11 November 2015

Agreement

Concerning the adoption of uniform technical prescriptions for wheeled vehicles, equipment and parts which can be fitted and/or be used on wheeled vehicles and the conditions for reciprocal recognition of approvals granted on the basis of these prescriptions*

(Revision 2, including the amendments which entered into force on 16 October 1995)

Addendum 36: Regulation No. 37

Revision 8

Incorporating all valid text up to:

Supplement 38 to the 03 series of amendments – Date of entry into force: 26 July 2012
Supplement 39 to the 03 series of amendments – Date of entry into force: 18 November 2012
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Supplement 42 to the 03 series of amendments – Date of entry into force: 10 June 2014
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Supplement 44 to the 03 series of amendments – Date of entry into force: 8 October 2015

Uniform provisions concerning the approval of filament lamps for use in approved lamp units of power-driven vehicles and of their trailers

This document is meant purely as documentation tool. The authentic and legal binding texts are:
- ECE/TRANS/WP.29/2011/97
- ECE/TRANS/WP.29/2012/9
- ECE/TRANS/WP.29/2012/70
- ECE/TRANS/WP.29/2013/17
- ECE/TRANS/WP.29/2013/78 (as amended by paragraph 56 of the report ECE/TRANS/WP.29/1106)
- ECE/TRANS/WP.29/2014/56
- ECE/TRANS/WP.29/2015/18.

UNITED NATIONS

* Former title of the Agreement: Agreement concerning the adoption of uniform conditions of approval and reciprocal recognition of approval for motor vehicle equipment and parts, done at Geneva on 20 March 1958.

Regulation No. 37

Uniform provisions concerning the approval of filament lamps for use in approved lamp units of power-driven vehicles and of their trailers

Contents

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 "*types*"[1] 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:

[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.

2.2.3.1. 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 Type Approval 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;

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 3 shall be used. The same Contracting Party may not assign the same code to another type of filament lamp. Notice of

[2] In the latter case, the luminous characteristics shall not be adversely affected.

[3] 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

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 Contracting 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 x 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 paragraph 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;[4]

2.4.3.2. The approval code, placed close to the truncated circle.

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.;

[4] The distinguish 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.3.

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. Apices outside the point of connection to the current lead-in legs shall be disregarded for the determination of the filament length.

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.[5] 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.

[5] 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.

3.7. UV radiation

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

$$k1 = \frac{\int_{\lambda=315nm}^{400nm} Ee(\lambda)\cdot d\lambda}{km\cdot\int_{\lambda=380nm}^{780nm} Ee(\lambda)\cdot V(\lambda)\cdot d\lambda} \le 2\cdot 10^{-4}\,W/lm$$

$$k2 = \frac{\int_{\lambda=250nm}^{315nm} Ee(\lambda)\cdot d\lambda}{km\cdot\int_{\lambda=380nm}^{780nm} Ee(\lambda)\cdot V(\lambda)\cdot d\lambda} \le 2\cdot 10^{-6}\,W/lm$$

Where:

$Ee(\lambda)$	(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.

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 Type Approval Authority;

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 Type Approval 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 Type Approval Authority may carry out any tests prescribed in this Regulation. Where the Type Approval 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 Type Approval Authority shall be one every two years. In the case where negative results are recorded during one of these visits, the Type Approval 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 definitively 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.[6]

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
C11	C5W
C15	C21W
T8/4	T4W
W10/5	W5W
W10/3	W3W

[6] 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.

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

Group 1

Without general restrictions:

Category		*Sheet number(s)*
H1	*[6]	H1/1 to 3
H3	*[6]	H3/1 to 4
H4		H4/1 to 5
H7		H7/1 to 4
H8		H8/1 to 4
H8B		H8/1 to 4
H9	*[3]	H9/1 to 4
H9B	*[3]	H9/1 to 4
H10		H10/1 to 3
H11		H11/1 to 4
H11B		H11/1 to 4
H13		H13/1 to 4
H15		H15/1 to 5
H16		H16/1 to 4
H16B		H16/1 to 4
H17		H17/1 to 6
H18		H18/1 to 4
H19		H19/1 to 5
H20		H20/1 to 4
H21W	*[2]	H21W/1 to 2
H21W	*[2]	H21W/1 to 2
H27W/1		H27W/1 to 3
H27W/2		H27W/1 to 3
HB3		HB3/1 to 4
HB4		HB4/1 to 4
HIR2		HIR2/1 to 3
HS1	*[6]	HS1/1 to 5
HS2	*[6]	HS2/1 to 3
HS5		HS5/1 to 4
HS5A	*[5]	HS5A/1 to 3
PSX24W	*[2]	P24W/1 to 3
PSX26W	*[2]	PSX26W1 to 3
PX24W	*[2]	P24W/1 to 3
S2	*[6]	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)*	
C5W	*[6]	C5W/1	
H6W		H6W/1	
H10W/1		H10W/1 to 2	
HY6W		H6W/1	
HY10W		H10W/1 to 2	
HY21W		H21W/1 to 2	
P13W		P13W/1 to 3	
P21W	*[6]	P21W/1 to 2	
P21/4W		P21/4W/1	(P21/5W/2 to 3)
P21/5W	*[6]	P21/5W/1 to 3	
P24W		P24W/1 to 3	
P27W		P27W/1 to 2	
P27/7W		P27/7W/1 to 3	
PR21W		PR21W/1	(P21W/2)
PR21/5W		PR21/5W/1	(P21/5W/2 to 3)
PS19W		P19W/1 to 3	
PS24W		P24W/1 to 3	
PSY19W		P19W/1 to 3	
PSY24W		P24W/1 to 3	
PW13W		P13W/1 to 3	
PW16W		PC16W/1 to 3	
PWR16W		PC16W/1 to 3	
PWY16W		PC16W/1 to 3	
PW19W		P19W/1 to 3	
PWR19W		P19W/1 to 3	
PWY19W		P19W/1 to 3	
PW24W		P24W/1 to 3	
PWR24W		P24W/1 to 3	
PWY24W		P24W/1 to 3	
PY21W		PY21W/1	(P21W/2)
PY21/5W		PY21/5W/1 to 3	
PY24W		P24W/1 to 3	
PY27/7W		PY27/7W/1	(P27/7W/2 to 3)
R5W	*[6]	R5W/1	
R10W	*[6]	R10W/1	
RR5W		R5W/1	

Category		*Sheet number(s)*	
RR10W		R10W/1	
RY10W	*[6]	R10W/1	
T4W	*[6]	T4W/1	
W2.3W		W2.3W/1	
W3W	*[6]	W3W/1	
W5W	*[6]	W5W/1	
W10W	*[6]	W10W/1	
W15/5W		W15/5W/1 to 3	
W16W		W16W/1	
W21W		W21W/1 to 2	
W21/5W		W21/5W/1 to 3	
WP21W		WP21W/1 to 2	
WPY21W		WP21W/1 to 2	
WR5W		W5W/1	
WR21/5W		WR21/5W/1	(W21/5W/2 to 3)
WT21W		WT21W/1 to 2	
WT21/7W		WT21/7W/1 to 3	
WTY21W		WT21W/1 to 2	
WTY21/7W		WT21/7W/1 to 3	
WY5W	*[6]	W5W/1	
WY10W	*[6]	W10W/1	
WY16W		W16W/1	
WY21W		WY21W/1 to 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	*[7], *[8]	C5W/1	38	12 months	38	unlimited
C21W	*[8]	C21W/1 to 2	28	12 months	28	unlimited
H1	*[7]	H1/1 to 3	38	12 months	38	unlimited
H3	*[7]	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	*[3]	HIR1/1 to 3	40	24 months	40	unlimited
HS1	*[7]	HS1/1 to 5	38	12 months	38	unlimited
HS2	*[7]	HS2/1 to 3	38	12 months	38	unlimited
HS6	*[4]	HS6/1 to 4	40	60 months	40	unlimited
P19W	*[8]	P19W/1 to 3	37	60 months	37	unlimited
P21W	*[7], *[8]	P21W/1 to 2	38	12 months	38	unlimited
P21/5W	*[7], *[8]	P21/5W/1 to 3	38	12 months	38	unlimited
PC16W	*[8]	PC16W/1 to 3	37	60 months	37	unlimited
PCR16W	*[8]	PC16W/1 to 3	37	12 months	37	unlimited
PCY16W	*[8]	PC16W/1 to 3	37	60 months	37	unlimited
PR19W	*[8]	P19W/1 to 3	37	12 months	37	unlimited
PR21/4W	*[8]	PR21/4W/1; (P21/5W/2 to 3)	40	24 months	40	unlimited
PR24W	*[8]	P24W/1 to 3	37	12 months	37	unlimited
PR27/7W	*[8]	PR27/7W/1; (P27/7W/2 to 3)	40	24 months	40	unlimited
PSR19W	*[8]	P19W/1 to 3	37	12 months	37	unlimited
PSR24W	*[8]	P24W/1 to 3	37	12 months	37	unlimited
PY19W	*[8]	P19W/1 to 3	37	60 months	37	unlimited
R2		R2/1 to 3	28	12 months	28	unlimited
R5W	*[7], *[8]	R5W/1	38	12 months	38	unlimited
R10W	*[7], *[8]	R10W/1	38	12 months	38	unlimited
RY10W	*[7], *[8]	R10W/1	38	12 months	38	unlimited
S1		S1/S2/1 to 2	28	12 months	28	unlimited
S2	*[7]	S1/S2/1 to 2	38	12 months	38	unlimited
S3		S3/1	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*
T1.4W	*[8]	T1.4W/1	40	24 months	40	unlimited
T4W	*[7], *[8]	T4W/1	38	12 months	38	unlimited
W3W	*[7], *[8]	W3W/1	38	12 months	38	unlimited
W5W	*[7], *[8]	W5W/1	38	12 months	38	unlimited
W10W	*[7], *[8]	W10W/1	38	12 months	38	unlimited
WY2.3W		WY2.3W/1	40	24 months	40	unlimited
WY5W	*[7]	W5W/1	40	12 months	40	unlimited
WY10W	*[7], *[8]	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:

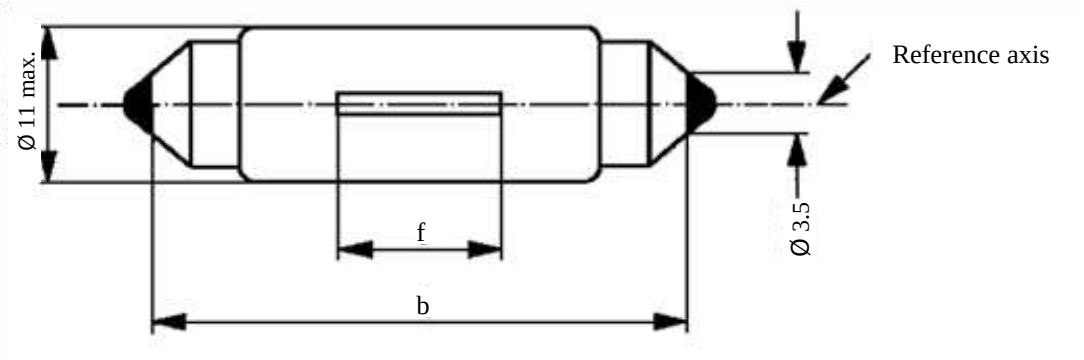
Sheet number(s)

C5W/1
C21W/1 to 2
H1/1 to 3
H3/1 to 4
H4/1 to 5
H7/1 to 4
H8/1 to 4
H9/1 to 4
H10/1 to 3
H11/1 to 4
H12/1 to 3
H13/1 to 4
H14/1 to 4
H15/1 to 5
H16/1 to 4
H17/1 to 6
H18/1 to 4
H19/1 to 5
H20/1 to 4
H6W/1
H10W/1 to 2
H21W/1 to 2
H27W/1 to 3
HB3/1 to 4
HB4/1 to 4
HIR1/1 to 3
HIR2/1 to 3
HS1/1 to 5
HS2/1 to 3
HS5/1 to 4
HS5A/1 to 3
HS6/1 to 4
P13W/1 to 3
P19W/1 to 3
P21W/1 to 2
P21/4W/1
P21/5W/1 to 3
P24W/1 to 3
P27W/1 to 2

Sheet number(s)
P27/7W/1 to 3
PC16W/1 to 3
PR21W/1
PR21/4W/1
PR21/5W/1
PR27/7W/1
PSX26W/1 to 3
PY21W/1
PY21/5W/1 to 3
PY27/7W/1
R2/1 to 3
R5W/1
R10W/1
S1/S2/1 to 2
S3/1
T1.4W/1
T4W/1
W2.3W/1
W3W/1
W5W/1
W10W/1
W15/5W/1 to 3
W16W/1
W21W/1 to 2
W21/5W/1 to 3
WP21W/1 to 2
WR21/5W/1
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.

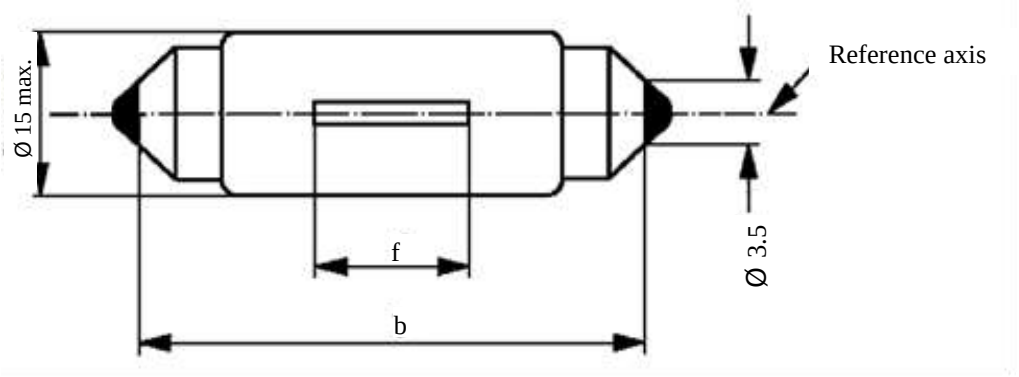
4/ 4.5 mm for 6 V filament lamps.

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

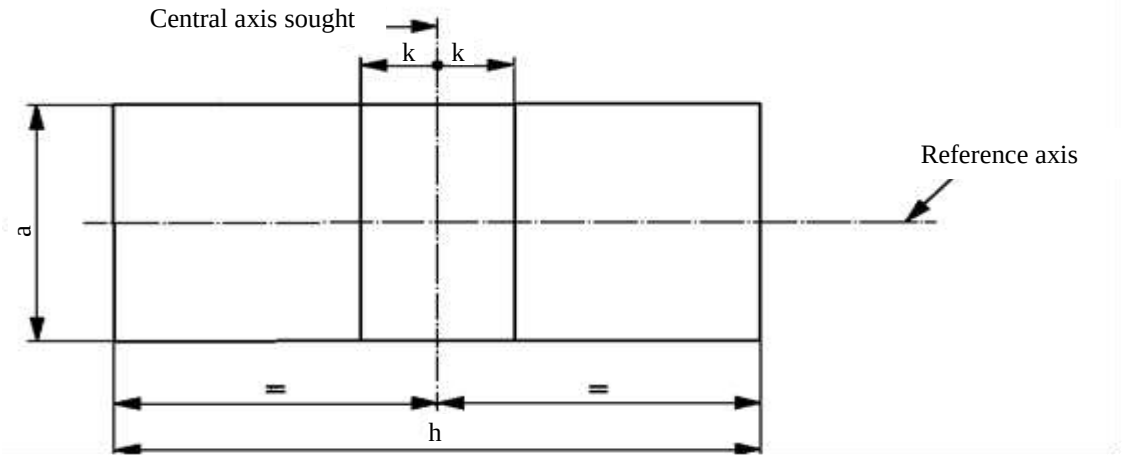


Dimensions in mm			*Filament lamps of normal production*			*Standard filament lamp*
			Min.	*Nom.*	*Max.*	
b [1/]			40.0	41.0	42.0	41.0 ± 0.5
f [2/]			7.5		10.5	8 ± 1.0
Cap SV8.5 in accordance with IEC Publication 60061 (sheet 7004-81-4)						
Electrical and photometric characteristics						
Rated values		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.

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.

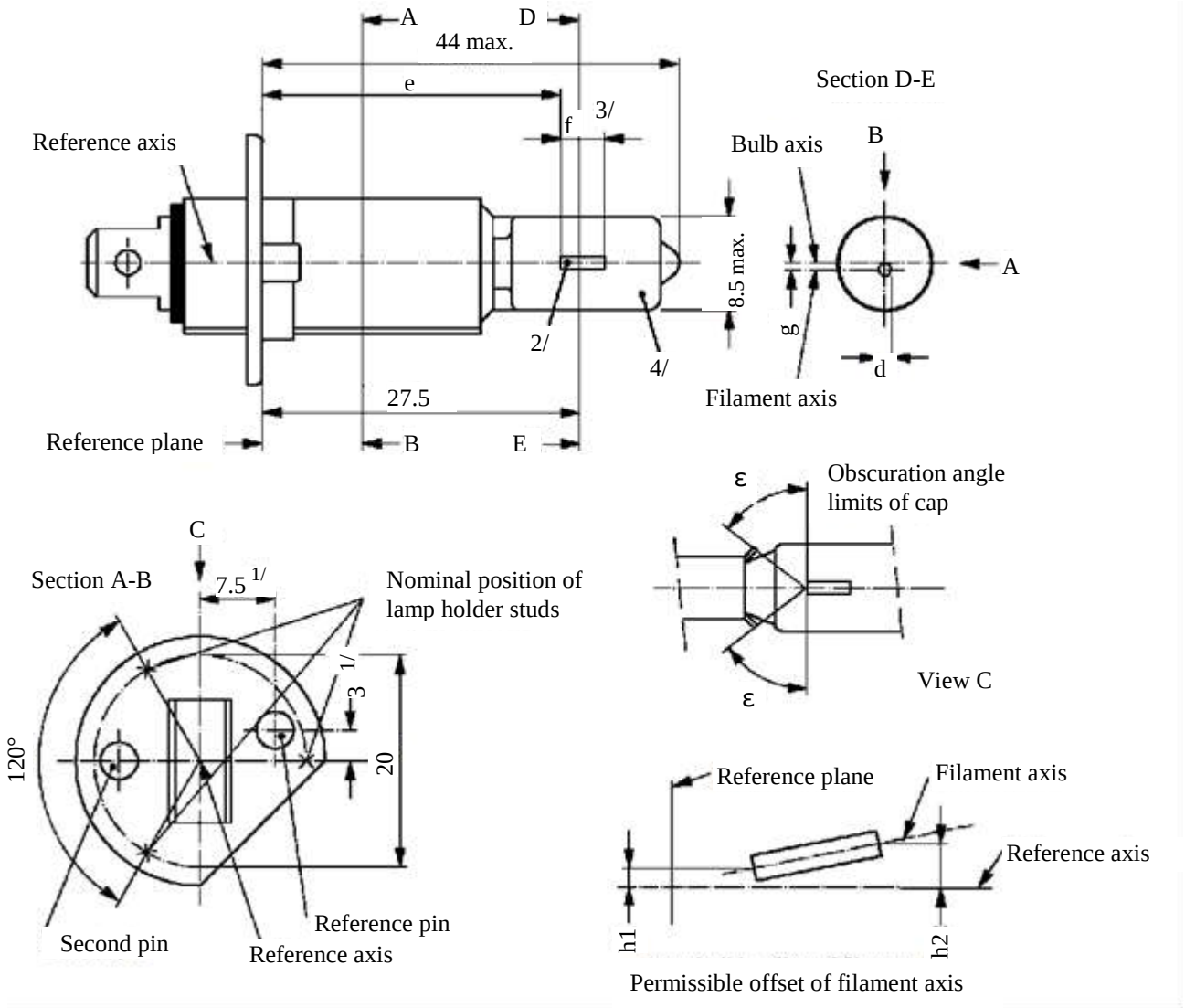
2. Front elevation

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 legs shall be positioned in the bulb, the longer leg 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.

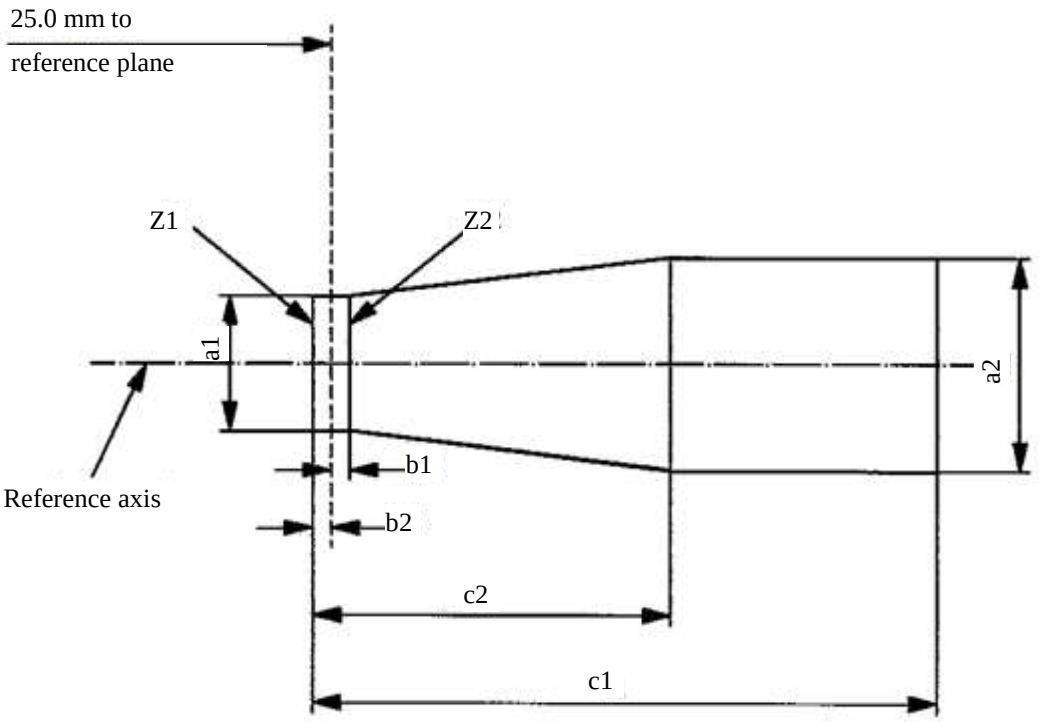
[8/] d: diameter of filament.

[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).

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	1.4d	1.9 d	0.25		6	3.5
12 V					6	4.5
24 V					7	4.5

d = diameter of filament.

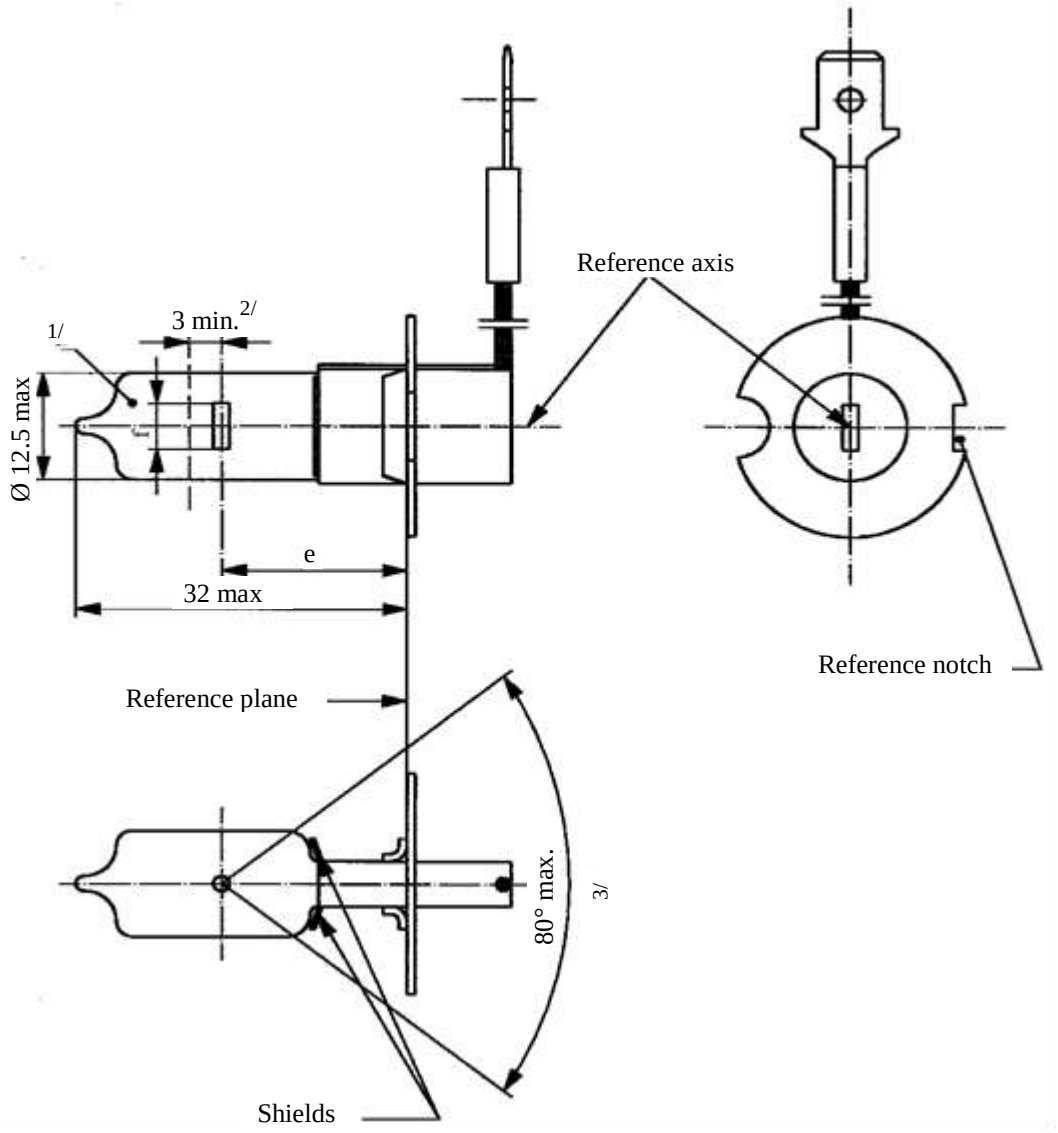
The filament position is checked solely in directions A and B as shown on sheet H1/1.

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



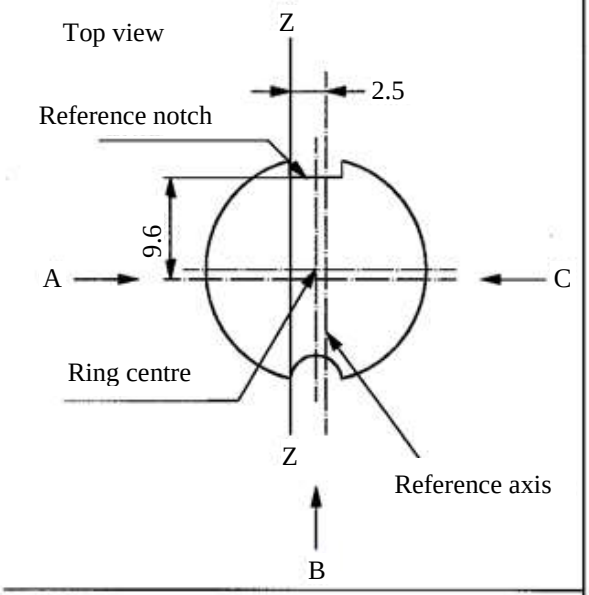
1/ The colour of the light emitted shall be white or selective-yellow.

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

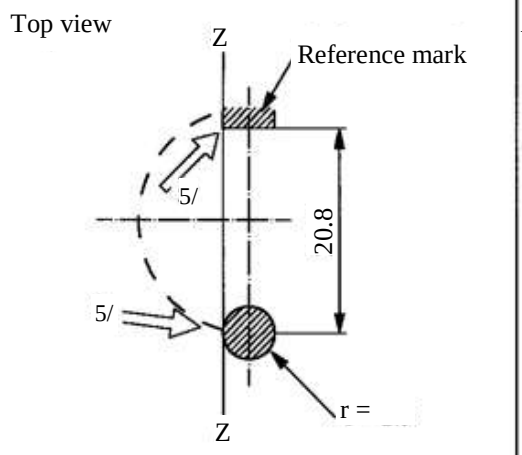
3/ The distortion of the base-end portion of the bulb shall not be visible from any direction outside the obscuration angle of 80° max. The shields shall produce no inconvenient reflections. The angle between the reference axis and the plane of each shield, measured on the bulb side, shall not exceed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

Category H3 **Sheet H3/2**

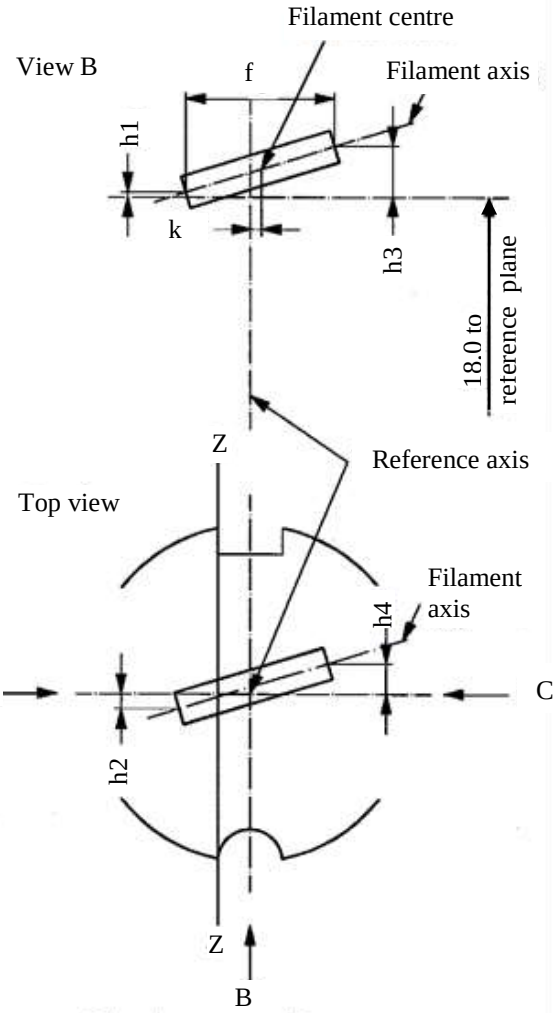
Definition: Ring centre and reference axis[4/]



Definition of Z - Z



Filament position and dimensions



View A: measuring h2
View B: measuring k, h1, h3, f
View C: measuring h4

[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.

Dimensions in mm		*Filament 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

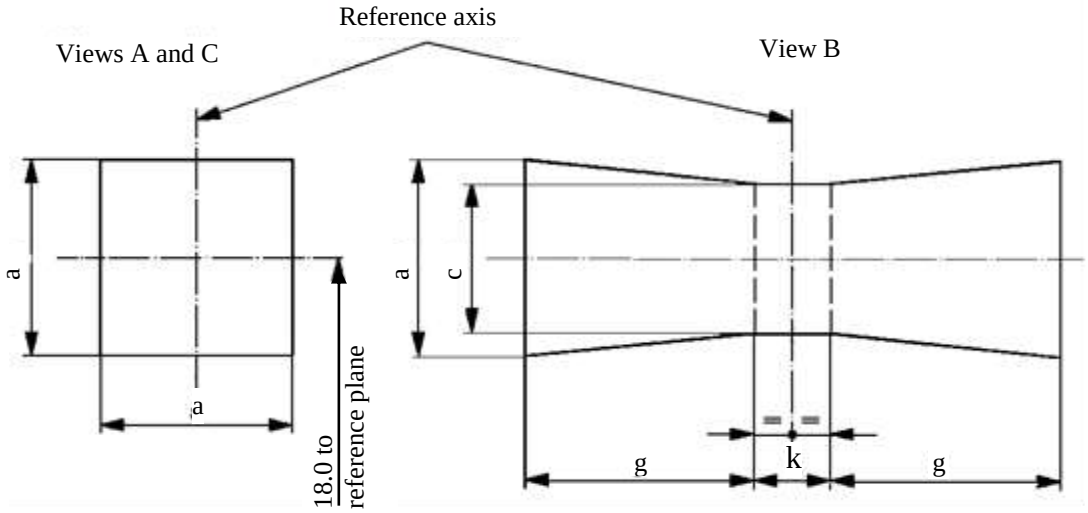
[6/] To be checked by means of a "Box system"; sheet H3/4.

[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).

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

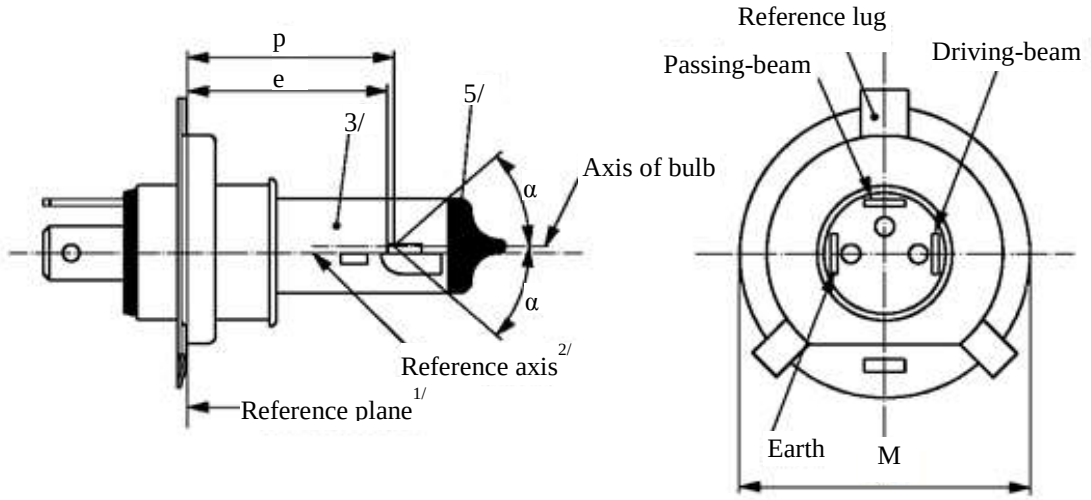


Figure 1 – Main drawing

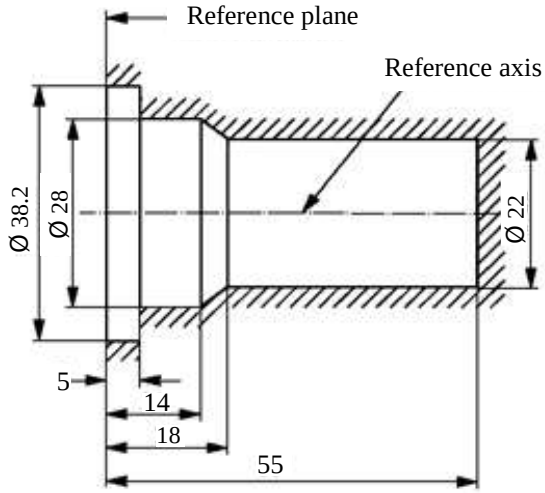


Figure 2

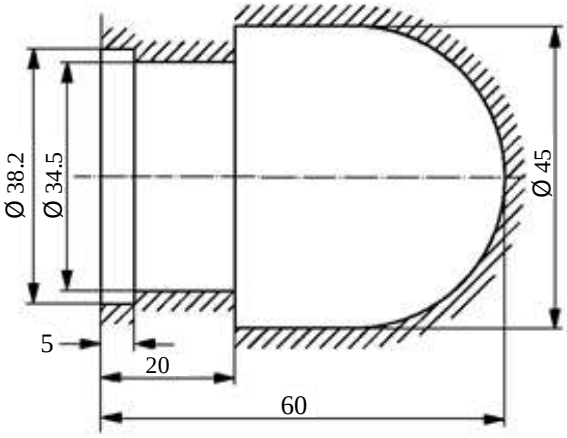


Figure 3

Maximum lamp outlines 4/

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.

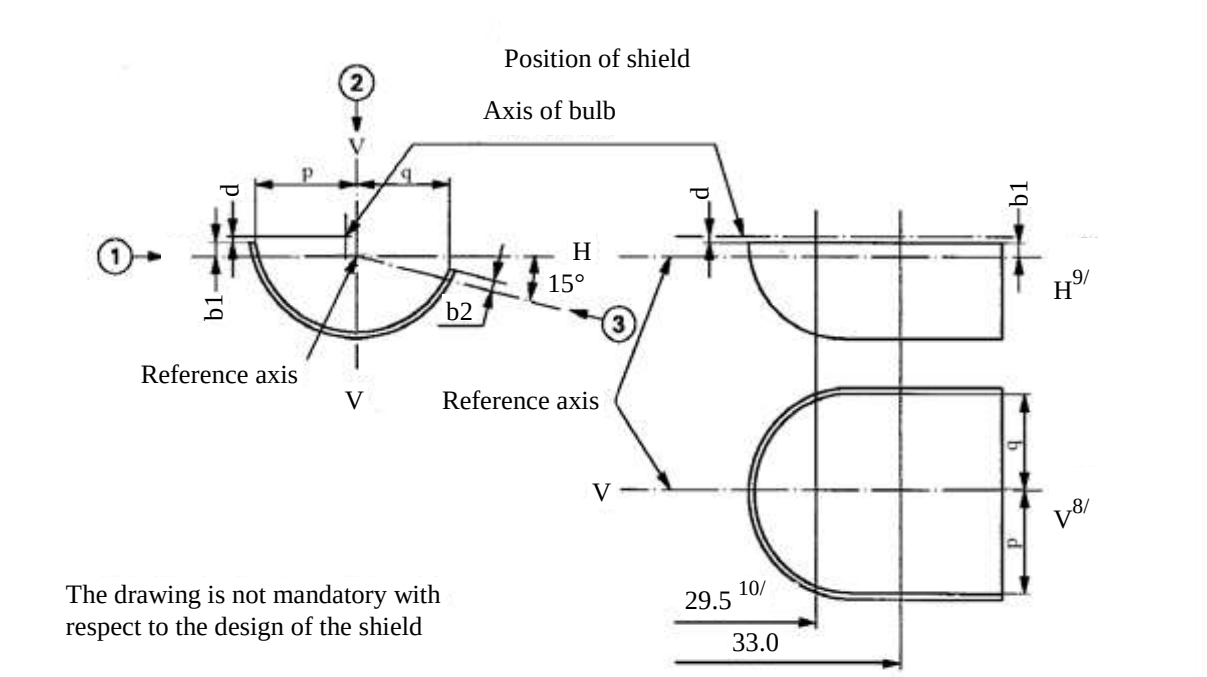
Category H4 **Sheet H4/2**

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

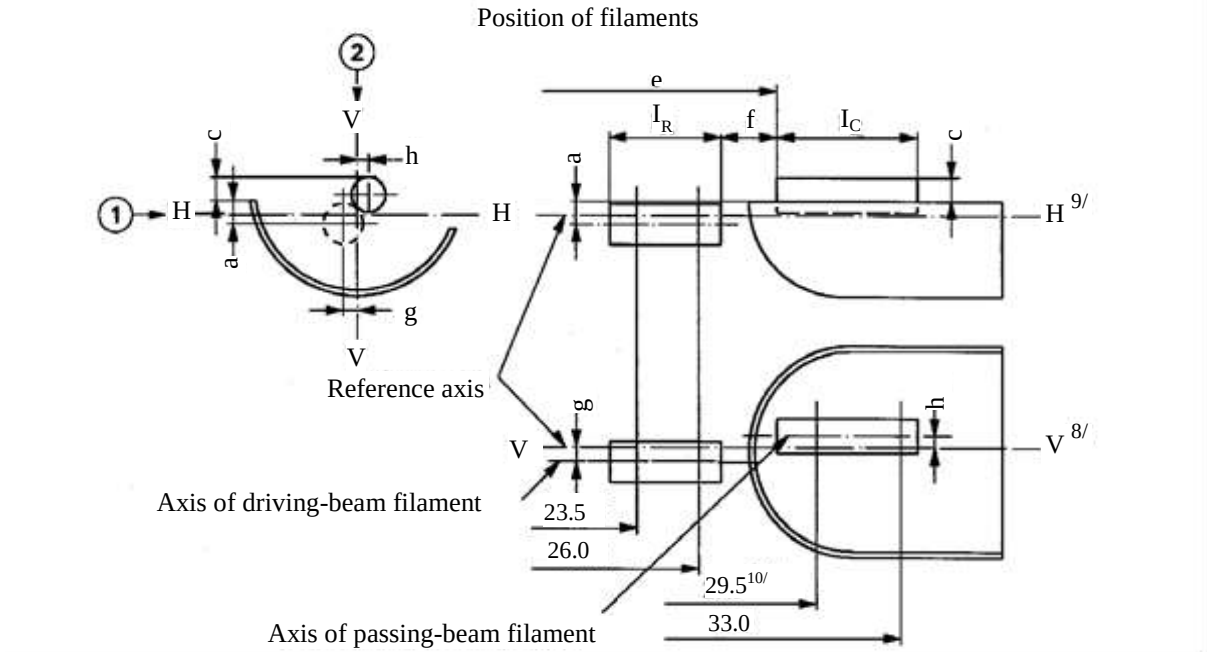
[6/] The value indicated in the left hand column relate to the driving-beam filament. Those indicated in the right-hand column relate to the passing-beam filament.

[7/] Measuring luminous flux for measuring according to paragraph 3.9. of this Regulation.

Category H4 **Sheet H4/3**



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



Category H4 **Sheet H4/4**

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

*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*
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/.

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.

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

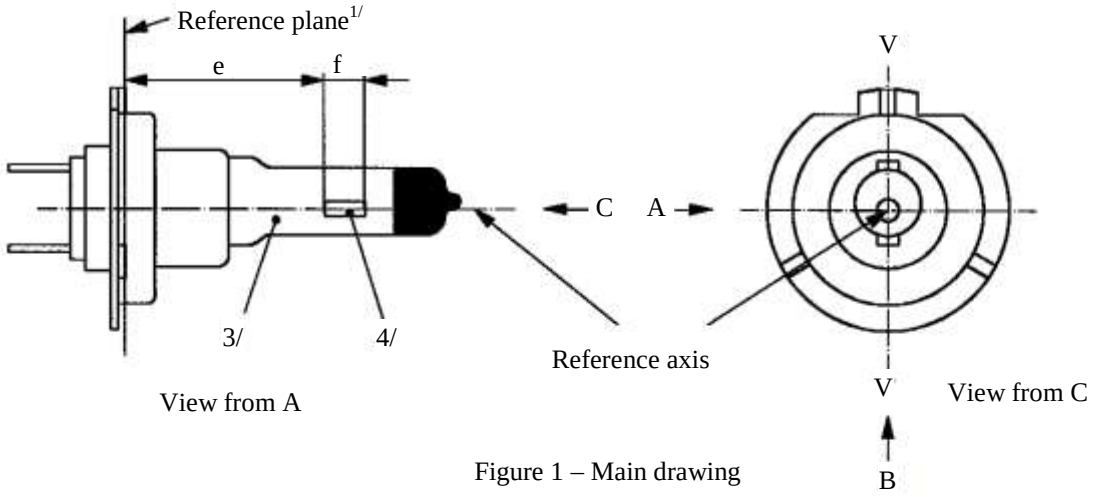


Figure 1 – Main drawing

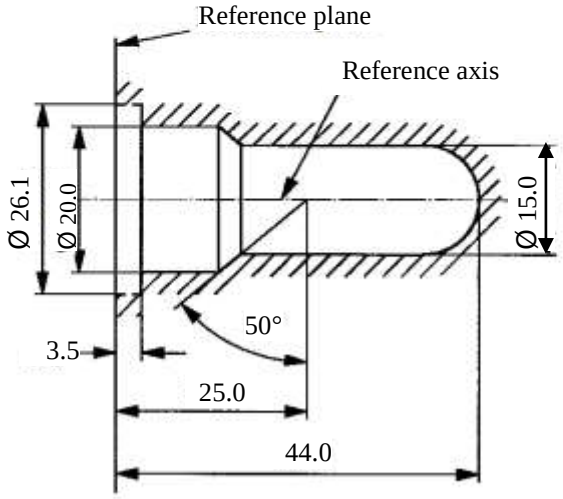


Figure 2 – Maximum lamp outline5/

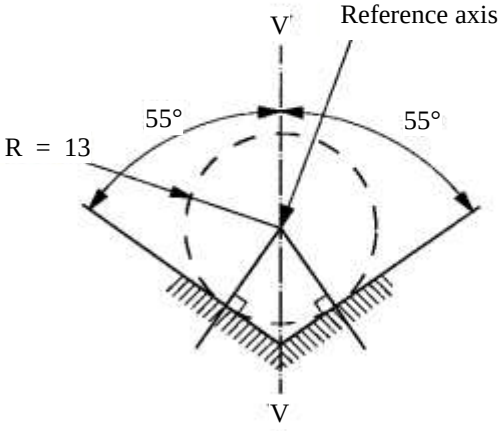


Figure 3 – Definition of reference axis2/

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 max. = 1.3 mm for 12 V and d 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.

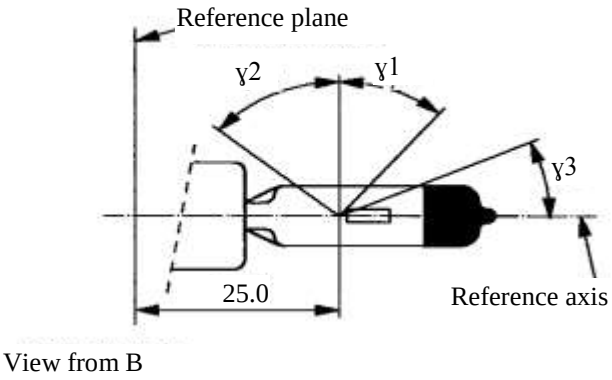


Figure 4 – Distorsion free area and black top[6/,7/]

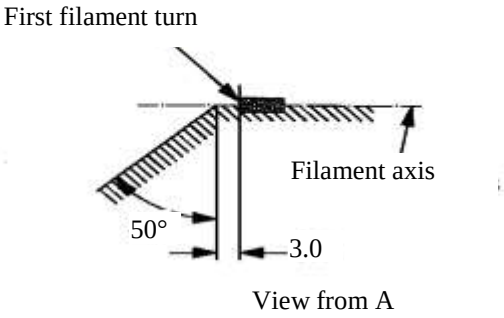


Figure 5 – Metal free zone[8/]

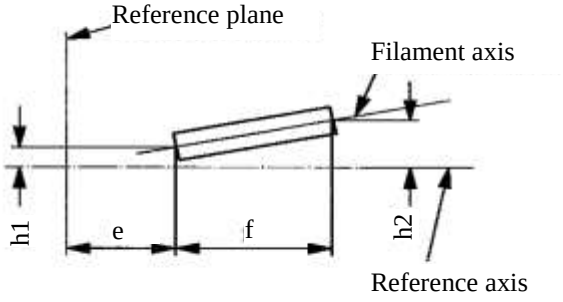


Figure 6 – Permissible offset of filament axis
(for standard filament lamps only)

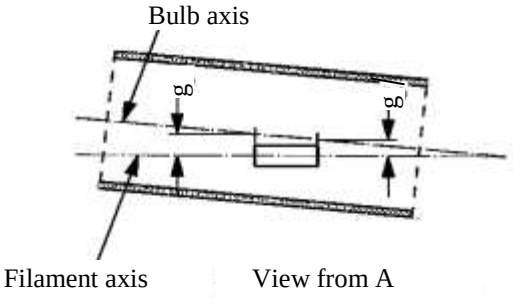


Figure 7 – Bulb eccentricity

6/ 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.

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 γ3 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		*Filament 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 7004-5-7)				
Electrical and photometric characteristics				
Rated values	Volts	12	24	12
	Watts	55	70	55
Test voltage	Volts	13.2	28.0	13.2
Objectivevalues	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.

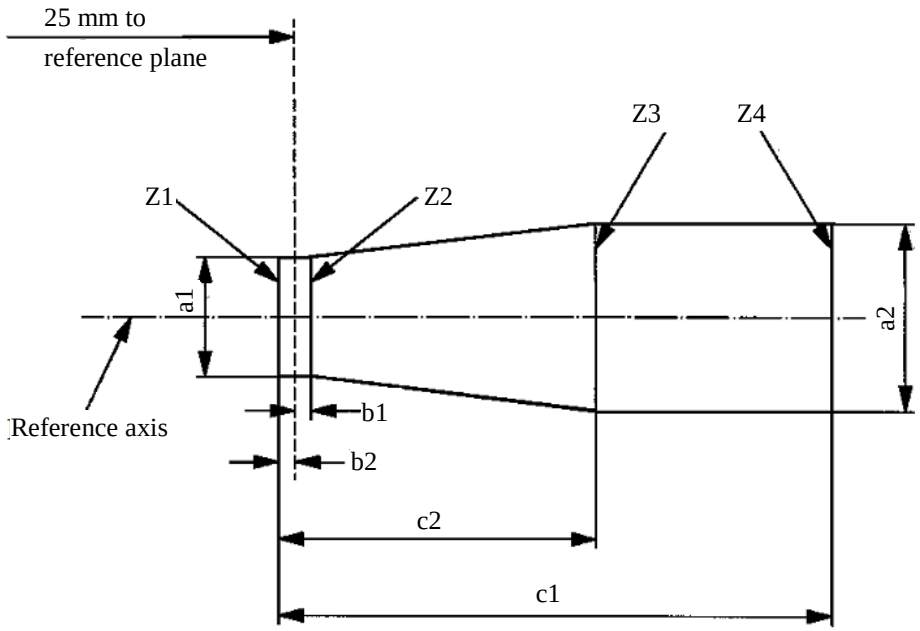
[11/] The offset of the filament with respect to the reference axis is measured only in viewing directions A and B as shown in Figure 1 in sheet H7/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament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

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
24V	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.

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

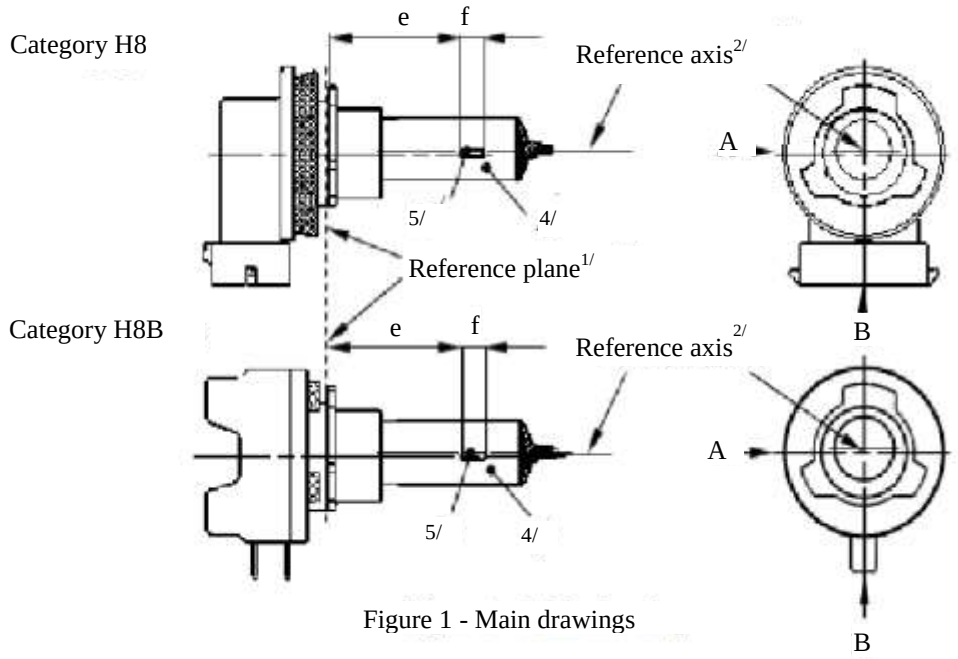


Figure 1 - Main drawings

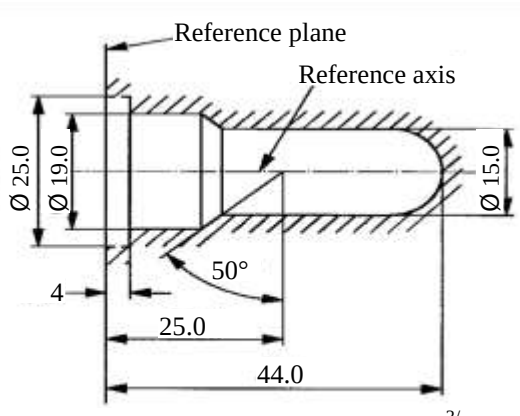


Figure 2 – Maximum lamp outline3/

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. = 1.2 mm.

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

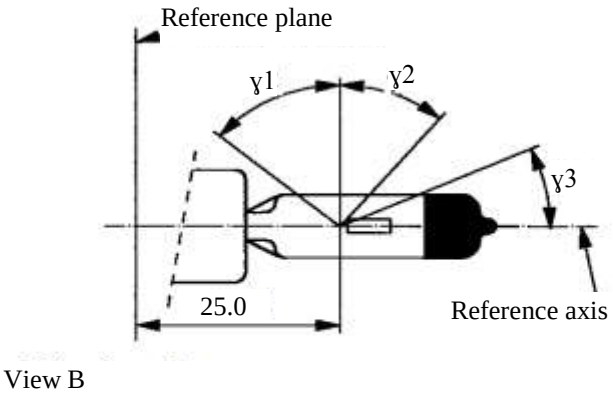


Figure 3 – Distorsion free area[6/] and black top[7/]

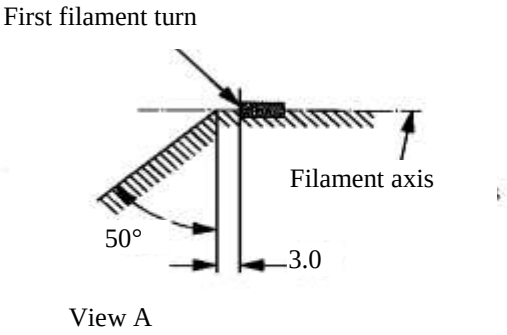


Figure 4 – Metal free zone[8/]

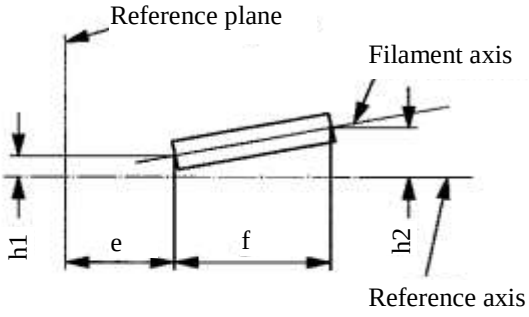


Figure 5 – Permissible offset of filament axis[9/]
(for standard filament lamps only)

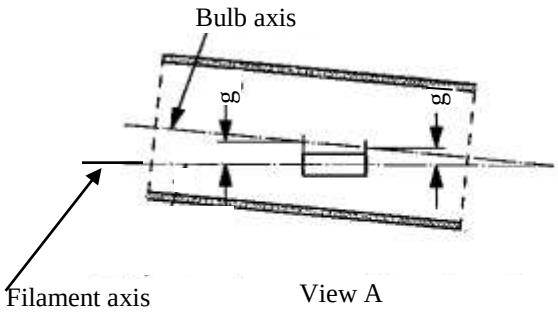


Figure 6 – Bulb eccentricity[10/]

[6/] Glass bulb shall be optically distortion free within the angles γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2.

[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 γ3 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**

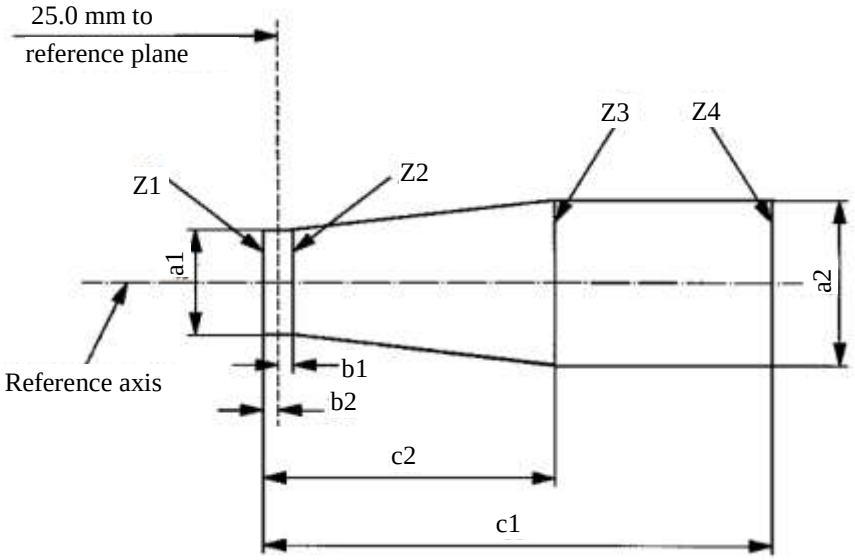
Dimensions in mm		*Filament lamps of normal production*	*Standard filament lamp*
		12 V	*12 V*
e [11/]		25.0 [12/]	25.0 ± 0.1
f [11/]		3.7 [12/]	3.7 ± 0.1
g		0.5 min.	u.c.
h1		0 [12/]	0 ± 0.1
h2		0 [12/]	0 ± 0.15
γ1		50° min.	50° min.
γ2		40° min.	40° min.
γ3		30° min.	30° min.
Cap:	H8: PGJ19-1	in accordance 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.

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.

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

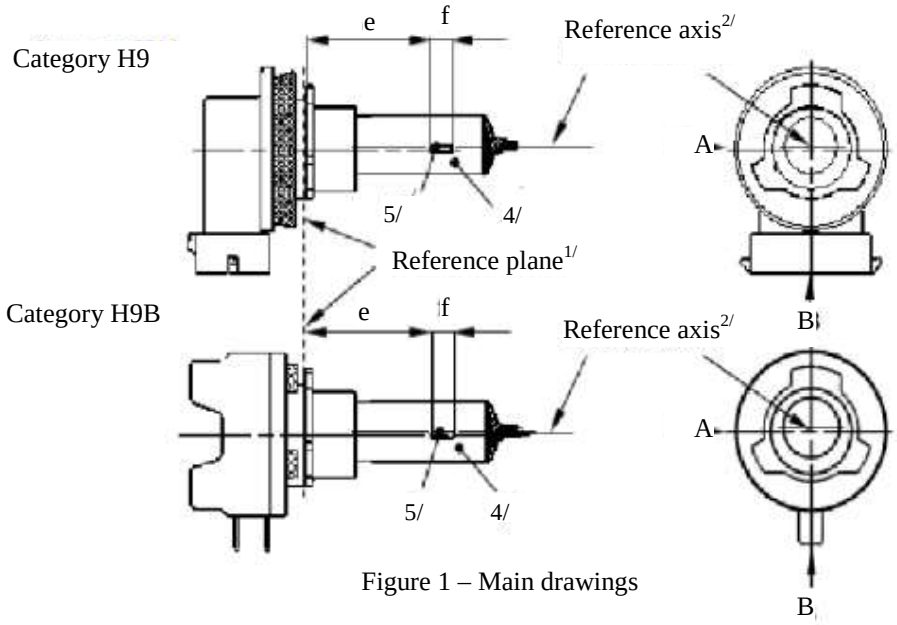


Figure 1 – Main drawings

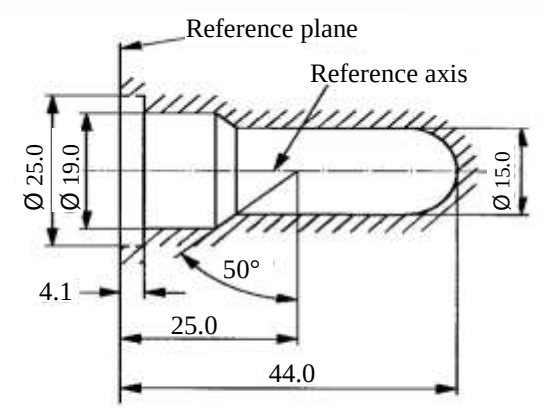


Figure 2 – Maximum lamp outline3/

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

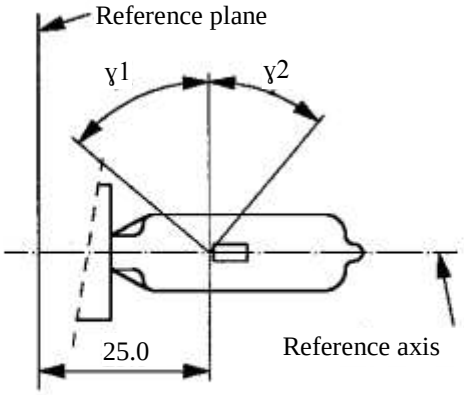
2/ The reference axis is perpendicular to the reference plane and passing through the centre of the 19 mm cap diameter.

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:

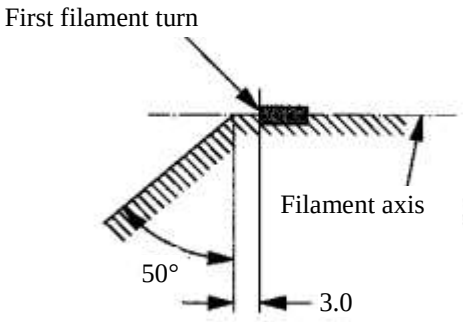
(a) No actual diameter restrictions apply but the objective for future developments is to have d max. = 1.4 mm.

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



View B

Figure 3 – Distorsion free area[5/]



View A

Figure 4 – Metal free zone[6/]

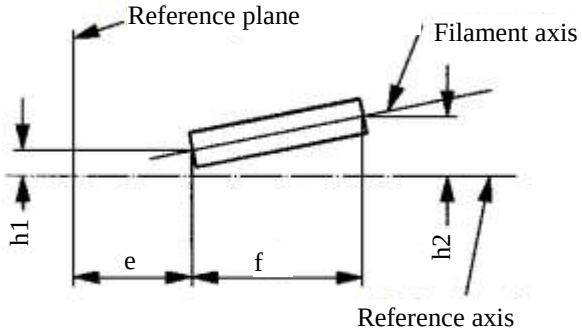


Figure 5 – Permissible offset of filament axis[7/]
(for standard filament lamps only)

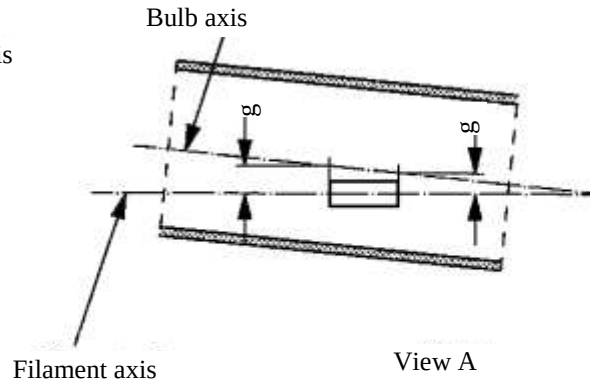


Figure 6 – Bulb eccentricity[8/]

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

[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.

Dimensions in mm		*Tolerance*	
		Filament 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.	-	-
Cap: 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.

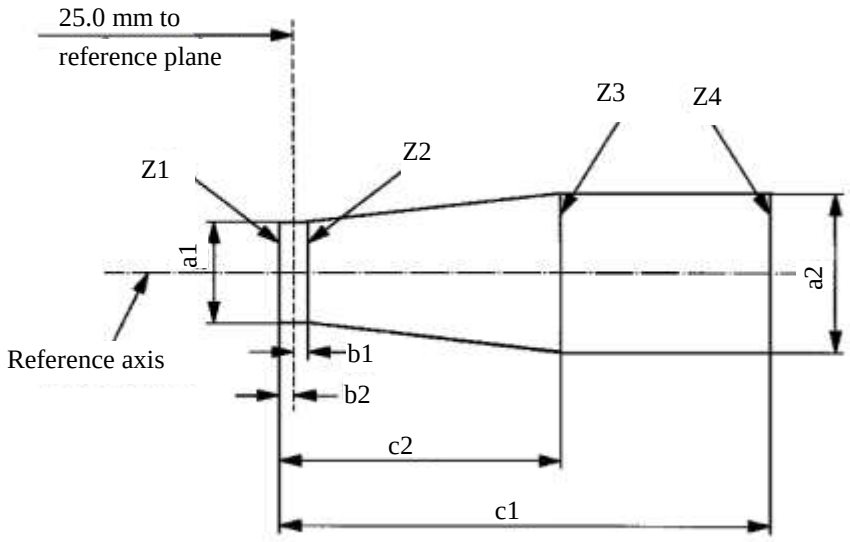
[10/] The ends of the filament are defined as the points where, when the viewing direction is as defined in footnote 9/ above, the projection of the outside of the end turns crosses the filament axis.

[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.

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

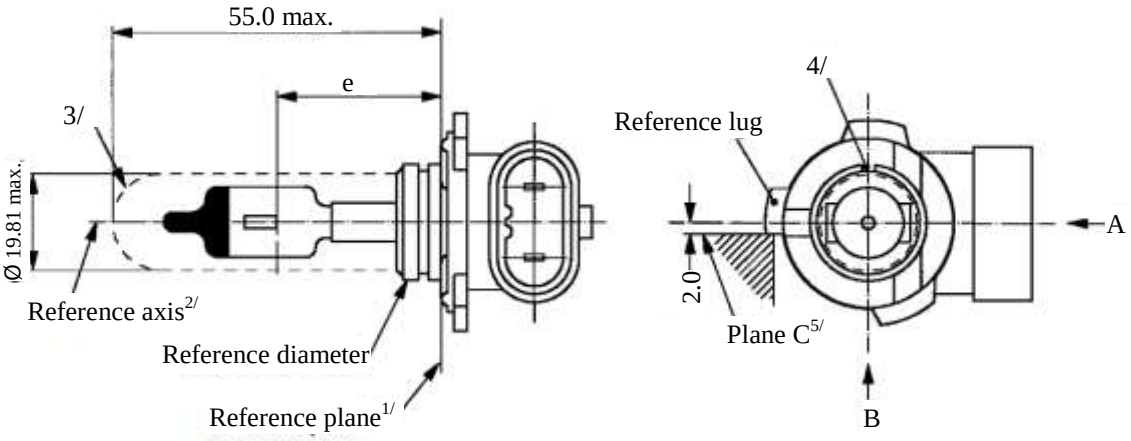
The filament position is checked solely in directions A and B as shown on sheet H9/1, Figure 1.

The filament shall lie entirely within the limits shown.

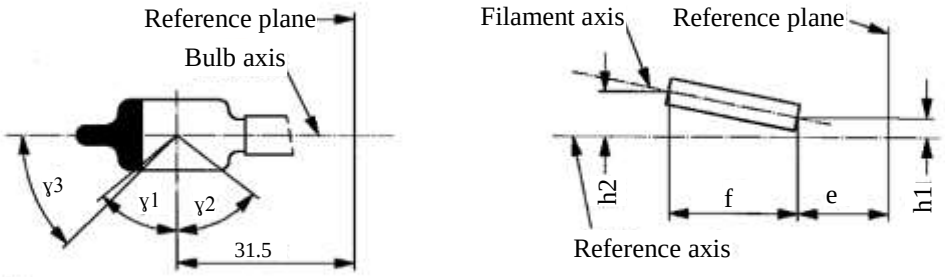
The ends of the filament as defined on sheet H9/3, footnote 10/, shall lie between lines Z1 and Z2 and between Z3 and Z4.

Category H10 **Sheet H10/1**

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



View A



View A — Distorsion free area6/ and black top7/ — Offset filament

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 γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2 and does not need to be verified in the area covered by the obscuration.

7/ The obscuration shall extend to at least angle γ3 and shall be at least as far as the undistorted part of the bulb defined by angle γ1.

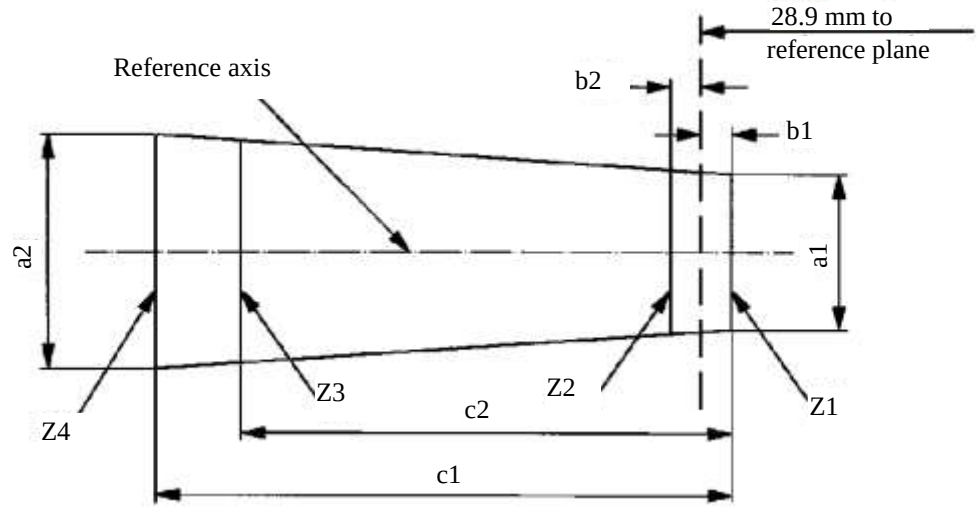
Category H10 **Sheet H10/2**

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.

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

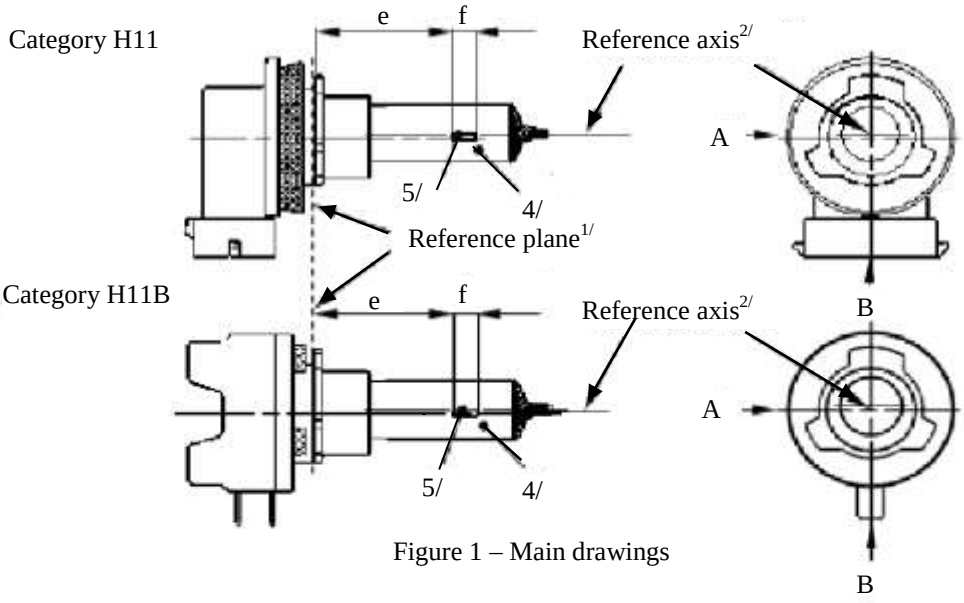


Figure 1 – Main drawings

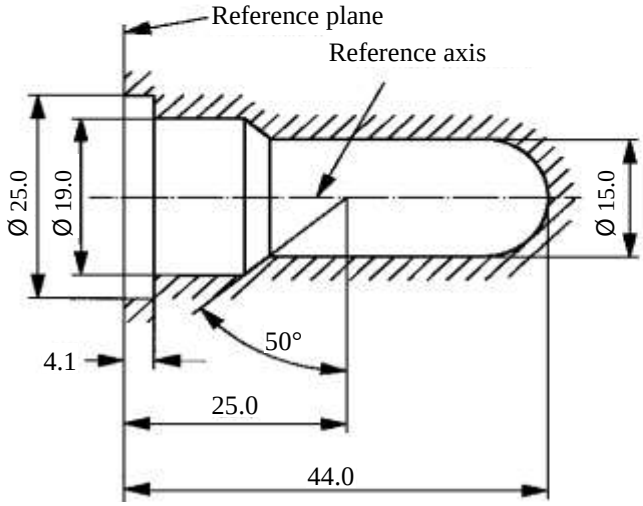


Figure 2 - Maximum lamp outline3/

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.

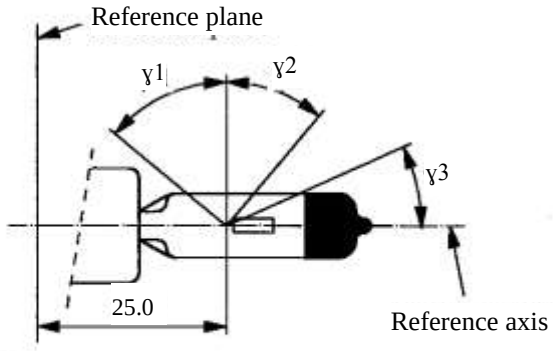
3/ Glass bulb and supports shall not exceed the envelope as indicated in Figure 2. The envelope is concentric to the reference axis.

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.



Distorsion free area[6/] and black top[7/]

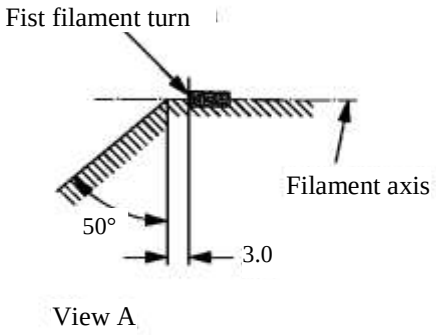


Figure 4 – Metal free zone[8/]

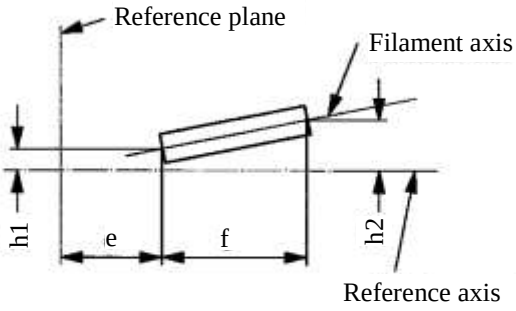


Figure 5 – Permissible offset of filament axis[9/]
(for standard filament lamps only)

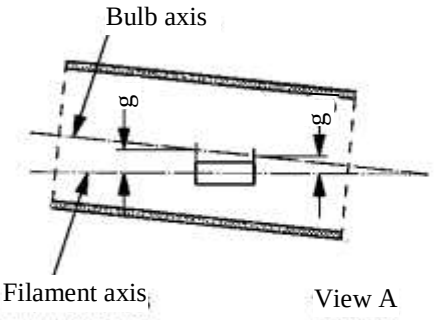


Figure 6 – Bulb eccentricity[10/]

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

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 γ3 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**

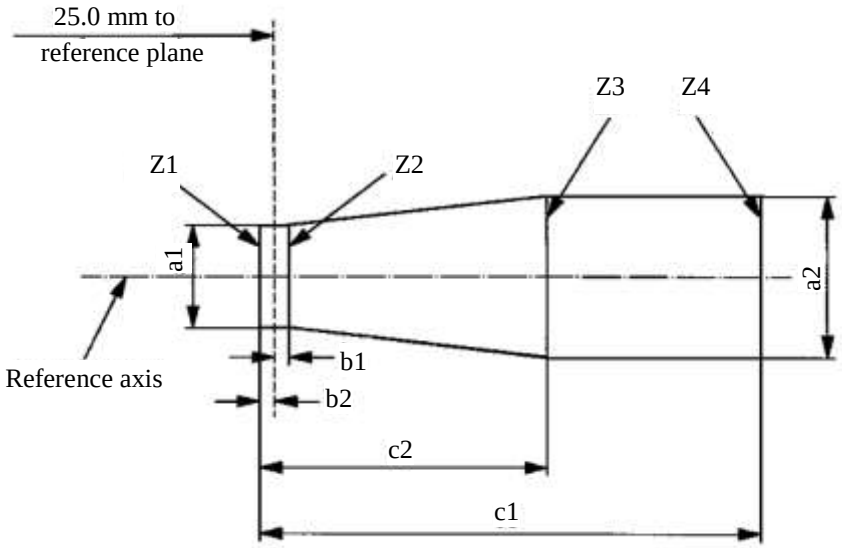
Dimensions in mm		*Filament lamps of normal production*		*Standard filament lamp*
		12 V	*24 V*	*12 V*
e [11/]		25.0 [12/]		25.0 ± 0.1
f [11/]		4.5	5.3 [12/]	4.5 ± 0.1
g		0.5 min.		u.c.
h1		0 [12/]		0 ± 0.1
h2		0 [12/]		0 ± 0.15
γ1		50° min.		50° min.
γ2		40° min.		40° min.
γ3		30° min.		30° min.
Cap:	H11: PGJ19-2	in accordance with IEC Publication 60061 (sheet 7004-110-2)		
	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.

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

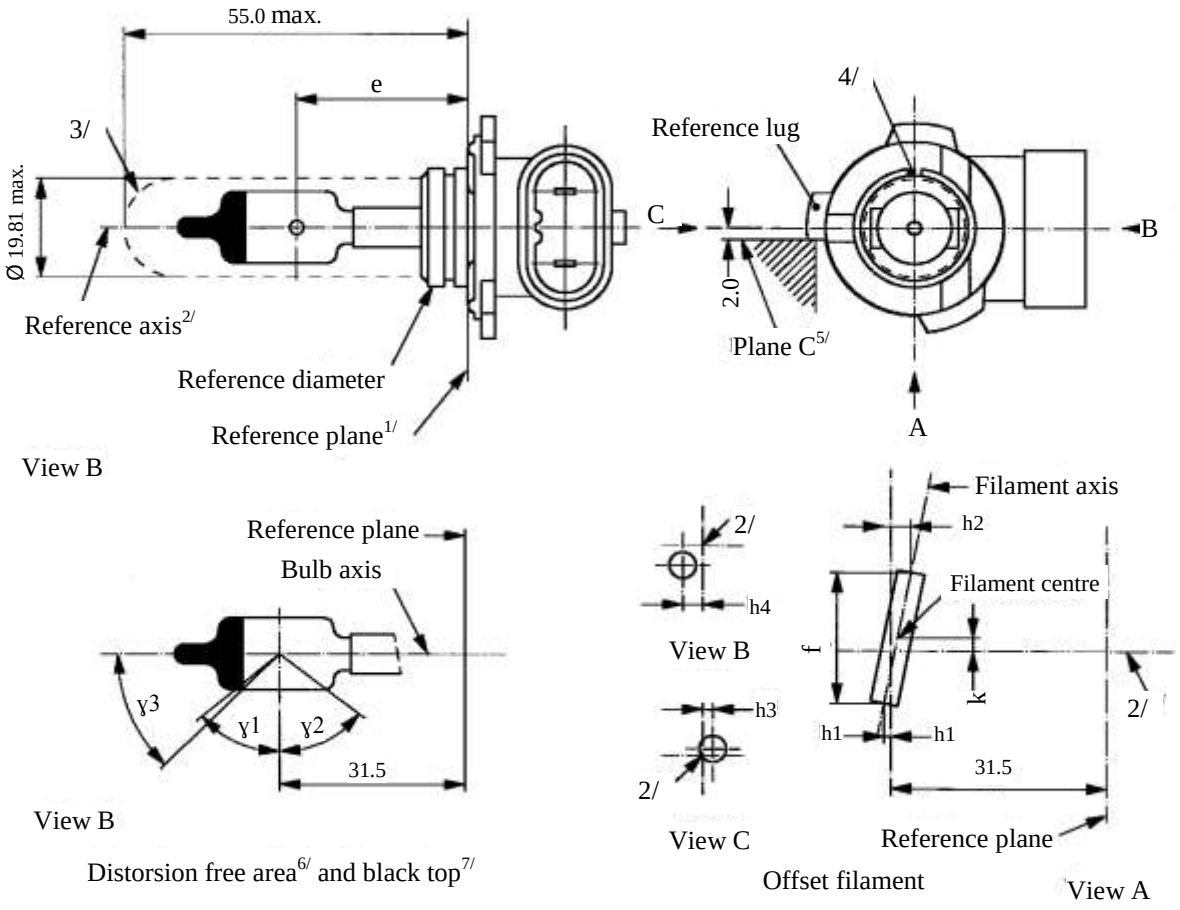
The filament position is checked solely in directions A and B as shown on sheet H11/1, Figure 1.

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



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 γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2 and does not need to be verified in the area covered by the obscuration.

7/ The obscuration shall extend to at least angle γ3 and shall be at least as far as the undistorted part of the bulb defined by angle γ1.

Category H12 **Sheet H12/2**

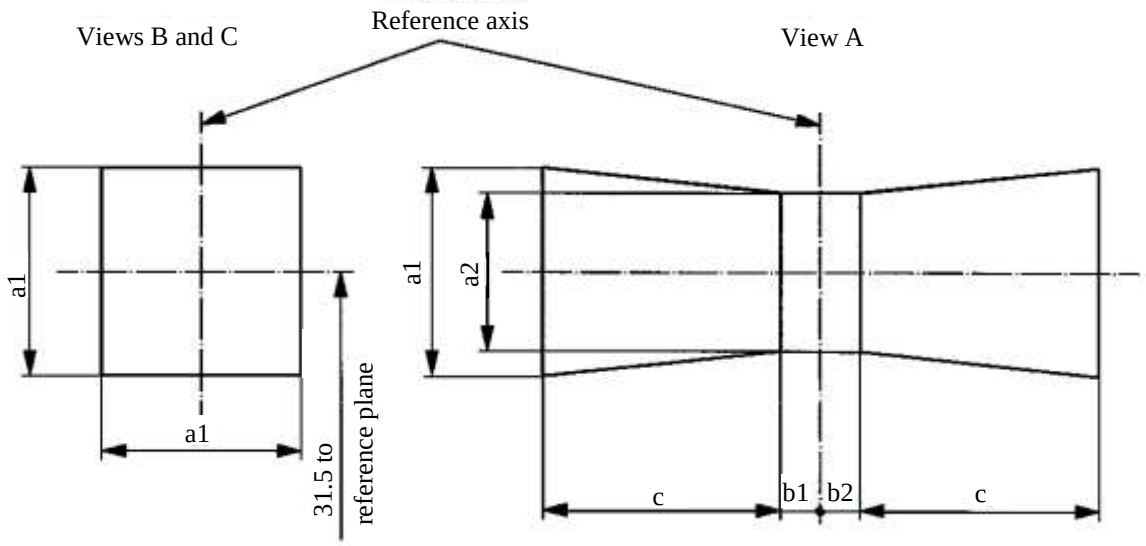
Dimensions in mm [8/]			*Tolerance*	
			Filament lamps of normal production	*Standard filament lamp*
e [9/,10/]	31.5		[11/]	±0.16
f [9/,10/]	5.5		4.8 min	±0.16
h1, h2, h3, h4	0		[11/]	±0.15 [12/]
k	0		[11/]	±0.15 [13/]
γ1	50° min.		-	-
γ2	52° min.		-	-
γ3	45°		±5°	±5°
Cap PZ20d in accordance with IEC 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 b1 and b2.

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

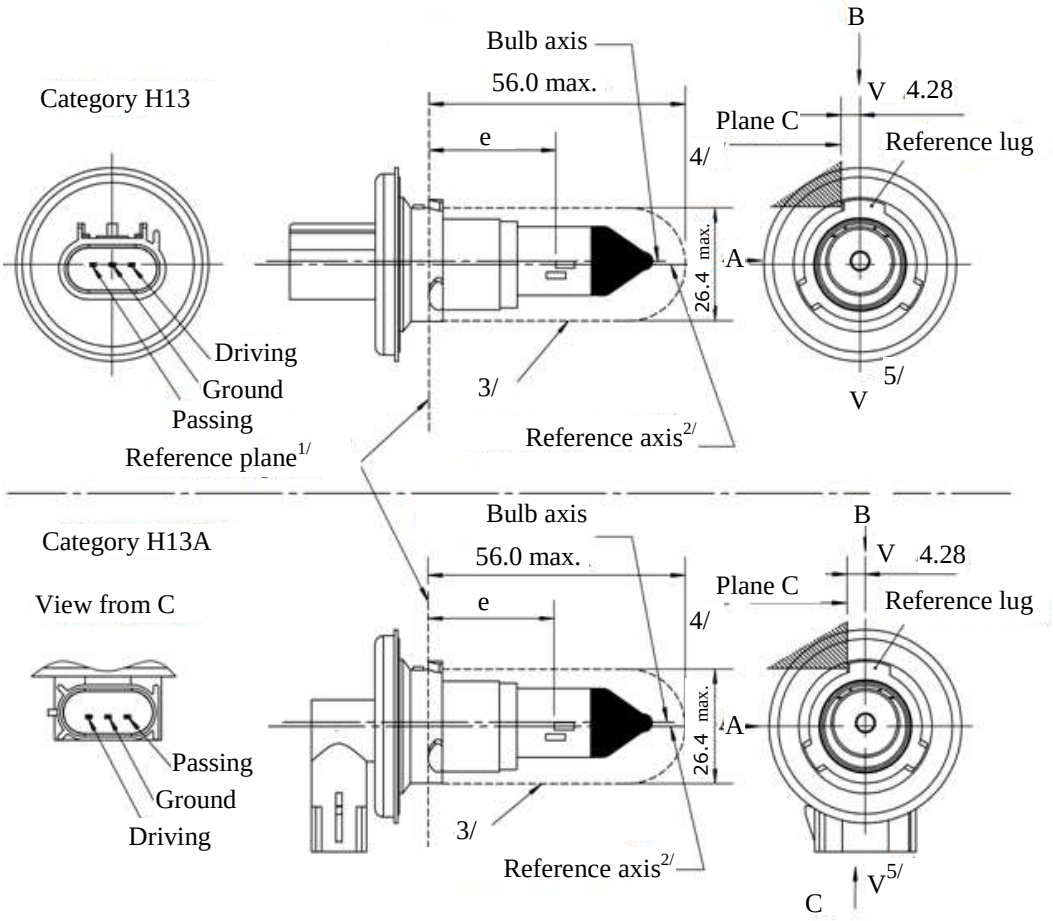


Figure 1 - Main drawing

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.

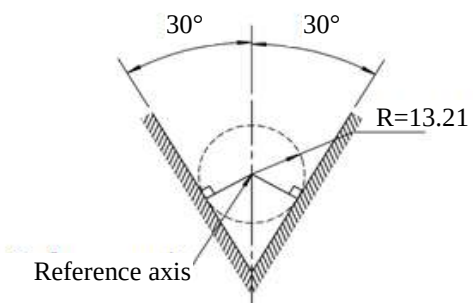


Figure 2 – Definition of reference axis[2/]

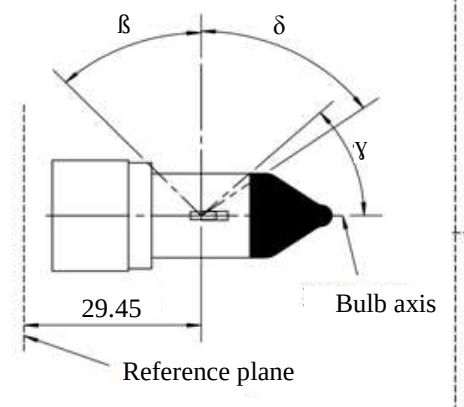
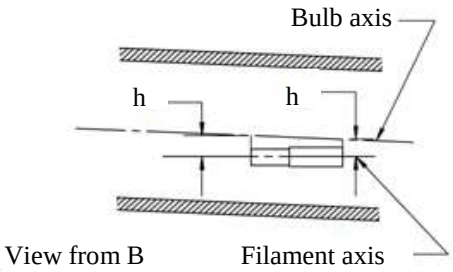


Figure 3 – Undistorted area[6/] and opaque coating[7/]



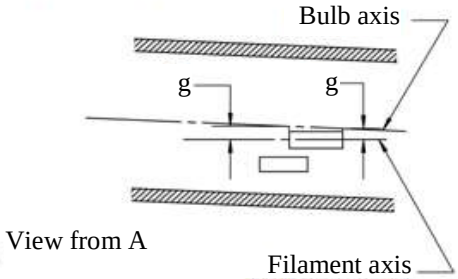


Figure 4 – Bulb offset[8/]

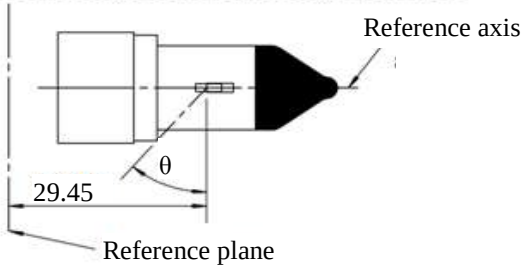


Figure 5 – Light blocking toward cap[9/]

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.

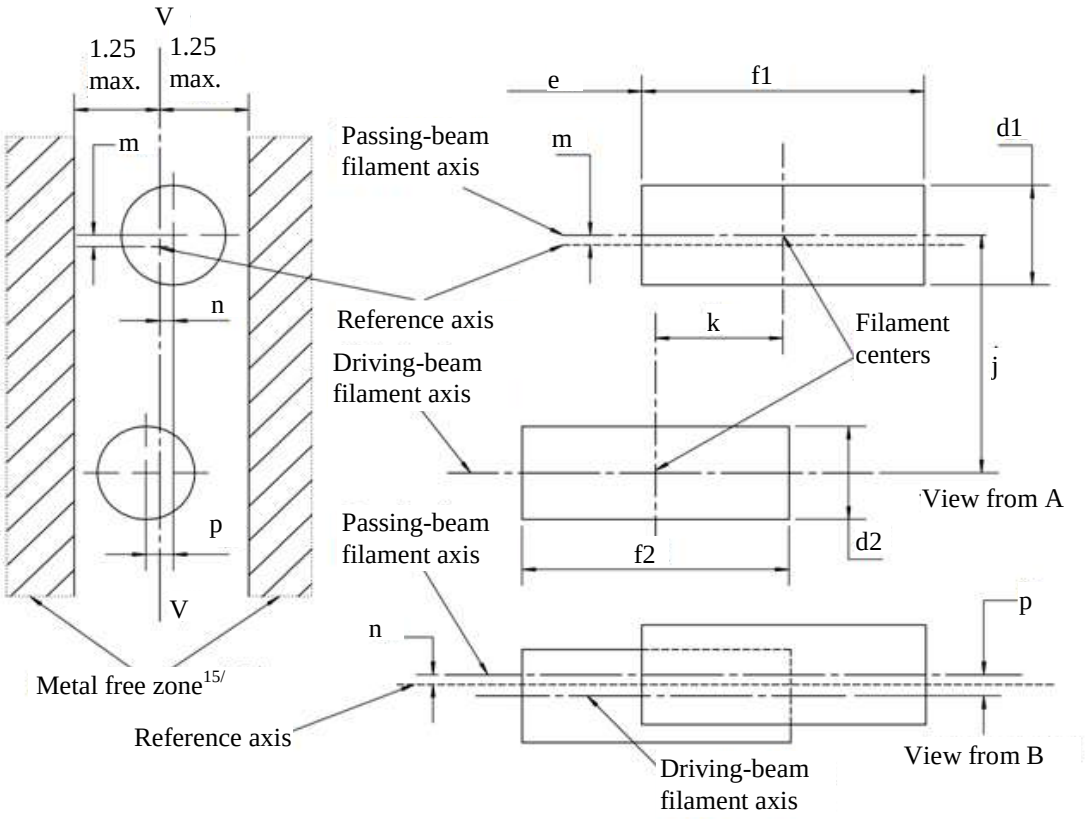


Figure 6 – Position and dimensions of filaments 10/, 11/, 12/, 13/, 14/

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.
(a) 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*	
		Filament 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°
Cap: H13: P26.4t H13A: PJ26.4t	in accordance with IEC Publication 60061 (sheet 7004-128-3)		
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.

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

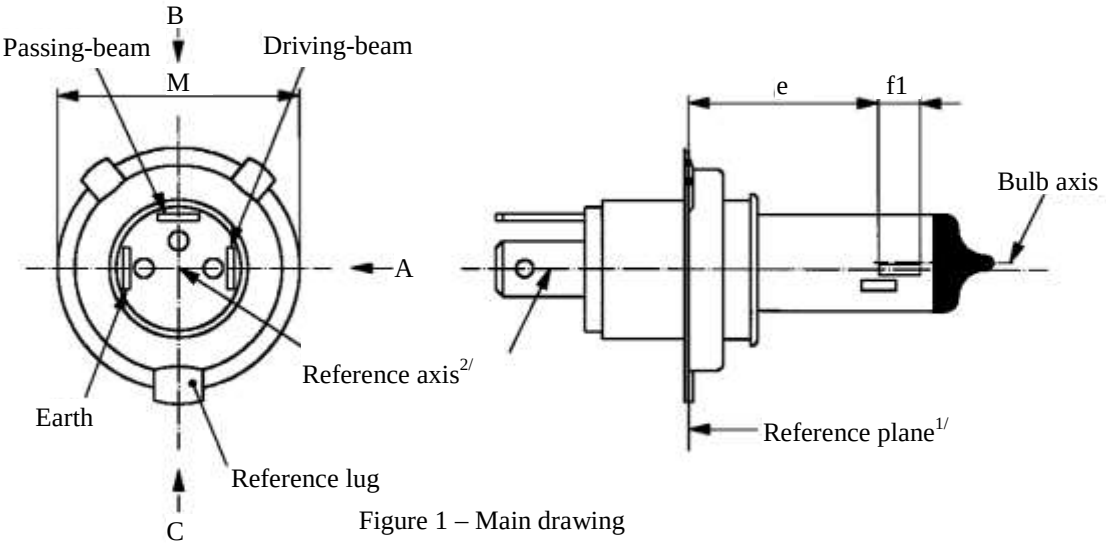


Figure 1 – Main drawing

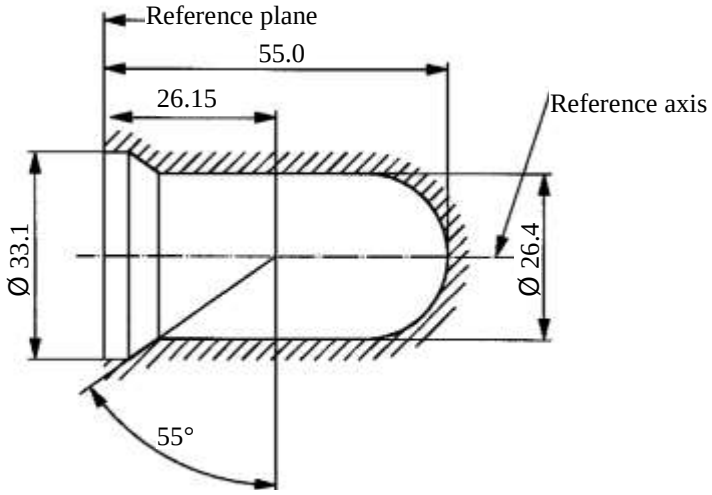


Figure 2 – Maximum lamp outline3/

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.

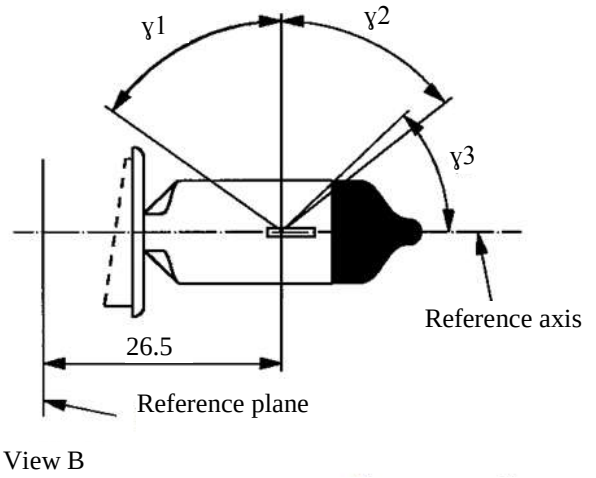


Figure 3 – Distorsion free area[4/] and black top[5/]

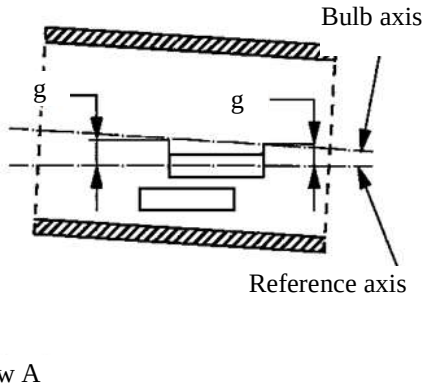


Figure 4 – Bulb eccentricity[6/]

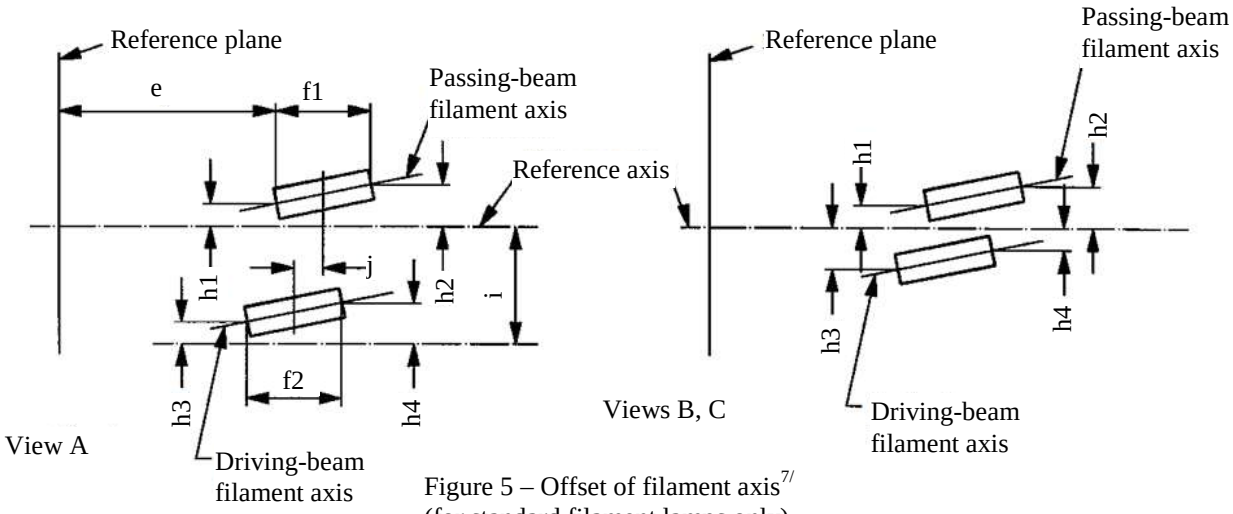


Figure 5 – Offset of filament axis[7/]
(for standard filament lamps only)

[4/] Glass bulb shall be optically distortion free within the angles γ1 and γ2 . This requirement applies to the whole bulb circumference within the angles γ1 and γ2 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 γ3 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

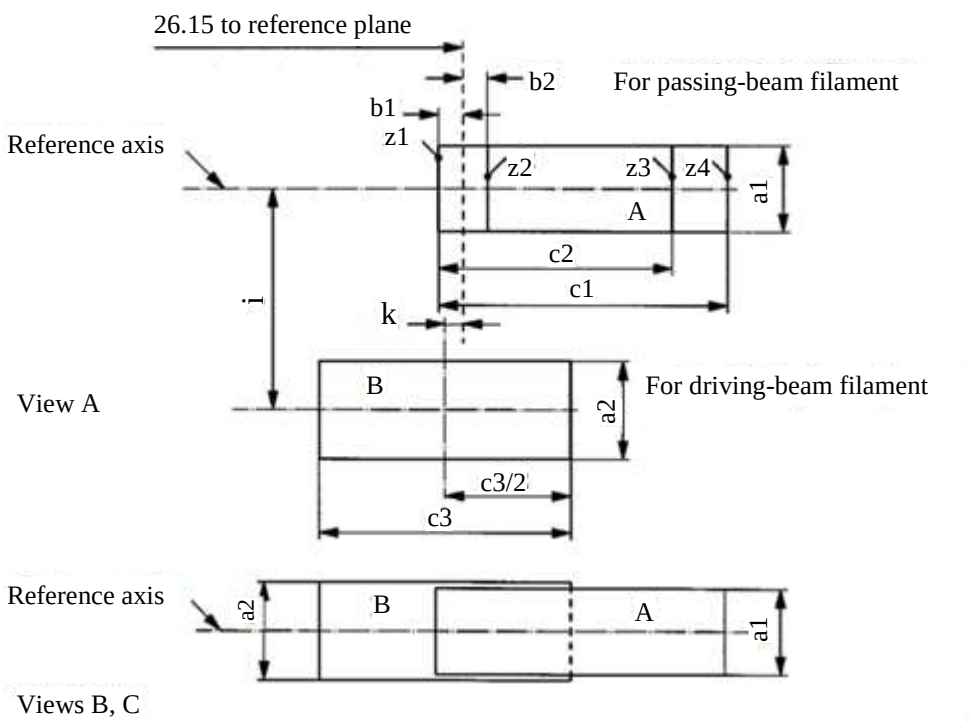
[8/] The ends of the filaments are defined as the points where, when the viewing direction is direction A as shown in Figure 1 on sheet H14/1, the projection of the outside of the end turns crosses the filaments axis.

[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.

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.

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

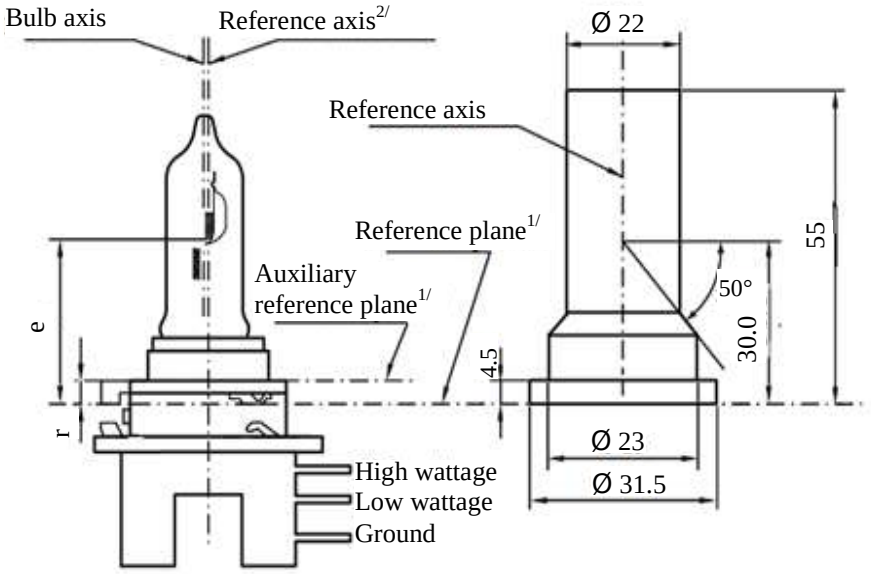


Figure 1 – Main drawing

Figure 3 - Maximum lamp outlines3/

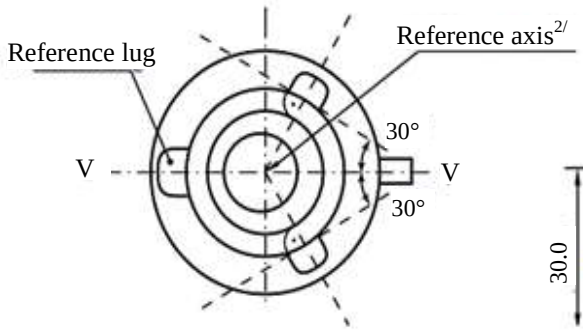


Figure 2 – Definition of reference axis7/

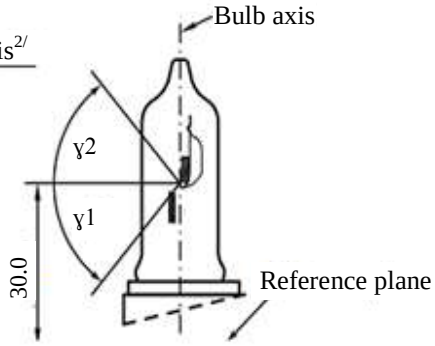


Figure 4 - Distorsion free area4/

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 γ_1 and γ_2 as indicated in Figure 4. This requirement applies to the whole bulb circumference within the angles γ_1 and γ_2.

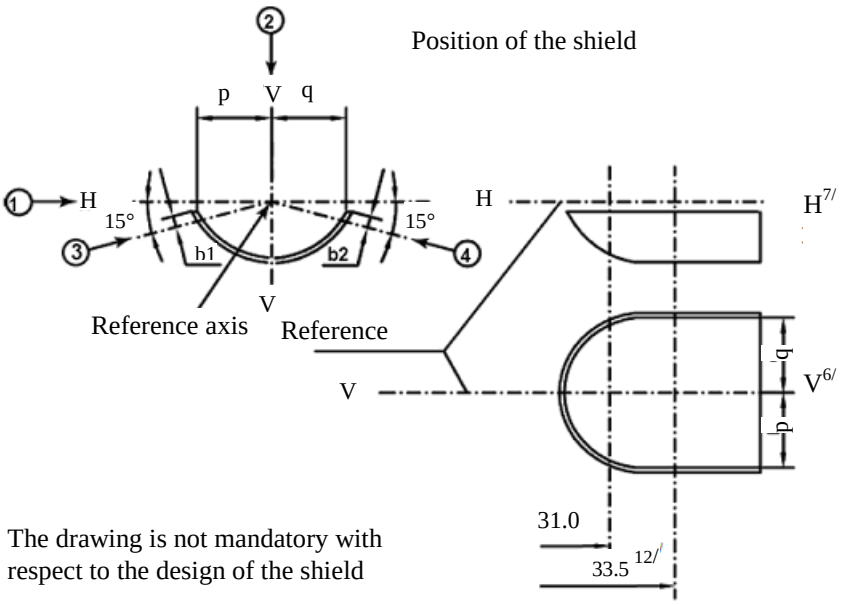
Category H15 **Sheet H15/2**

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	
γ_1		50°min		50°min		50°min	
γ_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

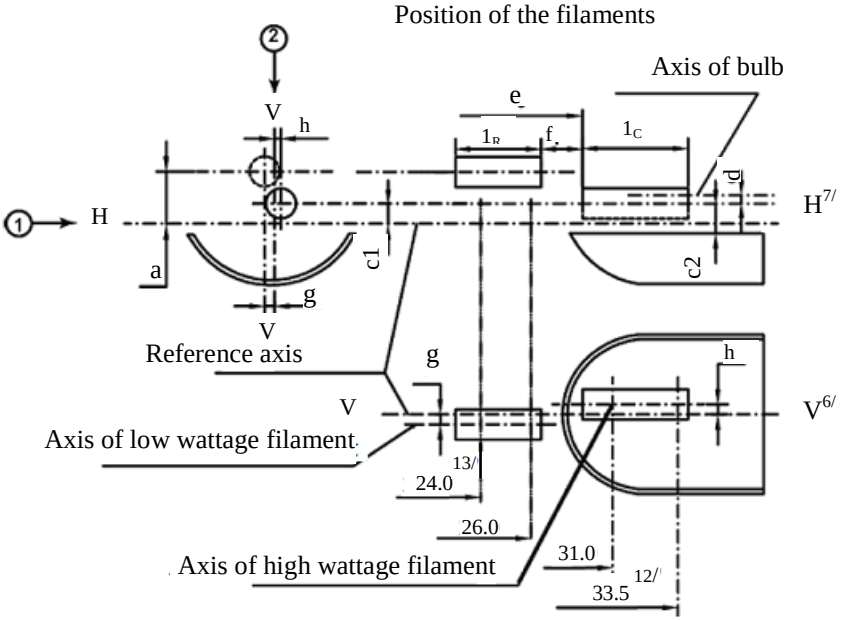


Table of the dimensions (in mm) referred to in the drawings on sheet H15/3

*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
1_R [8/, 11/]		4.2	4.6	±0.40	±0.60	±0.20	±0.30
1_C [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.

Additional explanations to sheet H15/3

The dimensions below are measured in four directions:

1) For dimensions a, c1, c2, d, e, f, lR and lC;

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.

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

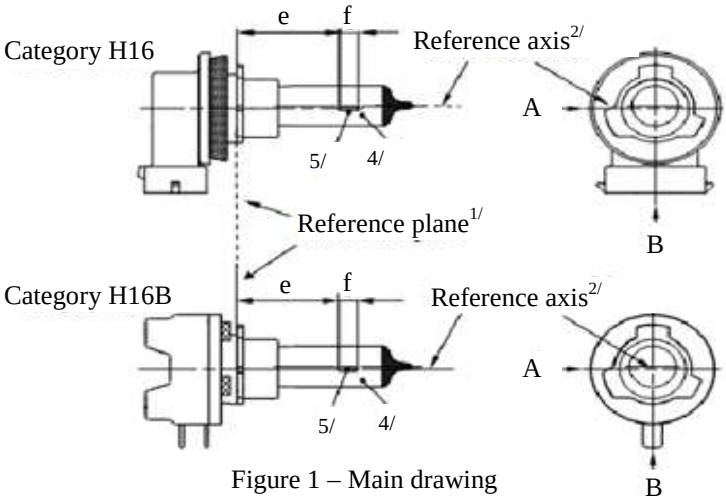


Figure 1 – Main drawing

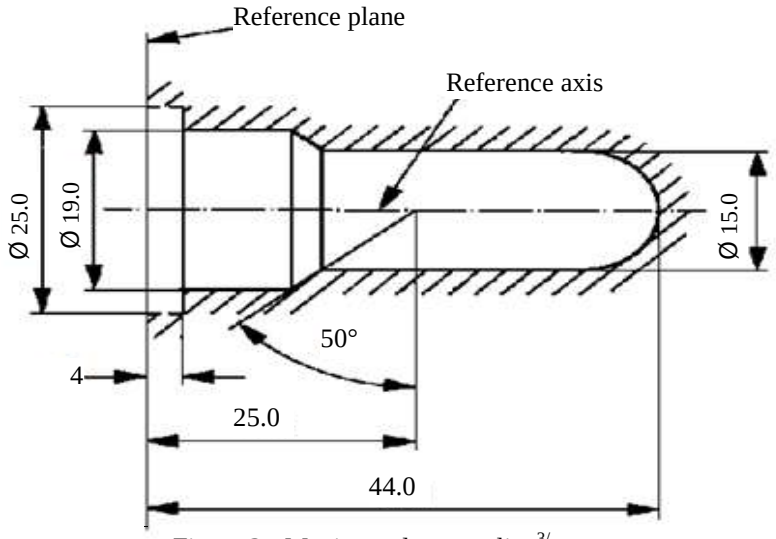


Figure 2 - Maximum lamp outline3/

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 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.

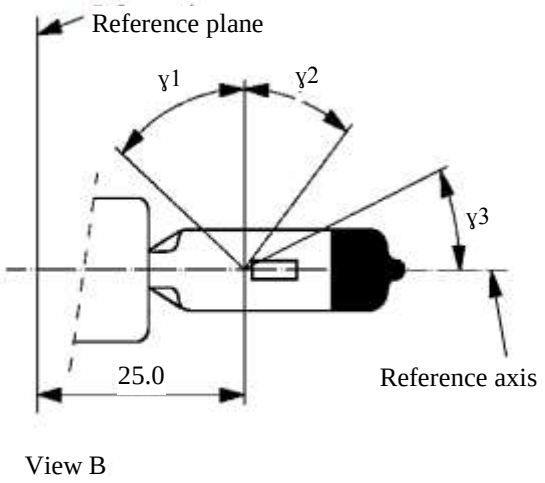


Figure 3 - Distorsion free area[6/] and black top[7/]

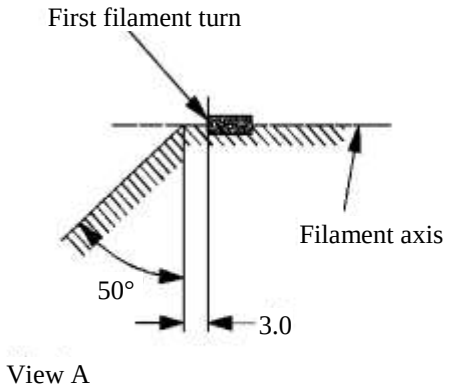


Figure 4 – Metal free zone[8/]

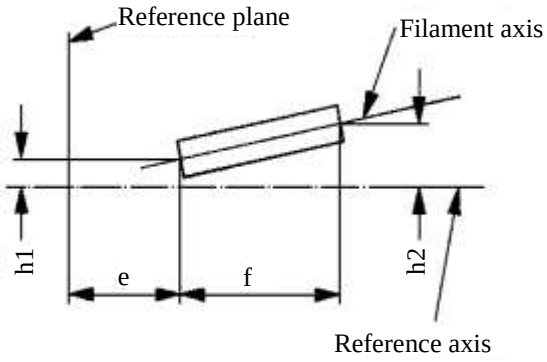


Figure 5 – Permissible offset of filament axis[9/] (for standard filament lamps only)

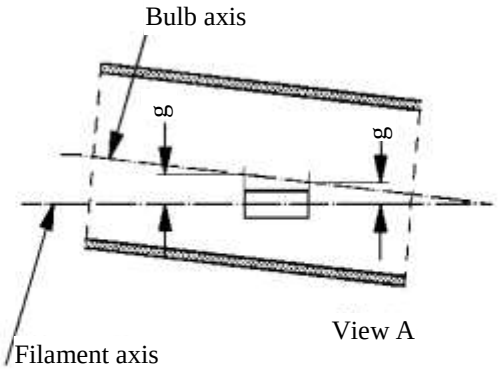


Figure 6 – Bulb eccentricity[10/]

[6/] Glass bulb shall be optically distortion free within the angles γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2.

[7/] The obscuration shall extend at least to angle γ3 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.

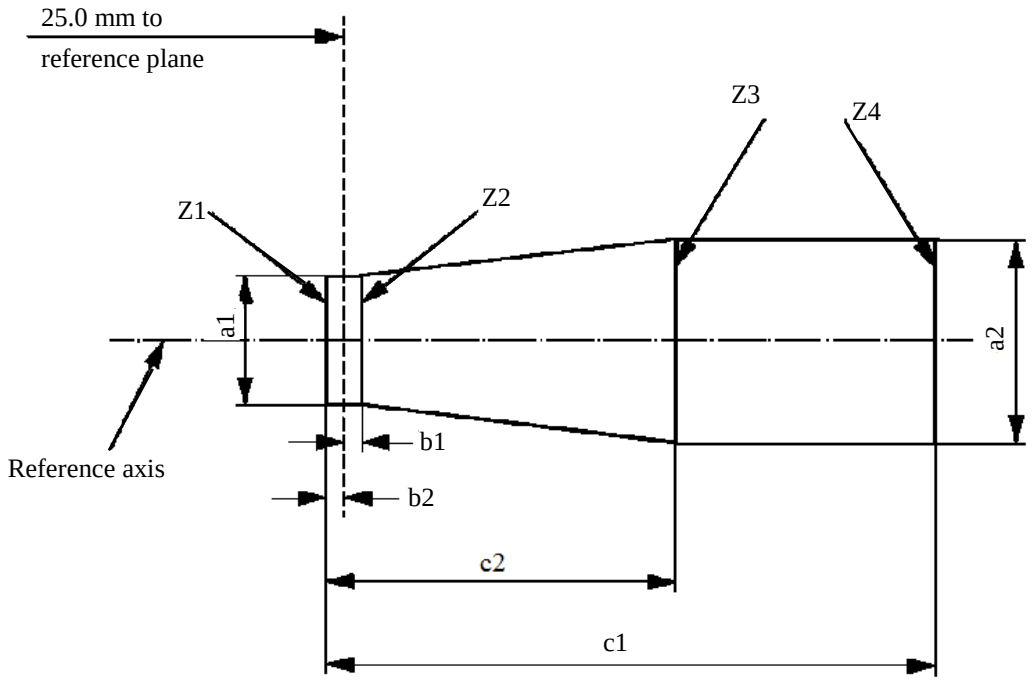
Dimensions in mm		*Filament lamps of normal production*	*Standard filament lamp*
		12 V	*12 V*
e [11/]		25.0 [12/]	25.0 ± 0.1
f [11/]		3.2 [12/]	3.2 ± 0.1
g		0.5 min.	u.c.
h1		0 [12/]	0 ± 0.1
h2		0 [12/]	0 ± 0.15
γ1		50° min.	50° min.
γ2		40° min.	40° min.
γ3		30° min.	30° min.
Cap:	H16: PGJ19-3	in accordance with IEC Publication 60061 (sheet 7004-110-2)	
	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.

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

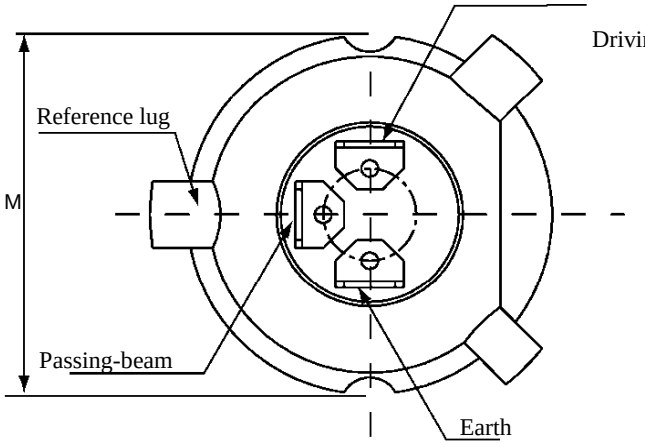
The filament position is checked solely in directions A and B as shown on sheet H16/1, Figure 1.

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



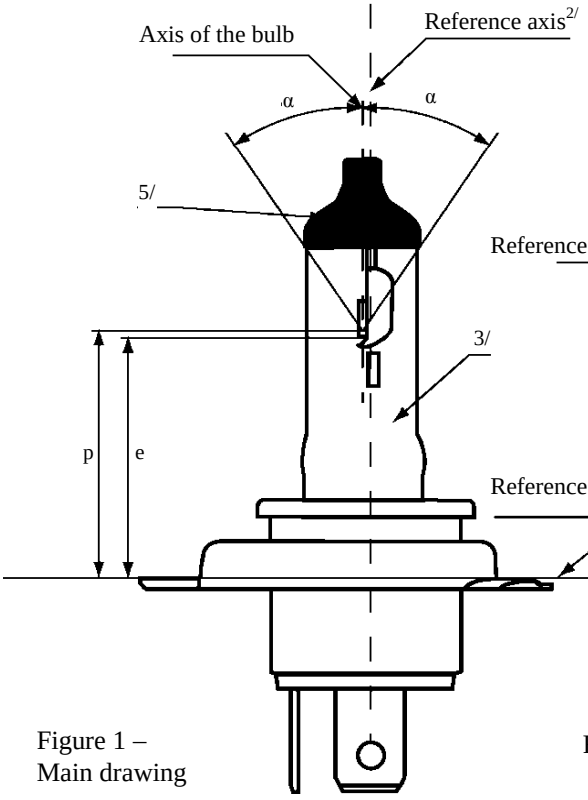


Figure 1 –
Main drawing

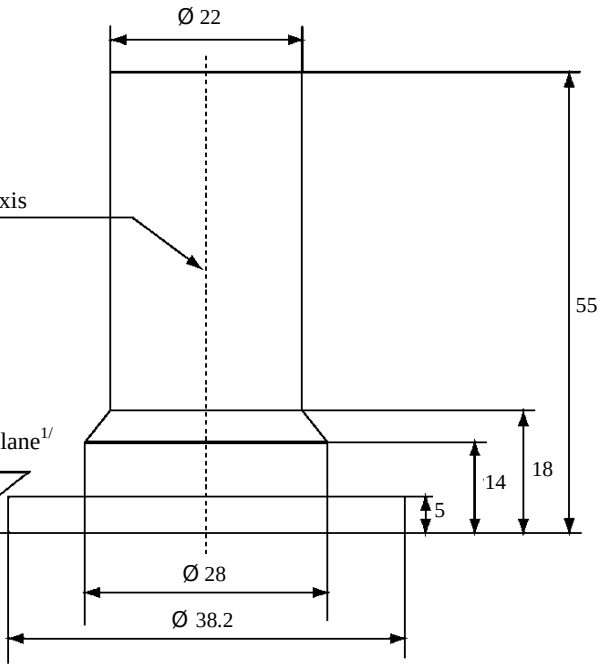


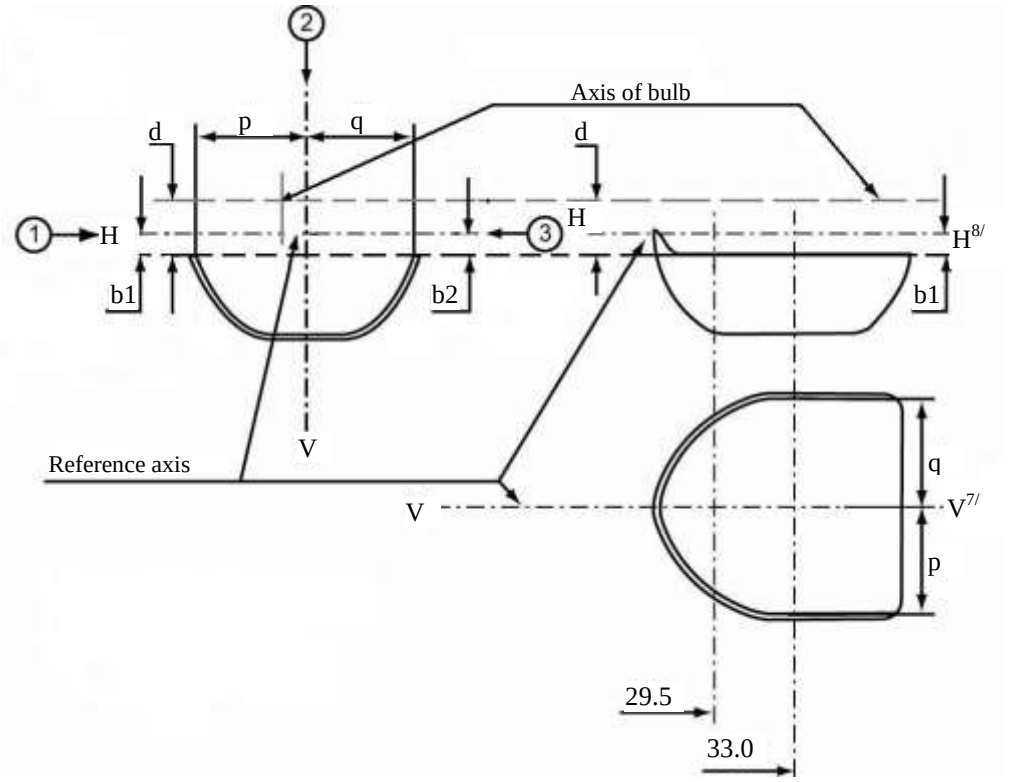
Figure 2 - Maximum lamp outlines4/

For the notes see sheet H17/6

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 7004-171-2)					
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 ± 10 %	600 ± 10 %		
Reference luminous flux at approximately			12.0 V	700	450
			13.2 V	900	600

For note 6/ see sheet H17/6

Position of the shield



Position of filaments

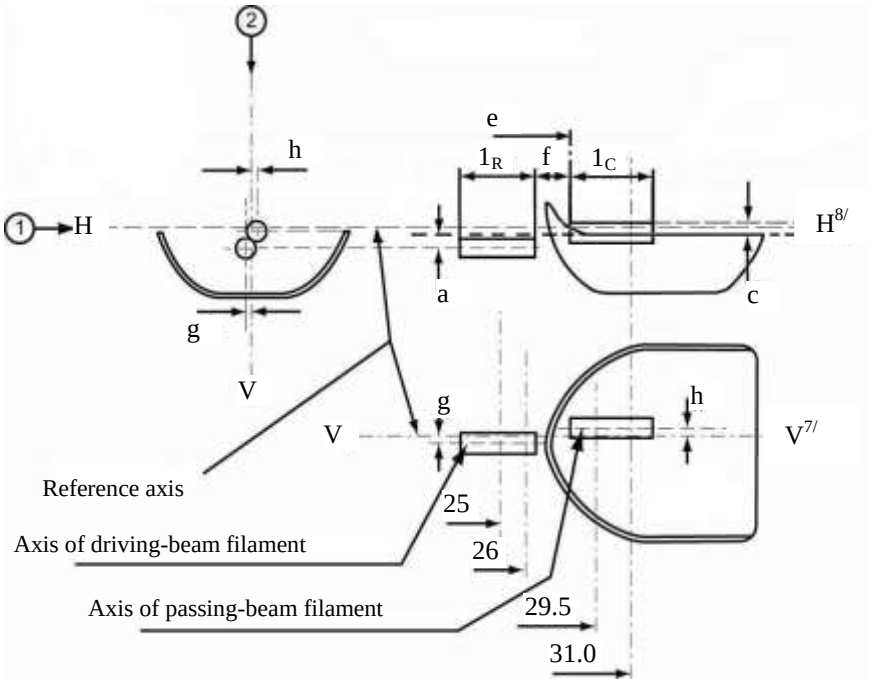


Table of the dimensions (in mm) referred to in the drawings on sheets H17/3 and H17/4

*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
l_R [9/, 12/]	4.0	±0.40	±0.20
l_C [9/, 10/]	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

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, l_R and l_C.
2 For dimensions g, h, p and q.
3 For dimension b2.

Dimensions p and q are measured in planes parallel to and 33.0 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 to IEC Publication 60809.

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

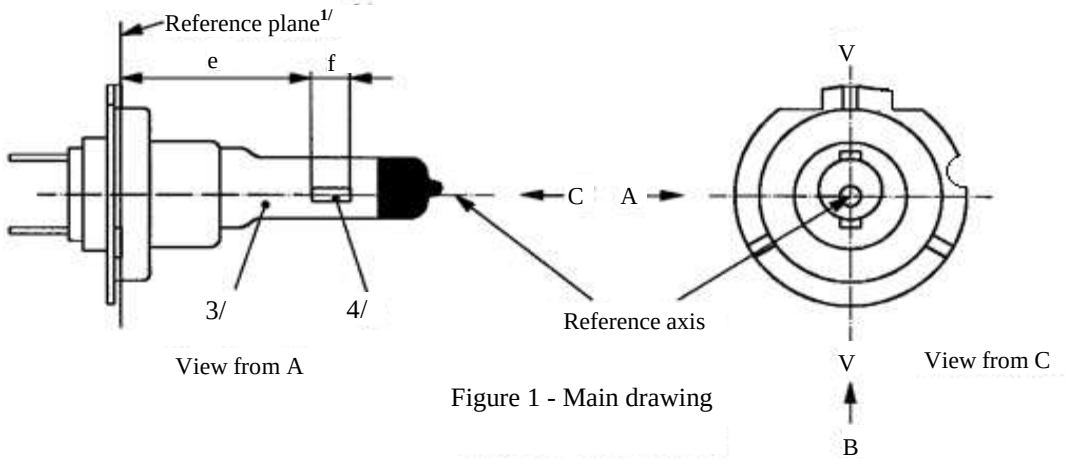


Figure 1 - Main drawing

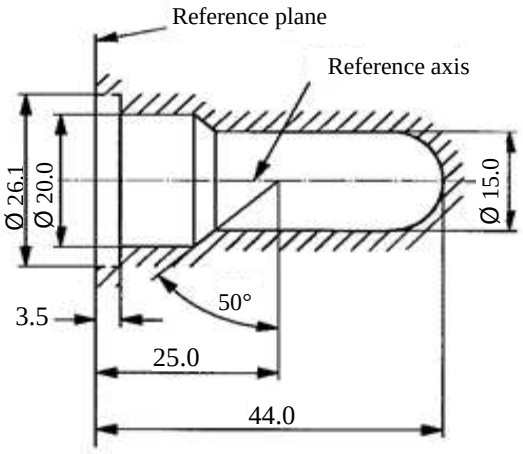


Figure 2 - Maximum lamp outline 5/

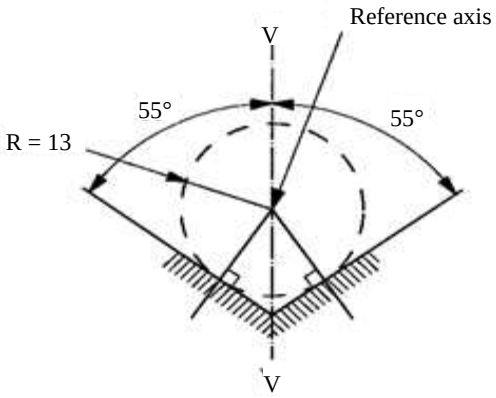


Figure 3 - Definition of reference axis 2/

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 design target is d max. = 1.3 mm.

(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.

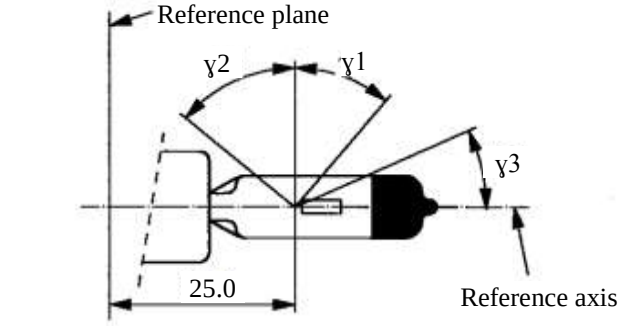


Figure 4 - Distortion free area and black top[6/, 7/]

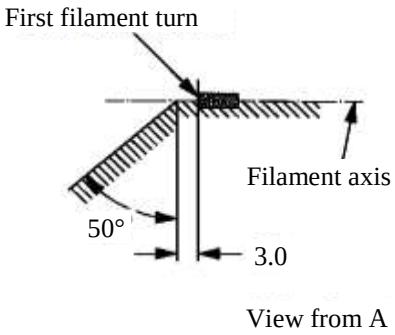


Figure 5 - Metal free zone[8/]

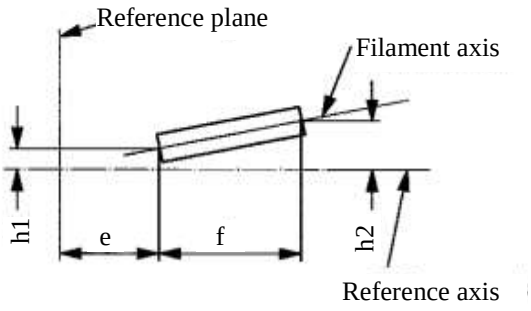


Figure 6 - Permissible offset of filament axis (for standard filament lamps only)

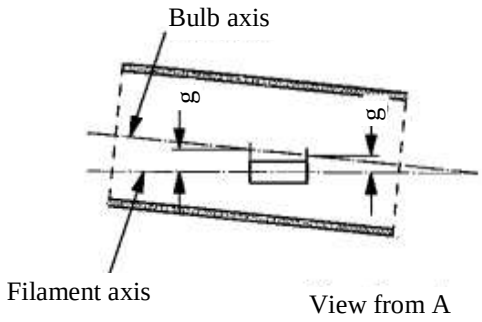


Figure 7 - Bulb eccentricity

6/ 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.

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 γ3 crosses the outer bulb surface (view B as indicated on sheet H18/1).

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 H18 /1).
No metal parts other than filament turns shall be located in the shaded area as seen in Figure 5.

		Filaments lamps of normal production	*Standard filament lamp*
		12 V	*12 V*
e [9/]		25.0 [10/]	25.0 ± 0.1
f [9/]		4.8 [10/]	4.8± 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 PY26d-1 in accordance with IEC Publication 60061 (sheet 7004-5-7)			
Electrical and photometric characteristics			
Rated values	Volts	12	12
	Watts	65	65
Test voltage	Volts	13.2	13.2
Objective values	Watts	69 max.	69 max.
	Luminous flux	1,700 ± 8 %	
Reference luminous flux at approximately		13.2 V	1,700

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 H18/1, the projection of the outside of the end turns crosses the filament axis.

10/ To be checked by means of a "Box System", sheet H18/4.

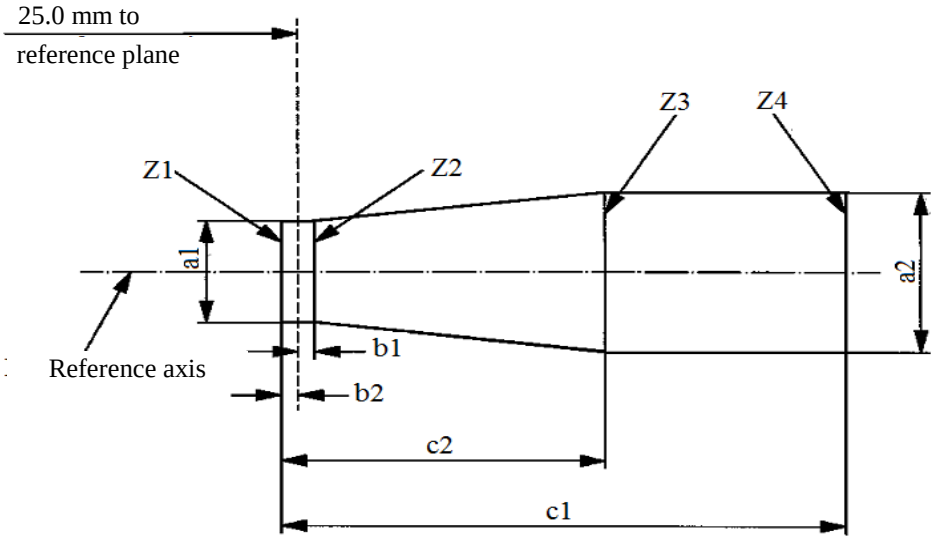
11/ The offset of the filament with respect to the reference axis is measured only in viewing directions A and B as shown in Figure 1 in sheet H18/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament 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.

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	5.3	4.7

d = diameter of filament

The filament position is checked solely in directions A and B as shown on sheet H18/1, Figure 1.

The filament shall lie entirely within the limits shown.

The ends of the filament as defined on sheet H18/3, note 9, shall lie between lines Z1 and Z2 and between Z3 and Z4.

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

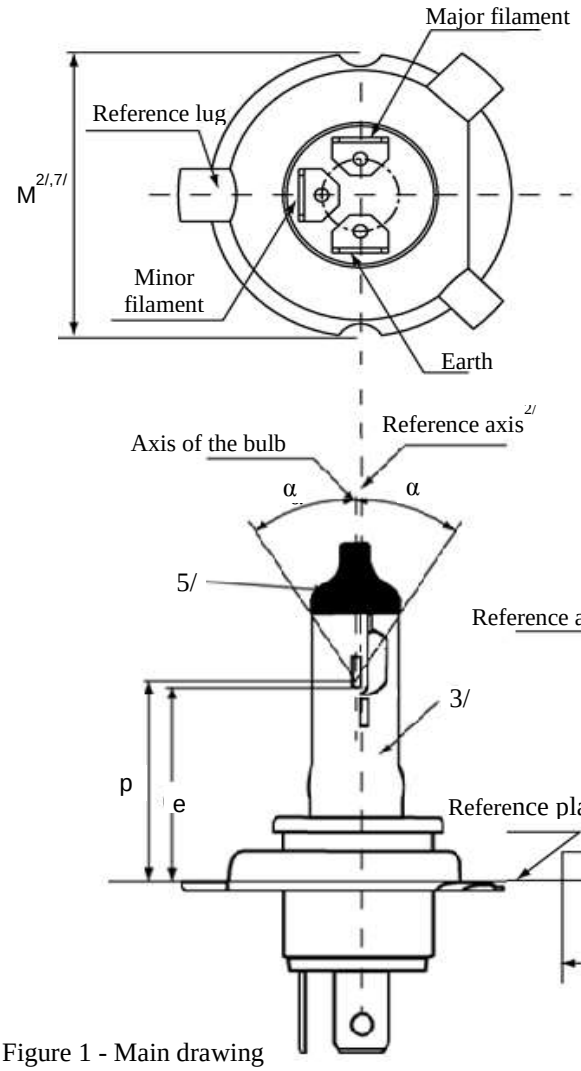


Figure 1 - Main drawing

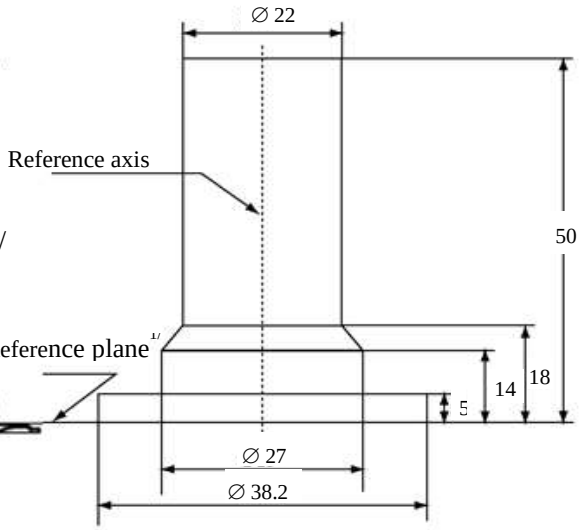


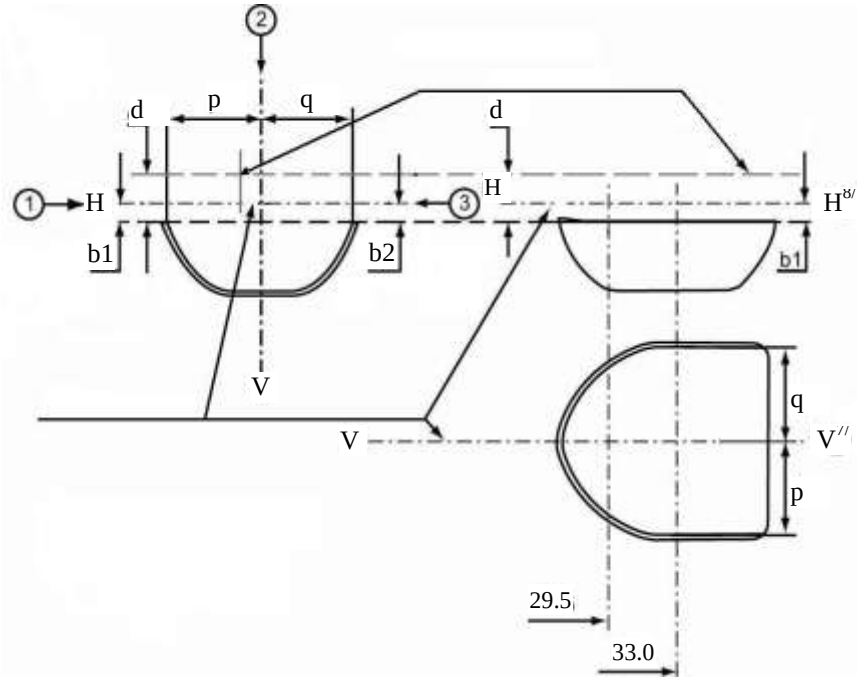
Figure 2 - Maximum lamp outlines 4/

For the notes see sheet H19/5.

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. 45°		max. 45°	
Cap PU43t-3 in accordance with IEC Publication 60061 (sheet 7004-171-1)					
Electrical and photometric characteristics					
Rated values	Volts	12[6/]		12[6/]	
	Watts	60	55	60	55
Test values	Volts	13.2	13.2	13.2	13.2
Objective values	Watts	72 max.	68 max.	72 max.	68 max.
	Luminous flux	1 750 ± 10%	1 200 ± 10%		
Reference luminous flux at approximately			13.2 V	1,750	1,200

For note 6 see sheet H19/5.

Position of shield



Position of filament

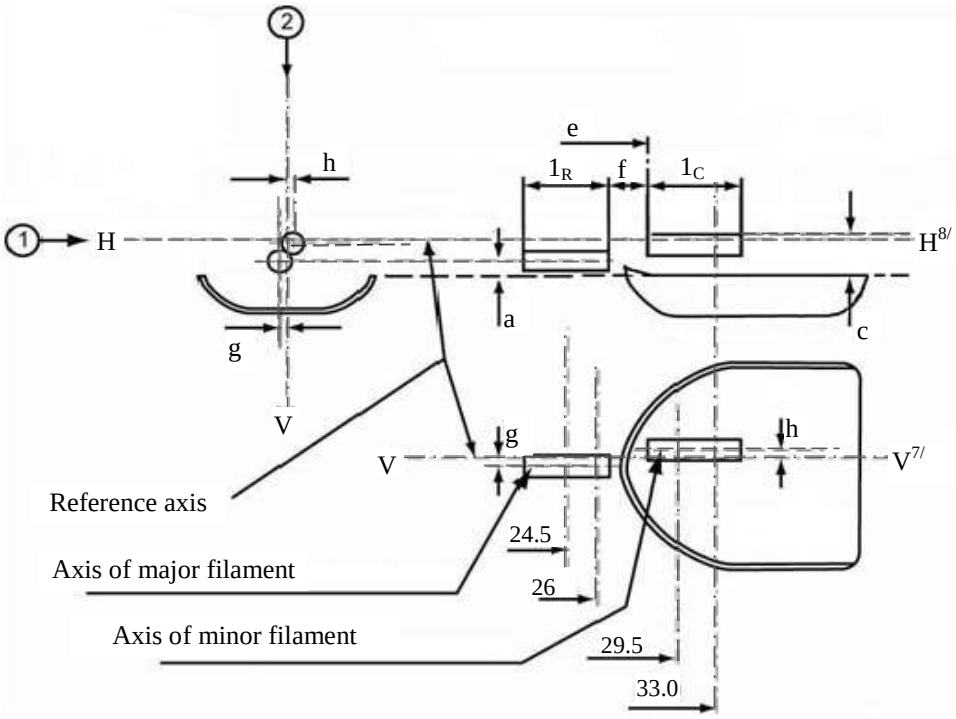


Table of the dimensions (in mm) referred to in the drawings on sheet H19/3

*Reference**	*Dimension***	*Tolerance*	
		Filament lamps of normal production	*Standard filament lamp*
a/26.0	0.7	±0.30	±0.20
a/24.5	0.7	±0.40	±0.20
b1/29.5	1.0	±0.30	±0.25
b1/33.0	b1/29.5 mv	±0.30	±0.15
b2/29.5	1.0	±0.30	±0.25
b2/33.0	b2/29.5 mv	±0.30	±0.15
c/29.5	1.7	±0.25	±0.15
c/33	c/29.5 mv	±0.25	±0.15
d	min. 1.1	-	-
e[11/]	28.5	+0.35 / -0.15	+0.20 / -0.0
f [9/, 10/, 11/]	1.4	±0.30	±0.15
g/26.0	0	±0.40	±0.30
g/24.5	0	±0.50	±0.25
h/29.5	0	±0.40	±0.25
h/33.0	h/29.5 mv	±0.30	±0.15
lR [9/, 12/]	4.0	±0.60	±0.30
lC [9/, 10/]	5.2	±0.60	±0.30
p/33.0	Depends on the shape of the shield	-	-
q/33.0	(p+q)/2	±0.60	±0.30

* "../24.5" 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 H19/5.

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 major filament. Those indicated in the right-hand column relate to the minor 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 minor filament, the points to be measured are the intersections, seen in direction 1, of either the lateral edge of the shield or the filament axis 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 minor filament as defined above.

12/ For the major 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 sheet H19/3

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 33.0 mm away from the reference plane.

Dimensions a and g are measured in planes parallel to and 24.5 mm and 26.0 mm away from the reference plane.

Note: For the method of measurement, reference is made to Appendix E of IEC Publication 60809.

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

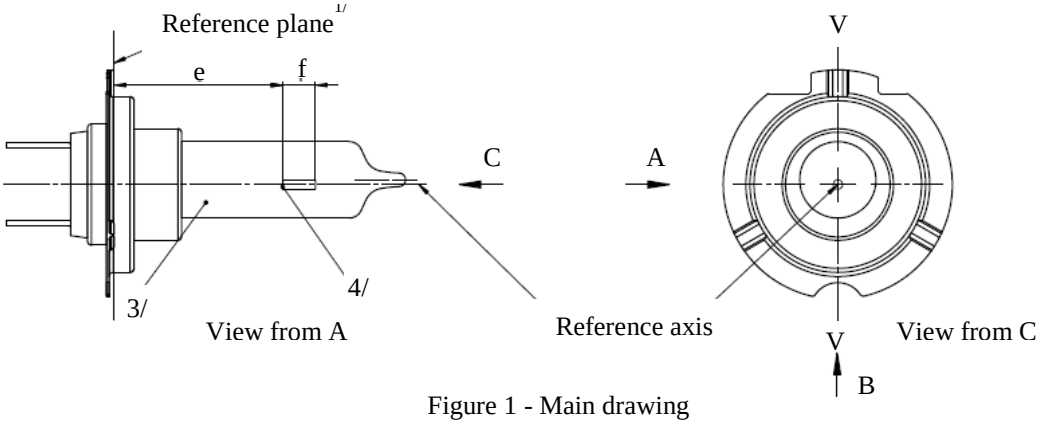


Figure 1 - Main drawing

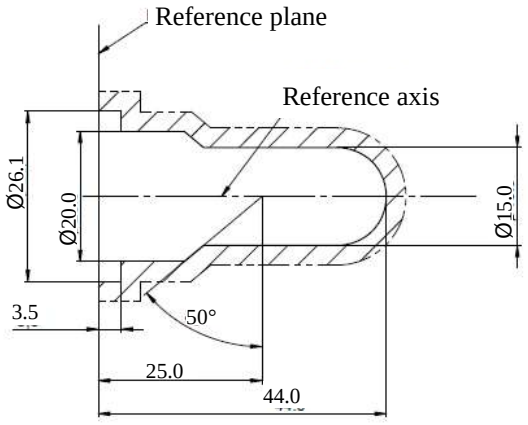


Figure 2 - Maximum lamp outline 5/

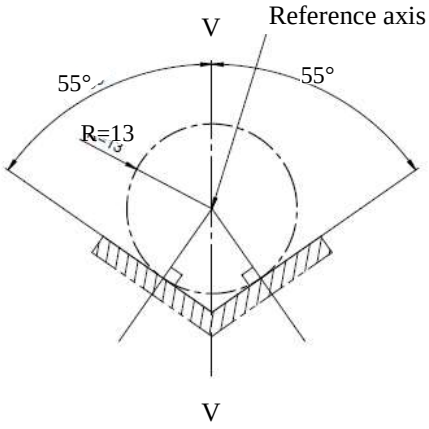


Figure 3 - Definition of reference axis 2/

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 with the restriction according to sheet H20/3.

4/ Notes concerning the filament diameter:

(a) No actual diameter restrictions apply but the design target 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.

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

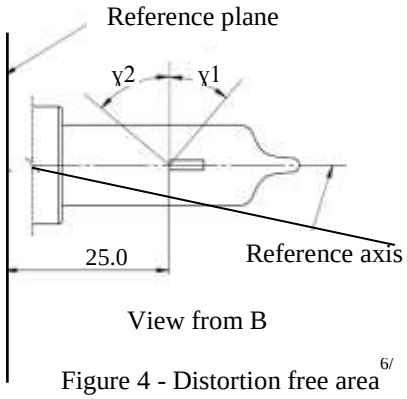


Figure 4 - Distortion free area[6/]

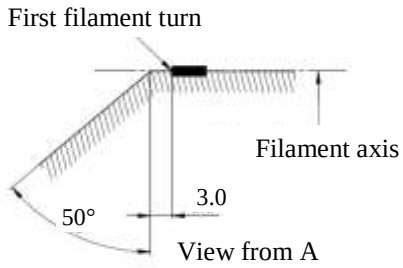


Figure 5 - Metal free zone[7/]

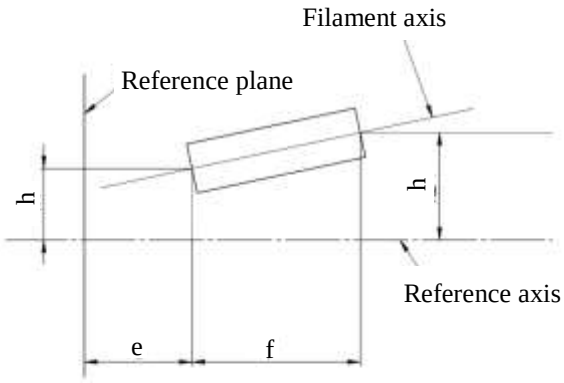


Figure 6 - Permissible offset of filament axis (for standard filament lamps only)

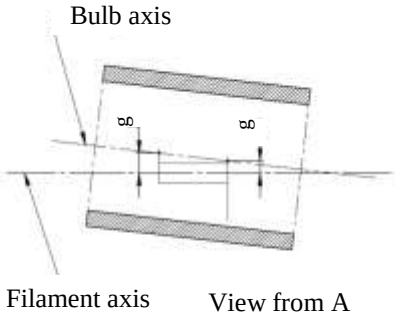


Figure 7 - Bulb eccentricity

6/ 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.

7/ 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 H20/1).
No metal parts other than filament turns shall be located in the shaded area as seen in Figure 5.

Dimensions in mm			*Filaments lamps of normal production* 12 V	*Standard filament lamp* 12 V
e [8/]			25.0 [9/]	25.0 ± 0.1
f [8/]			4.8 [9/]	4.8 ± 0.1
g [11/]			0.5 min.	0.5 min.
h1 [10/]			0 [9/]	0 ± 0.10
h2 [10/]			0 [9/]	0 ± 0.15
γ1			40° min.	40° min.
γ2			50° min.	50° min.
Cap PY26d-6 in accordance with IEC Publication 60061 (sheet 7004-5-7)				
Electrical and photometric characteristics				
Rated values	Volts		12	12
	Watts		70	70
Test voltage	Volts		13.2	13.2
Objective values	Watts		75 max.	75 max.
	Luminous flux		1 250 ± 10 %	
Reference luminous flux at approximately			12 V	900
			13.2 V	1250
Chromaticity Coordinates[12]	Objective		x=0.347	y=0.353
	Tolerance area	Boundaries	x=0.330	y=0.150+0.640x
			x=0.370	y=0.050+0.750x
		Intersection points	x=0.330	y=0.298
			x=0.370	y=0.327
			x=0.370	y=0.387
			x=0.330	y=0.361

8/ 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 H20/1, the projection of the outside of the end turns crosses the filament axis. (Special instructions for coiled-coil filaments are under consideration).

9/ To be checked by means of a "Box System", sheet H20/4.

10/ 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 H20/1. 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.

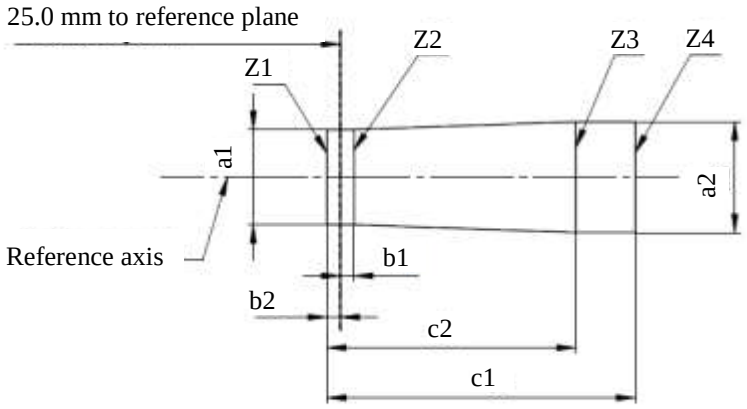
11/ Offset of filament in relation to bulb axis measured in two planes parallel to the reference plane where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament axis.

12/ See Annex 5.

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*
d + 0.40	d + 0.70	0.25		5.7	4.6

d = diameter of filament

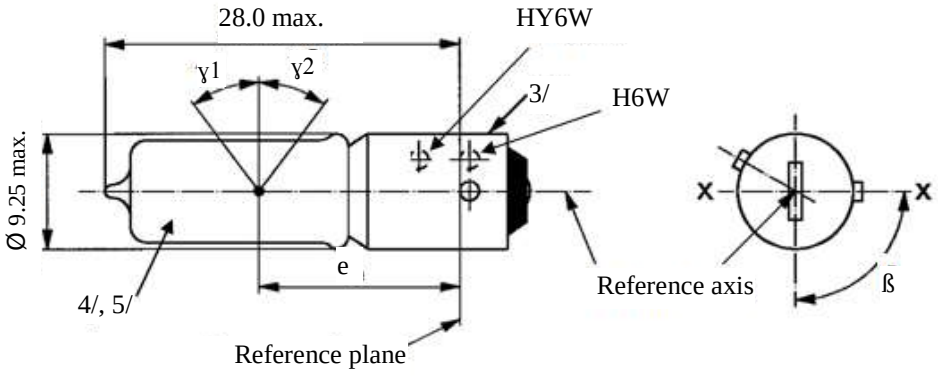
The filament position is checked solely in directions A and B as shown on sheet H20/1, Figure 1.

The filament shall lie entirely within the limits shown.

The ends of the filament as defined on sheet H20/3, note 9, shall lie between lines Z1 and Z2 and between Z3 and Z4.

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°
γ1, γ2 [2/]			30°			30° min.
Cap:	H6W:	BAX9s	in accordance with IEC Publication 60061 (sheet 7004-8-1)			
	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	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.

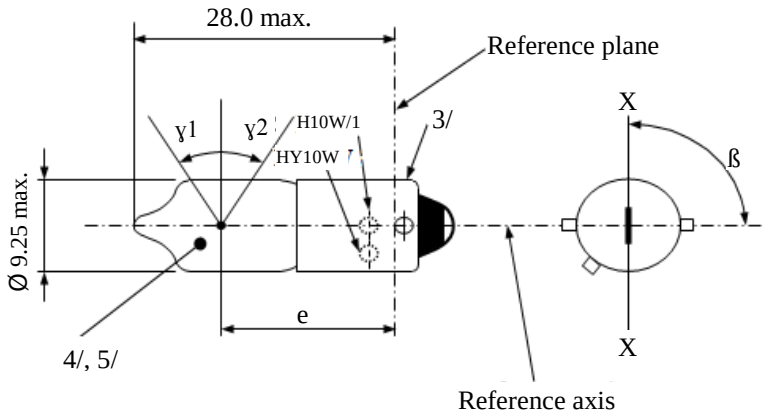
2/ In the area between the outer legs of the angles γ1 and γ2, the bulb shall have no optically distorting areas and the curvature of the bulb shall have a radius not less than 50 per cent of the actual bulb diameter.

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.

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°
γ1, γ2 [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 γ1 and γ2, 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.

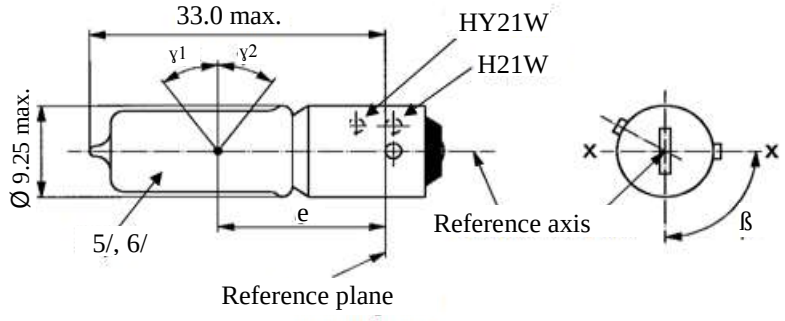
3/ Over the entire length of the cap there shall be no projections or soldering exceeding the permissible maximum diameter of the cap.

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.
Cap:	H21W: BAY9s		in accordance with IEC Publication 60061 (sheet 7004-9-1)			
	HY21W: BAW9s		in accordance with IEC Publication 60061 (sheet 7004-149-			
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.

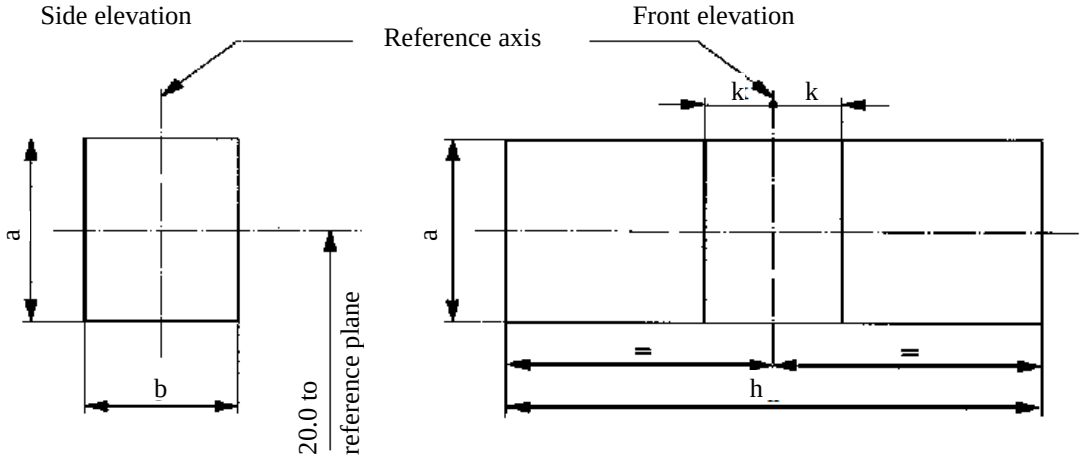
4/ In the area between the outer legs of the angles γ1 and γ2, the bulb shall have no optical distorting areas and the curvature of the bulb shall have a radius not less than 50 per cent of the actual bulb diameter.

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.

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 ±7.5°, 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

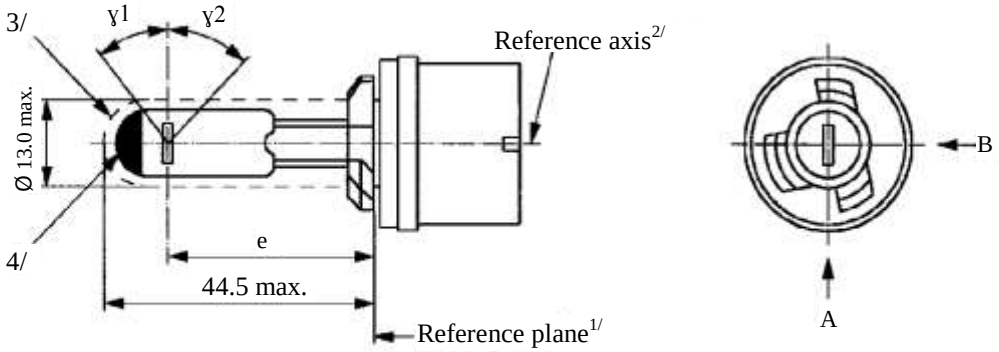
   The filament lamp placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to the filament axis:

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;

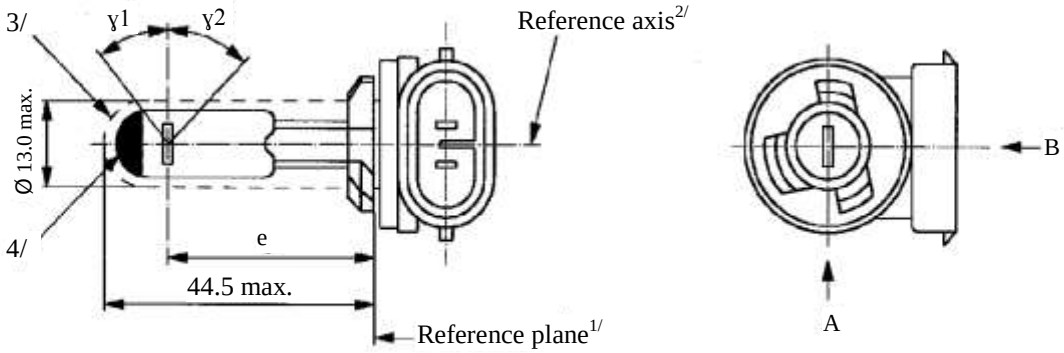
3.2. The centre of the filament shall not be offset by more than distance "k" from the reference axis.

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.

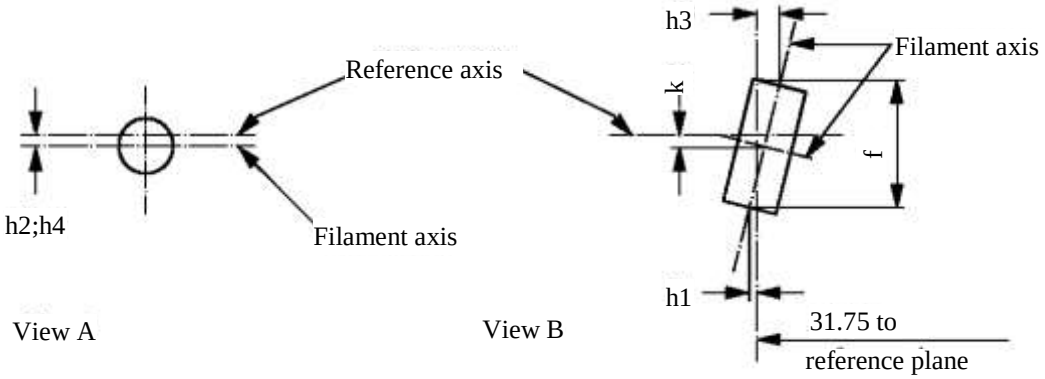


Category H27W/1



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 γ1.



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.
Cap: H27W/1: PG13 H27W/2: PGJ13		in accordance with IEC Publication 60061 (sheet 7004-107-4)	
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.

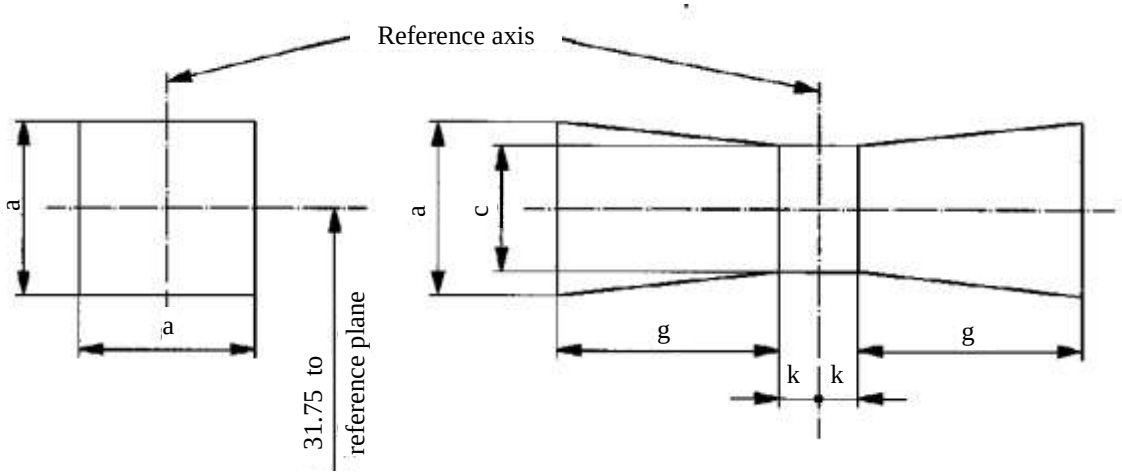
[7/] For standard filament lamps, the points to be measured are those where the projection of the outside of the end turns crosses the filament axis.

[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.

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

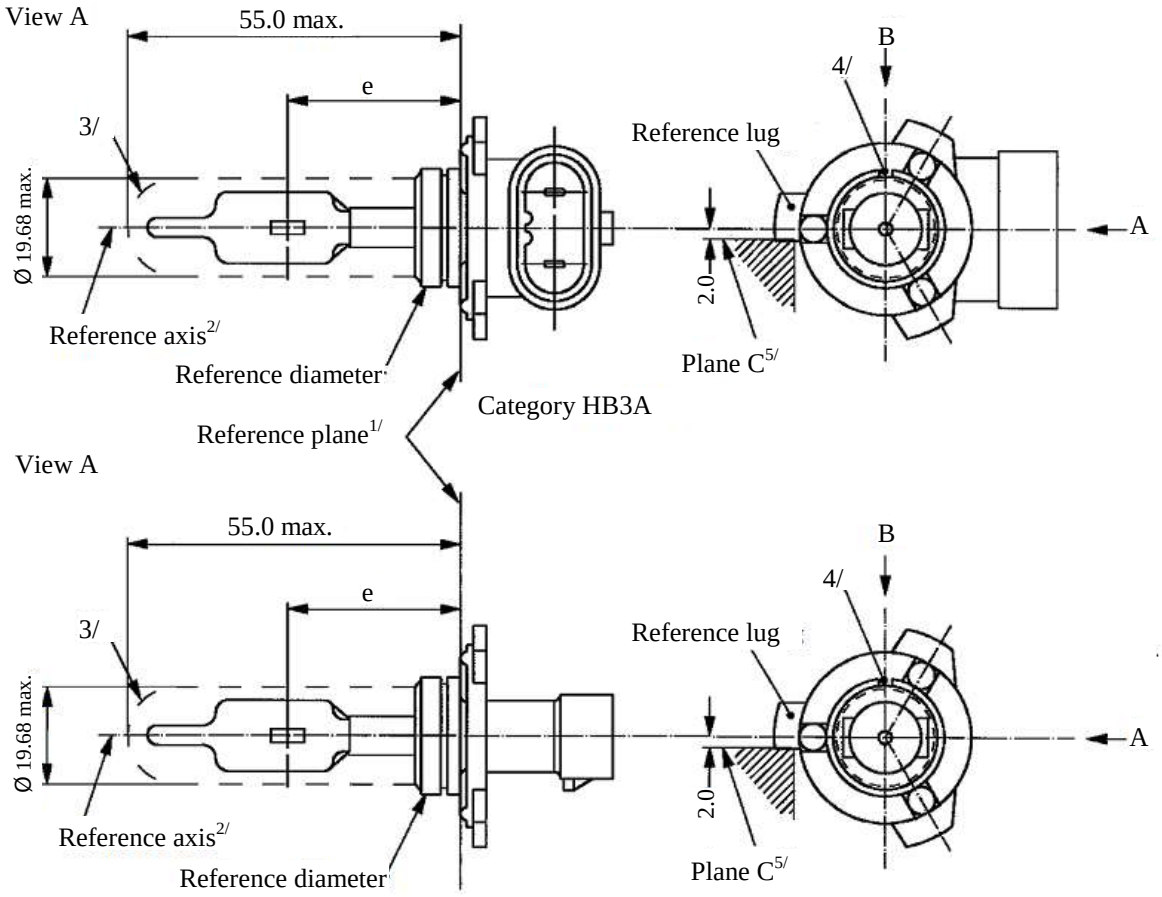
The filament shall lie entirely within the limits shown.

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

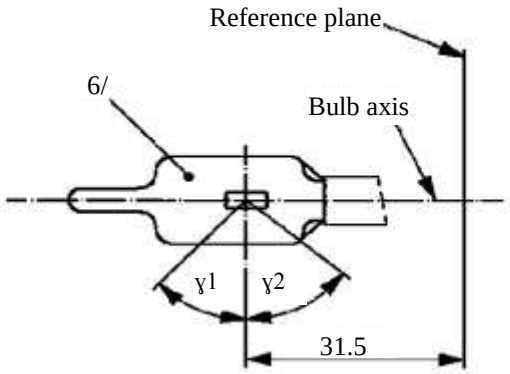
Categories HB3 and HB3A **Sheet HB3/1**

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

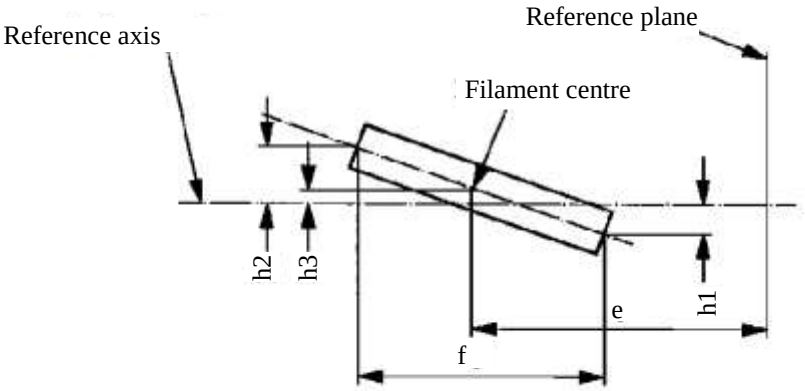
Category HB3



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.



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 γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2.

Dimensions in mm [12/]			*Tolerance*	
			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.

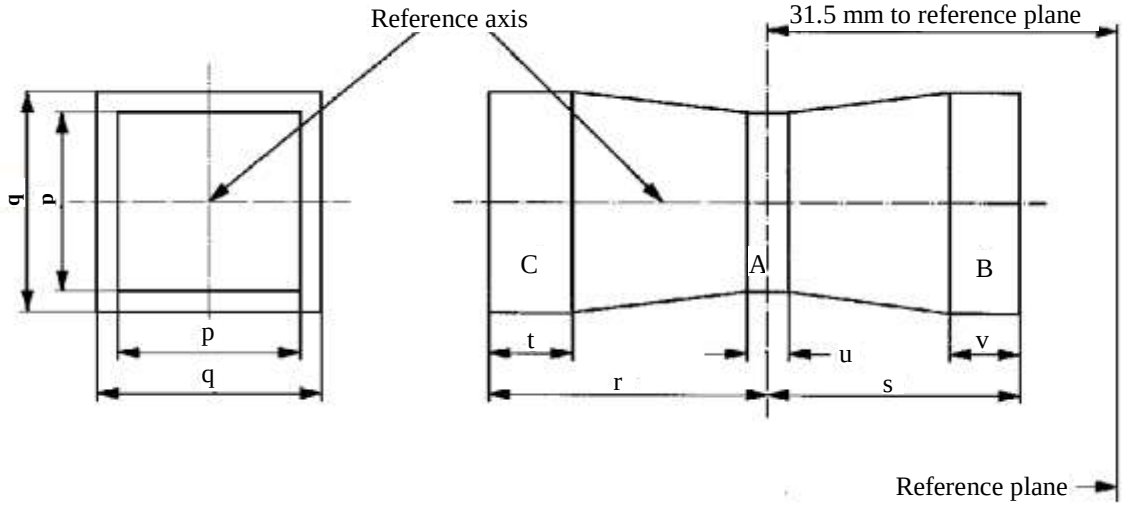
[12/] Dimensions shall be checked with O-ring removed.

[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.

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.

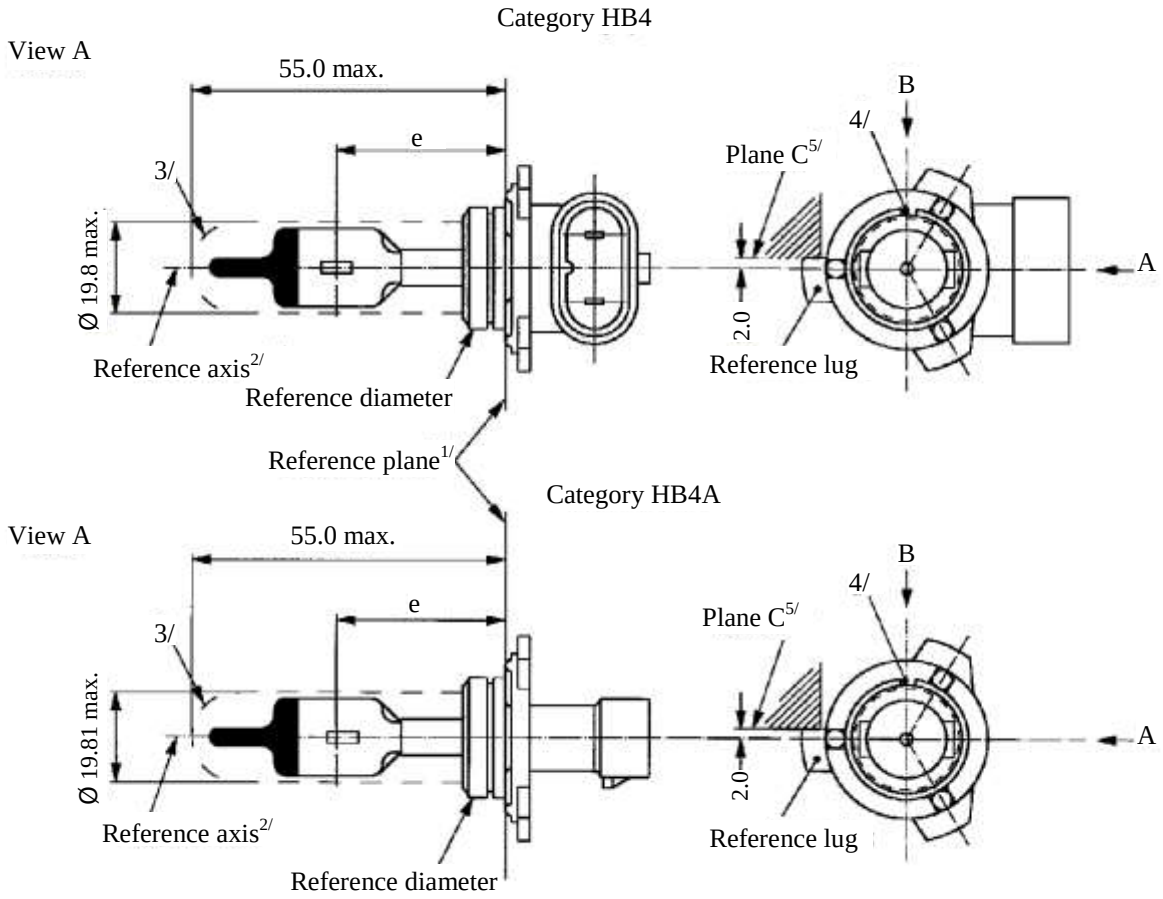
The filament shall lie entirely within the limits shown.

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".

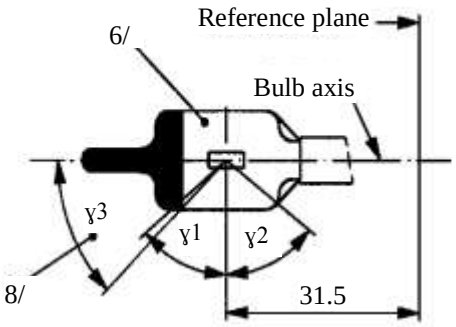
Volume "A" does not involve any filament centre requirement.

Categories HB4 and HB4A **Sheet HB4/1**

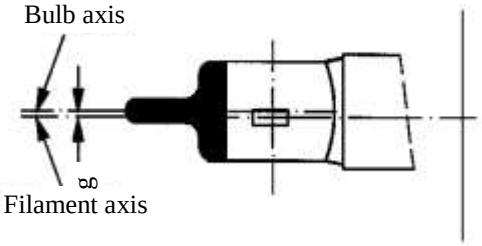
The drawings are intended only to illustrate the essential dimensions (in mm) of the filament lamp.



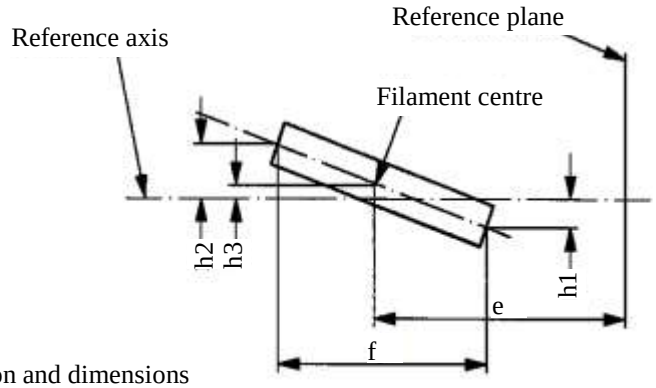
1/ The reference plane is the plane defined by the meeting points of cap-holder fit.
2/ The reference axis is perpendicular to the reference plane and concentric with the reference diameter of the cap.
3/ Glass bulb and supports shall not exceed the envelope and shall not interfere with insertion past 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.



Distorsion free area[7/] and black top[8/]



Bulb eccentricity



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 γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2 and does not need to be verified in the area covered by the obscuration.

8/ The obscuration shall extend to at least angle γ3 and shall be at least as far as the undistorted part of the bulb defined by angle γ1.

Dimensions in mm [13/]			*Tolerance*	
			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.

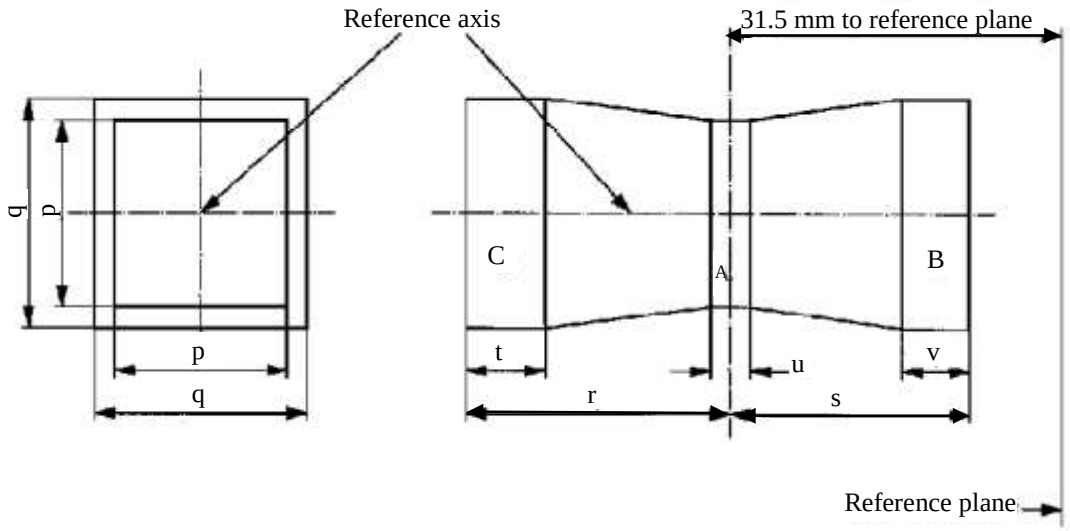
[13/] Dimensions shall be checked with O-ring removed.

[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.

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.

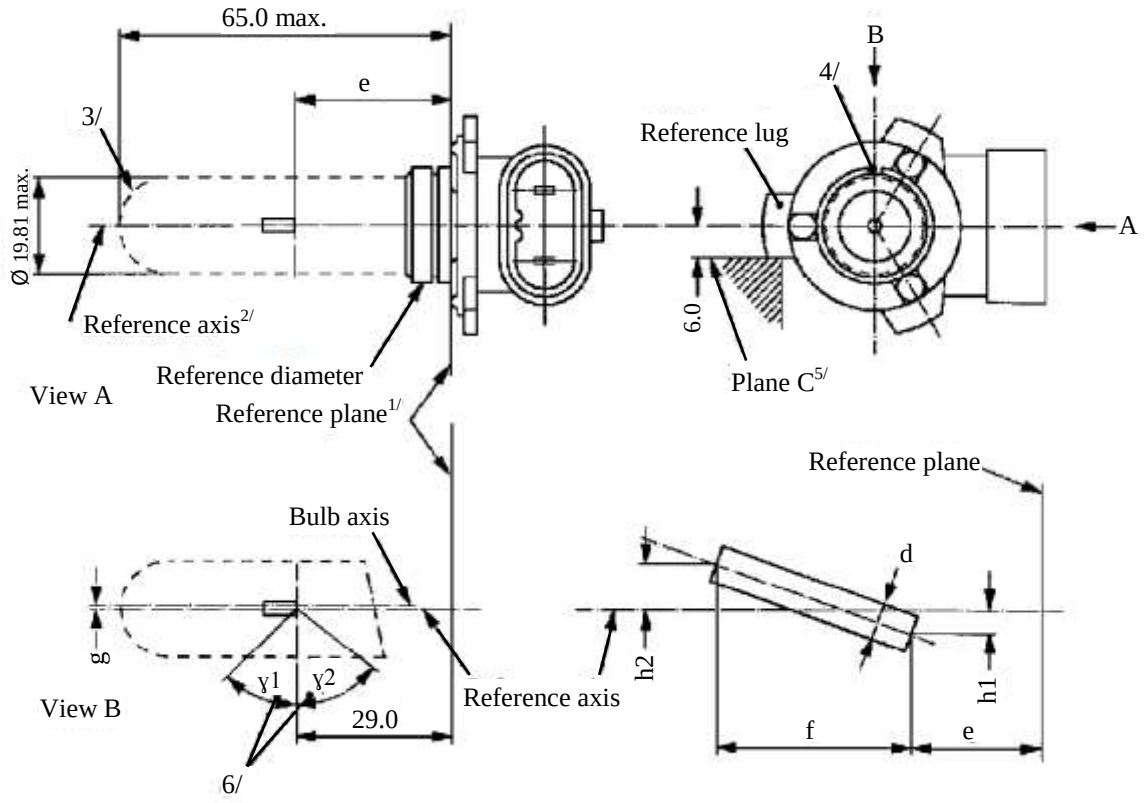
The filament shall lie entirely within the limits shown.

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 envelop 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 γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2.

Category HIR1 **Sheet HIR1/2**

Dimensions in mm [11/]		*Tolerance*	
		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.

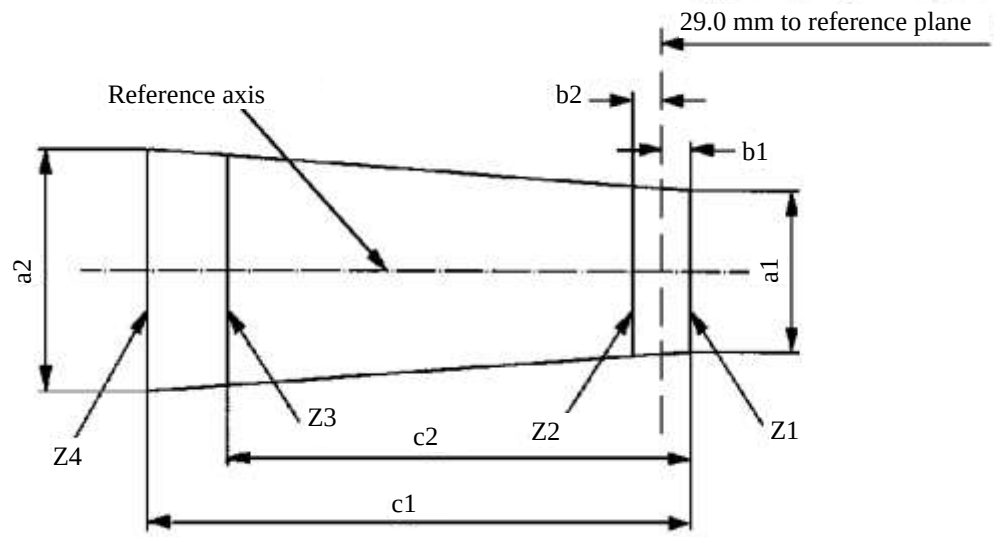
[9/] To be checked by means of a "Box system"; sheet HIR1/3.

[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.

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

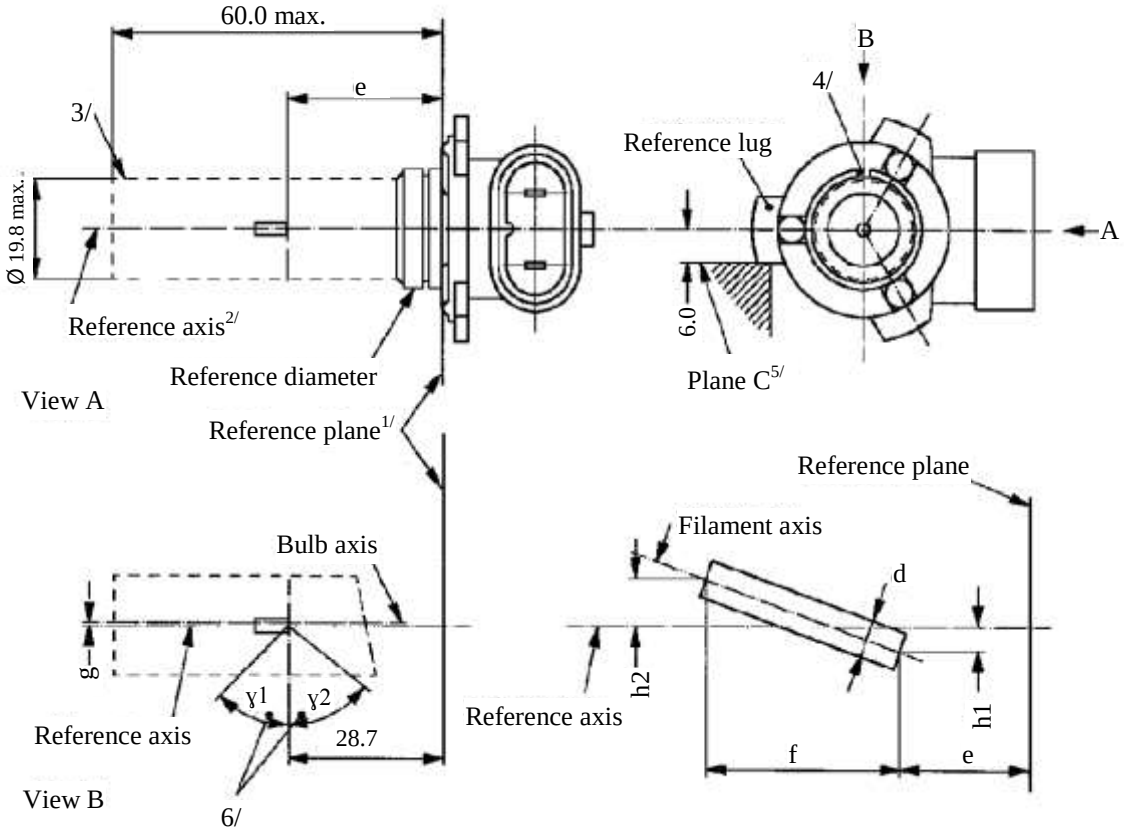
d = diameter of filament

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 γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2.

Category HIR2 **Sheet HIR2/2**

Dimensions in mm [11/]			*Tolerance*	
			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.

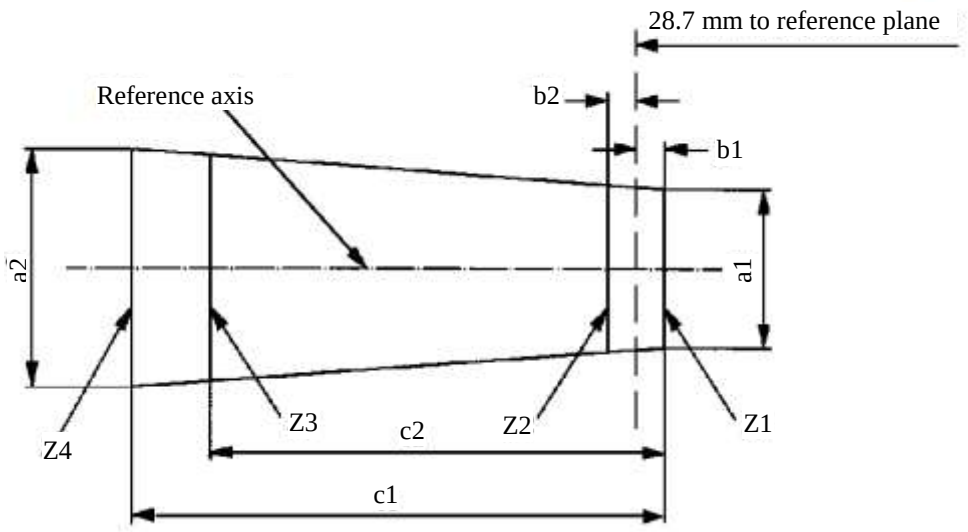
[10/] The ends of the filament are defined as the points where, when the viewing direction as defined in footnote 8/ above, the projection of the outside of the end turns crosses the filament axis.

[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.

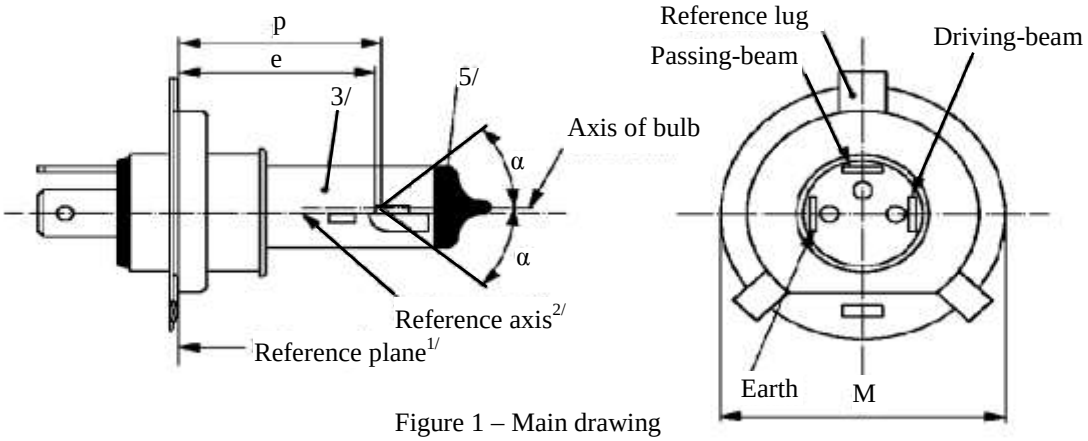


Figure 1 – Main drawing

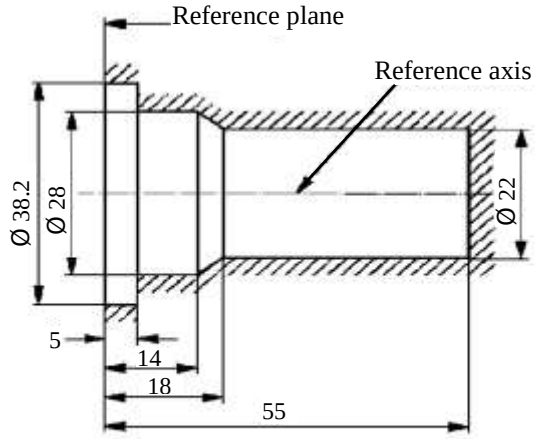


Figure 2

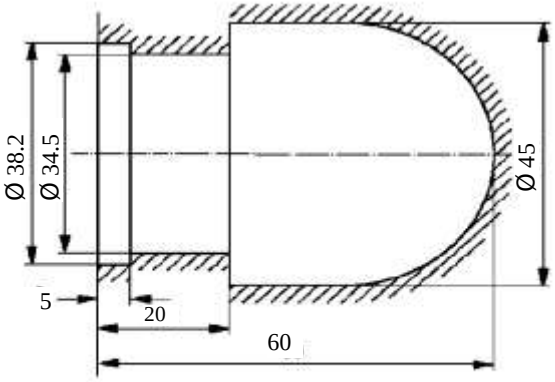


Figure 3

Maximum lamp outlines[4/]

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**

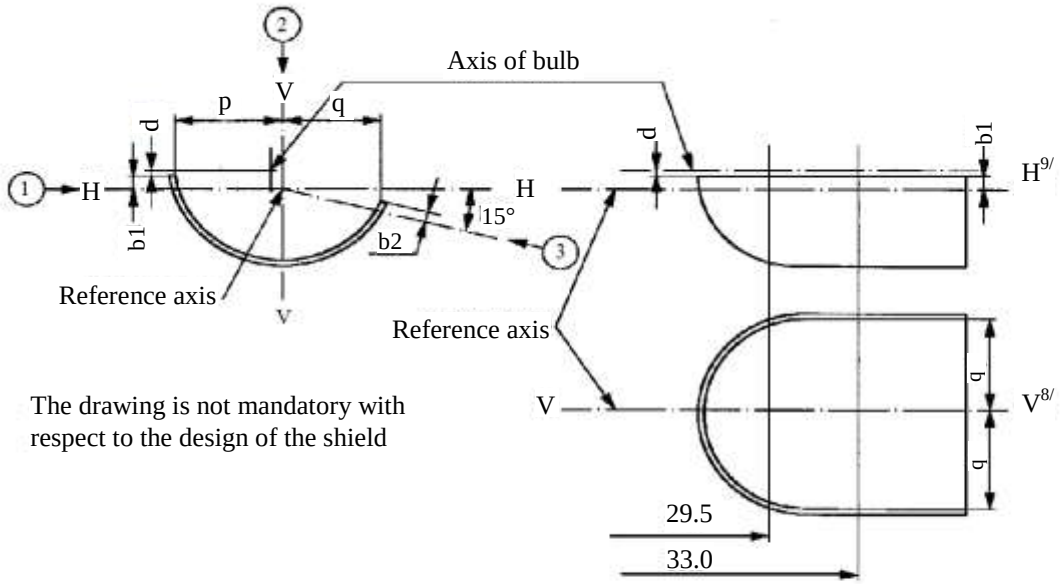
Dimensions in mm			*Filament lamps of normal production*				*Standard filament lamp*	
			6 V		*12 V*		*12 V*	
e			28.5 + 0.45 / -0.25				28.5 + 0.20 / -0.00	
p			28.95				28.95	
α			max. 40°				max. 40°	
Cap PX43t in accordance with IEC Publication 60061 (sheet 7004-34-2)								
Electrical and photometric 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.

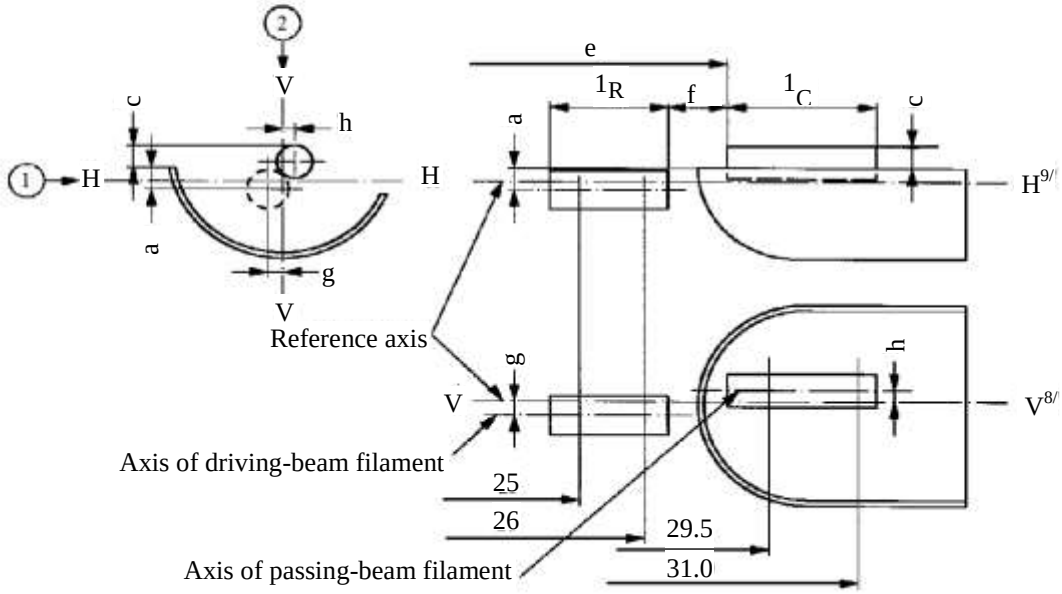
[7/] Measuring luminous flux according to paragraph 3.9. of this Regulation.

Category HS1 **Sheet HS1/3**

Position of shield



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*		
				Filament 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/.

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.

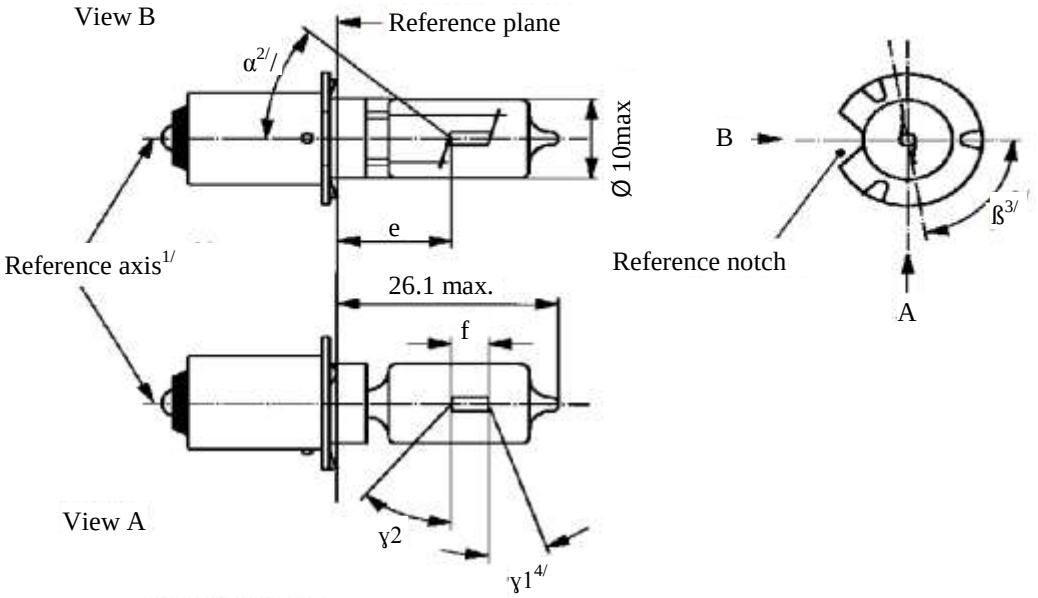
Dimensions a and g are measured in planes parallel to and 25.0 mm and 26.0 mm away from the reference plane.

Dimensions c and h are measured in planes parallel to and 29.5 mm and 31 mm away from the reference plane.

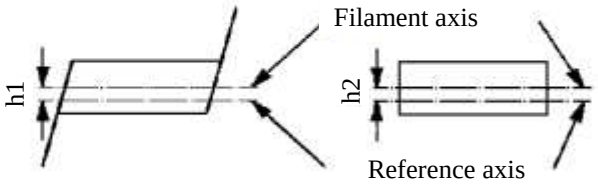
Note: For the method of measurement, see Appendix E of IEC Publication 60809.

Category HS2 **Sheet HS2/1**

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



Filament position



View B View A

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 γ1 and γ2, 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					

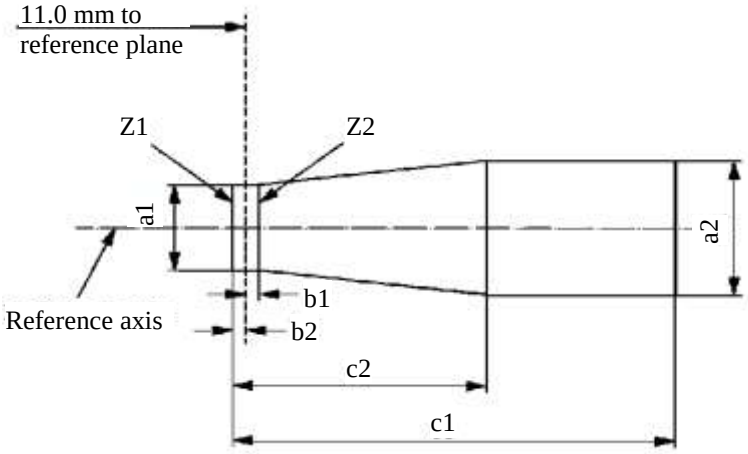
[5/] To be checked by means of the "Box system", sheet HS2/3.

[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

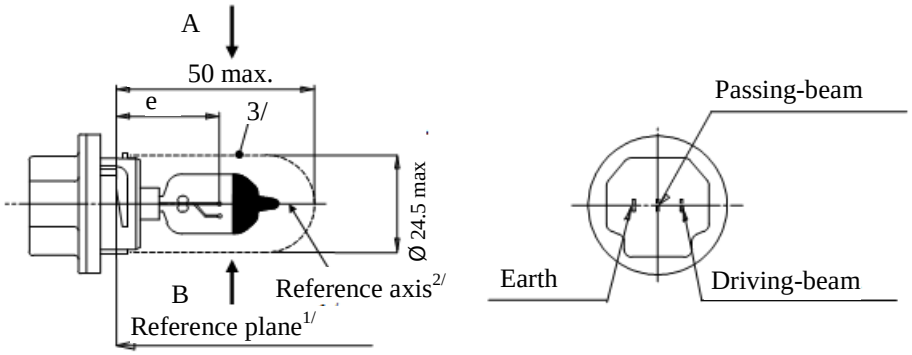


Figure 1 – Main drawing

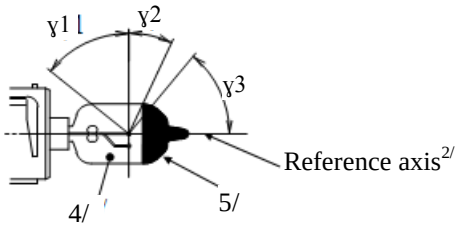


Figure 2 - Distorsion free area[4/] and black top[5/]

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 γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2.

5/ The obscuration shall extend at least to angle γ3 and shall extend at least to the cylindrical part of the bulb on the whole top circumference.

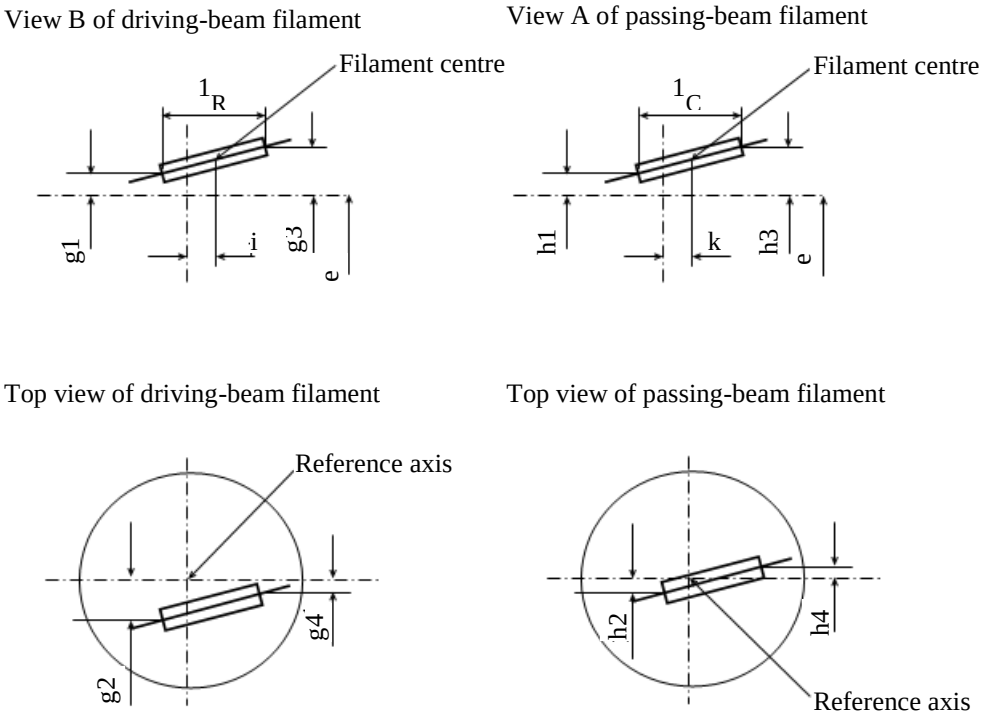


Figure 3 – Filament position and dimensions

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 characteristcs						
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**

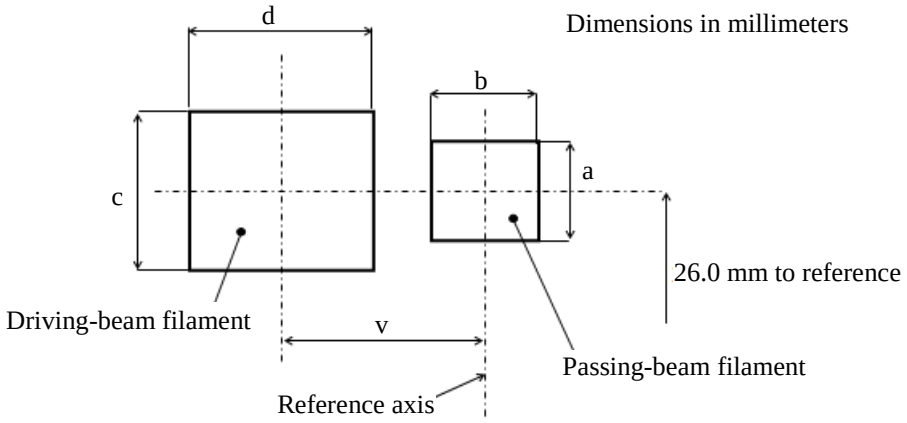
Screen projection requirement

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.

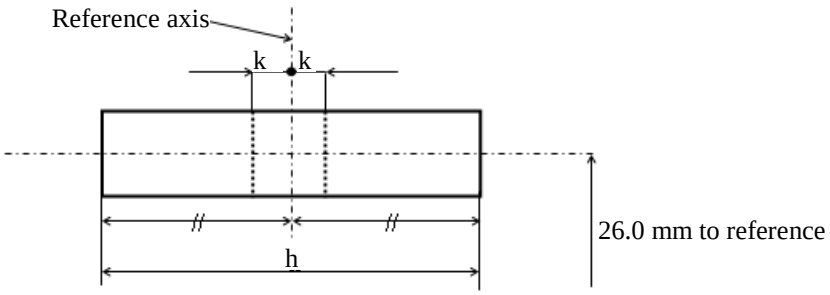
Side elevation



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	0.5

The filaments shall lie entirely within the limits shown.

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

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

Filament lamp for motorcycles

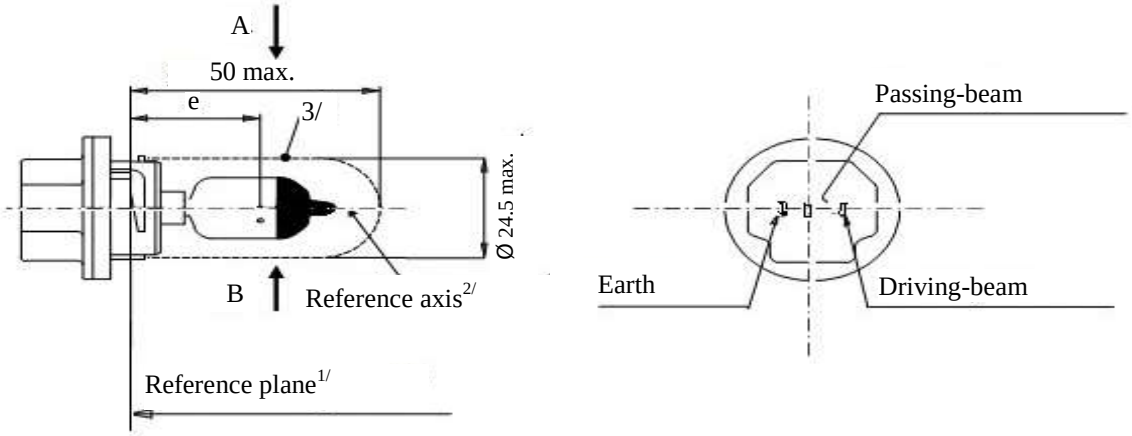


Figure 1 – Main drawing

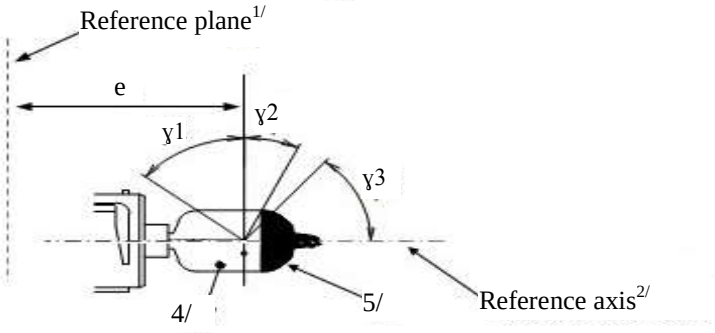


Figure 2 - Distorsion free area4/ and black top5/

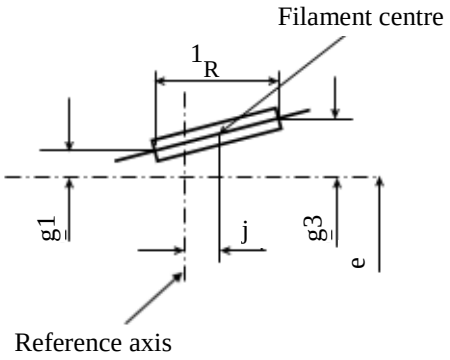
1/ The reference plane is defined by three ramps inside surface.

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

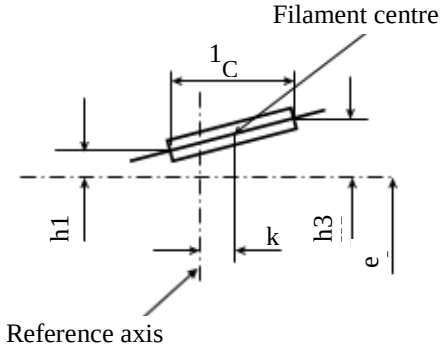
3/ Glass bulb and supports shall not exceed the envelope as indicated in Figure 1. The envelope is concentric to the reference axis.

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

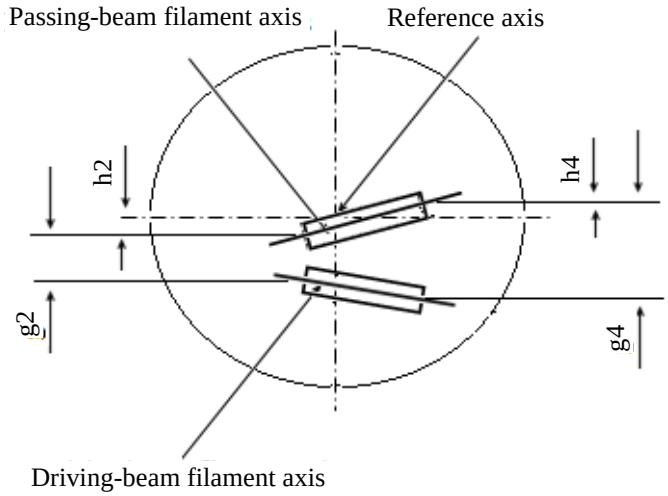
5/ The obscuration shall extend at least to angle γ3 and shall extend at least to the cylindrical part of the bulb on the whole top circumference.



View B - Driving-beam



View A - Passing-beam filament



Top view of driving-beam and passing-beam filament

Figure 3 – Filament position and dimensions

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	
γ1	50° min.		-		-	
γ2	23° min.		-		-	
γ3	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.

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

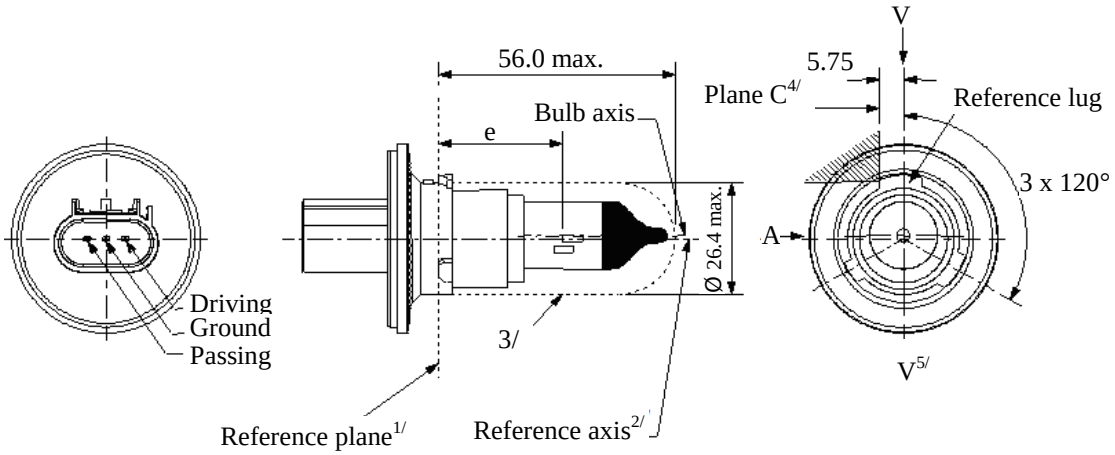


Figure 1 - Main drawings

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.

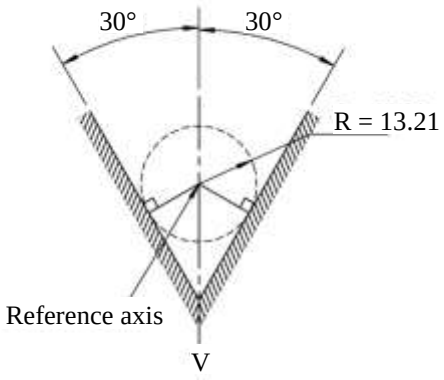


Figure 2 – Definition of reference axis[2/]

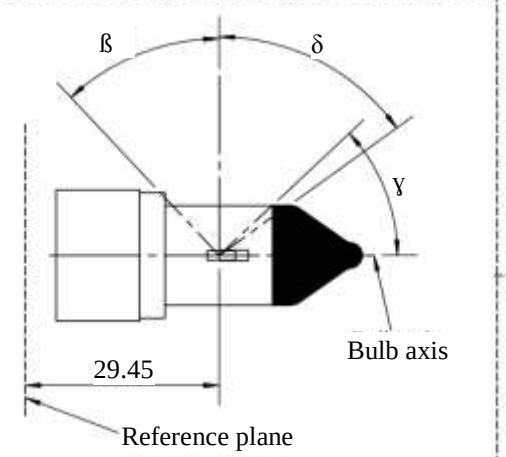
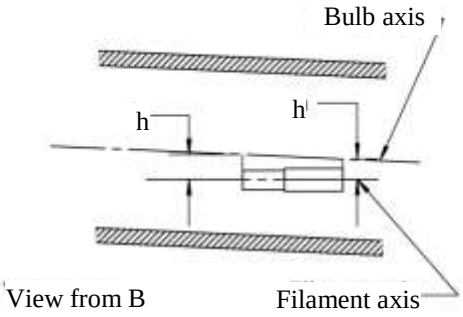


Figure 3 - Undistorted area[6/] and opaque coating[7/]



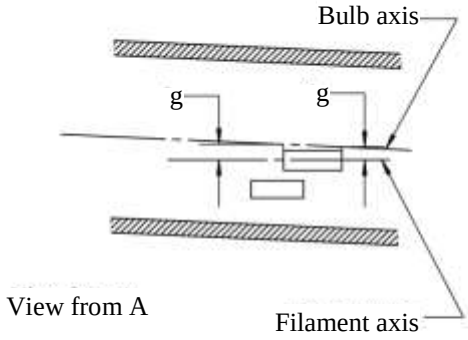


Figure 4 – Bulb offset[8/]

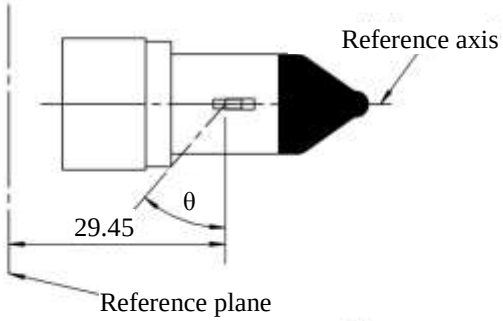


Figure 5 – Light blocking toward[9/] cap

[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.

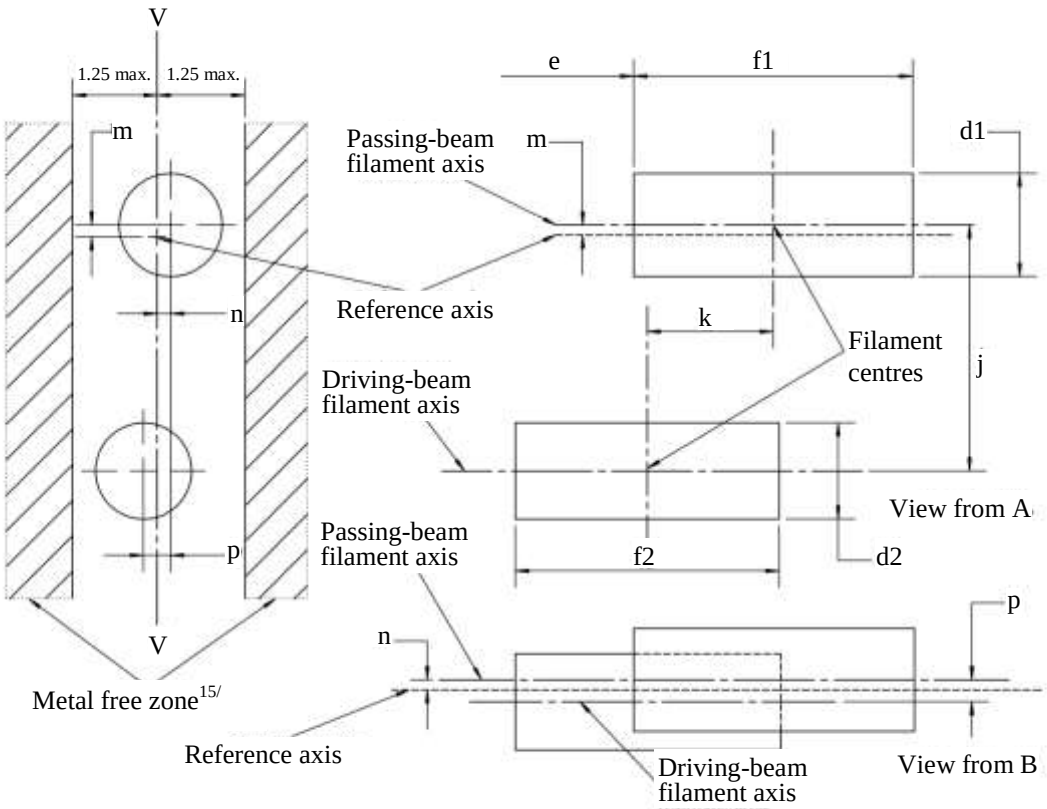


Figure 6 – Position and dimensions of filaments[10/, 11/, 12/, 13/, 14/]

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*	
		Filament 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.

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

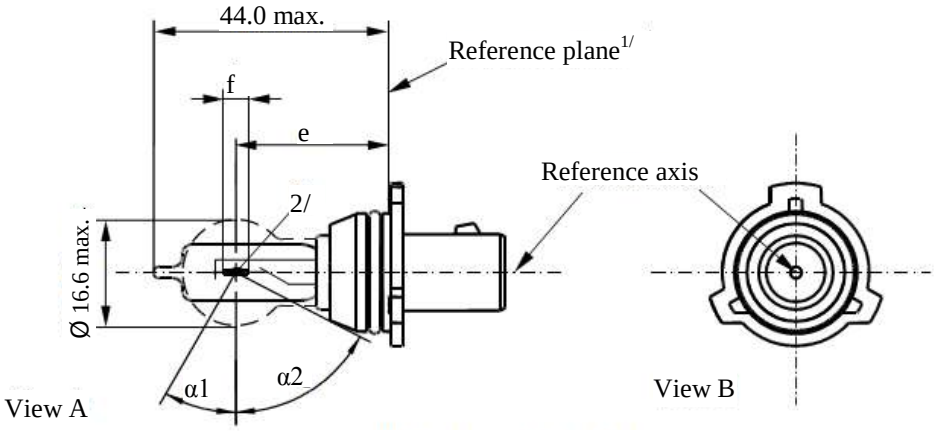


Figure 1 – Main drawing P13W

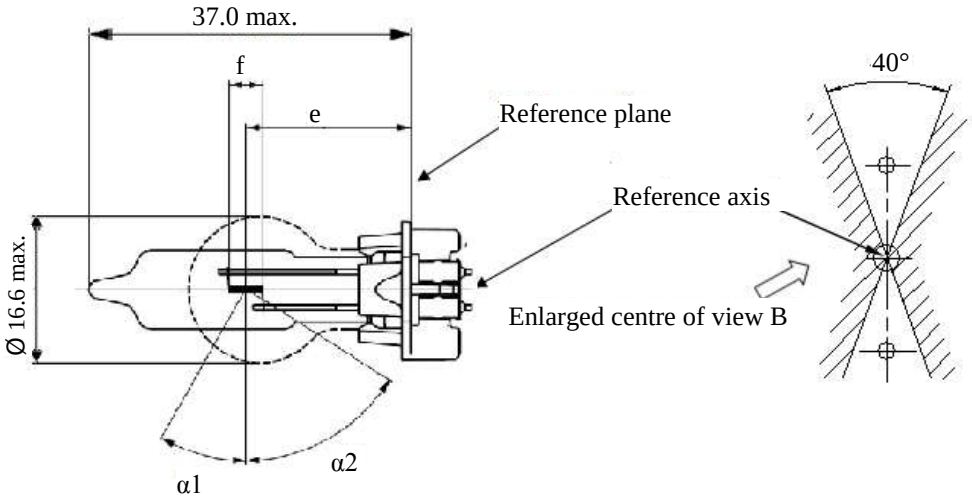


Figure 3 – Main drawing PW13W

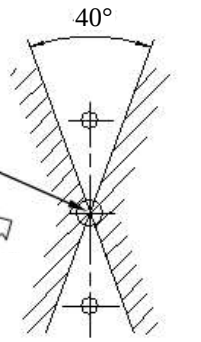


Figure 2 – Metal free zone3/

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. = 1.0 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

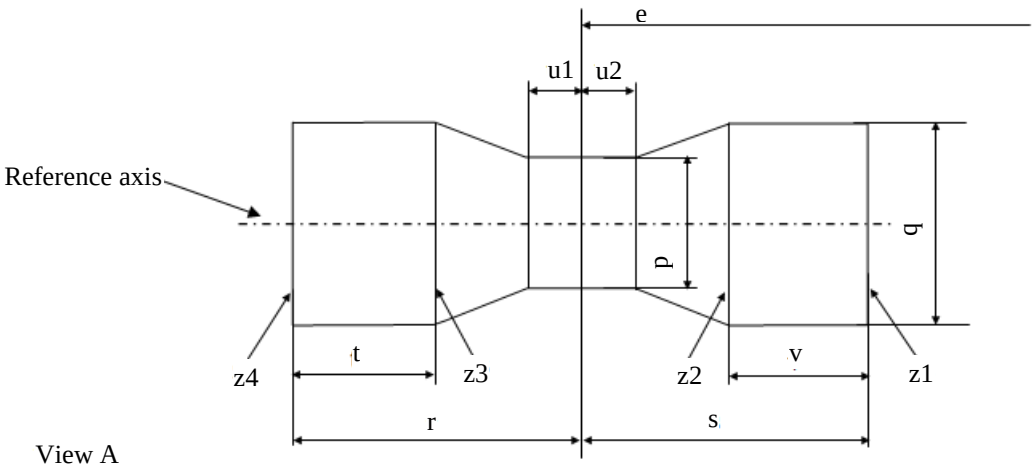
[4/] To be checked by means of a "Box system"; sheet P13W/3.

[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 α_1+ α_2.
These requirements apply to the whole bulb circumference.

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.



View A

	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.

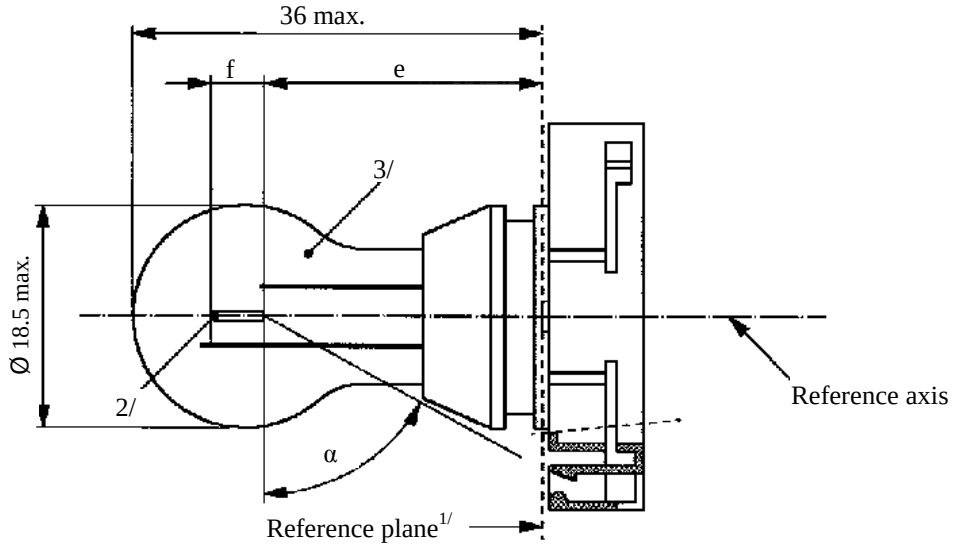
The filament shall lie entirely within the limits shown.

Sheet P19W/1

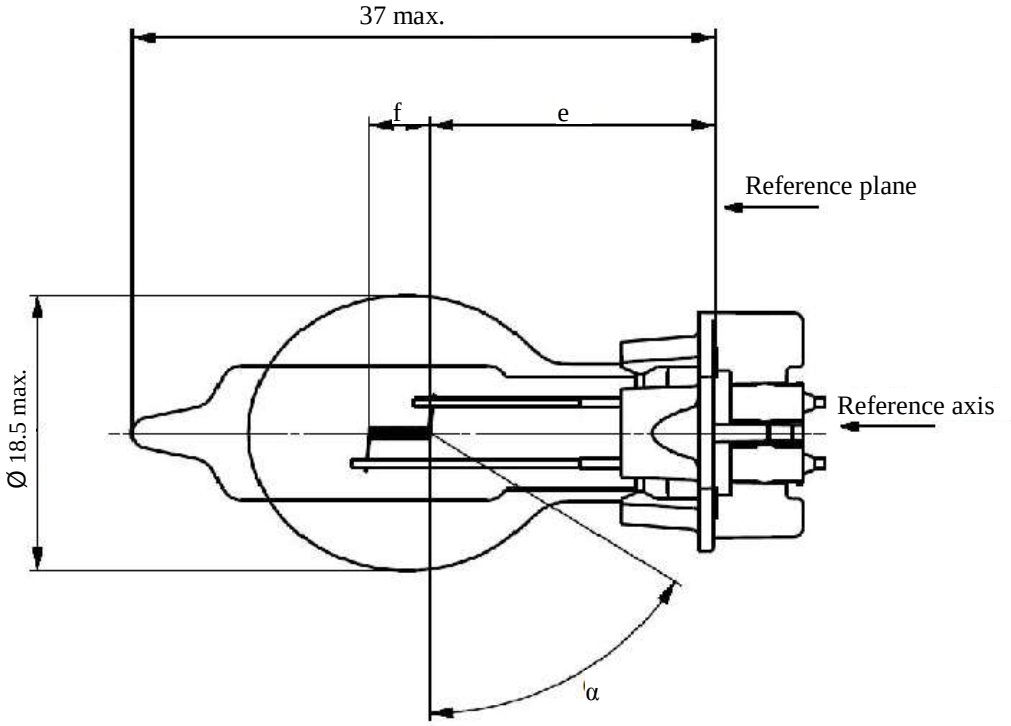
Categories P19W, PY19W, PR19W, PS19W, PSY19W, PSR19W, PW19W, PWY19W and PWR19W

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

P19W,
PY19W,
PR19W,
PS19W,
PSY19W,
PSR19W



PW19W,
PWY19W,
PWR19W



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/ 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/).

Sheet P19W/2

Categories P19W, PY19W, PR19W, PS19W, PSY19W, PSR19W, PW19W, PWY19W and PWR19W

Dimensions in mm [4/]			*Filament lamps of normal production*			*Standard filament lamp* [8/]
			Min.	*Nom.*	*Max.*	
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 PY19W Cap PGU20-2 PR19W Cap PGU20-5 PS19W Cap PG20-1 PSY19W Cap PG20-2 PSR19W Cap PG20-5			in accordance with IEC Publication 60061 (sheet 7004-127-2)			
PW19W Cap WP3.3x14.5-1 PWY19W Cap WP3.3x14.5-2 PWR19W Cap WP3.3x14.5-5			in accordance with IEC Publication 60061 (sheet 7004-164-1)			
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.

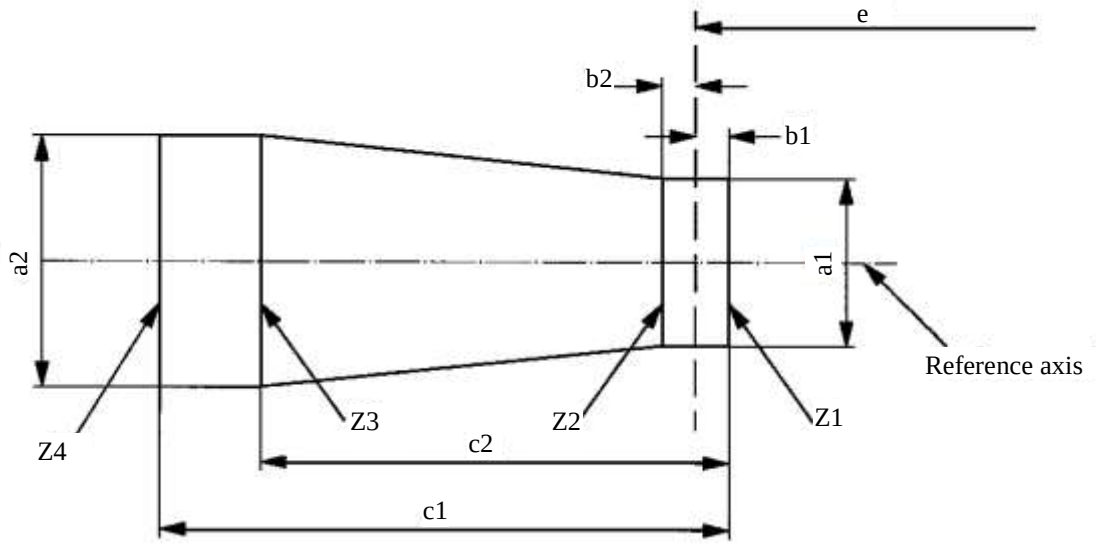
[6/] The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires as showed in the drawing on sheet P19W/1, the projection of the outside of the end turns crosses the filament axis.

[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.

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

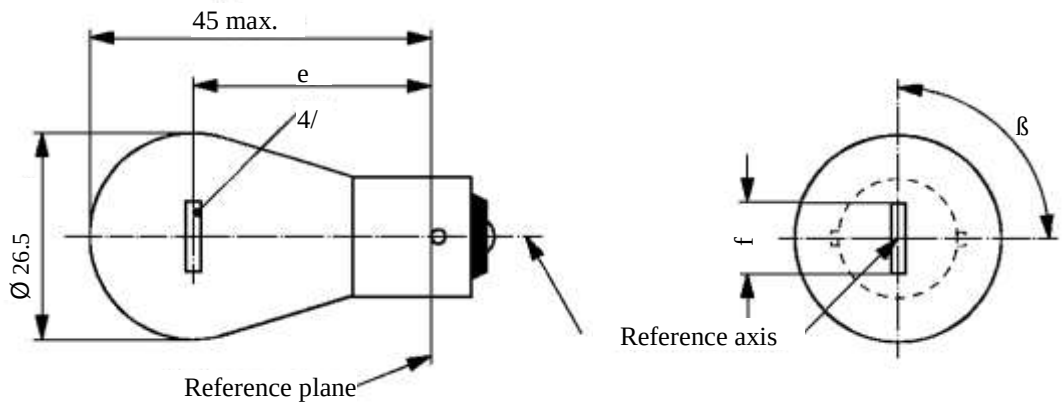
The filament position is checked in two mutually perpendicular planes, one of them being the plane through the lead-in wires.

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.

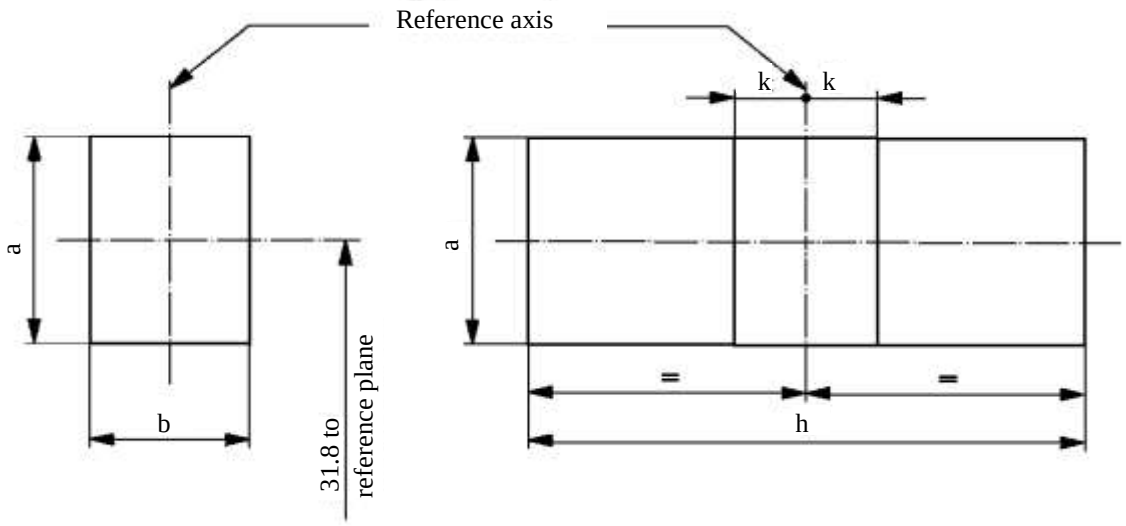
3/ To be checked by means of a "Box system"; sheet P21W/2.

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.

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 ±15°, 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

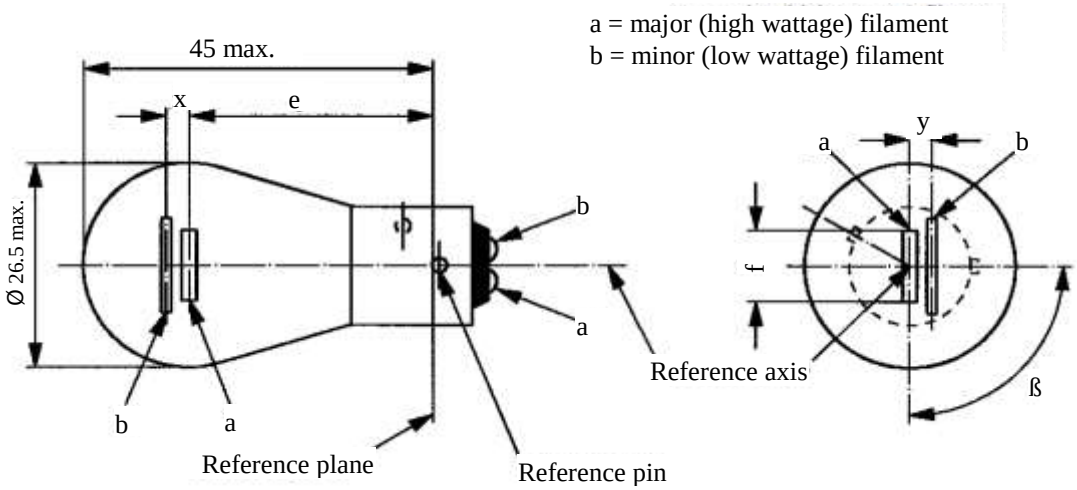
   The filament lamp placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to the filament axis:

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						

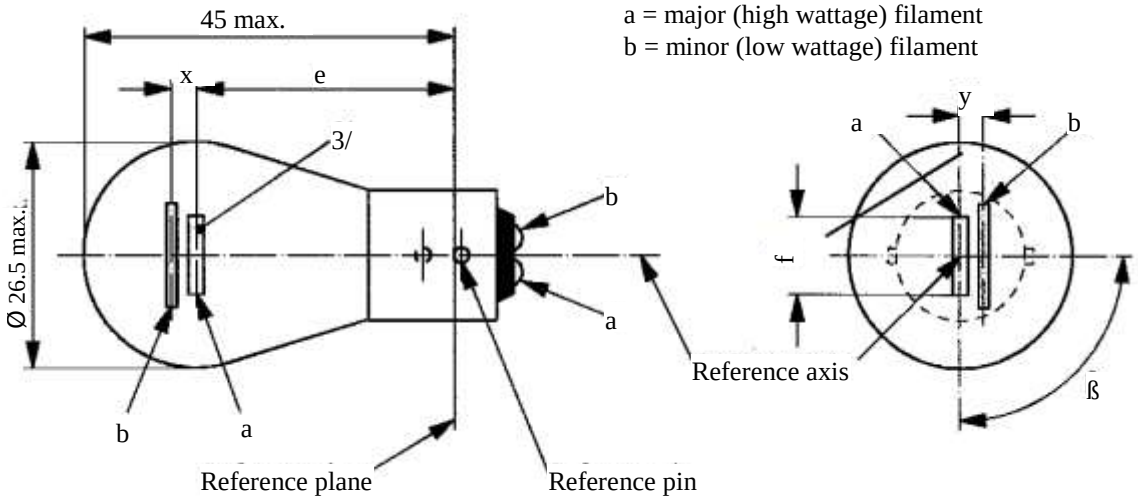
[1/] These dimensions shall be checked by means of a "Box system"[3/] based on the dimensions and tolerances shown above. "x" and "y" refer to the major (high wattage) filament, not to the reference axis. Means of increasing the positioning accuracy of the filament and of the cap-holder assembly are 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

[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 ±15°, 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;

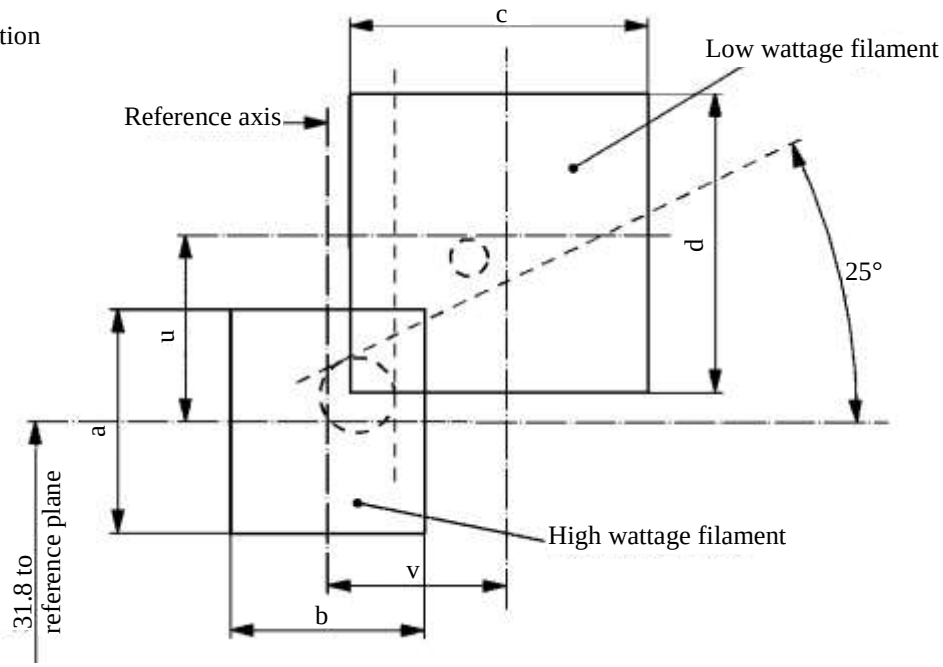
3.2. The centre of the major filament shall not be offset by more than distance "k" from the reference axis.

3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ±2 mm (±0.4 mm for standard filament lamps).

Category P21/5W **Sheet P21/5W/3**

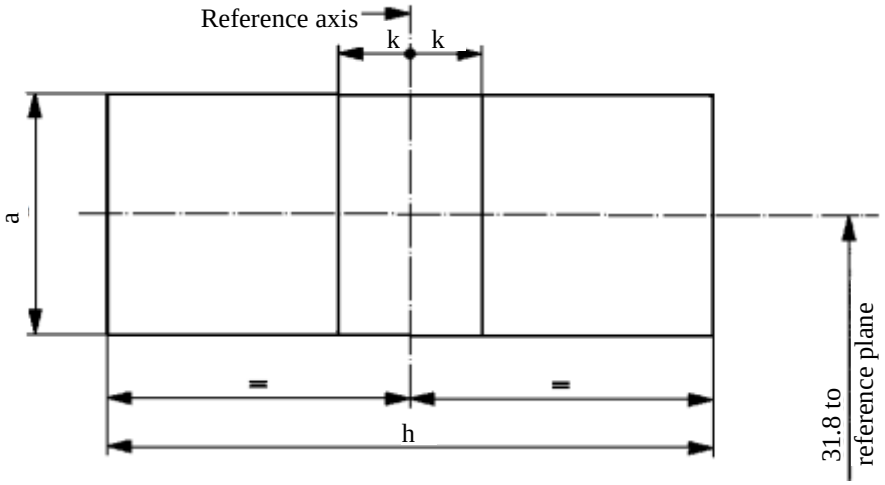
Dimensions in mm

Side elevation



Reference	*a*	*b*	*c*	*d*	*u*	*v*
Dimensions	3.5	3.0	4.8		2.8	

Front elevation



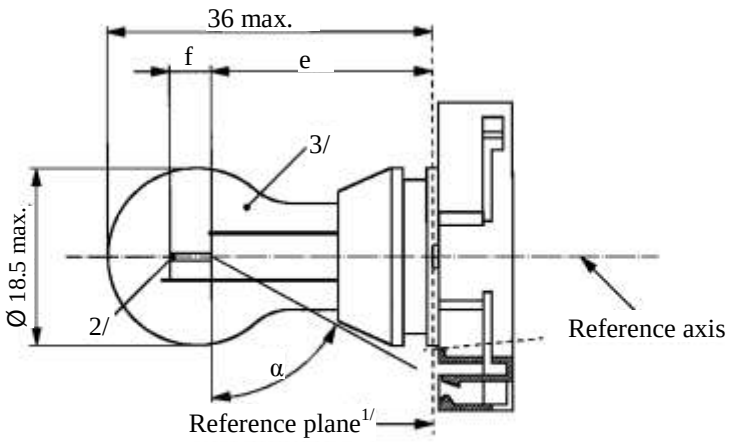
Reference	*a*	*h*	*k*
Dimensions	3.5	9.0	1.0

Sheet P24W/1

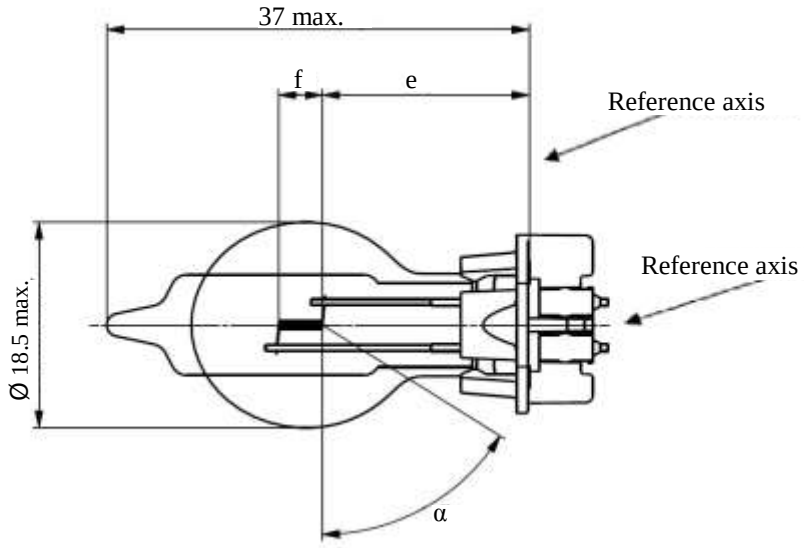
Categories P24W, PX24W, PY24W, PR24W, PS24W, PSX24W, PSY24W, PSR24W, PW24W, PWY24W and PWR24W

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

P24W,
PX24W,
PY24W, PR24W
PS24W,
PSX24W,
PSY24W, PSR24W



PW24W,
PWY24W,
PWR24W



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/ 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/).

Sheet P24W/2

Categories P24W, PX24W, PY24W, PR24W, PS24W, PSX24W, PSY24W, PSR24W, PW24W, PWY24W and PWR24W

Dimensions in mm [4/]		*Filament lamps of normal production*			*Standard filament lamp* [8/]
		Min.	*Nom.*	*Max.*	
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 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	in accordance with IEC Publication 60061 (sheet 7004-127-2)
PW24W Cap WP3.3x14.5-3 PWY24W Cap WP3.3x14.5-4 PWR24W Cap WP3.3x14.5-6	in accordance with IEC Publication 60061 (sheet 7004-164-1)

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 %	

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.

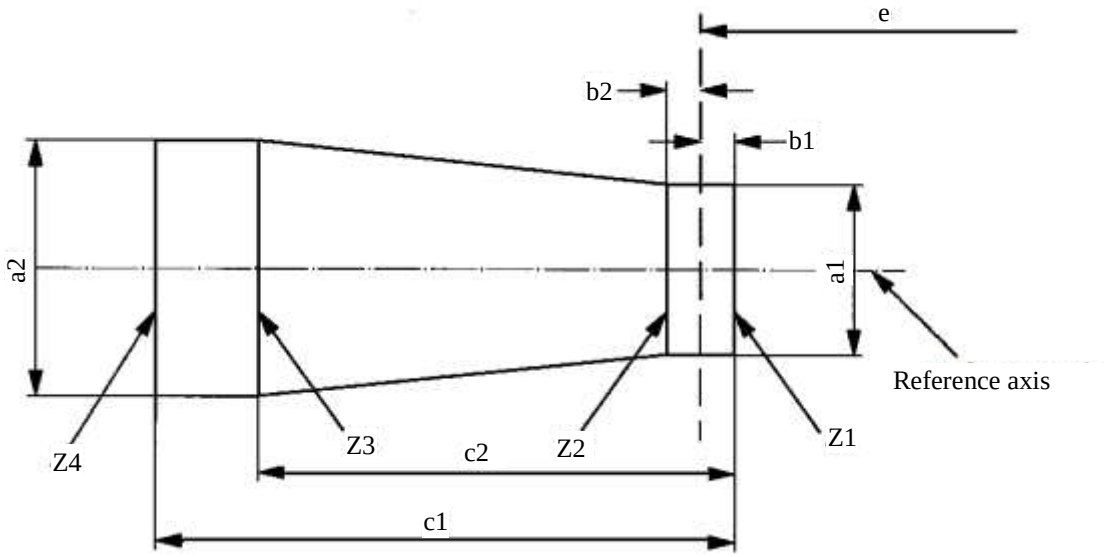
6/ The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires as showed in the drawing on sheet P24W/1, the projection of the outside of the end turns crosses the filament axis.

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 2α + 180°.

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.

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

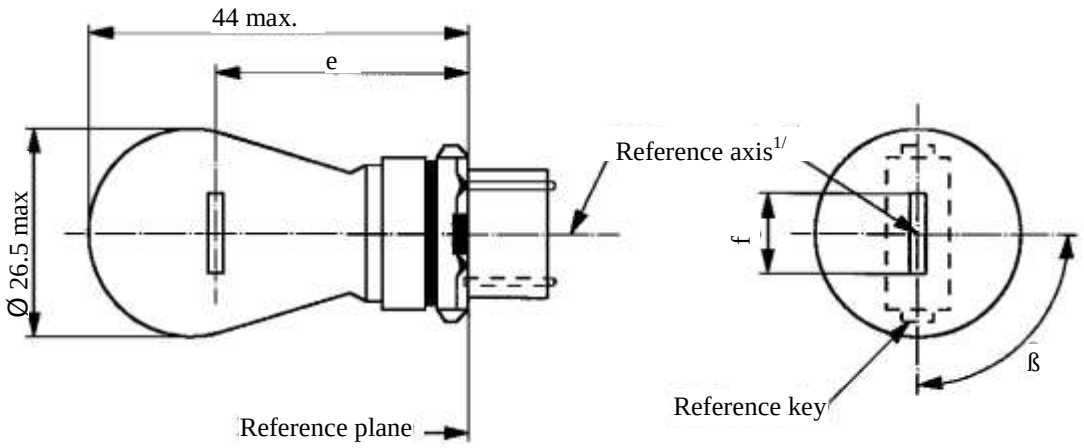
The filament position is checked in two mutually perpendicular planes, one of them being the plane through the lead-in wires.

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.

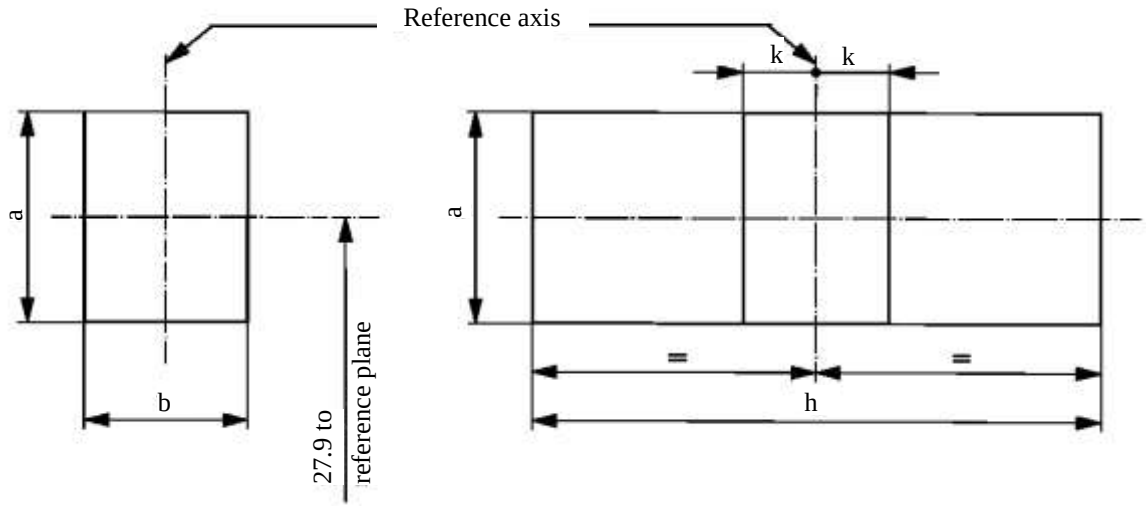
Category P27W **Sheet P27W/2**

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 ±15°, 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:

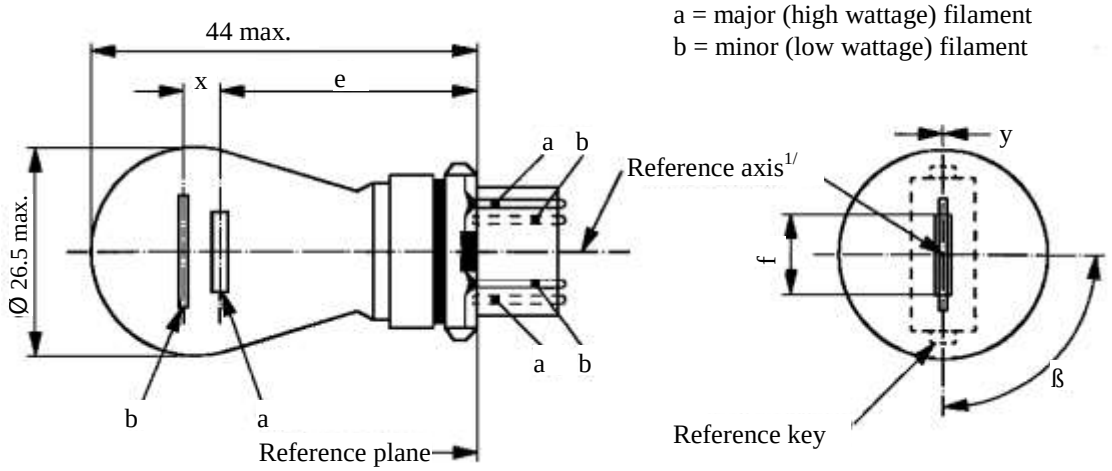
3.1. The projection of the filament shall lie entirely within a rectangle of height "a" and width "h", having its centre at the theoretical position of the centre of the filament.

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.

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			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.

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 ±15°, 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

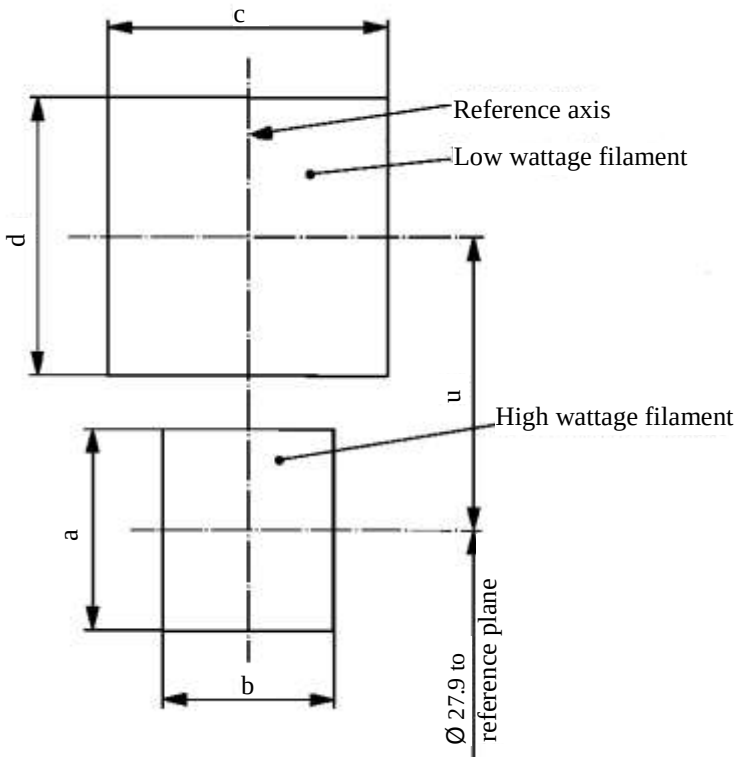
The filament lamp being placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to axis of the major filament:

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;

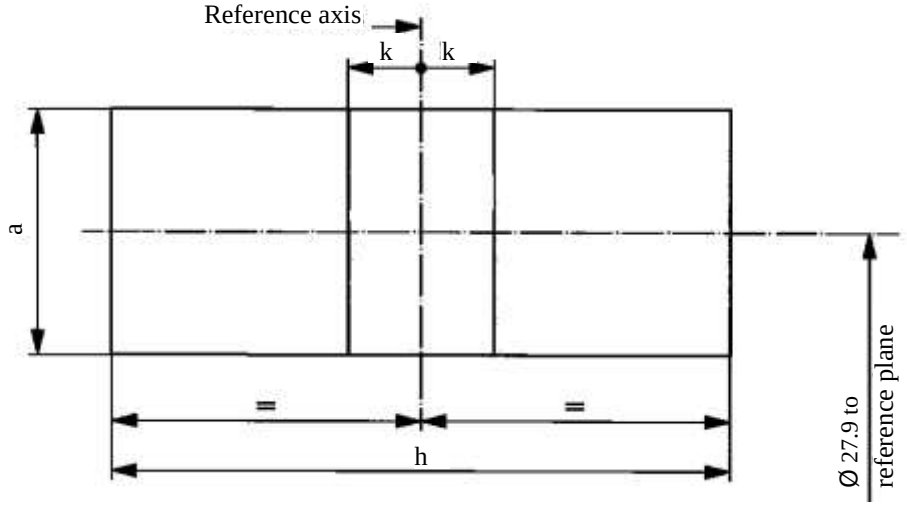
3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ±2 mm (±0.4 mm for standard filament lamps).

Side elevation



Reference	*a*	*b*	*c*	*d*	*u*
Dimension	3.5	3.0	4.8		5.1

Front elevation



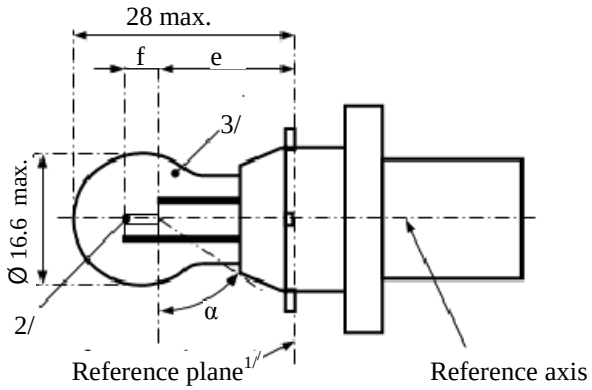
Reference	*a*	*h*	*k*
Dimension	3.5	11.9	1.0

Sheet PC16W/1

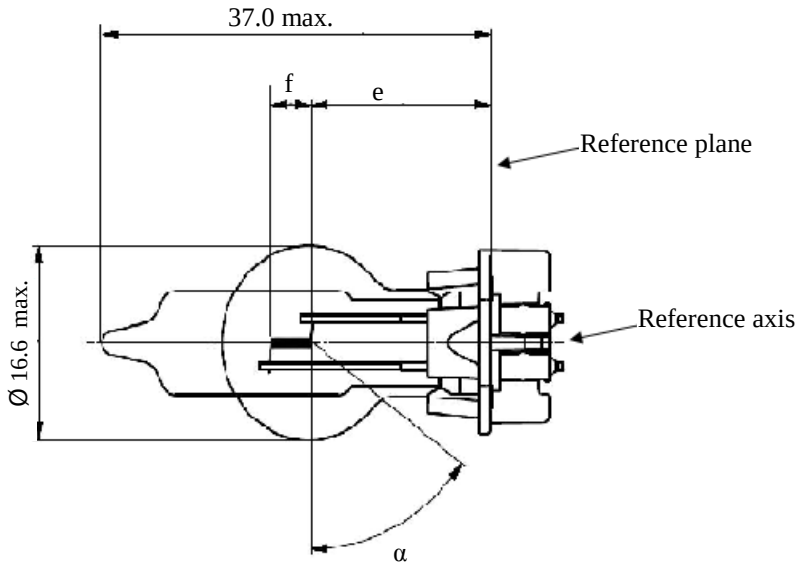
Categories PC16W, PCY16W, PCR16W, PW16W, PWY16W and PWR16W

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

PC16W,
PCY16W,
PCR16W



PW16W,
PWY16W,
PWR16W



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/ 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/).

Sheet PC16W/2

Categories PC16W, PCY16W, PCR16W, PW16W, PWY16W and PWR16W

Dimensions in mm		*Filament lamps of normal production*			*Standard filament lamp* [7/]
		Min.	*Nom.*	*Max.*	
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 PCY16W Cap PU20d-2 PCR16W Cap PU20d-7		in accordance with IEC Publication 60061 (sheet 7004-158-1)			
PW16W Cap WP3.3x14.5-8 PWY16W Cap WP3.3x14.5-9 PWR16W Cap WP3.3x14.5-10		in accordance with IEC Publication 60061 (sheet 7004-164-1)			
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.

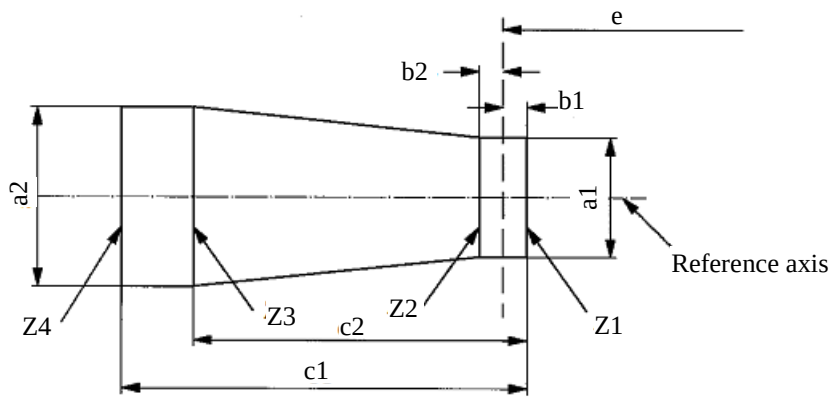
[5/] The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires as showed in the drawing on sheet PC16W/1, the projection of the outside of the end turns crosses the filament axis.

[6/] No part of the cap beyond the reference plane shall interfere with angle α. The bulb shall be optically distortion free within the angle 2α + 180°.

[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.

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

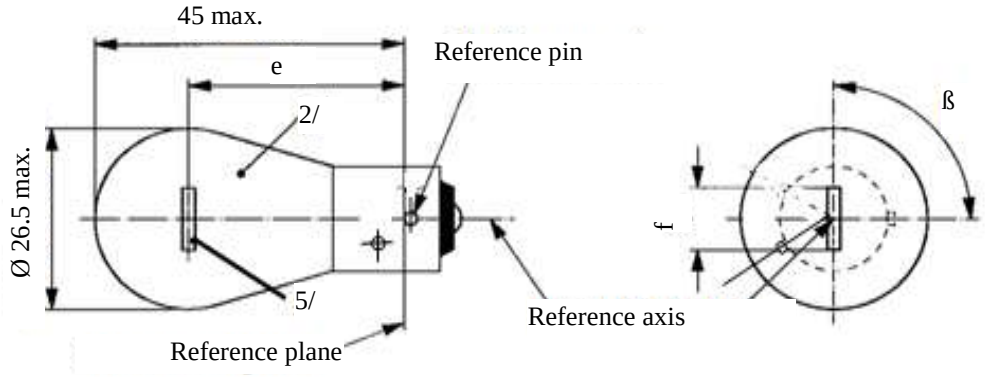
The filament position is checked in two mutually perpendicular planes, one of them being the plane through the lead-in wires.

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* [4/]
		Min.	*Nom.*	*Max.*	
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.

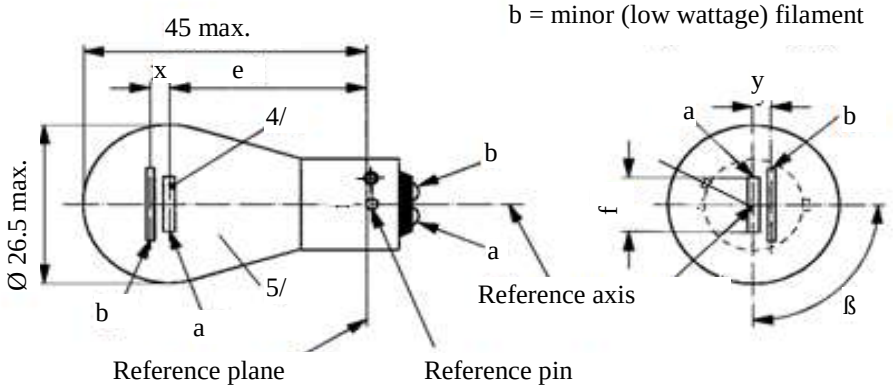
[4/] The light emitted from standard filament lamps shall be white or red.

[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.

a = major (high wattage) filament
b = minor (low wattage) filament



Dimensions in mm		*Filament lamps of normal production* [5/]				*Standard filament lamp* [6/]
		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 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 "Boxsystem"[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.

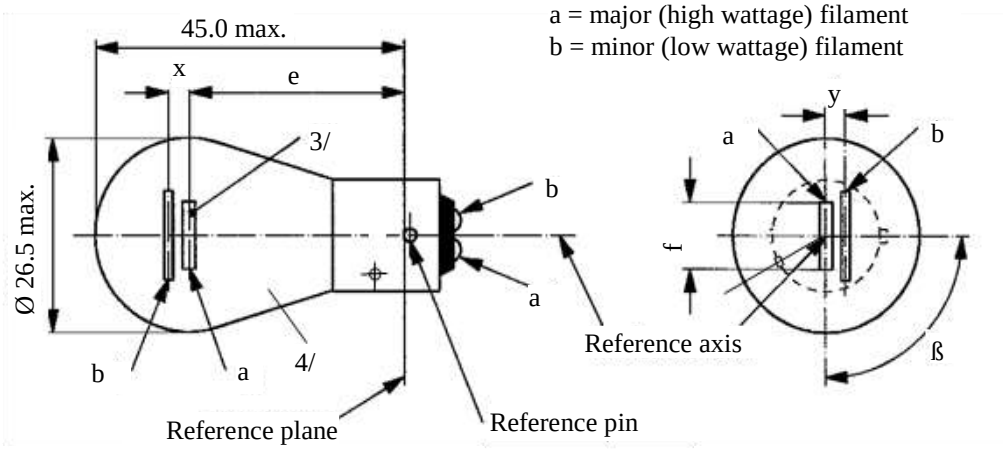
4/ The 24-volt filament lamp is not recommended for future embodiments.

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* [5/]
		Min.	*Nom.*	*Max.*	
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					

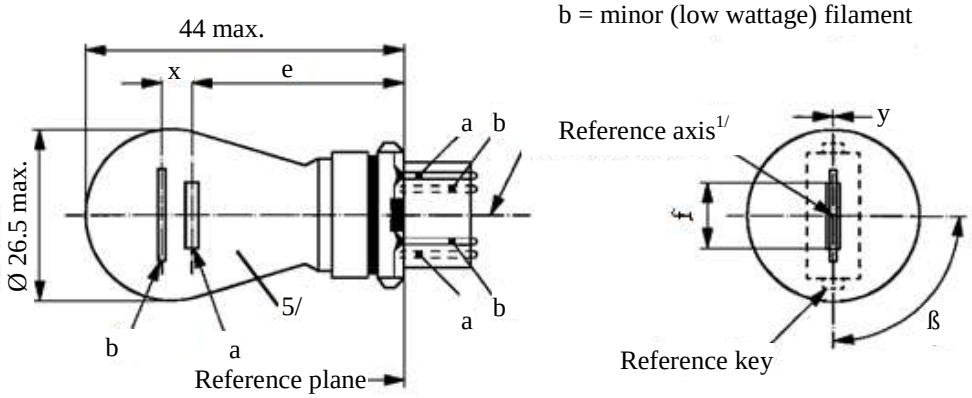
Rated values	Volts	12		24		12
	Watts	21	5	21	5	21/5
Test voltage	Volts	13.5		28.0		13.5
Objective values	Watts	26.5 max.	6.6 max.	29.7 max.	11.0 max.	26.5 and 6.6 max.
	Luminous flux	105	8	105	10	
	± %	20	25	20	25	
Reference luminous flux at approximately 13.5 V:				White:		440 lm and 35 lm
				Red:		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.

a = major (high wattage) filament
b = minor (low wattage) filament



Dimensions in mm		*Filament lamps of normal production*			*Standard filament lamp* 6/	
		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 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.

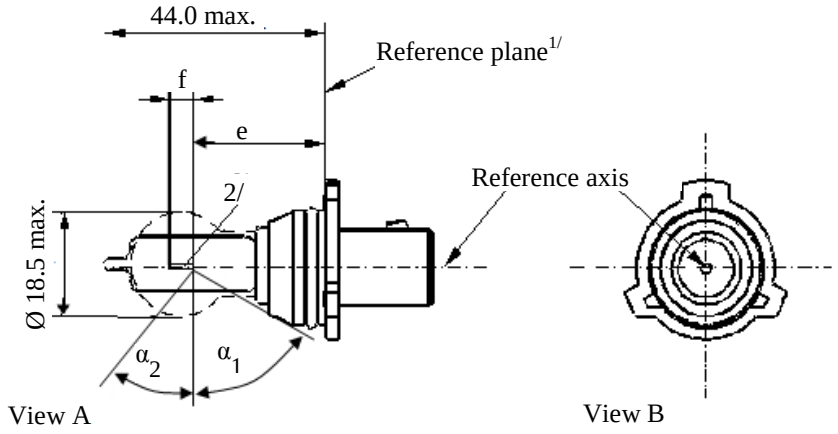


Figure 1 – Main drawing

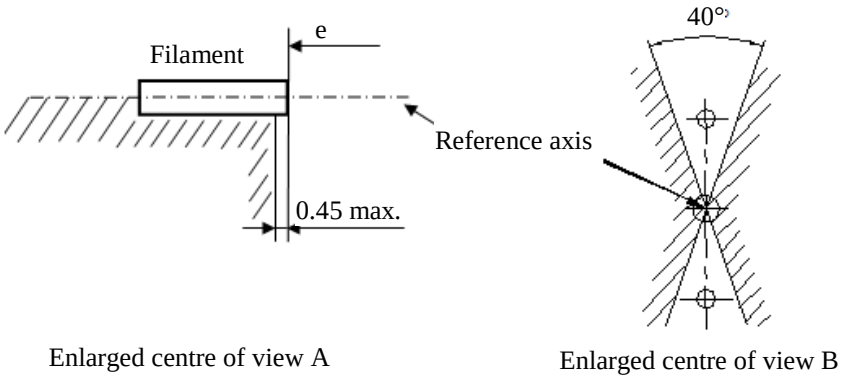


Figure 2 – Metal free zone3/

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 [5/]			24.0 [4/]	24.0 ± 0.25
f [5/]			4.2 [4/]	4.2 ± 0.25
α_1 [6/]			35.0° min.	35.0° min.
α_2 [6/]			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

[4/] To be checked by means of a "Box system"; sheet PSX26W/3.

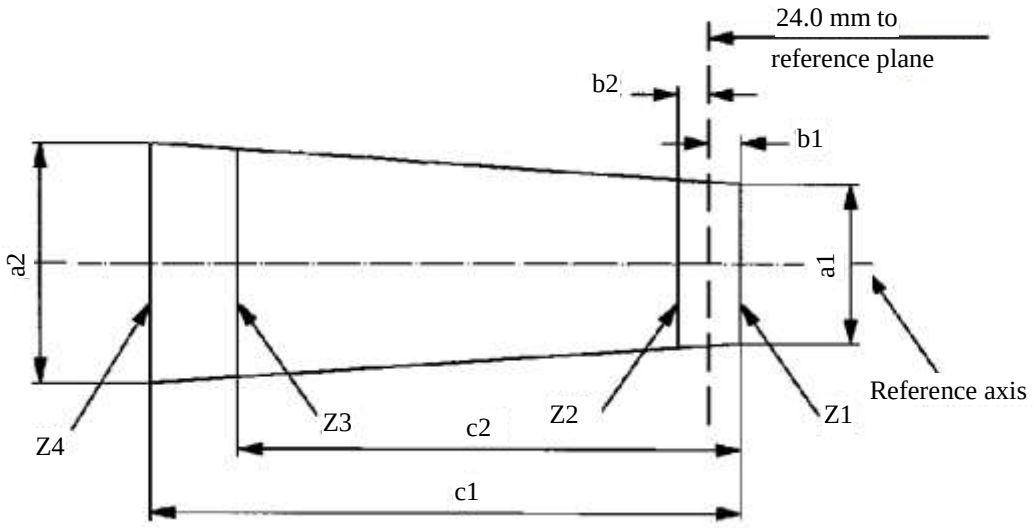
[5/] The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires, the projection of the outside of the end turns crosses the filament axis.

[6/] No part of the cap beyond the reference plane shall interfere with angle α_2 as shown in Figure 1 on sheet PSX26W/1. The bulb shall be optically distortion free within the angles $\alpha_1 + \alpha_2$.
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

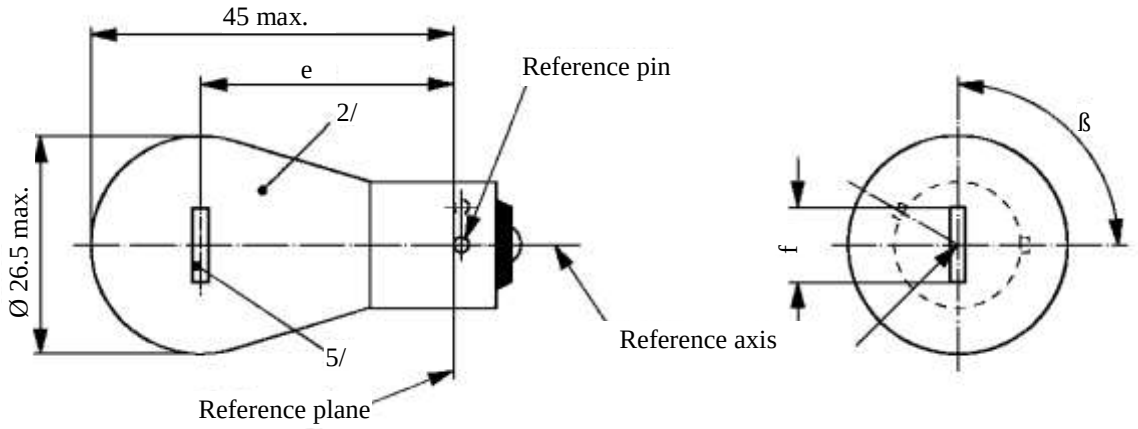
The filament position is checked in two mutually perpendicular planes, one of them being the plane through the lead-in wires.

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* [4/]
		Min.	*Nom.*	*Max.*	
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/).

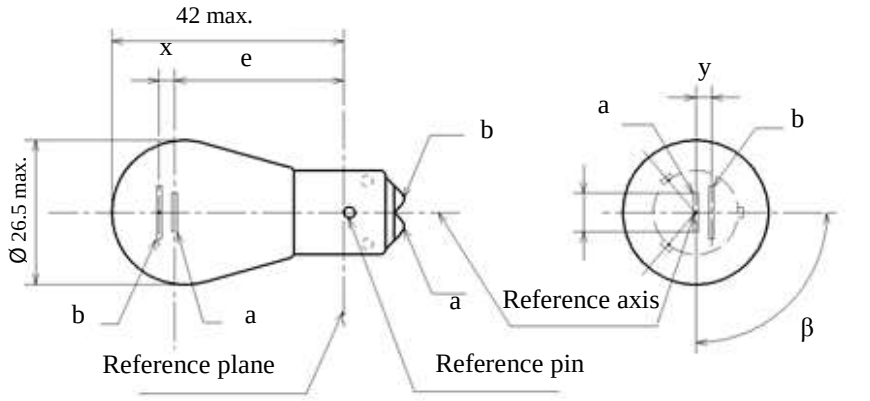
[3/] To be checked by means of a "Box system"; sheet P21W/2.

[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* [4/]
		Min.	*Nom.*	*Max.*	
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 ±15°, 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;

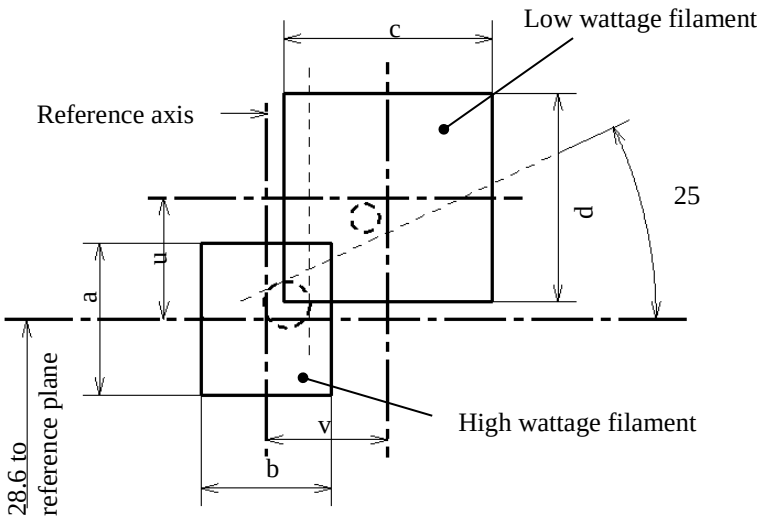
3.2. The centre of the major filament shall not be offset by more than distance "k" from the reference axis.

3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ±2 mm (±0.4 mm for standard filament lamps).

Category PY21/5W **Sheet PY21/5W/3**

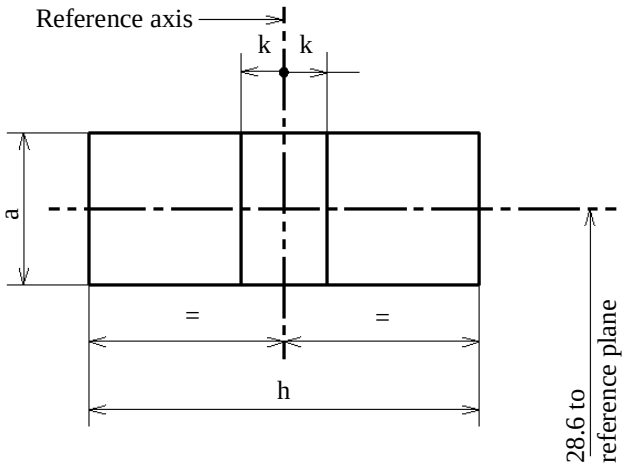
Dimensions in mm

Side elevation



Reference	*a*	*b*	*c*	*d*	*u*	*v*
Dimensions	3.5	3.0	4.8		2.8	

Front elevation

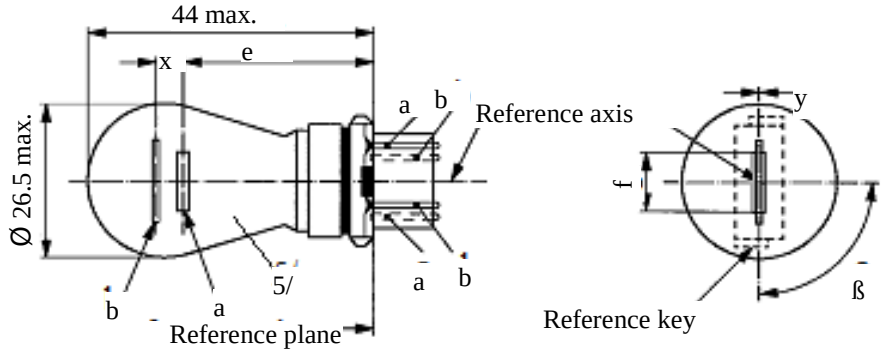


Reference	*a*	*h*	*k*
Dimensions	3.5	9.0	1.0

Category PY27/7W **Sheet PY27/7W/1**

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

a = major (high wattage) filament
b = minor (low wattage) filament

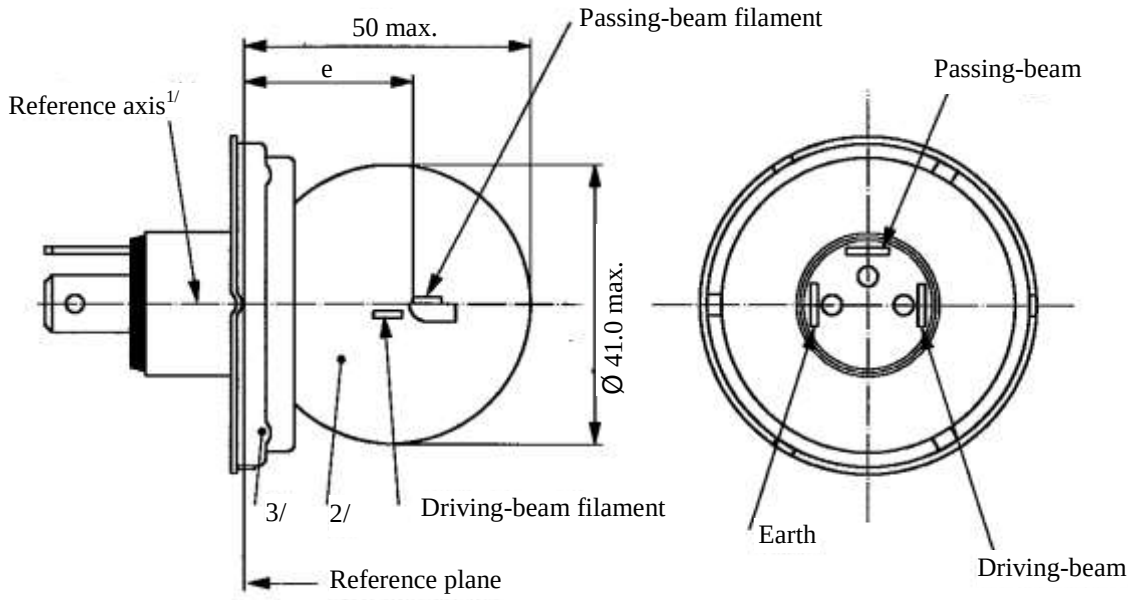


Dimensions in mm		*Filament lamps of normal production*			*Standard filament lamp* [6/]	
		Min.	*Nom.*	*Max.*		
e			27.9 [3/]		27.9 ± 0.3	
f				9.9	9.9 + 0 / -2	
Lateral deviation [2/]				[3/]	0.0 ± 0.4	
x [4/]			5.1 [3/]		5.1 ± 0.5	
y [4/]			0.0 [3/]		0.0 ± 0.5	
β		75° [3/]	90°	105° [3/]	90° ± 5°	
Cap 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.



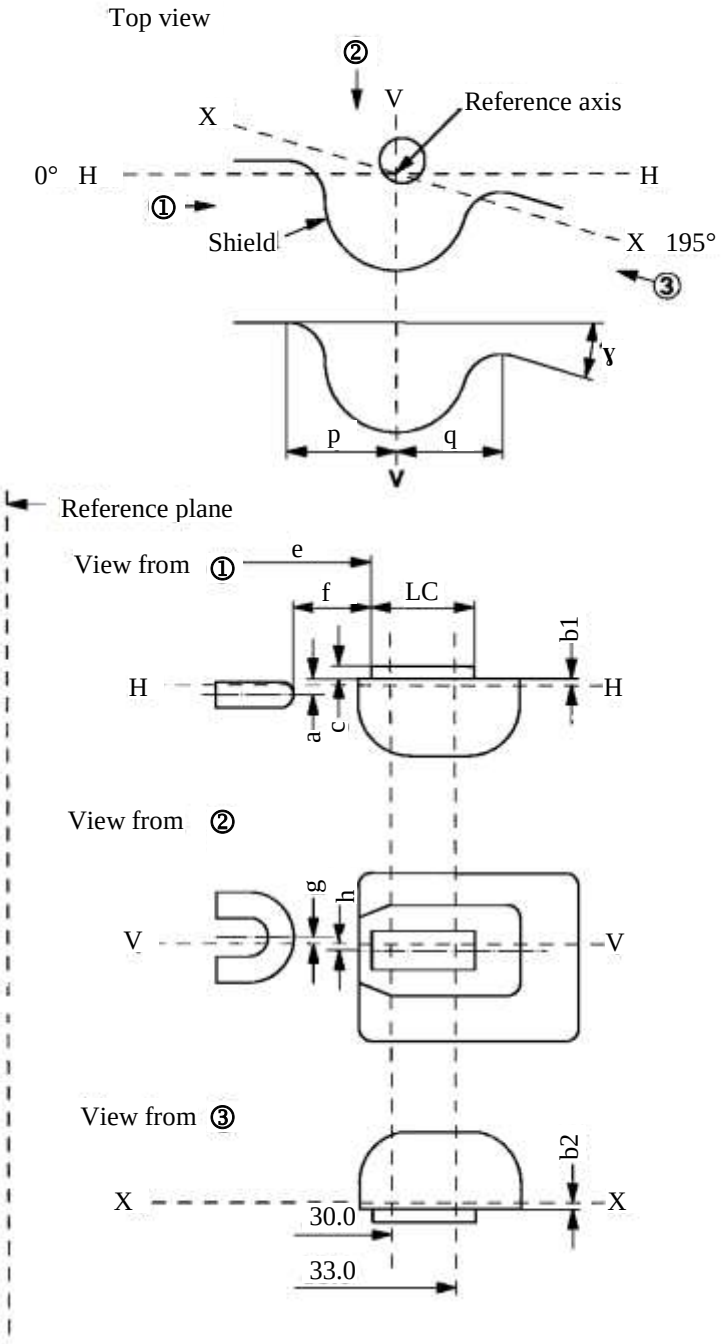
Electrical and photometric characteristics										
		Filament lamps of normal production						*Standard filament lamp*	
Rated values	Volts	6 4/		12 4/		24 4/		12 4/	
	Watts	45	40	45	40	55	50	45	40
Test voltage	Volts	6.3		13.2		28.0		13.2	
Objective values	Watts	53 max.	47 max.	57 max.	51 max.	76 max.	69 max.	52 +0 % -10 %	46 ±5 %
	Luminous flux	720 min.	570 ±15 %	860 min.	675 ±15 %	1,000 min.	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.



Category R2 **Sheet R2/3**

Filaments and shield position and dimensions [1/]				
			Tolerance	
			Filament lamps of normal production	*Standard filament lamp*
Dimensions in mm			*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.

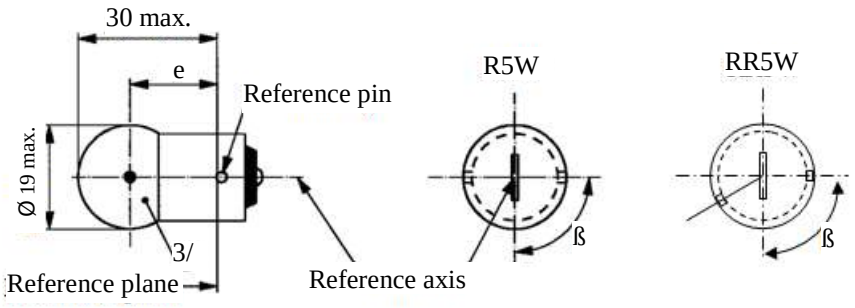
[2/] To be measured at the distance from the reference plane indicated in millimetres behind the stroke.

[3/] mv = measured value.

[4/] The angle γ 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* [4/]
			Min.	*Nom.*	*Max.*	
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 RR5W: BAW15s			in accordance with IEC Publication 60061			(sheet 7004-11A-9) [1/] (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.

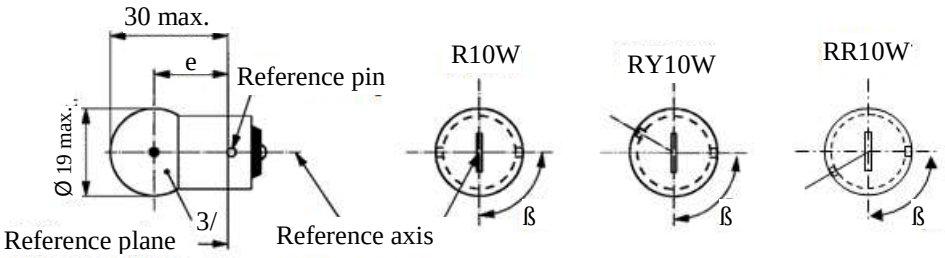
[3/] The light emitted from filament lamps of normal production shall be white for category R5W and red for category RR5W (see also footnote 4/).

[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.



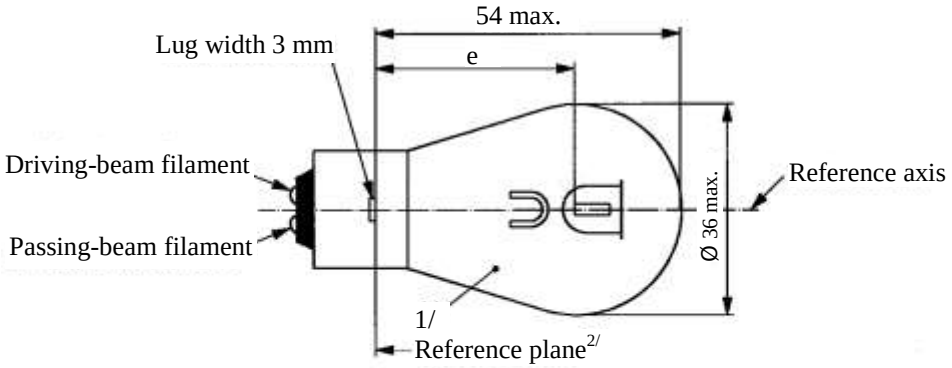
Dimensions in mm			*Filament lamps of normal production*			*Standard filament lamp* [4/]
			Min.	*Nom.*	*Max.*	
e			17.5	19.0	20.5	19.0 ± 0.3
Lateral deviation [2/]					1.5	0.3 max.
β			60°	90°	120°	90° ± 5°
Cap	R10W:	BA15s	in accordance with IEC Publication 60061			(sheet 7004-11A-9) [1/]
	RY10W:	BAU15s				(sheet 7004-19-2)
	RR10W:	BAW15s				(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.

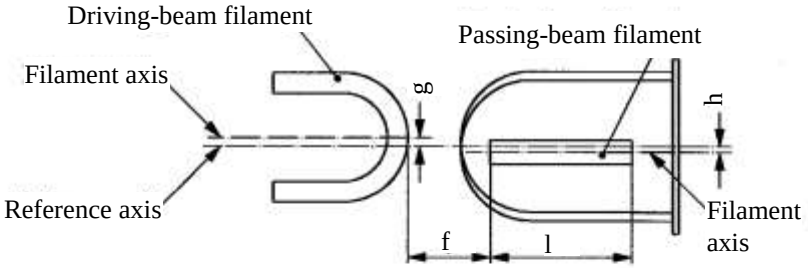
Categories S1 and S2 **Sheet S1/S2/1**

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

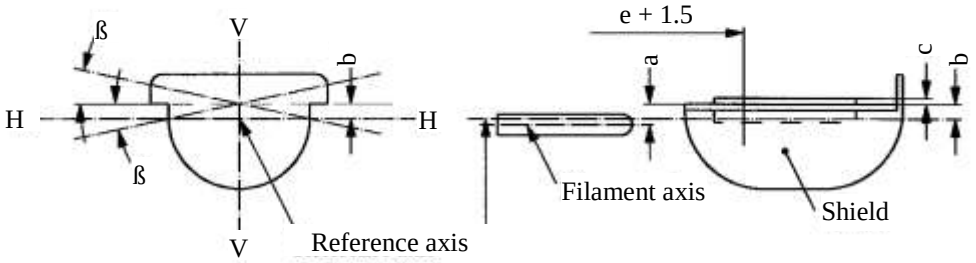
Filament lamps for motorcycles



Position and dimensions of filaments



Position of shield3/,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 β 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.

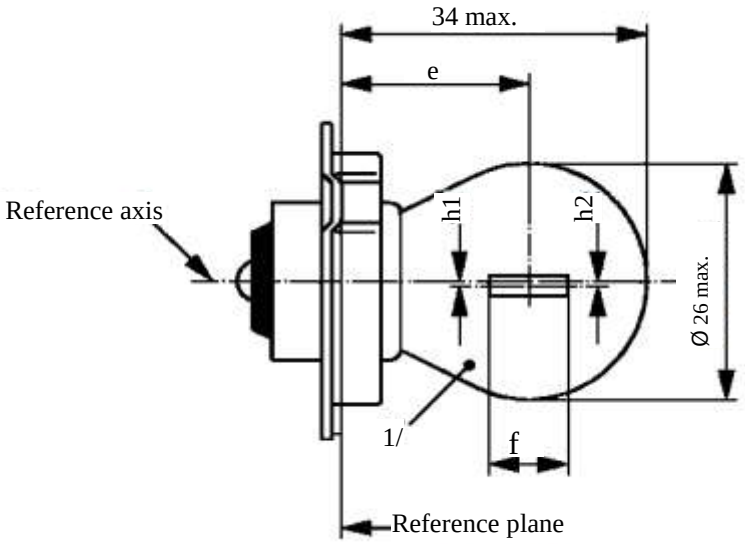
[6/] Admissible angular deviation of the shield plane position from the normal position.

[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

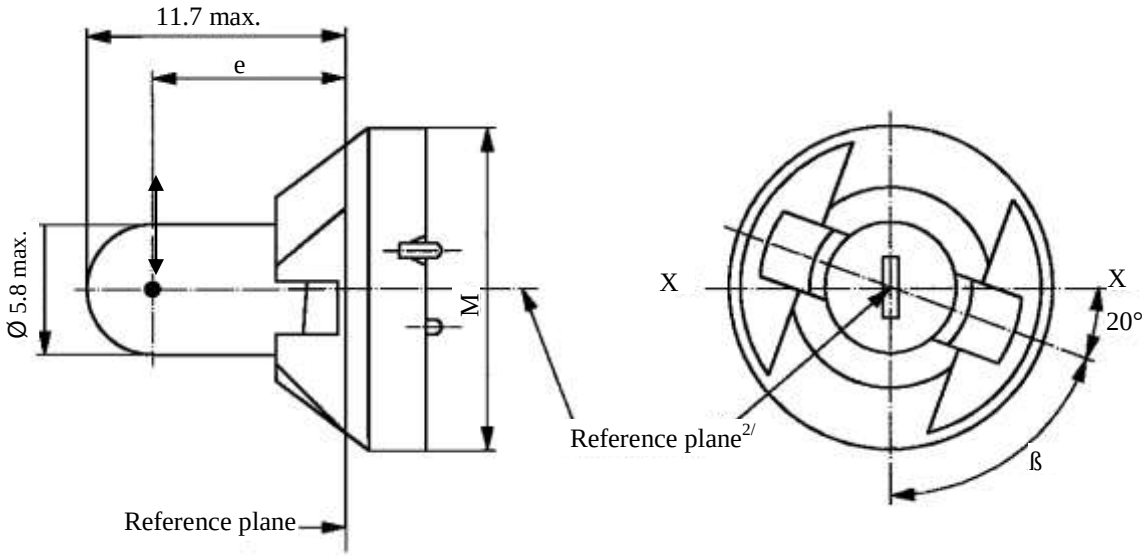


Dimensions in mm		*Filament lamps of normal production*			*Standard filament lamp*
		Min.	*Nom.*	*Max.*	
e [2/]		19.0	19.5	20.0	19.5 ± 0.25
f	6 V			3.0	2.5 ± 0.5
	12 V			4.0	
h1, h2 [3/]		-0.5	0	0.5	0 ± 0.3
Cap P26s in accordance with IEC Publication 60061 (sheet 7004-36-1)					
Electrical and photometric 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.



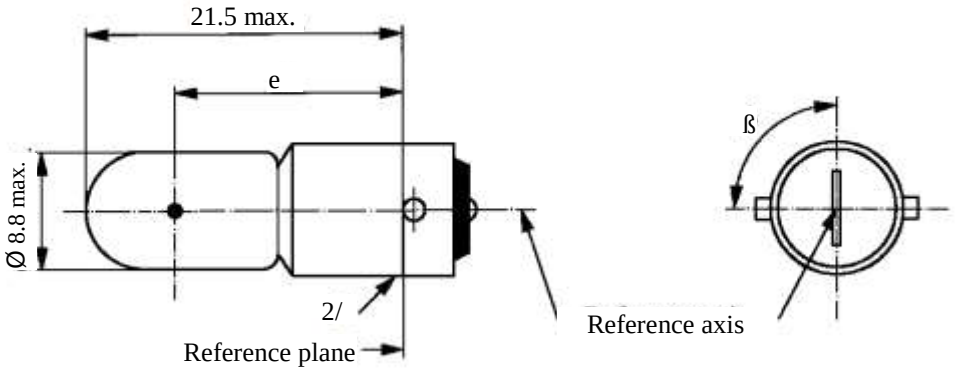
Dimensions in mm		*Filament lamps of normal production*			*Standard filament lamp*
		Min.	*Nom.*	*Max.*	
e		7.6	8.3	9.0	8.3 ± 0.35
Lateral deviation 1/				0.7	0.35 max
β		55°	70°	85°	70° ± 5°
Cap P11.5d in accordance with IEC Publication 60061 (sheet 7004-79-1)					
Electrical and photometric characteristics					
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.



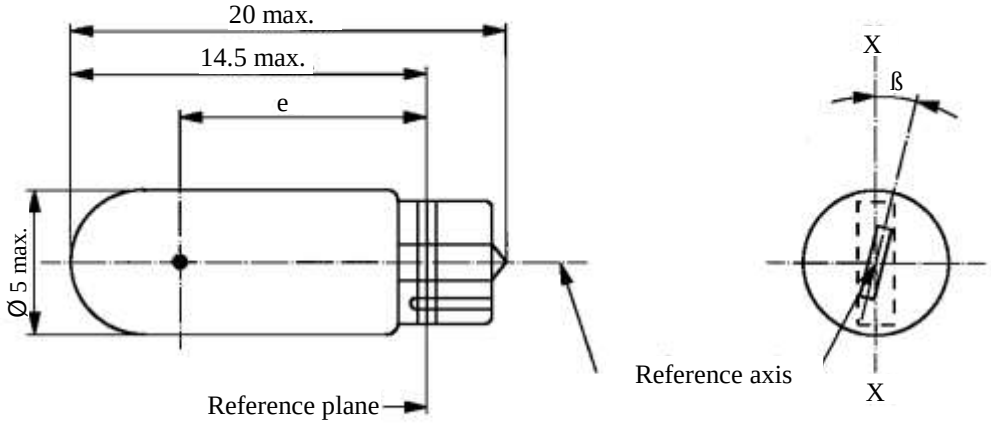
Dimensions in mm		*Filament lamps of normal production*			*Standard filament lamp*
		Min.	*Nom.*	*Max.*	
e		13.5	15.0	16.5	15.0 ± 0.3
Lateral deviation [1/]				1.5	0.5 max
β			90°		90° ± 5°
Cap BA9s in accordance with IEC Publication 60061 (sheet 7004-14-9)					
Electrical and photometric characteristics					
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 ± 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.

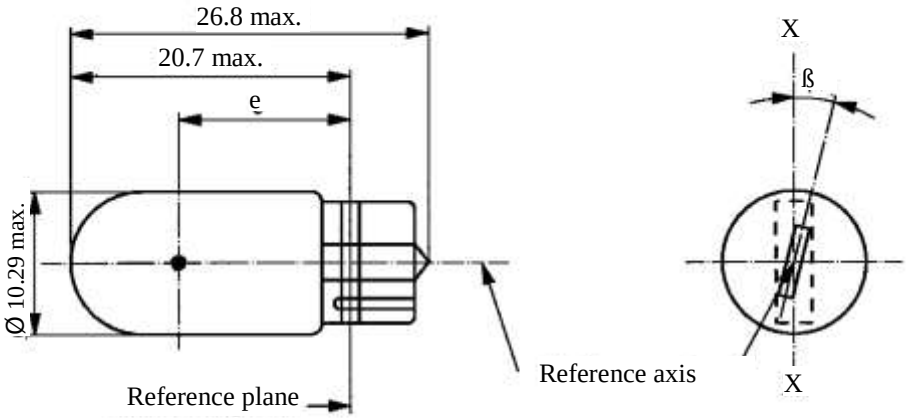


Dimensions in mm		*Filament lamps of normal production*			*Standard filament lamp*
		Min.	*Nom.*	*Max.*	
e		10.3	10.8	11.3	10.8 ± 0.3
Lateral deviation [1/]				1.0	0.5 max
β		-15°	0°	+15°	0° ± 5°
Cap W2x4.6d in accordance with IEC Publication 60061 (sheet 7004-94-2)					
Electrical and photometric characteristics					
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.

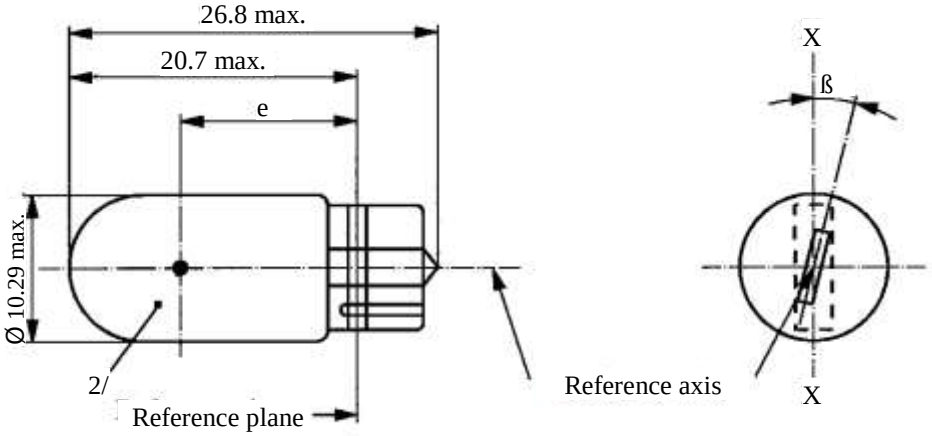


Dimensions in mm		*Filament lamps of normal production*			*Standard filament lamp*
		Min.	*Nom.*	*Max.*	
e		11.2	12.7.0	14.2	12.7 ± 0.3
Lateral deviation [1/]				1.5	0.5 max
β		-15°	0°	+15°	0° ± 5°
Cap W2.1x9.5d in accordance with IEC Publication 60061 (sheet 7004-91-3)					
Electrical and photometric characteristics					
Rated values	Volts	6	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 ± 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* [3/]
			Min.	*Nom.*	*Max.*	
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.

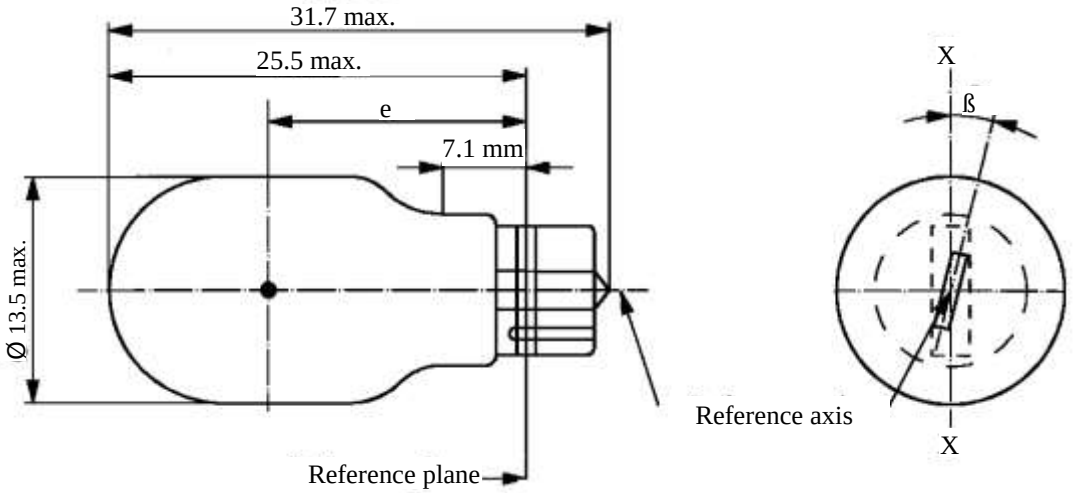
2/ The light emitted from filament lamps of normal production shall be white for category W5W, amber for category WY5W and red for category WR5W (see also footnote 3/)

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

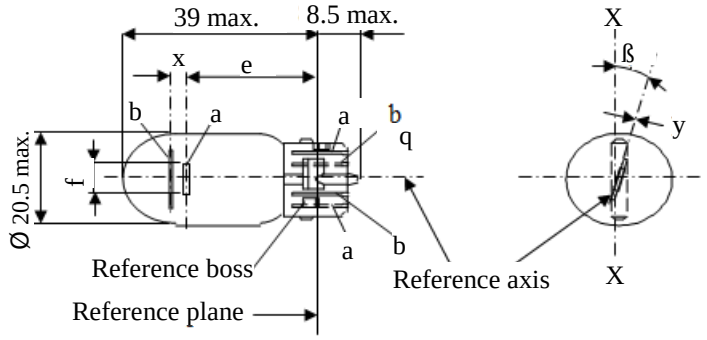
[1/] Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

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 7004-151-2)						
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 ±15°, 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. (±15°).

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:

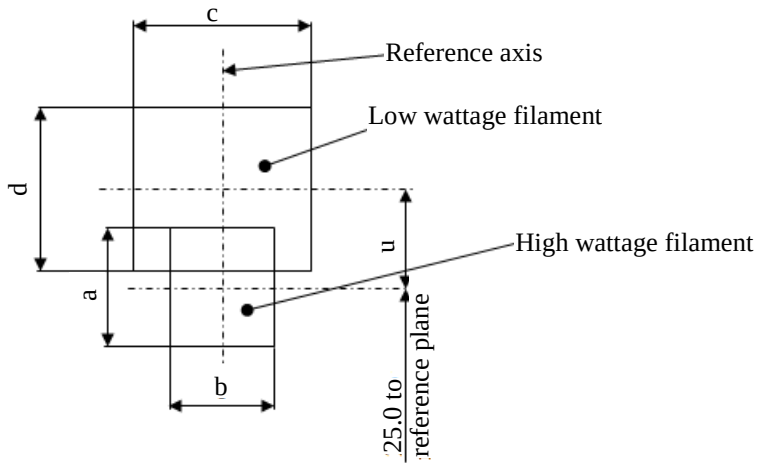
3.1. The projection of the major filament shall lie entirely within a rectangle of height "a" and width "h", centred on the theoretical position of the centre of the filament;

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 (±0.4 mm for standard filament lamps).

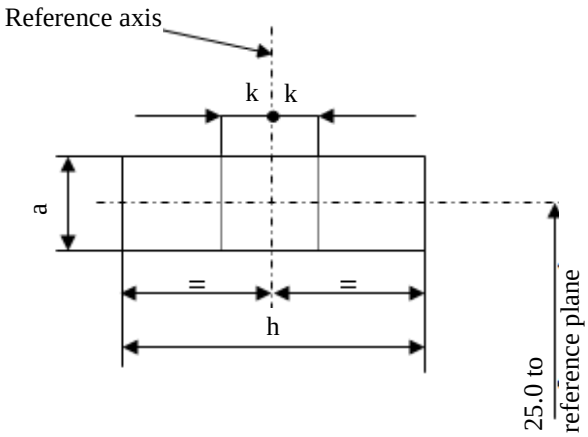
Category W15/5W **Sheet W15/5W/3**

Side elevation Dimensions in millimeters



Reference	*a*	*b*	*c*	*d*	*u*
Dimensions	3.3	2.8	4.8		2.8

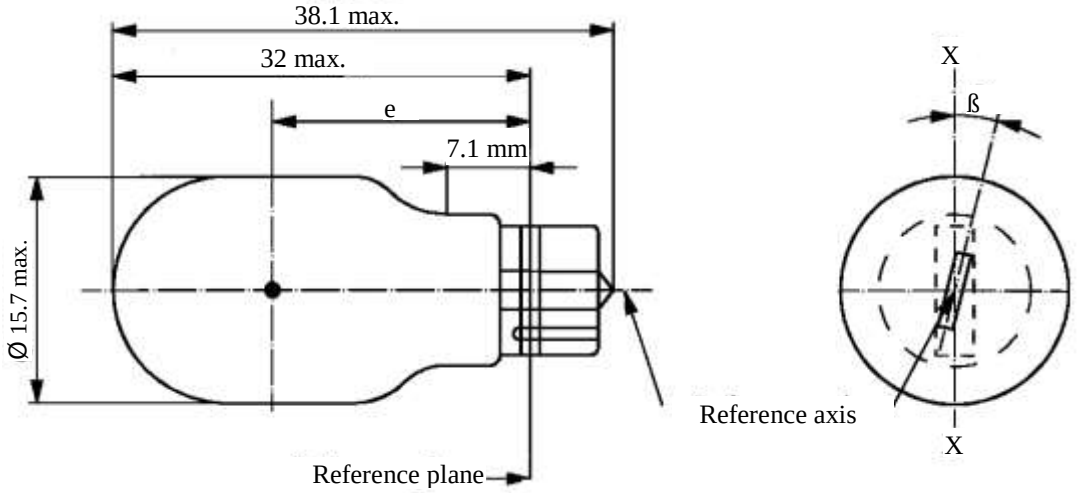
Front elevation



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.

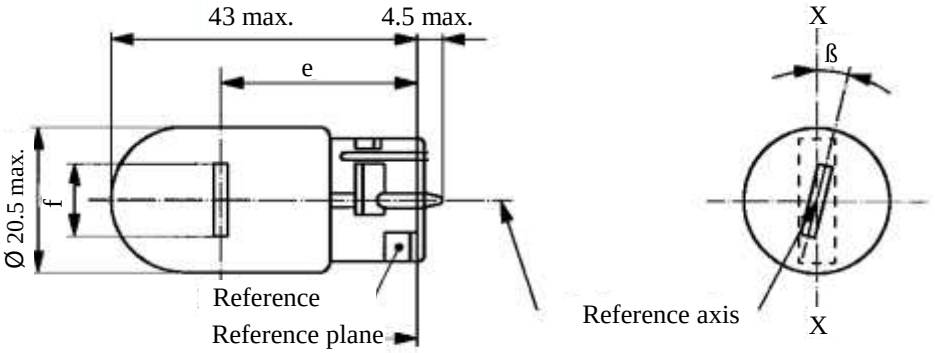


Dimensions in mm			*Filament lamps of normal production*			*Standard filament lamp*
			Min.	*Nom.*	*Max.*	
e			18.3	20.6	22.9	20.6 ± 0.3
Lateral deviation [1/]					1.0	0.5 max.
β			-15°	0°	+15°	0° ± 5°
Cap W2.1x9.5d in accordance with IEC Publication 60061 (sheet 7004-91-3)						
Electrical and photometric characteristics						
Rated values	Volts		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 7004-105-3)					
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.

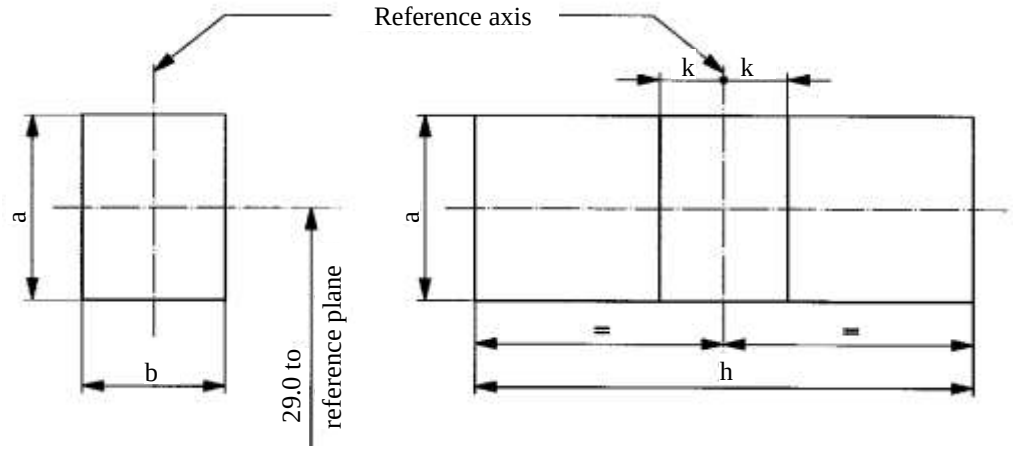
[2/] To be checked by means of a "Box system"; see sheet W21W/2.

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 ±15°, 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

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 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 (±15°).

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:

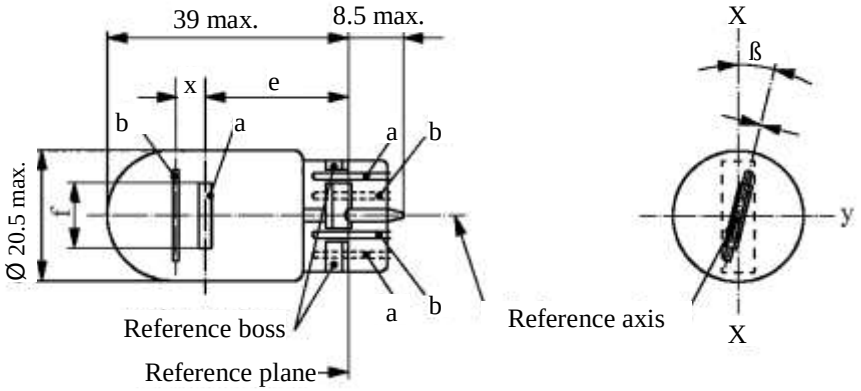
3.1. The projection of the filament shall lie entirely within a rectangle of height "a" and width "h", having its centre at the theoretical position of the centre of the filament;

3.2. The centre of the filament shall not be offset by more than distance "k" from the reference axis.

Category 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 7004-106-4)						
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 ±15°, 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 (±15°).

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:

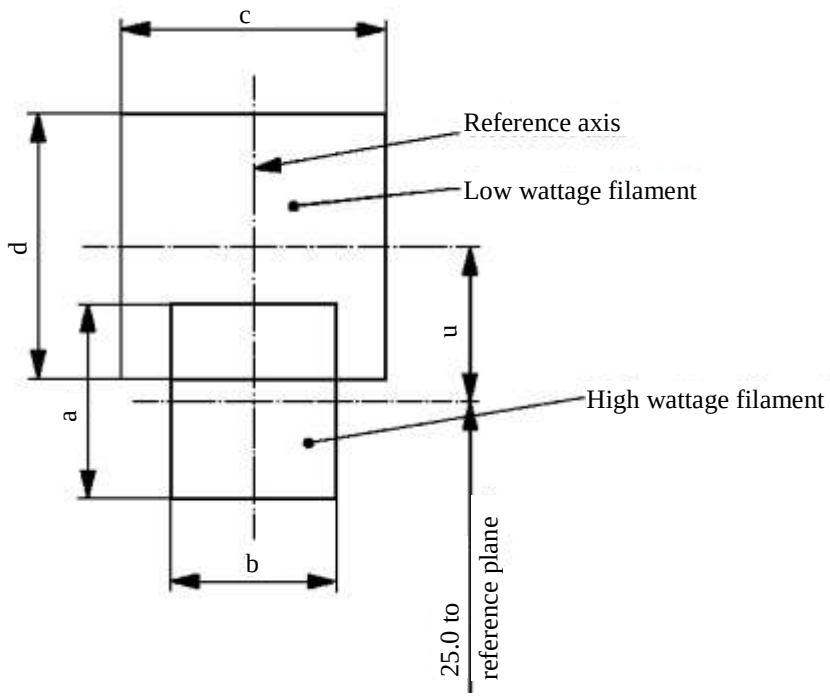
3.1. The projection of the major filament shall lie entirely within a rectangle of height "a" and width "h", centred on the theoretical position of the centre of the filament;

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 (±0.4 mm for standard filament lamps).

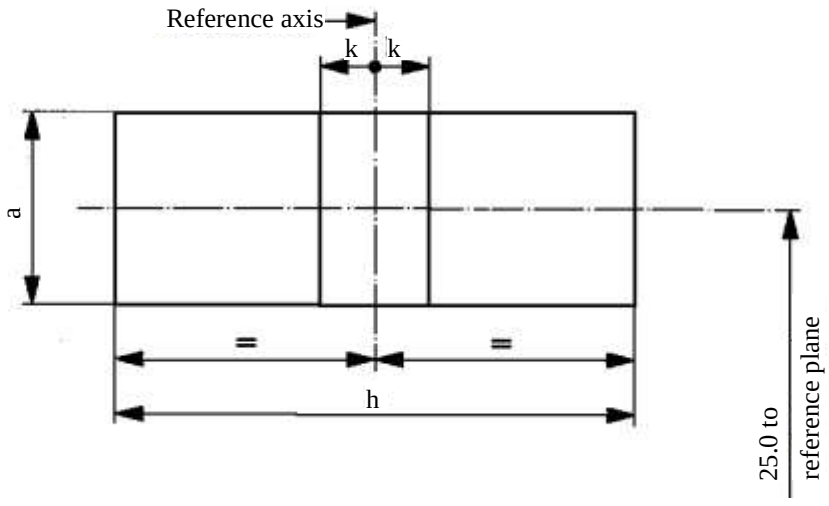
Category W21/5W **Sheet W21/5W/3**

Side elevation



Reference	*a*	*b*	*c*	*d*	*u*
Dimension	3.5	3.0	4.8		2.8

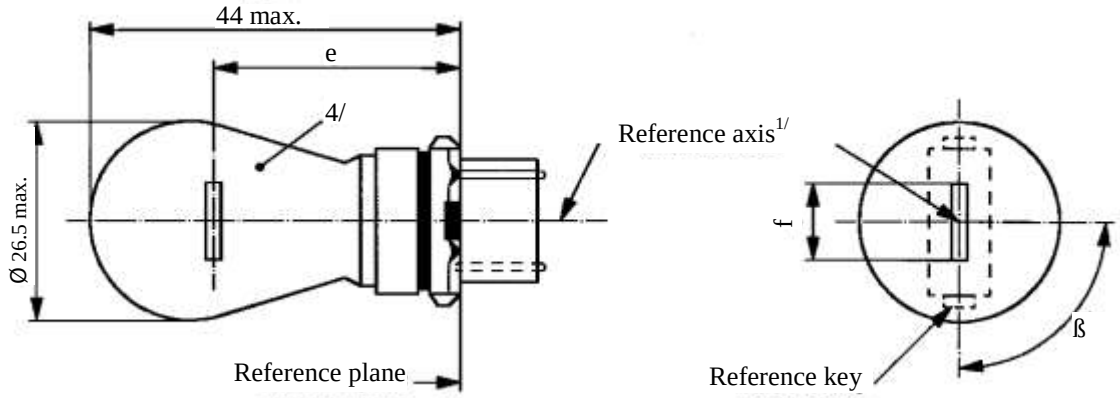
Front elevation



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 WPY21W: WZ2.5x16d	in accordance with IEC Publication 60061			(sheet 7004-104B-1) (sheet 7004-104C-1)
Electrical and photometric characteristics				

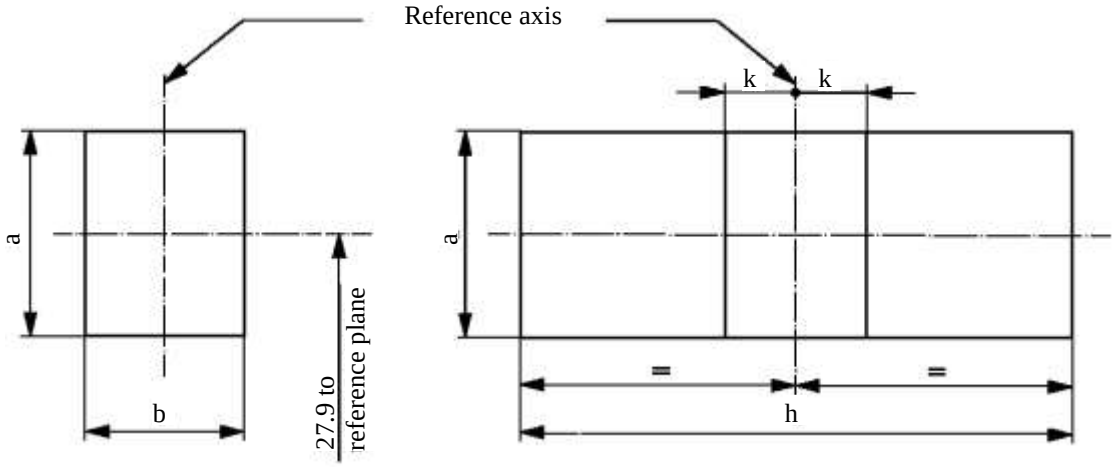
Rated values		Volts	12	12
		Watts	21	21
Test voltage		Volts	13.5	13.5
Objective values		Watts	26.5 max.	26.5 max.
	Luminous flux	WP21W	460 ± 15 %	
		WPY21W	280 ± 20 %	
Reference luminous flux at approximately 13.5 V				White: 460 lm Amber: 280 lm

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.

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 ±15°, 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:

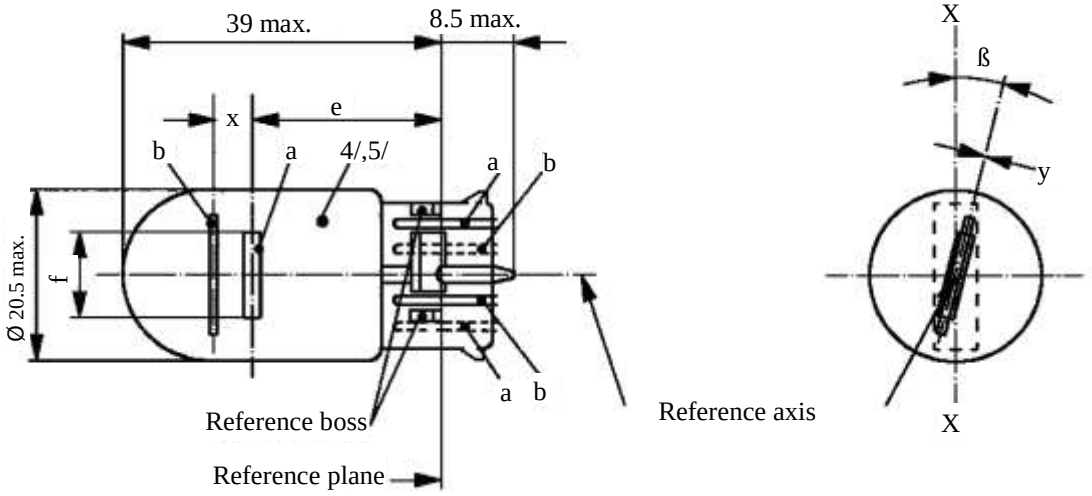
3.1. The projection of the filament shall lie entirely within a rectangle of height "a" and width "h", having its centre at the theoretical position of the centre of the filament.

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

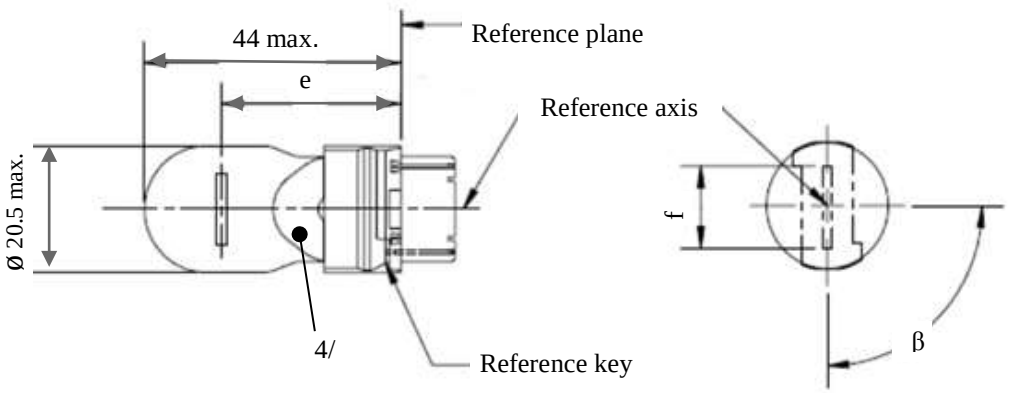


Dimensions in mm		*Filament lamps of normal production*			*Standard filament lamp*	
		Min.	*Nom.*	*Max.*		
e			25.0 1/		25.0 ± 0.3	
f				7.5	7.5 + 0 / -2	
Lateral deviation 2/				1/	0.3 max.	
x 3/			2.8 1/		2.8 ± 0.3	
y 3/			0.0 1/		0.0 ± 0.3	
β		-15° 1/	0°	15° 1/	0° ± 5°	
Cap WY3x16q in accordance with IEC Publication 60061 (sheet 7004-106-4)						
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.

CategoriesWT21W 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* [5/]
		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 WTY21W: WUY2.5x16d		in accordance with IEC Publication 60061			(sheet 7004-176-1) (sheet 7004-177-1)
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	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.

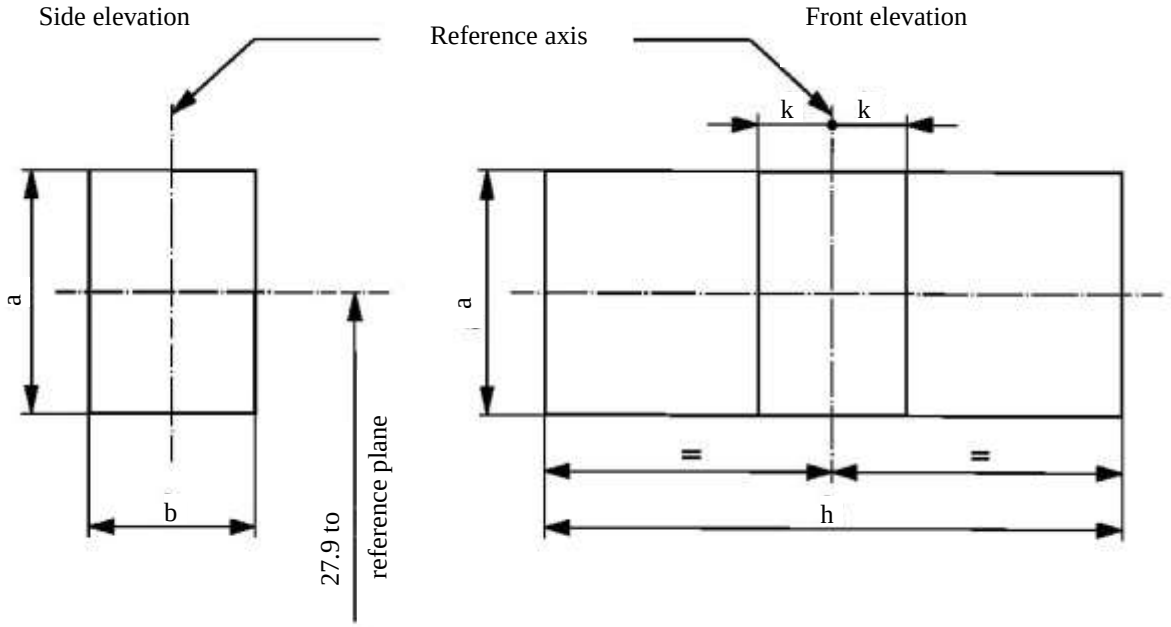
4/ The light emitted from filament lamps of normal production shall be white for category WT21W and amber for category WTY21W (see also note 5/).

5/ The light emitted from standard filament lamps shall be white for category WT21W and white or amber for category WTY21W.

Categories 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 ±15°, to the plane through the centres of the keys and the reference axis, whether a filament lamp complies with the requirements.



Reference	*a*	*b*	*h*	*k*
Dimension	3.5	3.0	9.5	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

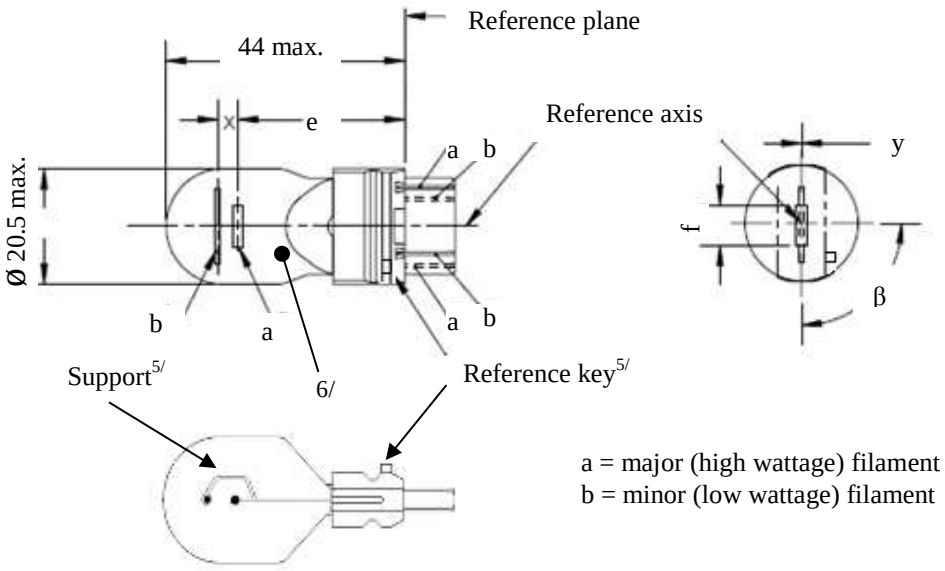
   The filament lamp placed with the cap down and the reference axis vertical, the filament lamp being viewed in a direction at right angles to the filament axis:

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.

Categories 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 WTY21/7W: WZY2.5x16q	in accordance with IEC Publication 60061			(sheet 7004-180-1) (sheet 7004-181-1)
Electrical and photometric characteristics				

Rated values	Volts	12		12	
	Watts	21	7	21	7
Test voltage	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.

Categories WT21/7W and WTY21/7W **Sheet WT21/7W/2**

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 shall 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 ±15°, 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:

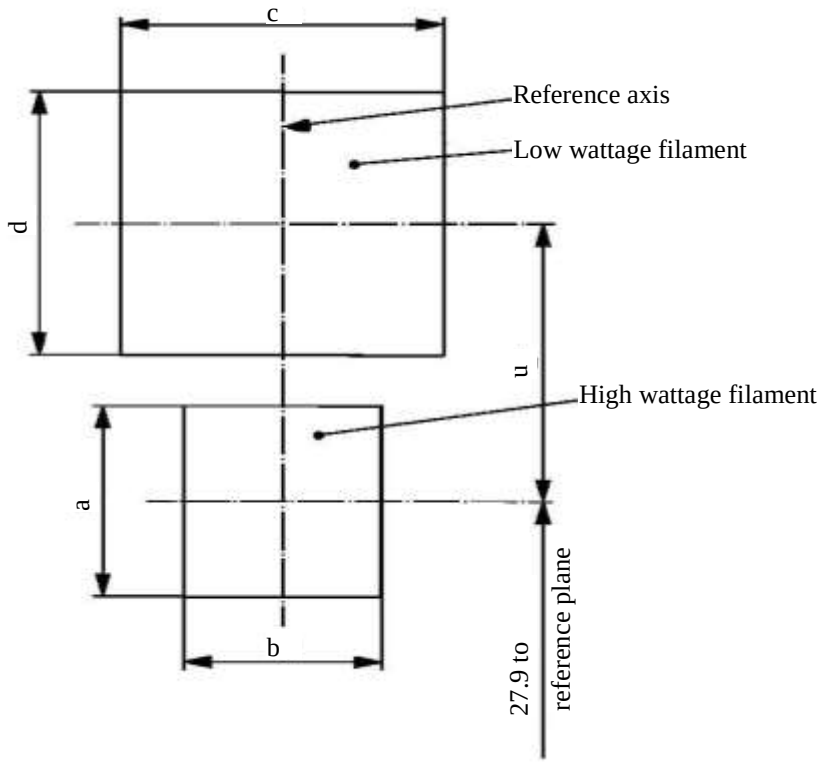
3.1. The projection of the major filament shall lie entirely within a rectangle of height "a" and width "h", centred on the theoretical position of the centre of the filament;

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 (±0.4 mm for standard filament lamps).

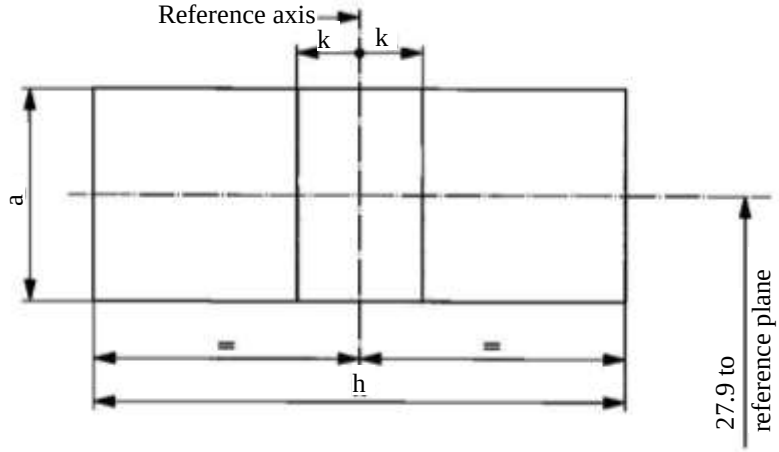
Category WT21/7W AND WTY21/7W **Sheet WT21/7W/3**

Side elevation



Reference	*a*	*b*	*c*	*d*	*u*
Dimensions	3.5	3.0	4.8		5.1

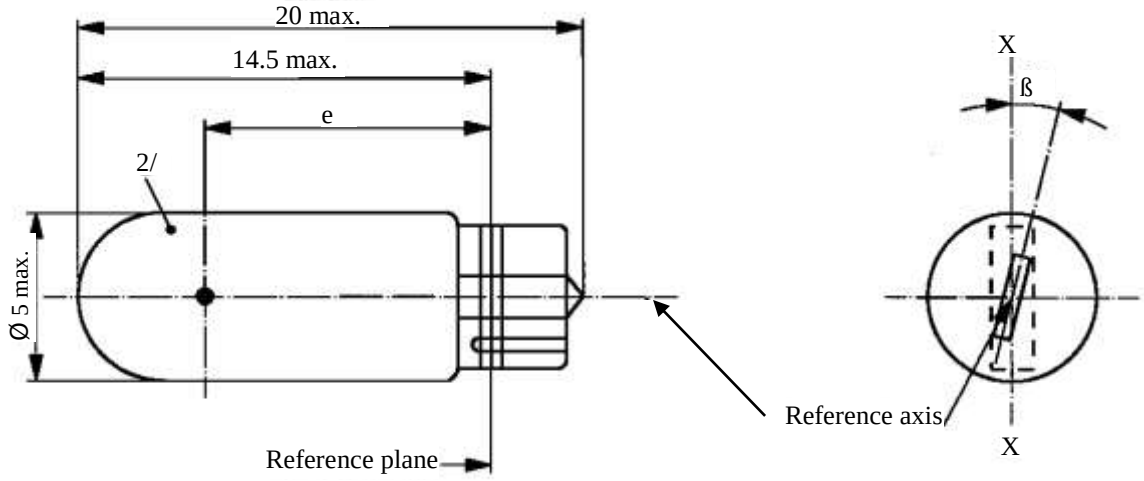
Front elevation



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

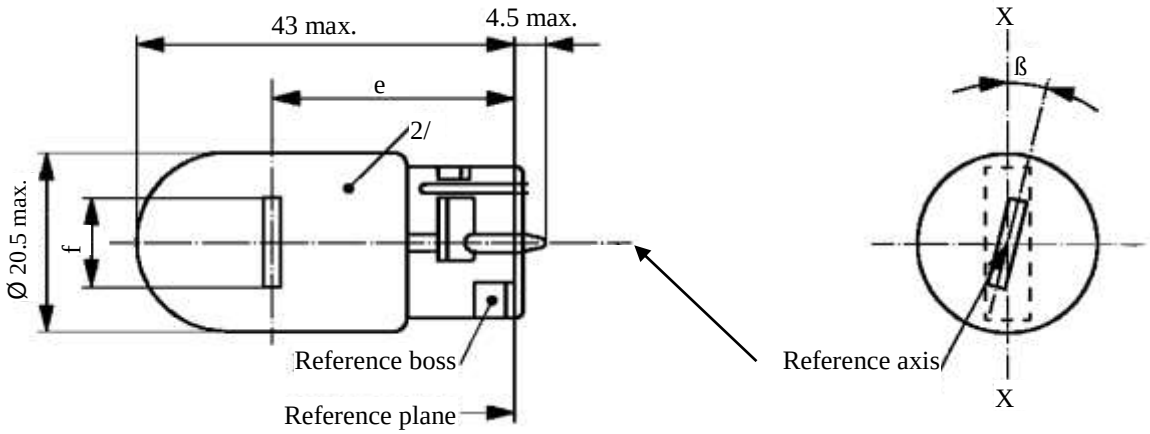
1/ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

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 7004-105-3)					
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

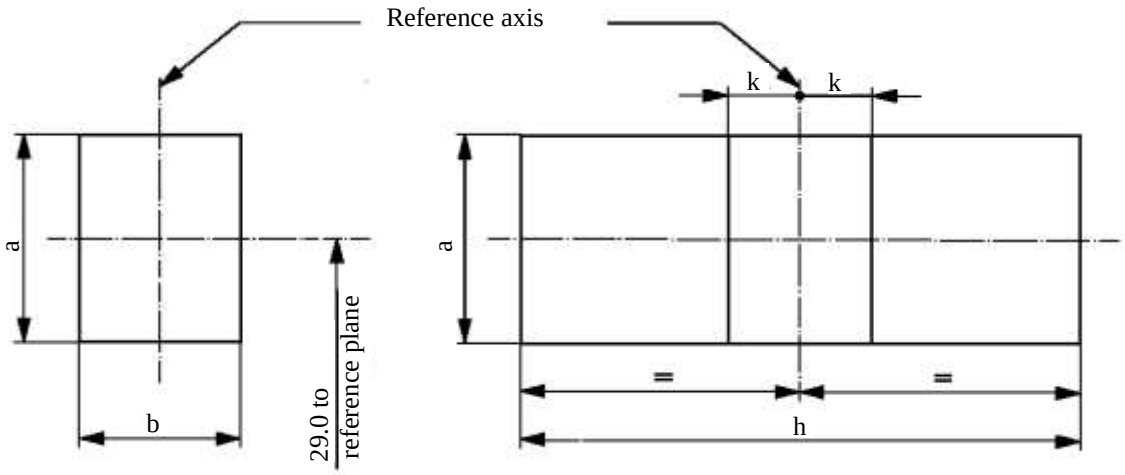
[1/] Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.
[2/] The light emitted from filament lamps of normal production shall be amber (see also footnote 4/).
[3/] To be checked by means of a "Box system"; 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 ±15°, 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

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 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 (±15°).

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:

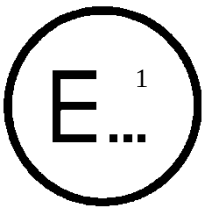
3.1. The projection of the filament shall lie entirely within a rectangle of height "a" and width "h", having its centre at the theoretical position of the centre of the filament.

3.2. The centre of the filament shall not be offset by more than distance "k" from the reference axis.

Annex 2

Communication

(Maximum format: A4 (210 x 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: .....

[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.

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]

13. Place:.....

14. Date:.....

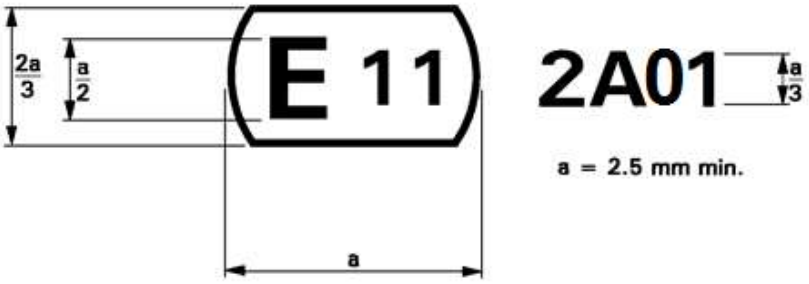
15. Signature:.....

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.)



The above approval mark affixed to a filament lamp indicates that the lamp has been approved in the United Kingdom (E 11) under the approval code A01.

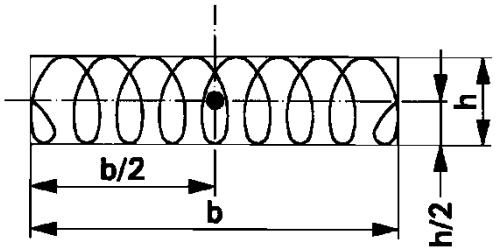
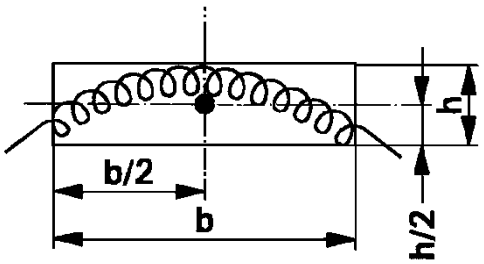
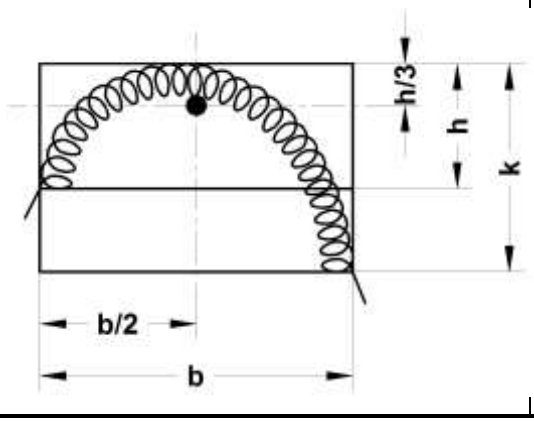
The first character of the approval code indicates that the approval was granted in accordance with the requirements of Regulation No 37 as amended by the 02 and 03 (*) series of amendments.

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 ≤ 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 °C ± 5 °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 stabilization.

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 ±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 ±30°, 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.

2.4. Restricted colour boundaries.

The following figure shows the colour tolerance area for the colour white (within the dashed lines) and the restricted tolerance area for the filament light source H20 (shaded area within the solid lines) in the CIE chromaticity coordinate system (x, y).

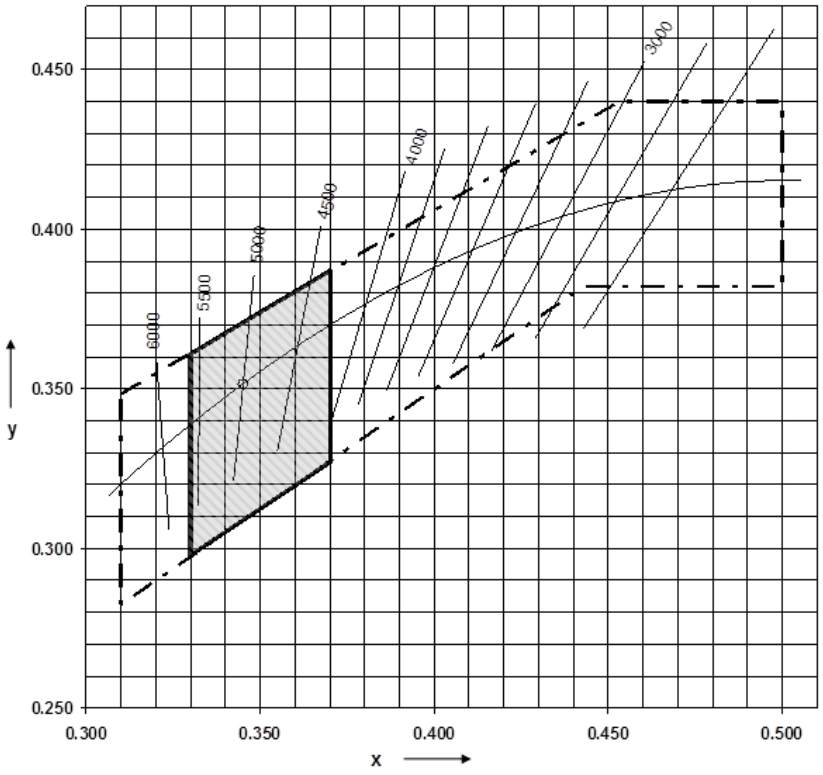
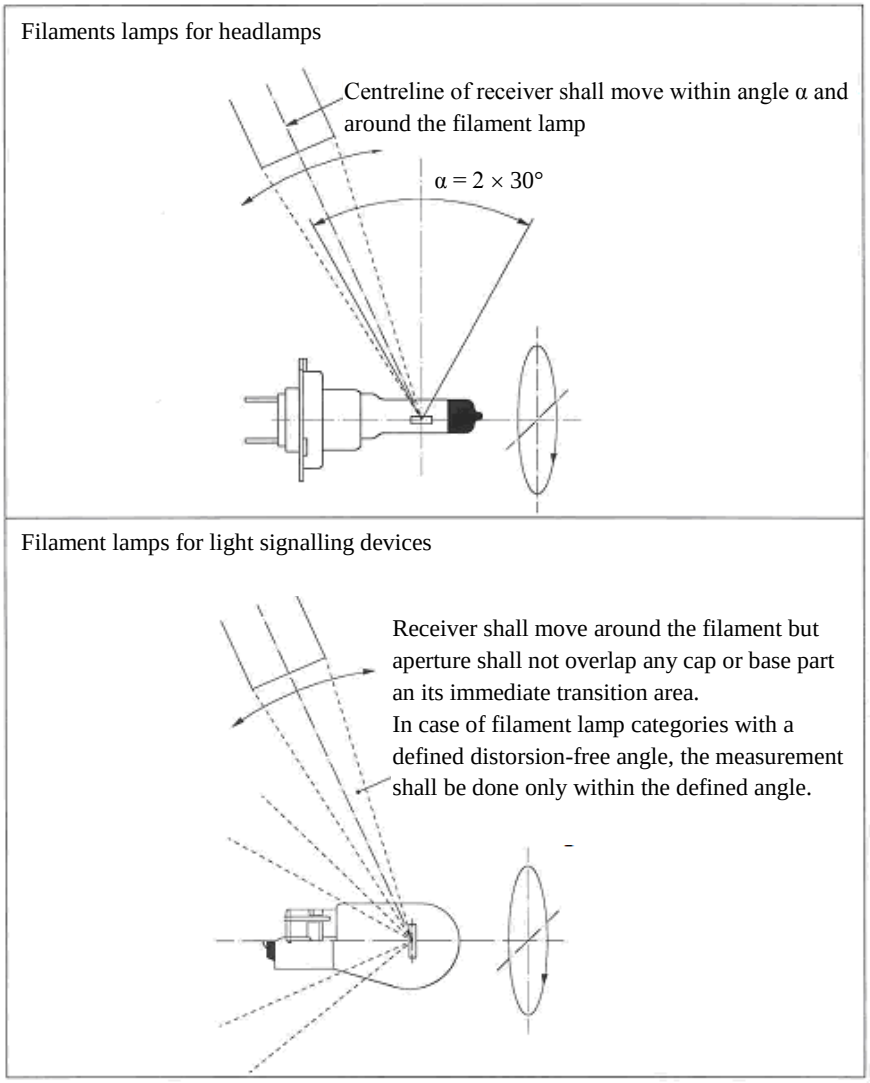


Figure illustrating the positions of colorimetric receiver



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 Type Approval 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
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 -,1016	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*	*Qualifying limits shown as a percentage of results.* *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.