts	2,3	2,3
Test voltage	Volts	13,5	13,5
Objective values	Watts	2,5 max.	2,5 max.
	Luminous flux	11,2 ± 20 %	
Reference luminous flux at approximately 13,5 V			White: 18,6 lm Amber: 11,2 lm

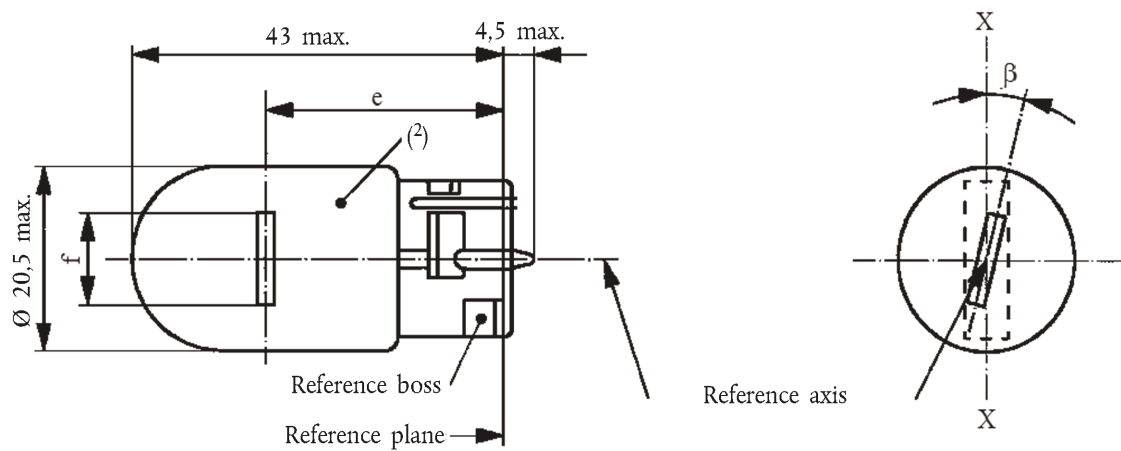
⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

⁽²⁾ The light emitted from production lamps shall be amber (see also footnote 3).

⁽³⁾ The light emitted from standard filament lamps shall be amber or white.

CATEGORY WY21W — Sheet WY21W/1

The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.



Dimensions in mm	Filament lamps of normal production			Standard filament lamp
	min.	nom.	max.	
e		29,0 ⁽²⁾		29,0 ± 0,3
f			7,5	7,5 + 0/- 2
Lateral deviation ⁽¹⁾			⁽²⁾	0,5 max.
β	- 15°	0°	+ 15°	0° ± 5°

Cap WX3x16d in accordance with IEC Publication 60061 (sheet 7004-105-2)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS			
Rated values	Volts	12	12
	Watts	21	21
Test voltage	Volts	13,5	13,5
Objective values	Watts	26,5 max.	26,5 max.
	Luminous flux	280 ± 20 %	
Reference luminous flux at approximately 13,5 V:			White: 460 lm Amber: 280 lm

⁽¹⁾ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.
⁽²⁾ The light emitted from filament lamps of normal production shall be amber (see also footnote 4).
⁽³⁾ To be checked by means of a 'Box-System'; sheet WY21W/2.
⁽⁴⁾ The light emitted from standard filament lamps shall be amber or white.

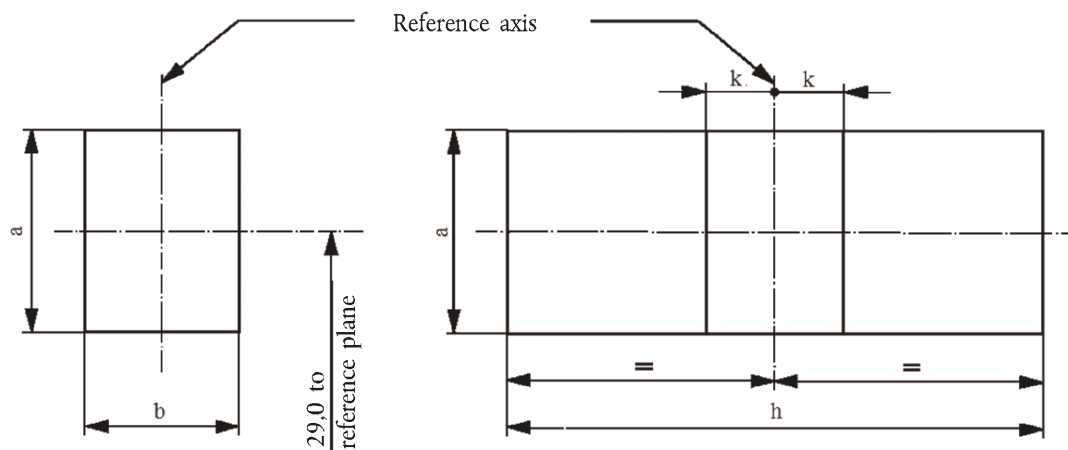
CATEGORY WY21W — Sheet WY21W/2

Screen projection requirements

This test is used to determine, by checking whether the filament is correctly positioned relative to the reference axis and reference plane and has an axis perpendicular, within $\pm 15^\circ$, to the plane through the axis X-X and the reference axis, whether a filament lamp complies with the requirements.

Side elevation

Front elevation



Reference	a	b	h	k
Dimension	3,5	3,0	9,5	1,0

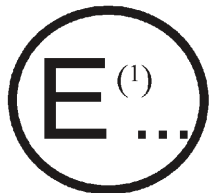
Test procedures and requirements

- The filament lamp is placed in a holder capable of being rotated about its axis and having either a calibrated scale or fixed stops corresponding to the angular displacement tolerance limits, i.e. $\pm 15^\circ$. The holder is then so rotated that an end view of the filament is seen on the screen on to which the image of the filament is projected. The end view of the filament shall be obtained within the angular displacements tolerance limits ($\pm 15^\circ$).
- Side elevation
The filament lamp placed with the cap down, the reference axis vertical and the filament seen end-on, the projection of the filament shall lie entirely within a rectangle of height 'a' and width 'b', having its centre at the theoretical position of the centre of the filament.
- Front elevation
The filament lamp placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to the filament axis:
 - The projection of the filament shall lie entirely within a rectangle of height 'a' and width 'h', having its centre at the theoretical position of the centre of the filament.
 - The centre of the filament shall not be offset by more than distance 'k' from the reference axis.

ANNEX 2

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration

.....

.....

.....

Concerning ⁽²⁾: Approval granted
 Approval extended
 Approval refused
 Approval withdrawn
 Production definitively discontinued

of a type of filament lamp pursuant to Regulation No 37

Approval No

Extension No

1. Trade name or mark of the device:
2. Manufacturer's name for the type of device:
3. Manufacturer's name and address:
4. If applicable, name and address of manufacturer's representative:
5. Submitted for approval on:
6. Technical Service responsible for conducting approval tests:
7. Date of report issued by that Service:
8. Number of report issued by that Service:
9. Concise description:
- Category of filament lamp:
- Rated voltage:
- Rated wattage:
- Colour of the light emitted: White/selective-yellow/amber/red ⁽²⁾
- Colour coating on glass bulb: yes/no ⁽²⁾
- Halogen filament lamp: yes/no ⁽²⁾
10. Position of the approval mark:
11. Reason(s) for extension (if applicable):
12. Approval granted/refused/extended/withdrawn ⁽²⁾:

⁽¹⁾ Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

⁽²⁾ Strike out what does not apply.

13. Place:
14. Date:
15. Signature:
16. The following documents, bearing the approval mark shown above, are available on request:
- _____

ANNEX 3

EXAMPLE OF THE ARRANGEMENT OF THE APPROVAL MARK

(see paragraph 2.4.3)

 $a = 2,5 \text{ mm min}$

The above approval mark affixed to a filament lamp indicates that the lamp has been approved in the United Kingdom (E11) under the approval code A01.

The first character of the approval code indicates that the approval was granted in accordance with the requirements of Regulation No 37 as amended by the 02 and 03 (*) series of amendments.

(*) Not requiring changes in the approval number.

ANNEX 4

LUMINOUS CENTRE AND SHAPES OF FILAMENT LAMPS

Save as possibly otherwise stated on the filament lamp data sheets, this standard is applicable to the determination of the luminous centre of different filament shapes.

The position of the luminous centre depends upon the filament shape.

No	Filament shapes	Observations
1		With $b > 1,5 h$, the deviation of the filament axis with respect to a plane normal to the reference axis shall not exceed 15°
2		Only applicable to filaments which can be inscribed in a rectangle of $b > 3h$.
3		Applicable to filaments which can be inscribed in a rectangle of $b \geq 3h$, whereby, however, $k < 2h$.

The side lines of the circumscribed rectangles in Nos 2 and 3 are parallel and perpendicular, respectively, to the reference axis.

The luminous centre is the intersection of the dash-dot lines.

The drawings are intended only to demonstrate the essential dimensions.

ANNEX 5

CHECKING THE COLOUR OF FILAMENT LAMPS**1. GENERAL**

- 1.1. 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.
- 1.2. Tests shall be made at an ambient temperature of $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$.
- 1.3. Tests shall be made at test voltage(s) as specified in the relevant lamp data sheet.
- 1.4. Filament lamps shall be measured preferably in the normal operating position. In case of dual filament lamps the high wattage (major or driving beam) filament shall be operated only.
- 1.5. Before starting a test, the stabilisation of the temperature of the filament lamp shall be obtained by operating at test voltage for 10 minutes. In the case of filament lamps, for which more than one test voltage is specified, the relevant test voltage value shall be used for achieving stabilisation.

2. COLOUR

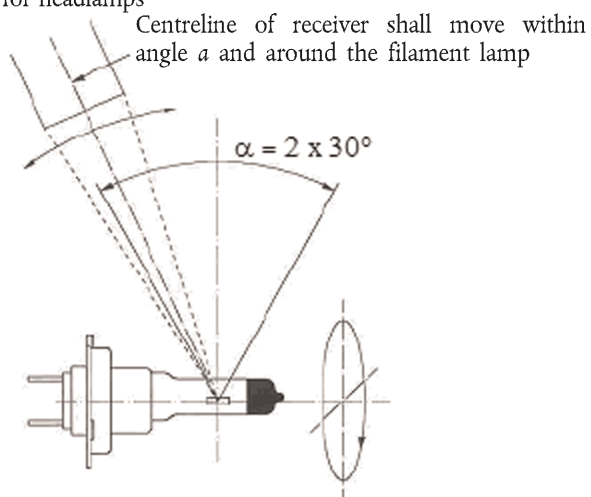
- 2.1. Colour tests shall be made with a measuring system that determines CIE trichromatic co-ordinates of the received light with an accuracy of $\pm 0,002$.
- 2.2. The trichromatic coordinates shall be measured with a colourimetric receiver integrating over a right circular cone subtending an angle of minimum 5° and maximum 15° , at the centre of the filament.
- 2.3. Measuring directions (see the figure below).
 - 2.3.1. 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 paragraphs 2.3.2 or 2.3.3 is covered. In each position a measurement shall be made. However, no measurement shall be made when:
 - (a) The centreline of the receiver coincides with the filament axis; or
 - (b) The line of sight between the receiver and the filament is blocked by opaque (non-transmitting) parts of the light source, such as lead wires or a second filament, if any.
 - 2.3.2. For 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 $\pm 30^{\circ}$, from the plane perpendicular to the lamp axis with the origin in the centre of the filament. In case of filament lamps with two filaments, the centre of the driving beam filament shall be taken.
 - 2.3.3. For filament lamps used in light signalling devices, measurements shall be made in directions around the filament lamp with exception of:
 - (a) The area claimed or covered by the cap of the filament lamp; and
 - (b) The immediate transition area along the cap.

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

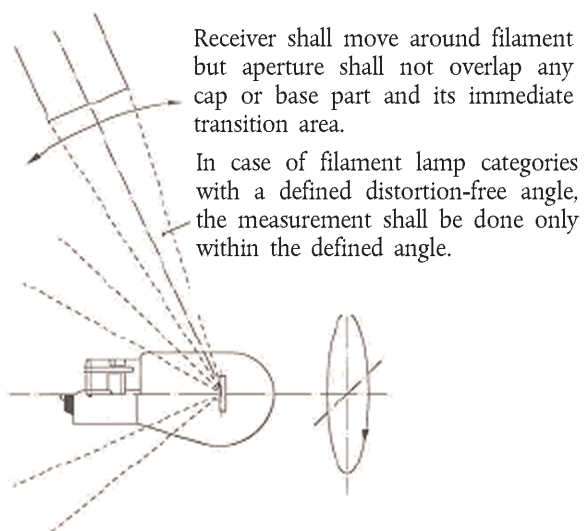
In case of filament lamp categories with a defined distortion-free angle, the measurement shall be done only within the defined angle.

Figure illustrating the positions of colourimetric receiver

Filament lamps for headlamps



Filament lamps for light signalling devices



ANNEX 6

MINIMUM REQUIREMENTS FOR QUALITY CONTROL PROCEDURES BY THE MANUFACTURER**1. GENERAL**

The conformity requirements shall be considered satisfied from a photometric, geometrical, visual and electrical standpoint if the specified tolerances for production filament lamps in the relevant data sheet of Annex 1 and the relevant data sheet for the caps are met.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of filament lamp the manufacturer or the holder of the approval mark shall carry out tests, in accordance with the provisions of this Regulation, at appropriate intervals.

2.1. Nature of tests

Tests of conformity of these specifications shall cover their photometric, geometrical and optical characteristics.

2.2. Methods used in tests**2.2.1. Tests shall generally be carried out in accordance with the methods set out in this Regulation.****2.2.2. The application of paragraph 2.2.1 requires regular calibration of test apparatus and its correlation with measurements made by a competent authority.****2.3. Nature of sampling**

Samples of filament lamps shall be selected at random from the production of a uniform batch. A uniform batch means a set of filament lamps of the same type, defined according to the production methods of the manufacturer.

2.4. Inspected and recorded characteristics

The filament lamps shall be inspected and test results recorded following the grouping of characteristics as listed in Annex 7, Table 1.

2.5. Criteria governing acceptability

The manufacturer or the holder of approval is responsible for carrying out a statistical study of the test results in order to meet the specifications laid down for verification of conformity of production in paragraph 4.1 of this Regulation.

Compliance shall be assured if the level of acceptable non-compliance per grouping of characteristics given in Table 1 of Annex 7 is not exceeded. This means that the number of filament lamps not complying with the requirement for any grouping of characteristics of any filament lamp type does not exceed the qualifying limits in the relevant Tables 2, 3 or 4 of Annex 7.

Note: Each individual filament lamp requirement shall be considered as a characteristic.

ANNEX 7

SAMPLING AND COMPLIANCE LEVELS FOR MANUFACTURER TEST RECORDS

Table 1

Characteristics

Grouping of characteristics	Grouping (*) of test records between lamp types	Minimum 12 monthly sample per grouping (*)	Acceptable level of non-compliance per grouping of characteristics (%)
Marking, legibility and durability	All types with the same external dimensions	315	1
Bulb quality	All types with the same bulb	315	1
Colour of the bulb	All types (emitting red and amber light) of the same category and colour technology	20	1
External lamp dimensions (excluding cap/base)	All types of the same category	200	1
Dimensions of caps and bases	All types of the same category	200	6,5
Dimensions related to internal elements (**)	All lamps of one type	200	6,5
Initial readings, watts and lumens (**)	All lamps of one type	200	1
Colour endurance test	All lamps (emitting red, amber and white light) of one colour coating technology	20 (***)	1

(*) The assessment shall in general cover series production filament lamps from individual factories. A manufacturer may group together records concerning the same type from several factories, provided these operate under the same quality system and quality management.

(**) In case a filament lamp has more than one inner element (filament, shield) the grouping of characteristics (dimensions, watts, lumens) applies to each element separately.

(***) Representative distribution over categories of lamps using the same colour coating technology and finishing, and that comprises lamps of the smallest and the largest diameter of the outer bulb, each at the highest rated wattage.

Qualifying limits for acceptance based on different numbers of test results for each grouping of characteristics are listed in Table 2 as maximum number of non-compliance. The limits are based on an acceptable level of 1 per cent of non-compliance, assuming an acceptance probability of at least 0,95.

Table 2 (*)

Number of test results of each characteristics	Qualifying limits for acceptance
20	0
21-50	1
51-80	2
81-125	3
126-200	5
201-260	6

Number of test results of each characteristics	Qualifying limits for acceptance
261-315	7
316-370	8
371-435	9
436-500	10
501-570	11
571-645	12
646-720	13
721-800	14
801-860	15
861-920	16
921-990	17
991-1 060	18
1 061-1 125	19
1 126-1 190	20
1 191-1 249	21

(*) In accordance with ISO 2859-1:1999 'Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection' including Technical Corrigendum 1:2001.

Qualifying limits for acceptance based on different numbers of test results for each grouping of characteristics are listed in Table 3 given as maximum number of non-compliance. The limits are based on an acceptable level of 6,5 per cent of non-compliance, assuming an acceptance probability of at least 0,95.

Table 3

Number of lamps in records	Qualifying limit	Number of lamps in records	Qualifying limit	Number of lamps in records	Qualifying limit
-200	21	541-553	47	894-907	73
201-213	22	554-567	48	908-920	74
214-227	23	568-580	49	921-934	75
228-240	24	581-594	50	935-948	76
241-254	25	595-608	51	949-961	77
255-268	26	609-621	52	962-975	78
269-281	27	622-635	53	976-988	79
282-295	28	636-648	54	989-1 002	80
296-308	29	649-662	55	1 003 -1 016	81
309-322	30	663-676	56	1 017-1 029	82
323-336	31	677-689	57	1 030-1 043	83
337-349	32	690-703	58	1 044-1 056	84
350-363	33	704-716	59	1 057-1 070	85
364-376	34	717-730	60	1 071-1 084	86
377-390	35	731-744	61	1 085-1 097	87
391-404	36	745-757	62	1 098-1 111	88
405-417	37	758-771	63	1 112-1 124	89
418-431	38	772-784	64	1 125-1 138	90
432-444	39	785-798	65	1 139-1 152	91
445-458	40	799-812	66	1 153-1 165	92
459-472	41	813-825	67	1 166-1 179	93
473-485	42	826-839	68	1 180-1 192	94
486-499	43	840-852	69	1 193-1 206	95
500-512	44	853-866	70	1 207-1 220	96
513-526	45	867-880	71	1 221-1 233	97
527-540	46	881-893	72	1 234-1 249	98

Qualifying limits for acceptance based on different numbers of test results for each grouping of characteristics are listed in Table 4 given as a percentage of the results, assuming an acceptance probability of at least 0,95.

Table 4

Number of test results of each characteristic	Qualifying limits shown as a percentage of results.	
	Acceptable level of 1 % of non-compliance	Acceptable level of 6,5 % of non-compliance
1 250	1,68	7,91
2 000	1,52	7,61
4 000	1,37	7,29
6 000	1,30	7,15
8 000	1,26	7,06
10 000	1,23	7,00
20 000	1,16	6,85
40 000	1,12	6,75
80 000	1,09	6,68
100 000	1,08	6,65
1 000 000	1,02	6,55

ANNEX 8

MINIMUM REQUIREMENTS FOR SPOT CHECKS BY THE TYPE APPROVAL AUTHORITY

1. General

The conformity requirements shall be considered satisfied from a photometric, geometrical, visual and electrical standpoint if the specified tolerances for production filament lamps in the relevant data sheet of Annex 1 and the relevant data sheet for the caps are met.

2. The conformity of mass-produced filament lamps shall not be contested if the results are in agreement with Annex 9 to this Regulation.
3. Conformity shall be contested and the manufacturer requested to make the production meet the requirements if the results are not in agreement with Annex 9 to this Regulation.
4. If paragraph 3 of this Annex is applied, a further sample of 250 filament lamps, selected at random from a recent production run, shall be taken within two months.

ANNEX 9

COMPLIANCE APPROVED BY SPOT CHECK

Compliance approved or disapproved shall be decided according to the values in Table 1. For each grouping of characteristics filament lamps shall be either accepted or rejected according to the values in Table 1 (*).

Table 1

	1 % (**)		6,5 % (**)	
	Accept	Reject	Accept	Reject
First sample size: 125	2	5	11	16
If the number of non-conforming units is greater than 2 (11) and less than 5 (16) take a second sample size of 125 and assess the 250	6	7	26	27

(*) The proposed scheme is designed to assess the compliance of filament lamps to an acceptance level of non-compliance of 1 per cent and 6,5 per cent respectively and is based on the Double Sampling Plan for Normal Inspection in IEC Publication 60410: Sampling Plans and Procedures for Inspection by Attributes.

(**) The filament lamps shall be inspected and test results recorded following the grouping of characteristics as listed in Annex 7, Table 1.

ANNEX 10

TRANSLATIONS OF THE TERMS USED IN THE DRAWINGS IN ANNEX 1

English	
a = major (high wattage) filament	
Auxiliary reference plane	
Axis of bulb	
Axis of driving beam filament	
Axis of high wattage filament	
Axis of low wattage filament	
Axis of passing beam filament	
Axis of the bulb	
b = minor (low wattage) filament	
Bulb axis	
Bulb eccentricity	
Bulb offset	
Category	
Central axis sought	
Definition of reference axis	
Definition of Z-Z	
Definition of Z-Z line	
Definition: Ring centre and reference axis	
Distortion free area	
Distortion free area and black top	
Driving	
Driving-beam	
Driving-beam filament	
Driving-beam filament axis	
Earth	
Enlarged centre of View A	
Enlarged centre of View B	
Figure	
Filament axis	
Filament centre	
Filament centres	

English	
Filament position	
Filament position and dimensions	
First filament turn	
For driving-beam filament	
For passing-beam filament	
Front elevation	
Ground	
High wattage	
High-wattage filament	
Light blocking toward cap	
Low wattage	
Low-wattage filament	
Lug width 3 mm	
Main drawing	
max	
Maximum lamp outline	
Metal free zone	
Nominal position of lamp holder studs	
Obscuration angle limits of cap	
Offset of filament	
Passing	
Passing-beam	
Passing-beam filament	
Passing beam filament axis	
Permissible offset of filament axis	
Permissible offset of filament axis (for standard filament lamps only)	
Plane C	
Position and dimensions of filaments	
Position of the filaments	
Position of the shield	
Reference axis	
Reference boss	
Reference diameter	
Reference key	

English	
Reference lug	
Reference mark	
Reference notch	
Reference pin	
Reference plane	
Ring centre	
Second pin	
Section A-B	
Section D-E	
Shield	
Side elevation	
The drawing is not mandatory with respect to the design of the shield	
Top view	
Top view of driving-beam filament	
Top view of passing-beam filament	
Top view of driving-beam and passing-beam filament	
Undistorted area and opaque coating	
View A	
View A of passing-beam filament	
View A: measuring h2	
View B	
View B of driving-beam filament	
View B: measuring k, h1, h3, f	
View C	
View C: measuring h4	
View from A/View from 1	
View from B/View from 2	
View from C/View from 3	
Views A and C	
Views B and C	
x mm to reference plane	
x to reference plane	

ISSN 1977-0677 (electronic edition)
ISSN 1725-2555 (paper edition)



Publications Office of the European Union
2985 Luxembourg
LUXEMBOURG

EN