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Informal document **GRE-75-03**
(75th GRE, 5-8 April 2016,
agenda item 4)

Modifications to Annex 1 of the draft Resolution on the common specification of light source categories (ECE/TRANS/WP.29/GRE/2015/28)

Annex 1

Sheets for filament light sources

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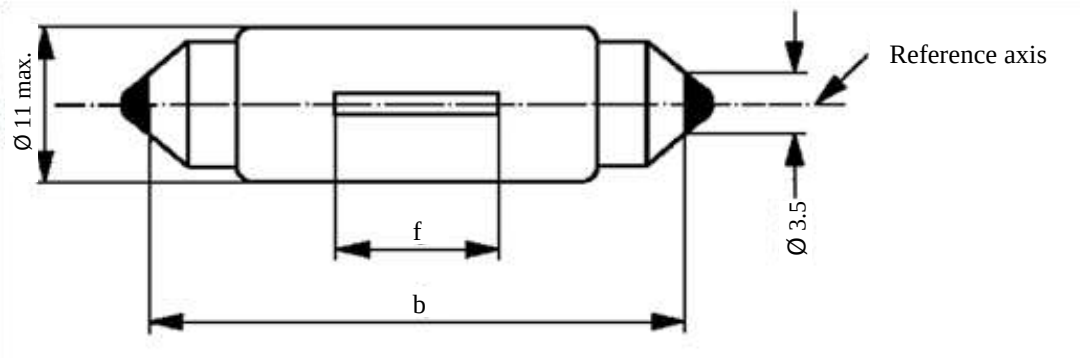
The drawings are intended only to illustrate the essential dimensions (in mm) of the ~~filament lamp~~filament light source



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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.

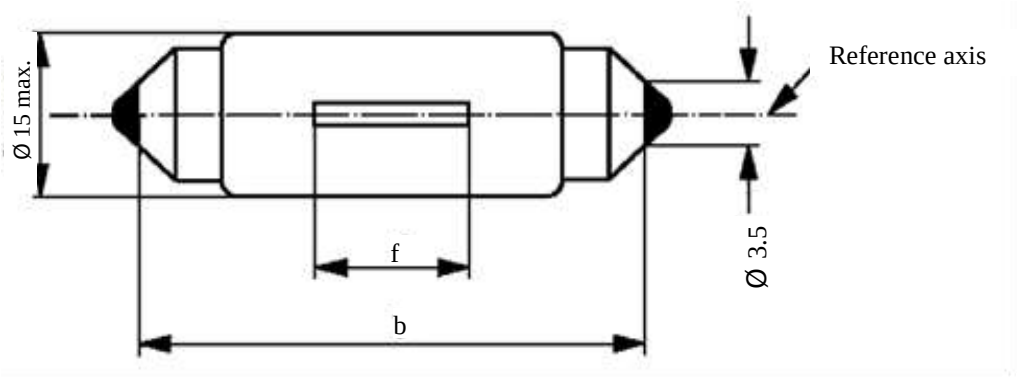
2/ The filament shall be housed in a cylinder 19 mm long co-axial with the ~~filament lamp~~filament light source and placed symmetrically about the ~~filament lamp~~filament light source centre.
The diameter of the cylinder is for 6 V and 12 V ~~filament lamp~~filament light sources: d + 4 mm (for standard ~~filament lamp~~filament light sources: d + 2 mm) and for 24 V ~~filament lamp~~filament light sources: 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~~filament light source shall not be more than ±2.0 mm (for standard ~~filament lamp~~filament light sources: ±0.5 mm) measured in the direction of the reference axis.

4/ 4.5 mm for 6 V ~~filament lamp~~filament light sources.

5/ 16.5 mm for 24 V ~~filament lamp~~filament light sources.

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

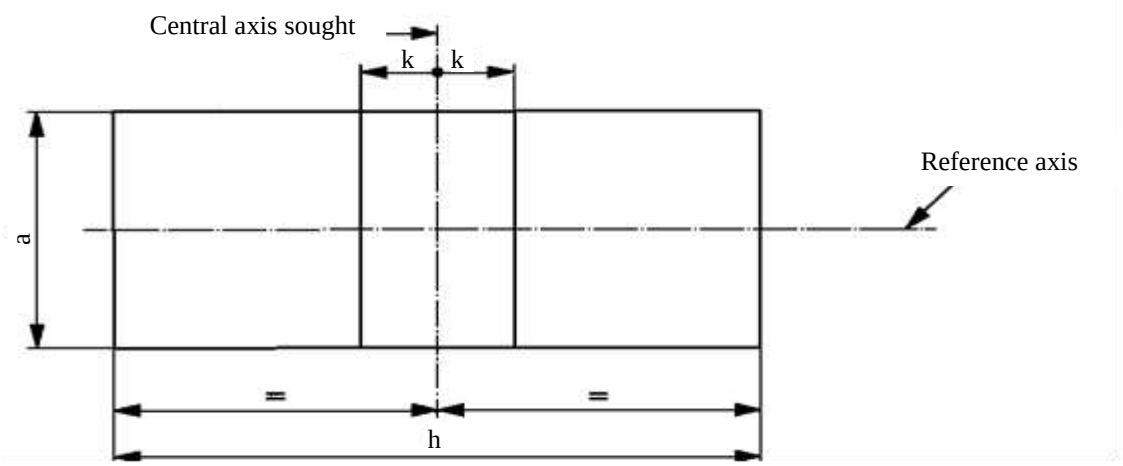


Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		Min.	*Nom.*	*Max.*	
b [1/]		40.0	41.0	42.0	41.0 ± 0.5
f [2/]		7.5		10.5	8 ± 1.0
Cap SV8.5 in accordance with IEC Publication 60061 (sheet 7004-81-4)					
Electrical and 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~~filament light source's length, whether a ~~filament lamp~~filament light source complies with the requirements.



12 V	*a*	*h*	*k*
~~Filament lamp~~Filament light sources of normal production	4.0 + d	14.5	2.0
Standard ~~filament lamp~~filament light source	2.0 + d	14.5	0.5

d = nominal filament diameter as stated by the manufacturer.

Test procedure and requirements

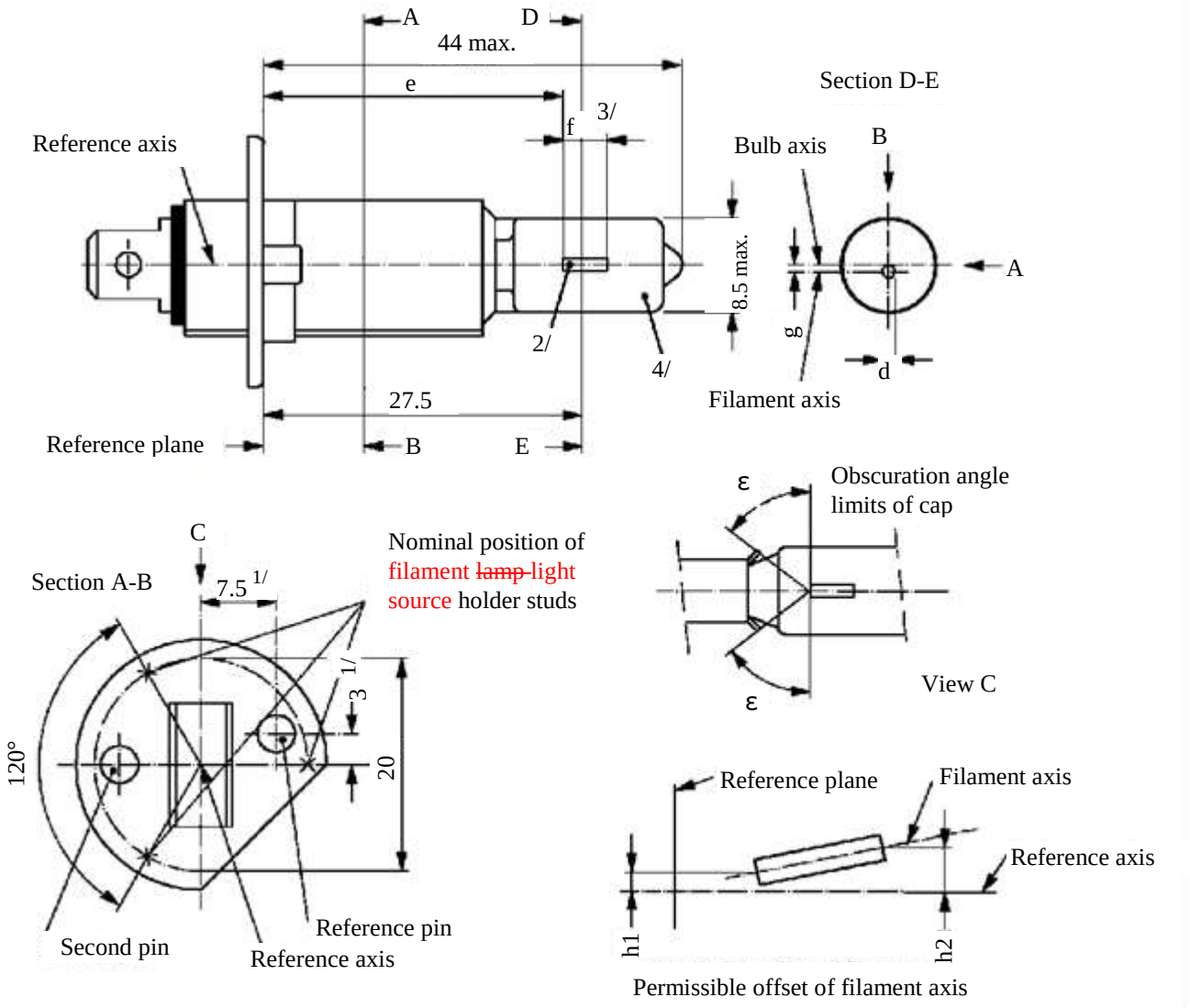
1. The ~~filament lamp~~filament light source is placed in a holder (socket) capable of being so rotated through 360° about the reference axis that the front elevation is seen on the screen on to which the image of the filament is projected. The reference plane on the screen shall coincide with the centre of the ~~filament lamp~~filament light source. The central axis sought on the screen shall coincide with the centre of the ~~filament lamp~~filament light source length.

2. Front elevation

2.1. The projection of the filament shall lie entirely within the rectangle when the ~~filament lamp~~filament light source 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.

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



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~~filament light source 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.

Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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~~filament light source 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.

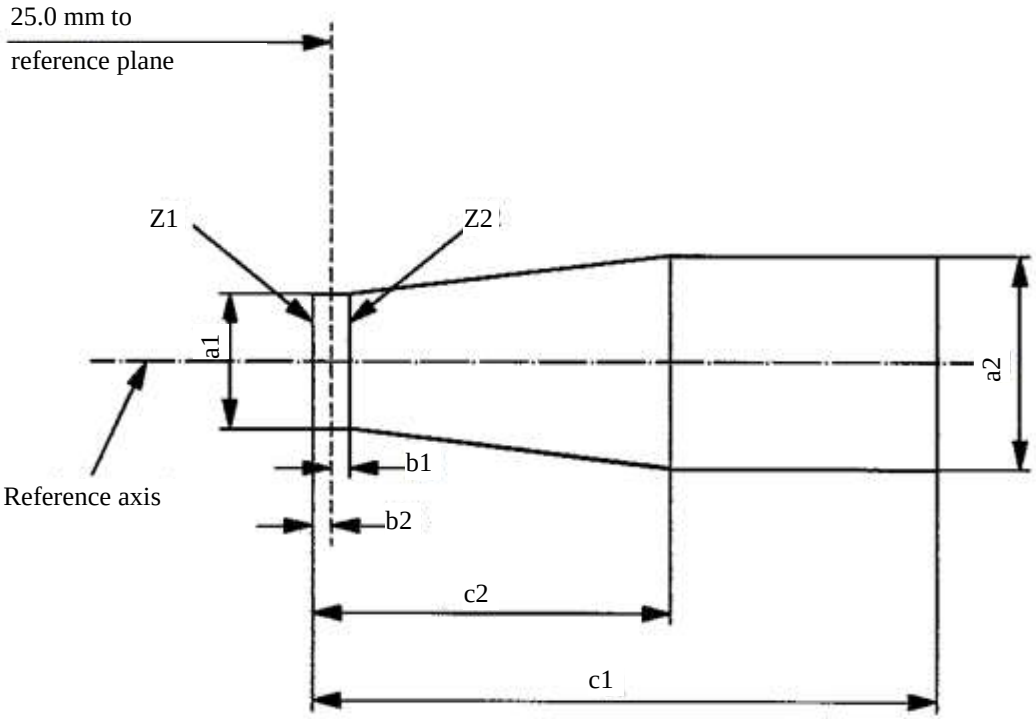
[8/] d: diameter of filament.

[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~~filament light source 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

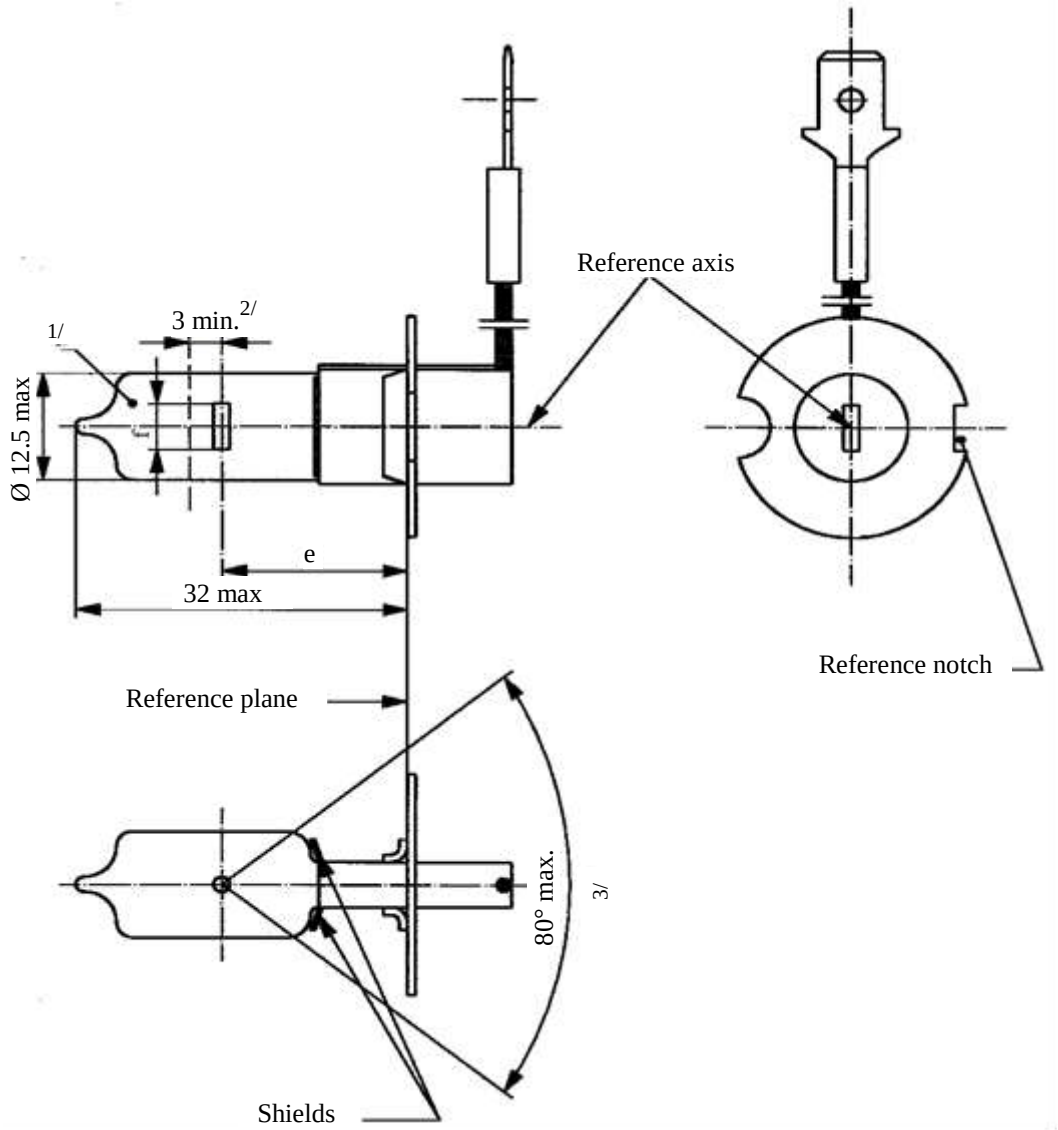
d = diameter of filament.

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.

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

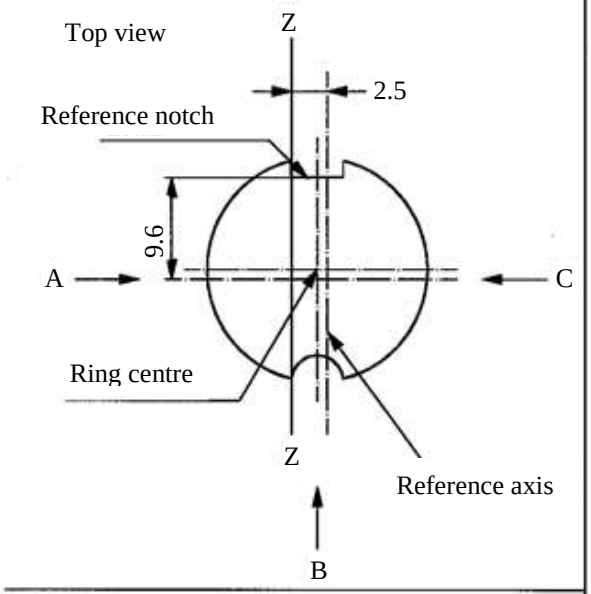


1/ The colour of the light emitted shall be white or selective-yellow.

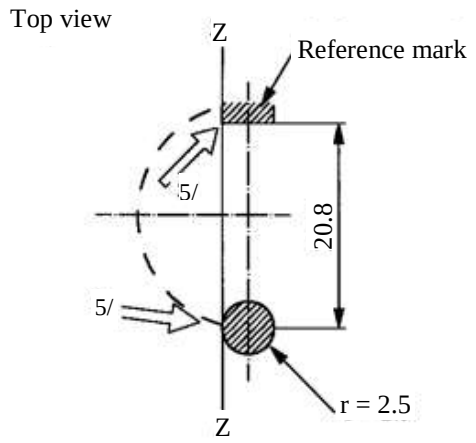
2/ Minimum length above the height of the light emitting centre ("e") over which the bulb shall be cylindrical.

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°.

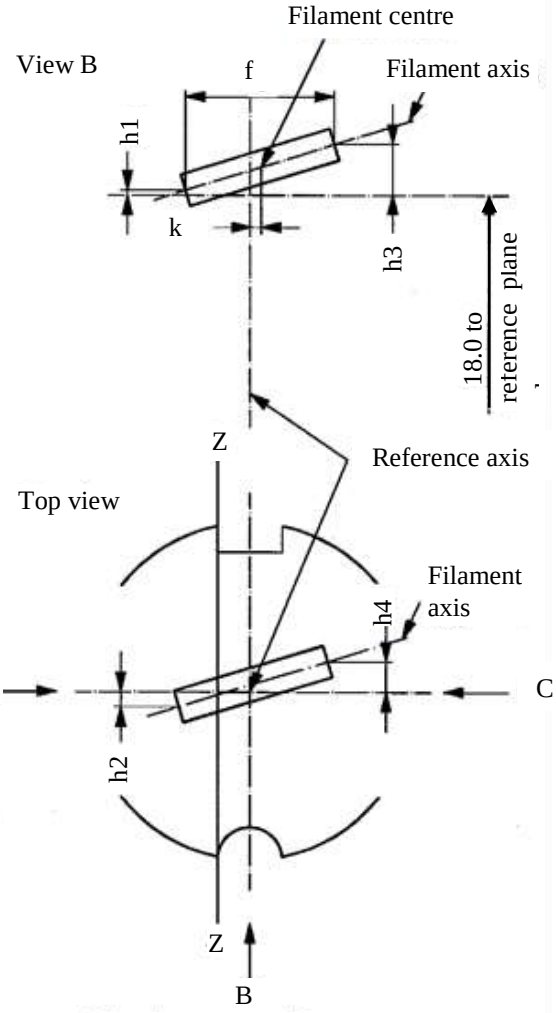
Definition: Ring centre and reference axis[4/]



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 lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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

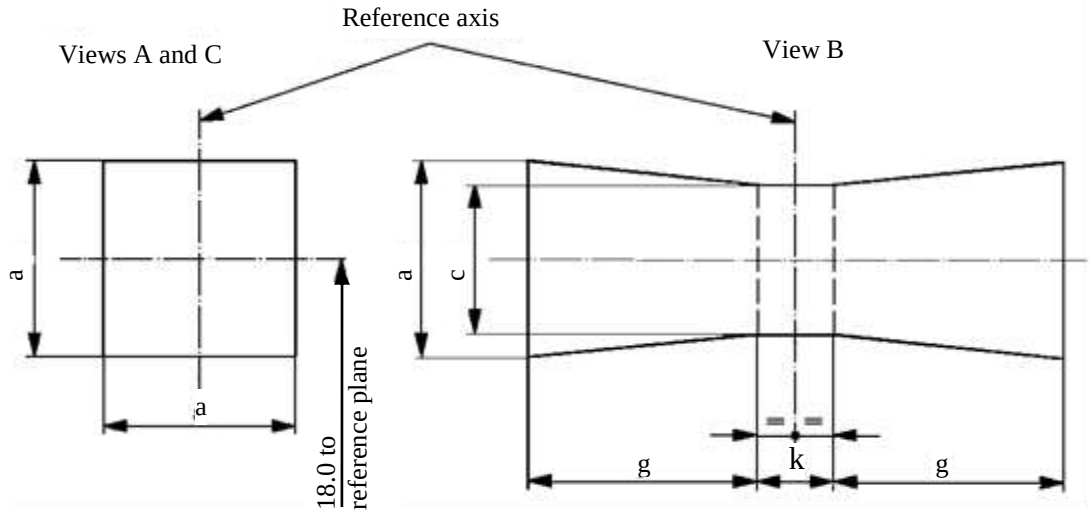
6/ To be checked by means of a "Box system"; sheet H3/4.

7/ For standard ~~filament lamp~~filament light sources 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.

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

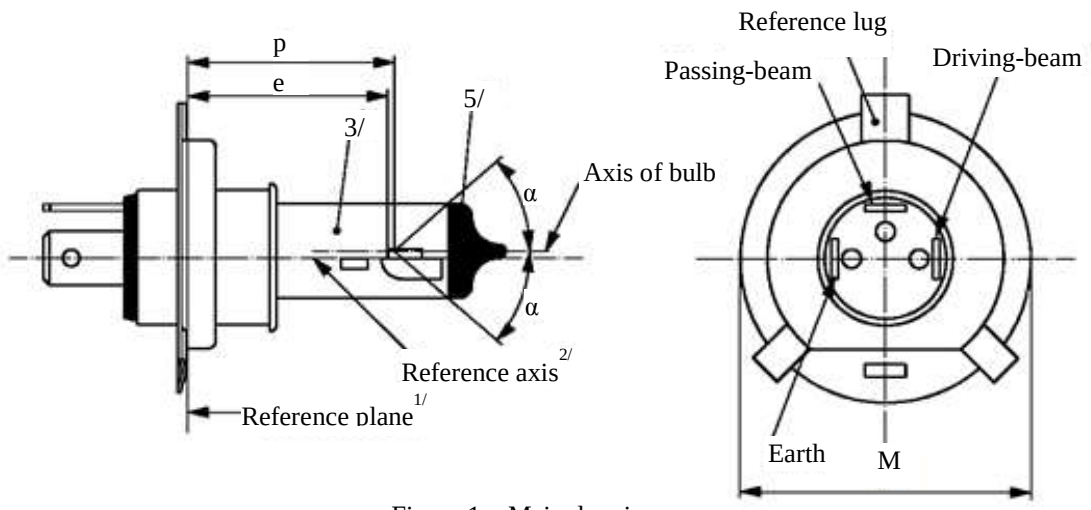


Figure 1 – Main drawing

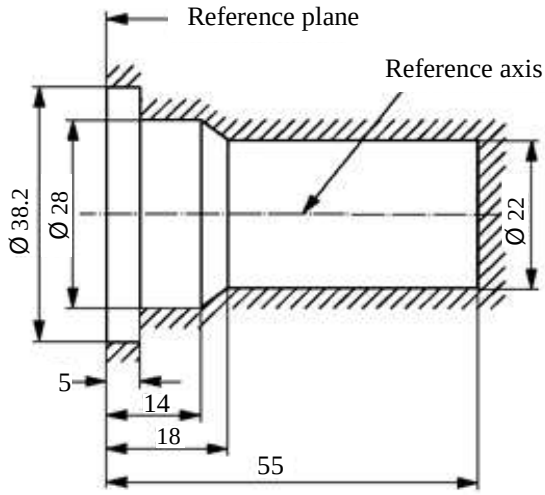


Figure 2

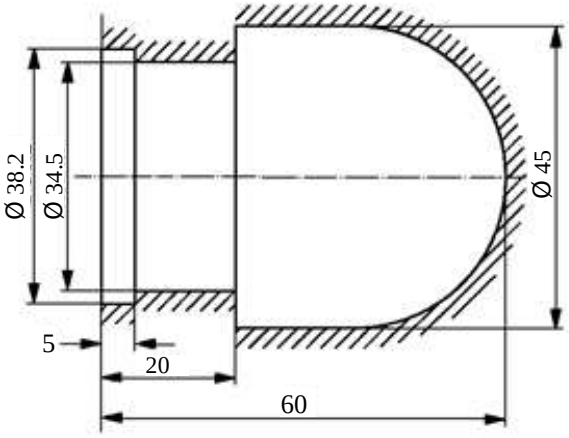


Figure 3

Maximum ~~filament lamp~~filament 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.

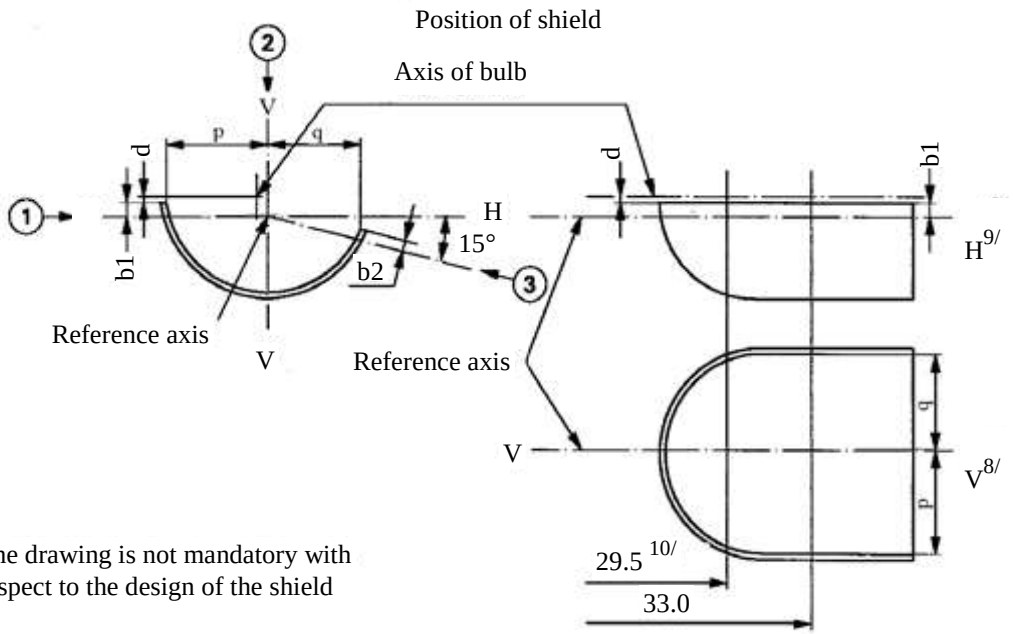
4/ The bulb and supports shall not exceed the envelope as in Figure 2. However, where a selective-yellow outer bulb is used the bulb and supports shall not exceed the envelope as in Figure 3.

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.

<table>
<tr><td colspan="3" rowspan="2">Dimensions in mm</td><td colspan="4">~~Filament lamp~~Filament light sources of normal production</td><td colspan="2">Standard ~~filament lamp~~filament light source</td></tr>
<tr><td colspan="2">12 V</td><td colspan="2">24 V</td><td colspan="2">12 V</td></tr>
<tr><td colspan="3">e</td><td colspan="2">28.5 +0.35/-0.25</td><td colspan="2">29.0 ± 0.35</td><td colspan="2">28.5 + 0.20 / -0.00</td></tr>
<tr><td colspan="3">p</td><td colspan="2">28.95</td><td colspan="2">29.25</td><td colspan="2">28.95</td></tr>
<tr><td colspan="3">α</td><td colspan="4">max. 40°</td><td colspan="2">max. 40°</td></tr>
<tr><td colspan="9">Cap P43t in accordance with IEC Publication 60061 (sheet 7004-39-6)</td></tr>
<tr><td colspan="9">Electrical and photometric characteristics</td></tr>
<tr><td colspan="2" rowspan="2">Rated values</td><td>Volts</td><td colspan="2">12 [6/]</td><td colspan="2">24 [6/]</td><td colspan="2">12 [6/]</td></tr>
<tr><td>Watts</td><td>60</td><td>55</td><td>75</td><td>70</td><td>60</td><td>55</td></tr>
<tr><td colspan="2">Test voltage</td><td>Volts</td><td colspan="2">13.2</td><td colspan="2">28.0</td><td colspan="2">13.2</td></tr>
<tr><td rowspan="3">Objective values</td><td colspan="2">Watts</td><td>75 max.</td><td>68 max.</td><td>85 max.</td><td>80 max.</td><td>75 max.</td><td>68 max.</td></tr>
<tr><td colspan="2" rowspan="2">Luminous flux ± %</td><td>1,650</td><td>1,000</td><td>1,900</td><td>1,200</td><td colspan="2"></td></tr>
<tr><td colspan="4">15</td><td colspan="2"></td></tr>
<tr><td colspan="3">Measuring flux [7/] lm</td><td>-</td><td>750</td><td>-</td><td>800</td><td colspan="2"></td></tr>
<tr><td colspan="5" rowspan="2">Reference luminous flux at approximately</td><td>12 V</td><td>1,250</td><td>750</td></tr>
<tr><td>13.2 V</td><td>1,650</td><td>1,000</td></tr>
</table>

[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 according to the provisions for ~~filament lamp~~filament light sources with an internal shield to produce the cut-off.



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

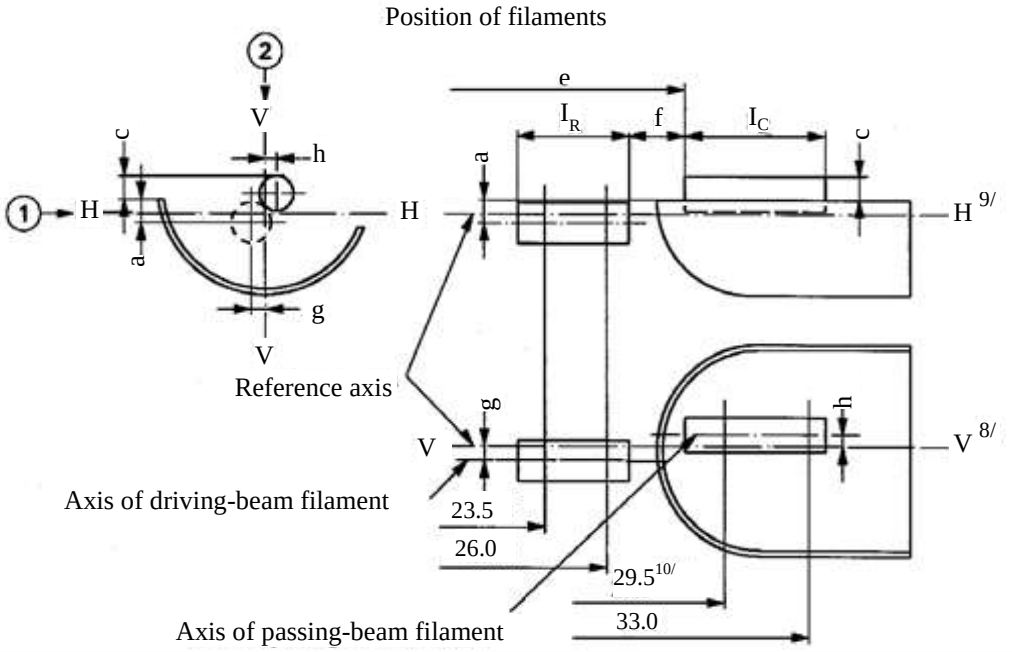


Table of the dimensions (in mm) referred to in the drawings on sheet H4/3

*Reference**		*Dimension***		*Tolerance*		
				~~Filament lamp~~Filament light sources of normal production		*Standard ~~filament lamp~~filament light source*
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 lamp~~filament light sources) 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~~filament light source

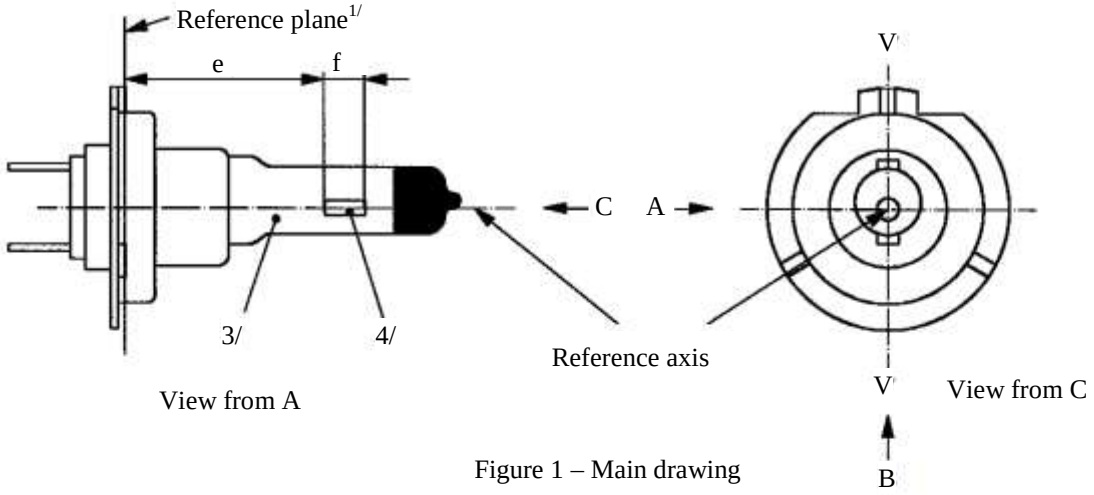


Figure 1 – Main drawing

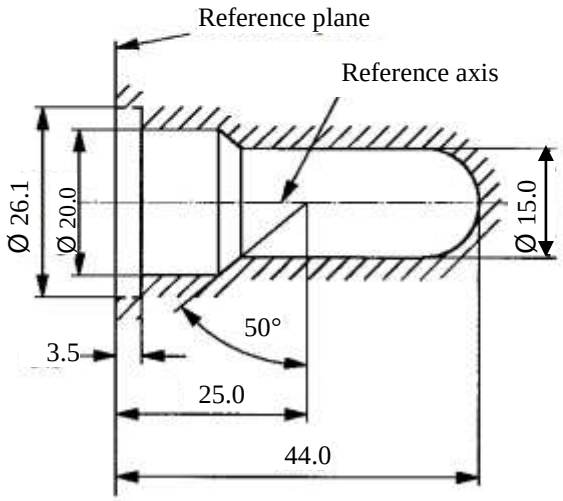


Figure 2 – Maximum ~~filament lamp~~filament light source outline5/

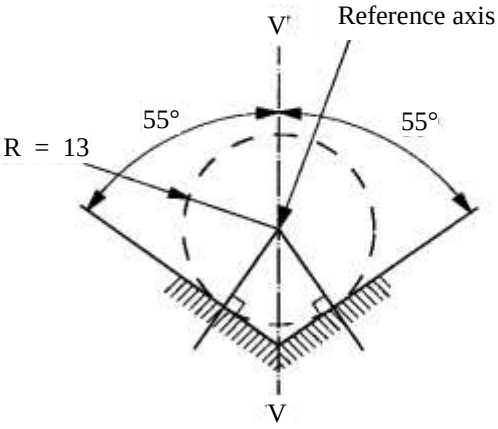


Figure 3 – Definition of reference axis2/

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 lamp~~filament light sources.

(b) For the same manufacturer, the design diameter of standard (étalon) ~~filament lamp~~filament light source and ~~filament lamp~~filament light source 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.

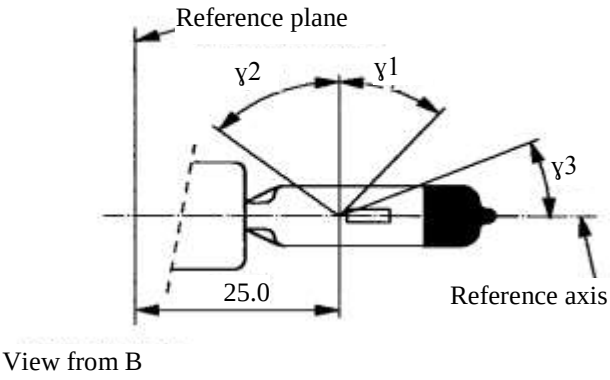


Figure 4 – Distorsion free area and black top[6/,7/]

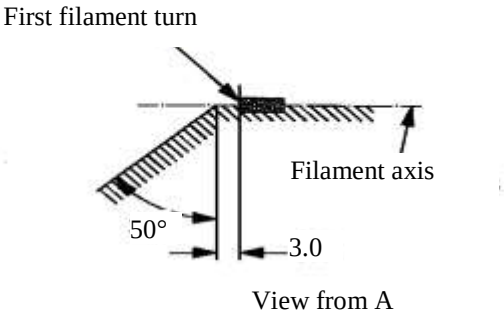


Figure 5 – Metal free zone[8/]

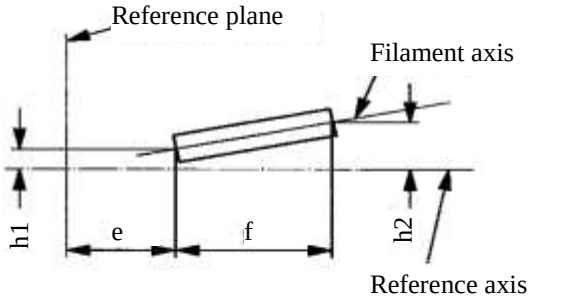


Figure 6 – Permissible offset of filament axis
(for standard ~~filament lamp~~filament light sources only)

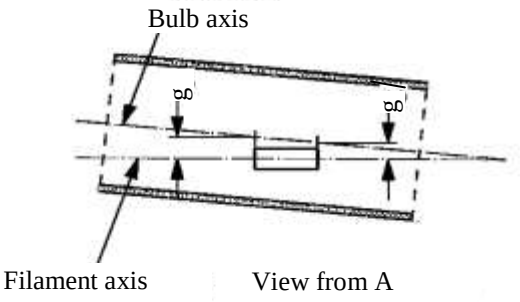


Figure 7 – Bulb eccentricity

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 ~~filament lamp~~filament light source 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.

Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*		*Standard ~~filament lamp~~filament light source*
		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.

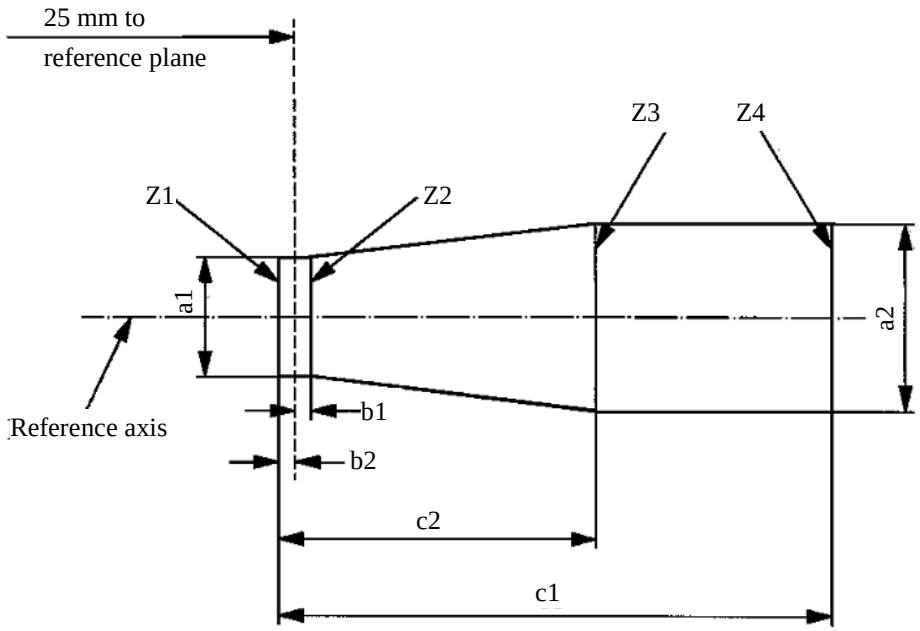
[11/] The offset of the filament with respect to the reference axis is measured only in viewing directions A and B as shown in Figure 1 in sheet H7/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament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

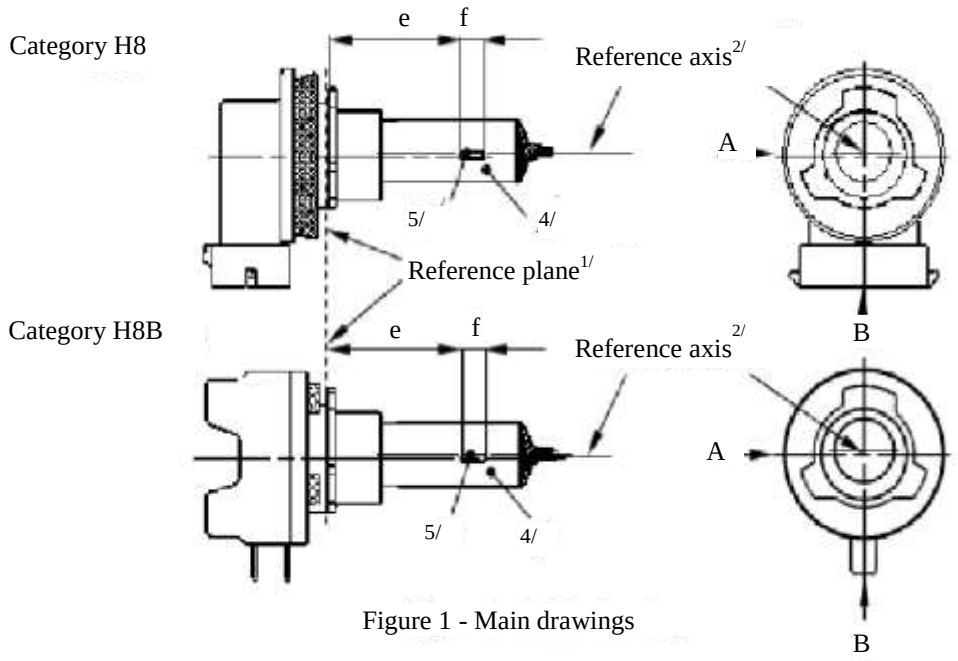


Figure 1 - Main drawings

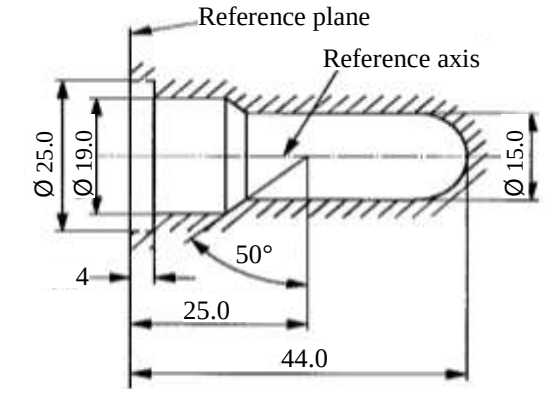


Figure 2 – Maximum ~~filament lamp~~filament light source outline3/

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~~filament light source and ~~filament lamp~~filament light source of normal production shall be the same.

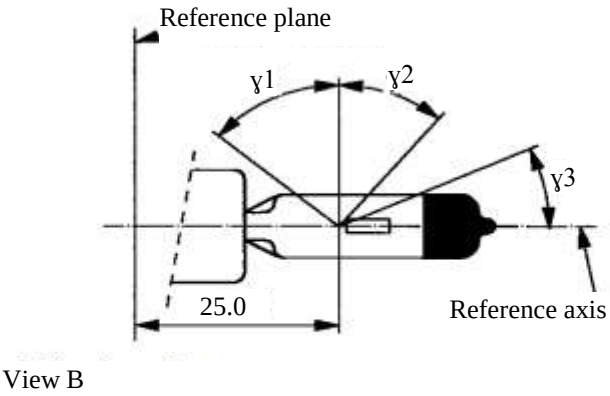


Figure 3 – Distorsion free area[6/] and black top[7/]

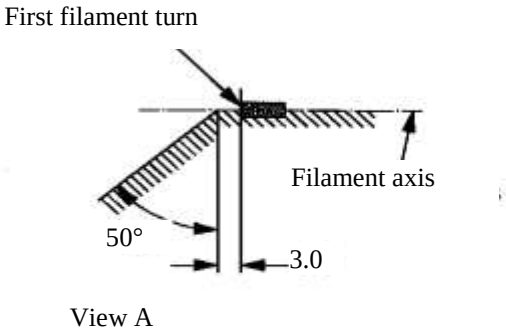


Figure 4 – Metal free zone[8/]

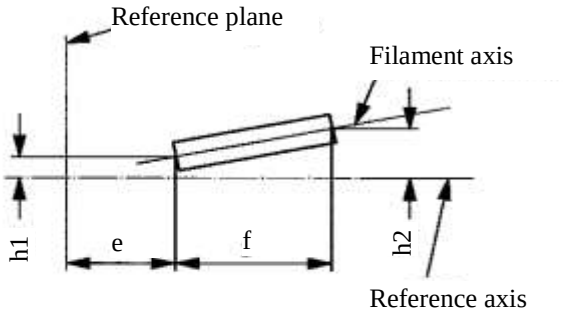


Figure 5 – Permissible offset of filament axis[9/]
(for standard ~~filament lamp~~filament light sources only)

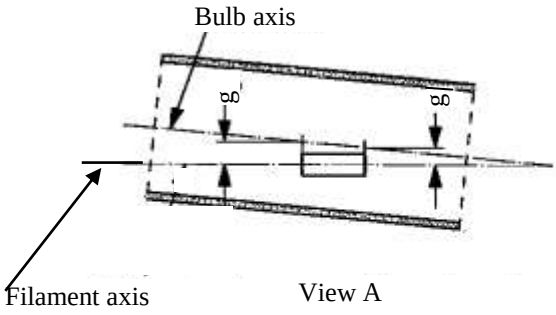


Figure 6 – Bulb eccentricity[10/]

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 ~~filament lamp~~filament light source 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.

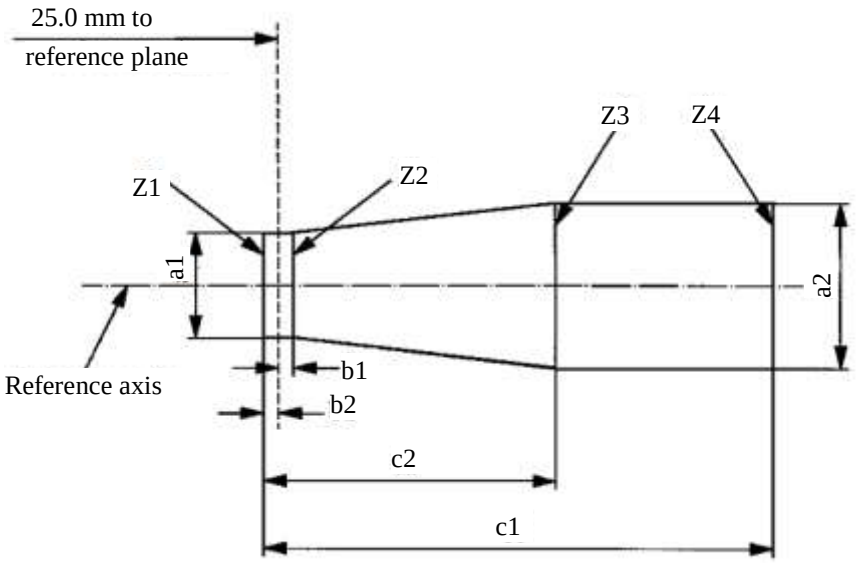
Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*	*Standard ~~filament lamp~~filament light source*
		12 V	*12 V*
e [11/]		25.0 [12/]	25.0 ± 0.1
f [11/]		3.7 [12/]	3.7 ± 0.1
g		0.5 min.	u.c.
h1		0 [12/]	0 ± 0.1
h2		0 [12/]	0 ± 0.15
γ1		50° min.	50° min.
γ2		40° min.	40° 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~~filament light source

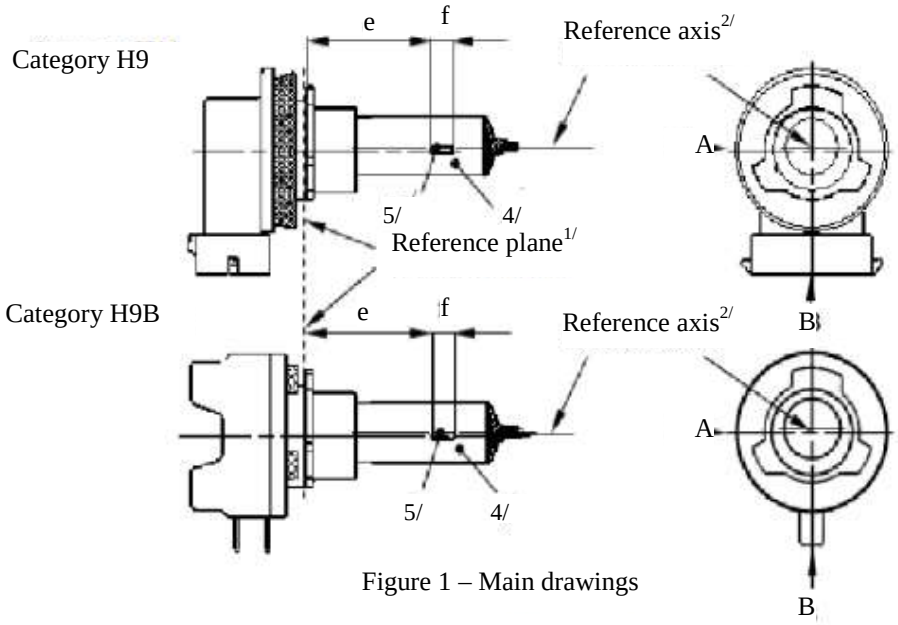


Figure 1 – Main drawings

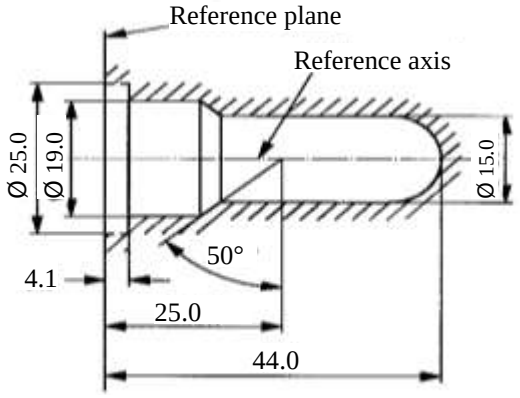


Figure 2 – Maximum~~filament lamp~~filament light

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

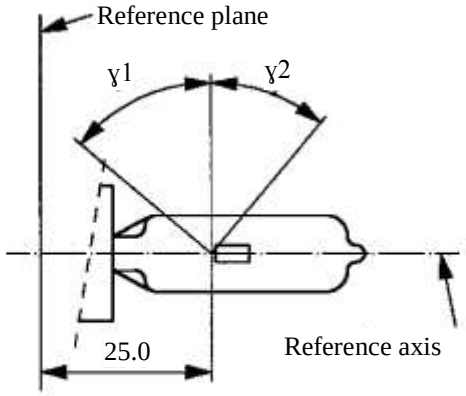
2/ The reference axis is perpendicular to the reference plane and passing through the centre of the 19 mm cap diameter.

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:

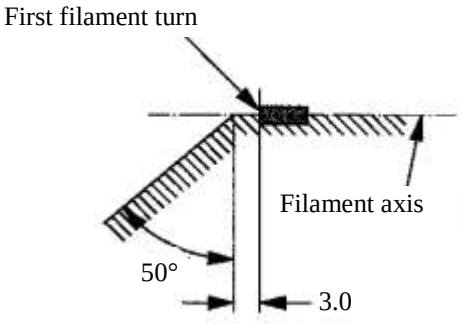
(a) No actual diameter restrictions apply but the objective for future developments is to have d max. = 1.4 mm.

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



View B

Figure 3 – Distorsion free area[5/]



View A

Figure 4 – Metal free zone[6/]

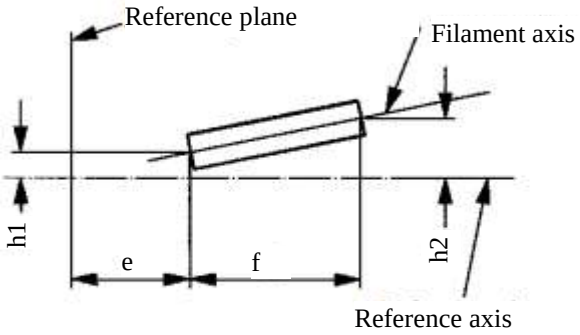


Figure 5 – Permissible offset of filament axis[7/]
(for standard ~~filament lamp~~filament light

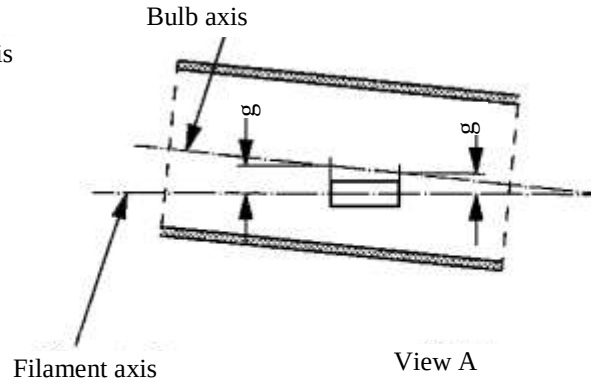


Figure 6 – Bulb eccentricity[8/]

[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 ~~filament lamp~~filament light source 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 lamp~~Filament light sources of normal production	*Standard ~~filament lamp~~filament light source*
		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)		
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.

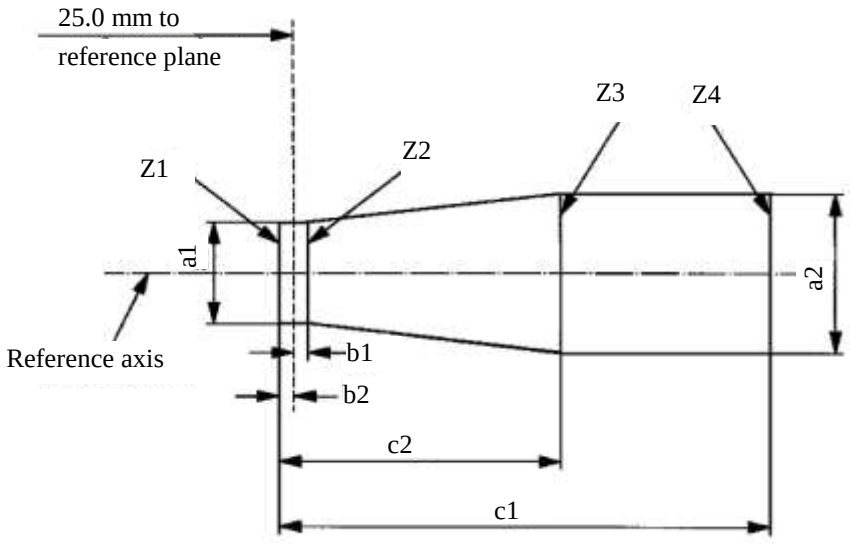
[10/] The ends of the filament are defined as the points where, when the viewing direction is as defined in footnote 9/ above, the projection of the outside of the end turns crosses the filament axis.

[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

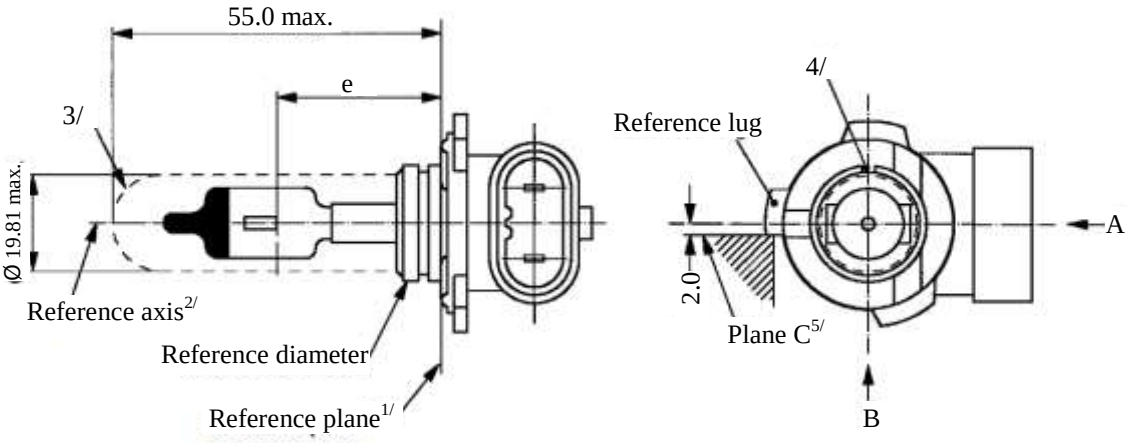
d = diameter of filament

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

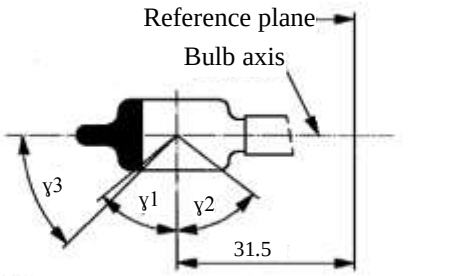
The filament shall lie entirely within the limits shown.

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.

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

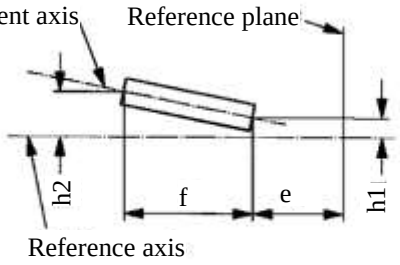


View A



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 ~~filament lamp~~filament light source key. The envelope is concentric to the reference axis.

4/ The keyway is mandatory.

5/ The ~~filament lamp~~filament light source 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.

Dimensions in mm [8/]		*Tolerance*	
		~~Filament lamp~~Filament light sources of normal production	*Standard ~~filament lamp~~filament light source*
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.

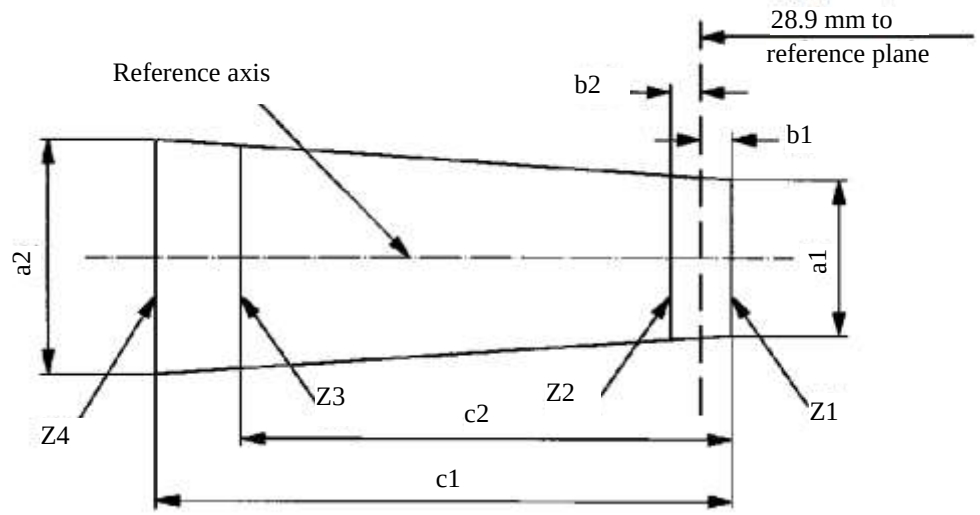
[11/] To be checked by means of a "Box system", sheet H10/3*.

[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~~filament light source 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.

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

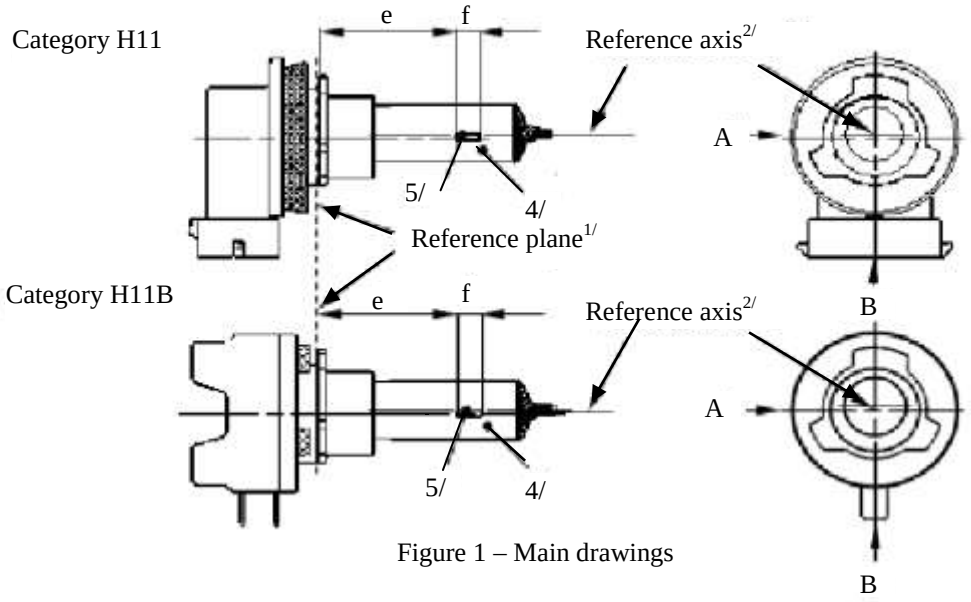


Figure 1 – Main drawings

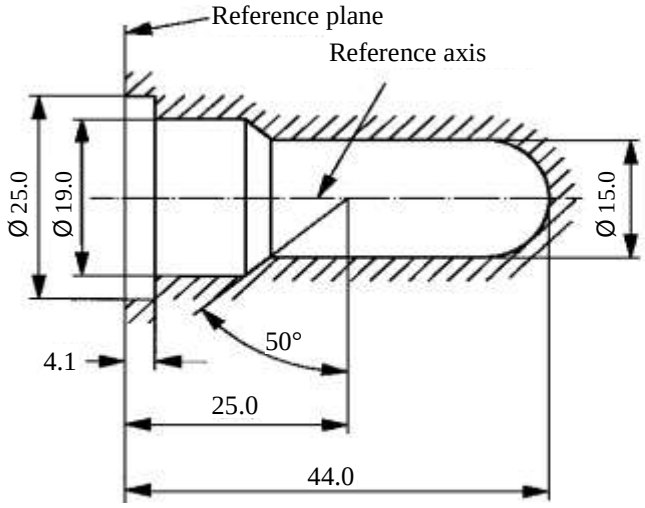


Figure 2 - Maximum ~~filament lamp~~filament light

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.

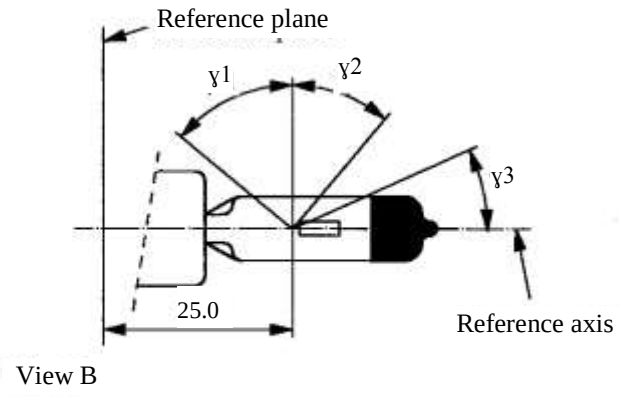
3/ Glass bulb and supports shall not exceed the envelope as indicated in Figure 2. The envelope is concentric to the reference axis.

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~~filament light source and ~~filament lamp~~filament light source of normal production shall be the same.



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

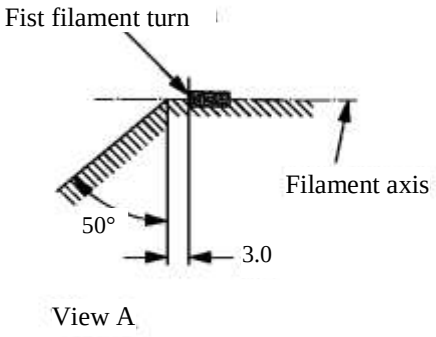


Figure 4 – Metal free zone[8/]

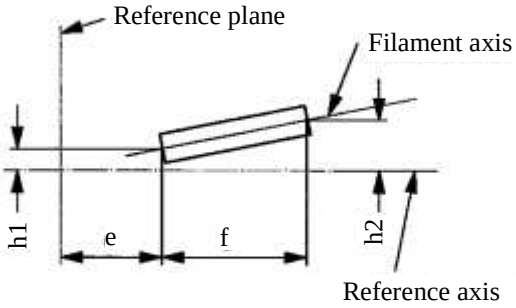


Figure 5 – Permissible offset of filament axis[9/]
(for standard ~~filament lamp~~filament light sources

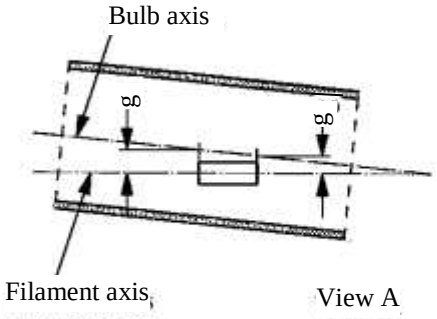


Figure 6 – Bulb eccentricity[10/]

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 ~~filament lamp~~filament light source 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.

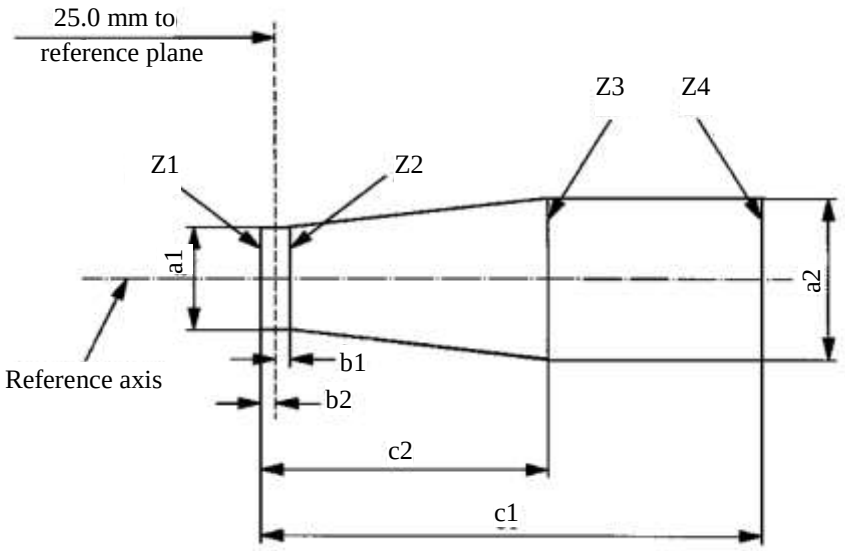
Dimensions in mm		*~~Filament lamp~~Filament light source~~s~~ of normal production*		*Standard ~~filament lamp~~filament light source*
		12 V	*24 V*	*12 V*
e [11/]		25.0 [12/]		25.0 ± 0.1
f [11/]		4.5	5.3 [12/]	4.5 ± 0.1
g		0.5 min.		u.c.
h1		0 [12/]		0 ± 0.1
h2		0 [12/]		0 ± 0.15
γ1		50° min.		50° 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

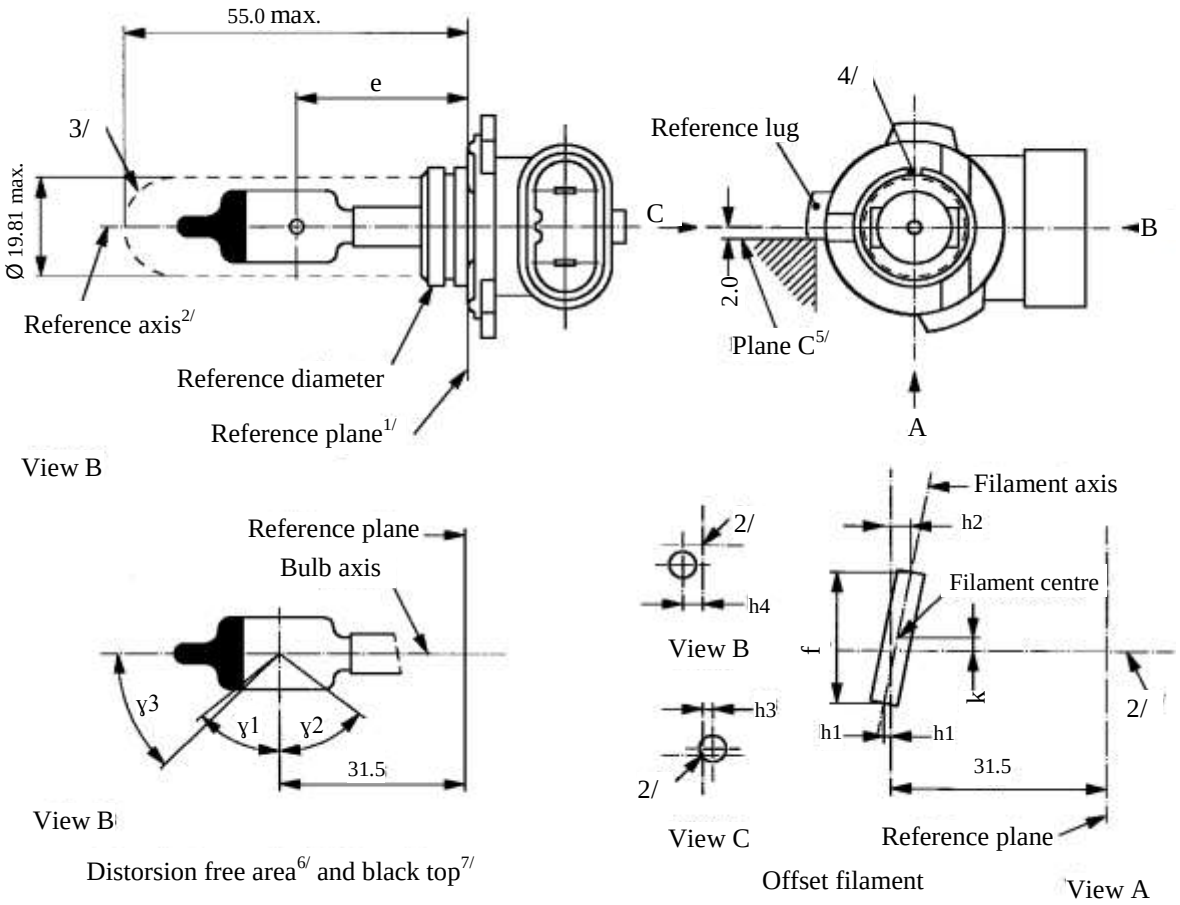
d = diameter of filament

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.

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



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 ~~filament lamp~~filament light source 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.

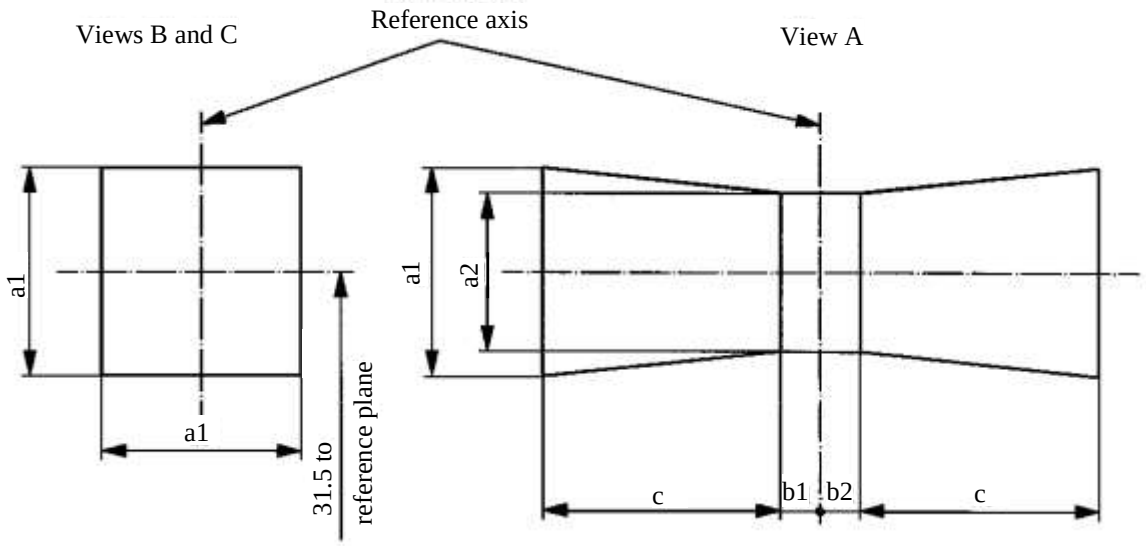
7/ The obscuration shall extend to at least angle γ3 and shall be at least as far as the undistorted part of the bulb defined by angle γ1.

Dimensions in mm [8/]		*Tolerance*	
		~~Filament lamp~~Filament light sources of normal production	*Standard ~~filament lamp~~filament light source*
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.

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~~filament light source 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~~filament light source.

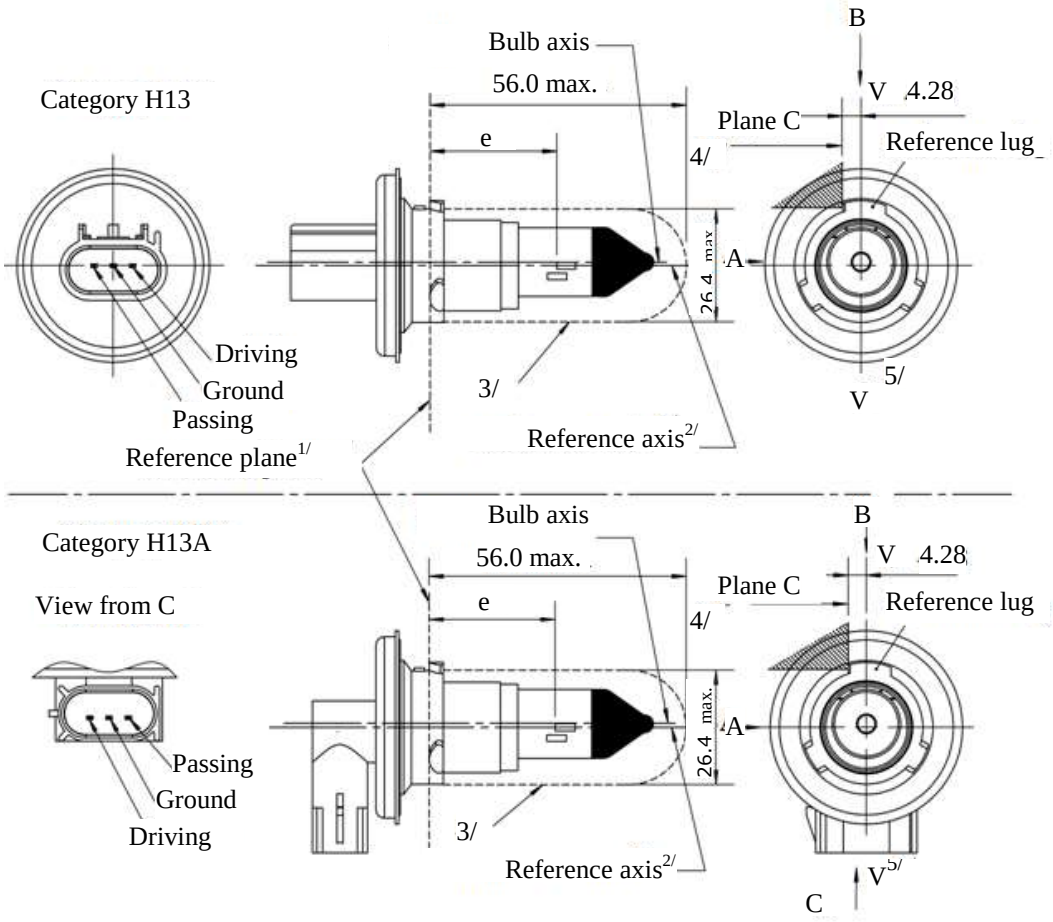


Figure 1 - Main drawing

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~~filament light source 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.

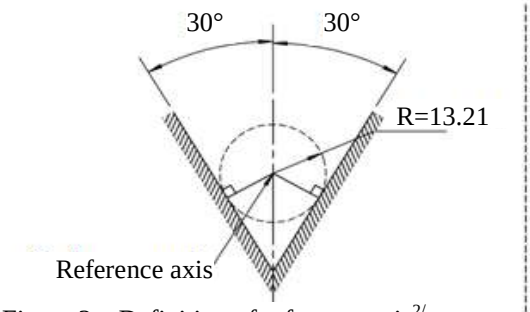


Figure 2 – Definition of reference axis[2/]

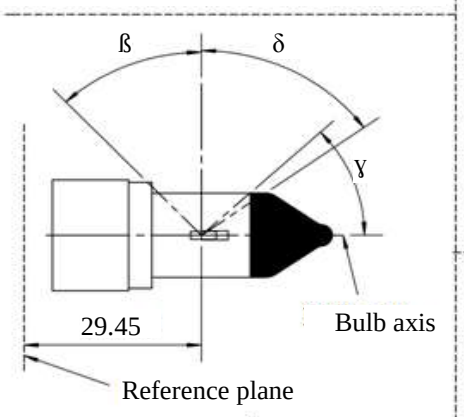


Figure 3 – Undistorted area[6/] and opaque coating[7/]

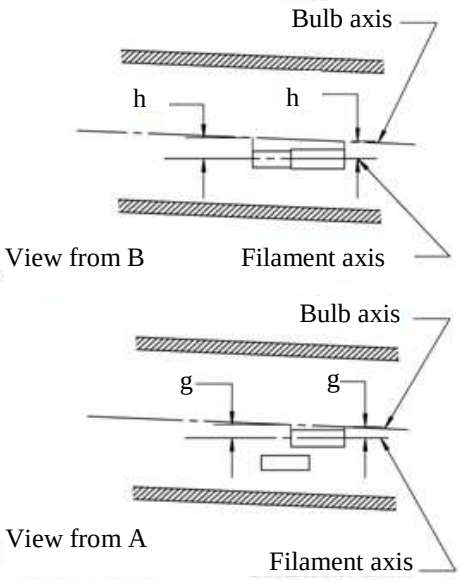


Figure 4 – Bulb offset[8/]

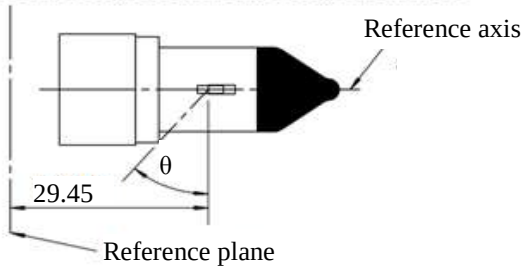


Figure 5 – Light blocking toward cap[9/]

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.

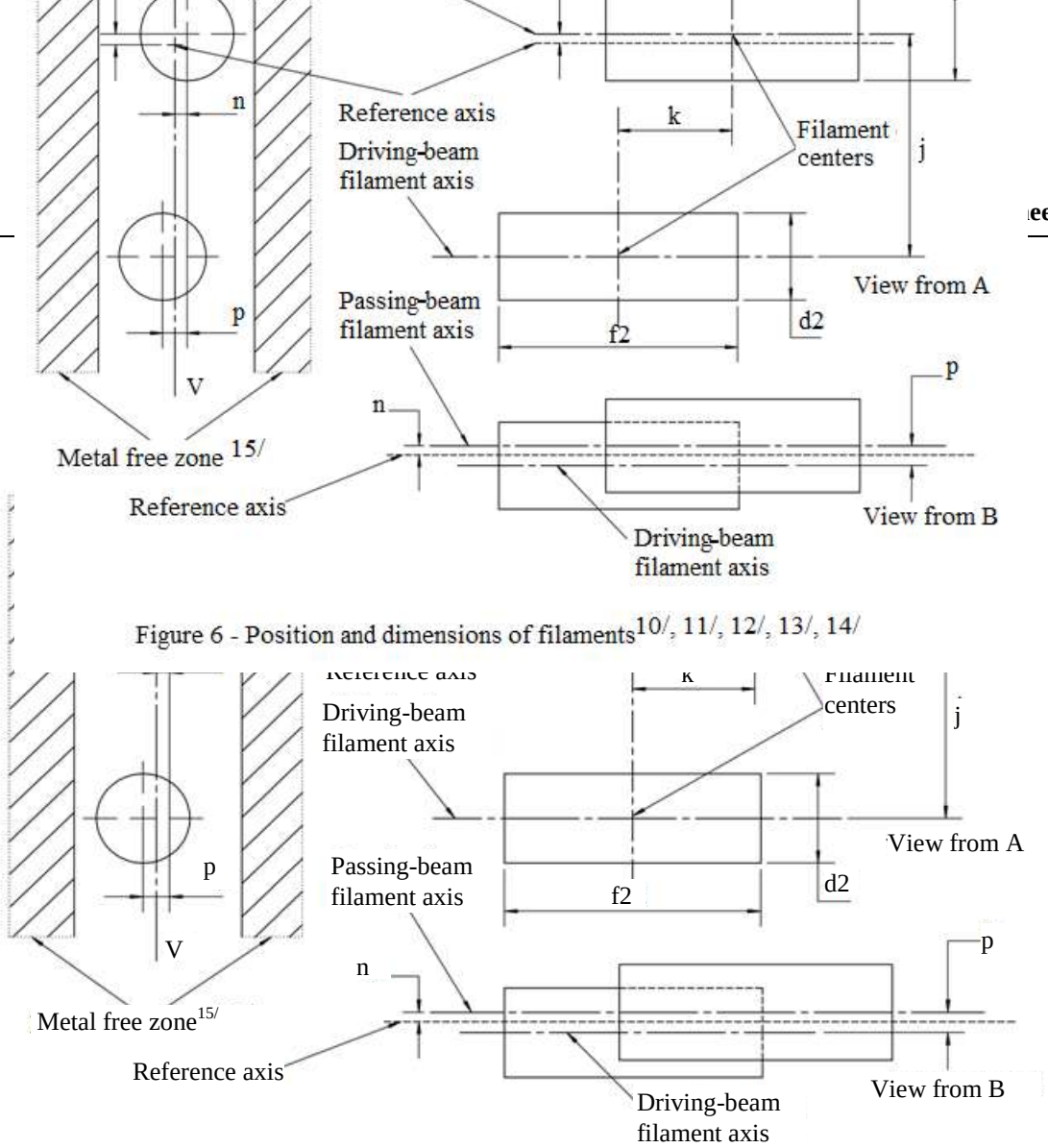


Figure 6 - Position and dimensions of filaments 10/, 11/, 12/, 13/, 14/

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~~filament light source and ~~filament lamp~~filament light source 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.

Dimensions in mm		*Tolerance*			
		~~Filament lamp~~Filament light sources of normal production		*Standard ~~filament lamp~~filament light source*	
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~~filament light source.

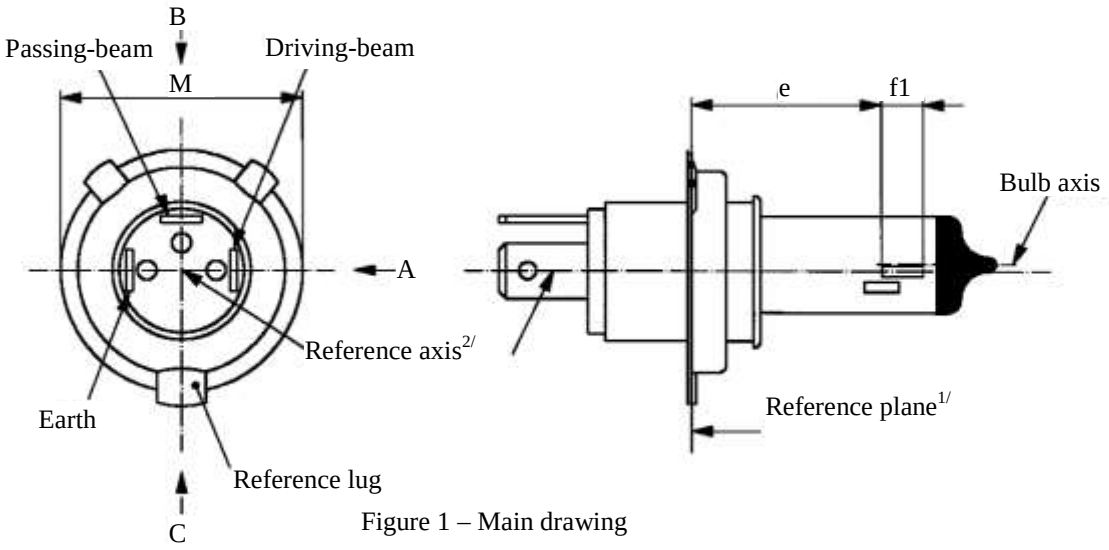


Figure 1 – Main drawing

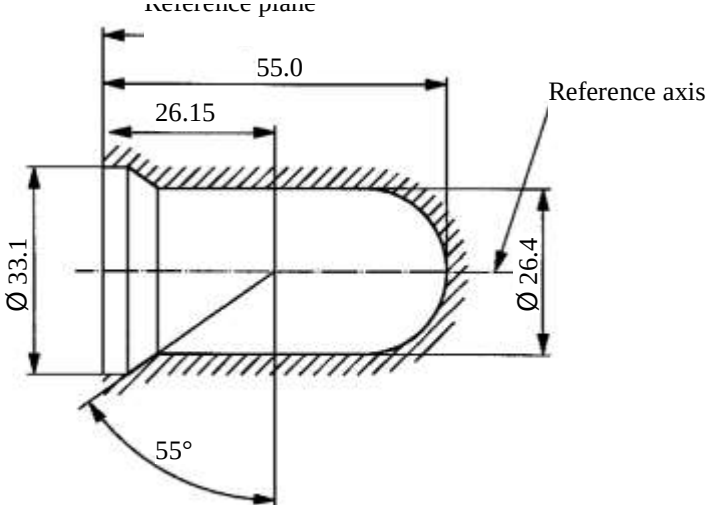
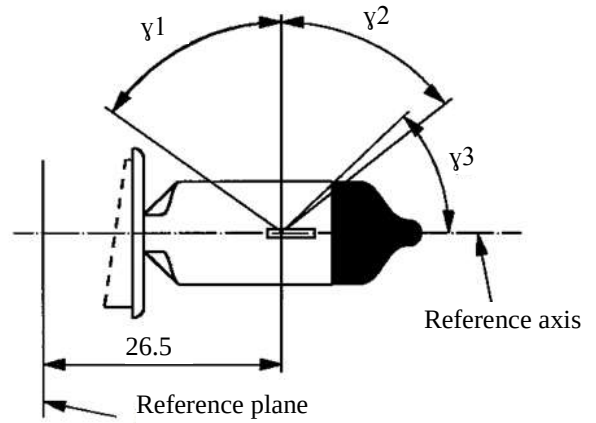


Figure 2 – Maximum ~~filament lamp~~filament light source outline3/

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.

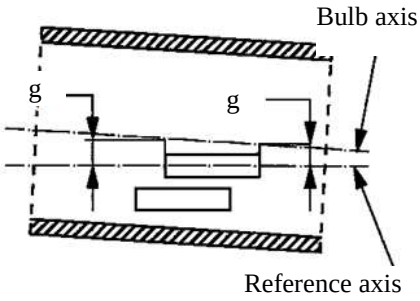
2/ The reference axis is perpendicular to the reference plane and passing through the centre of the cap ring diameter "M"

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



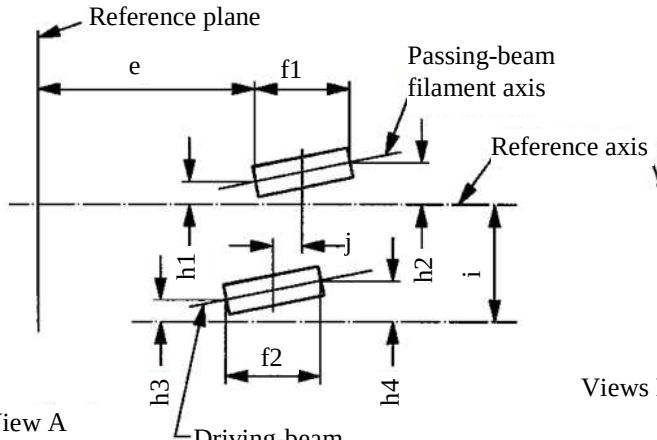
View B

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

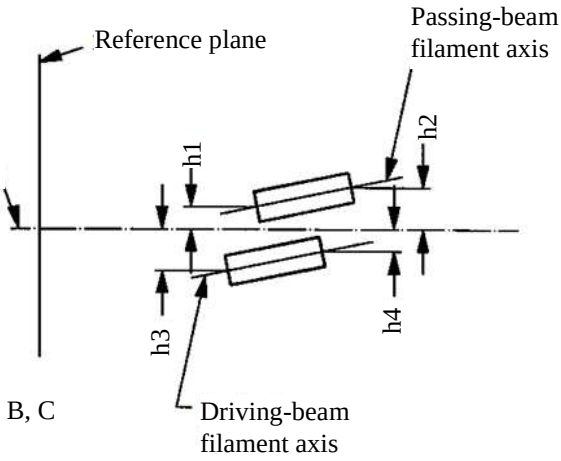


View A

Figure 4 – Bulb eccentricity[6/]



View A



Views B, C

Figure 5 – Offset of filament axis[7/]
(for standard ~~filament lamp~~filament light sources 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.

Dimensions in mm		*~~Filament lamp~~Filament light source of normal production*	*Standard ~~filament lamp~~filament light sources*
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

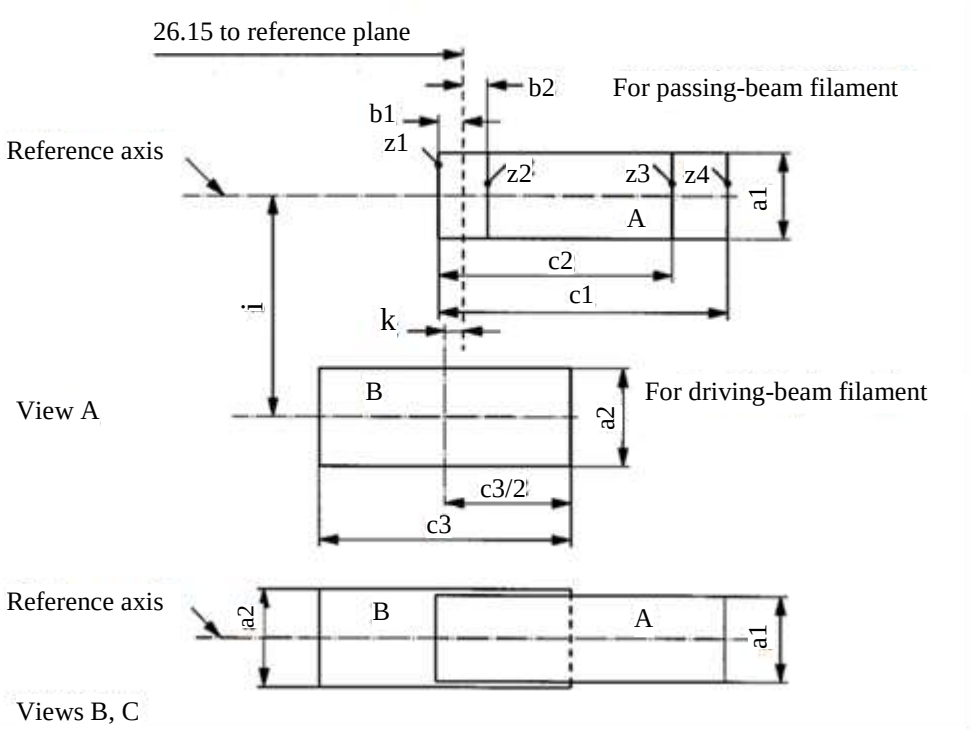
[8/] The ends of the filaments are defined as the points where, when the viewing direction is direction A as shown in Figure 1 on sheet H14/1, the projection of the outside of the end turns crosses the filaments axis.

[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~~filament light source 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 lamp~~filament light sources and ~~filament lamp~~filament light sources 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~~filament light source

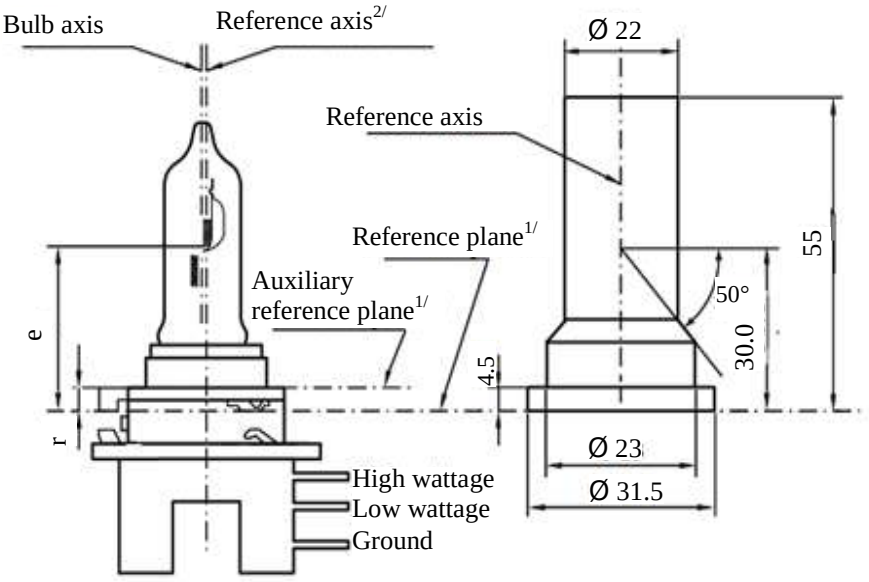


Figure 1 – Main drawing

Figure 3 - Maximum filament ~~lamp~~ light source

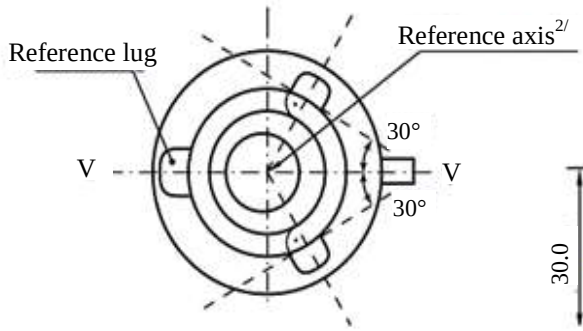


Figure 2 – Definition of reference axis7/

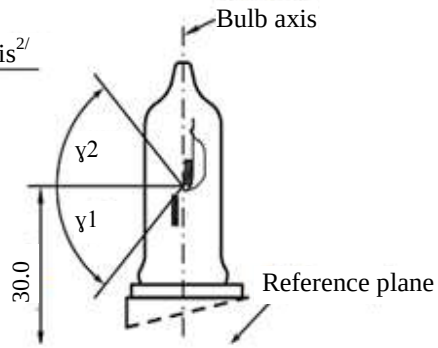


Figure 4 - Distorsion free area4/

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.

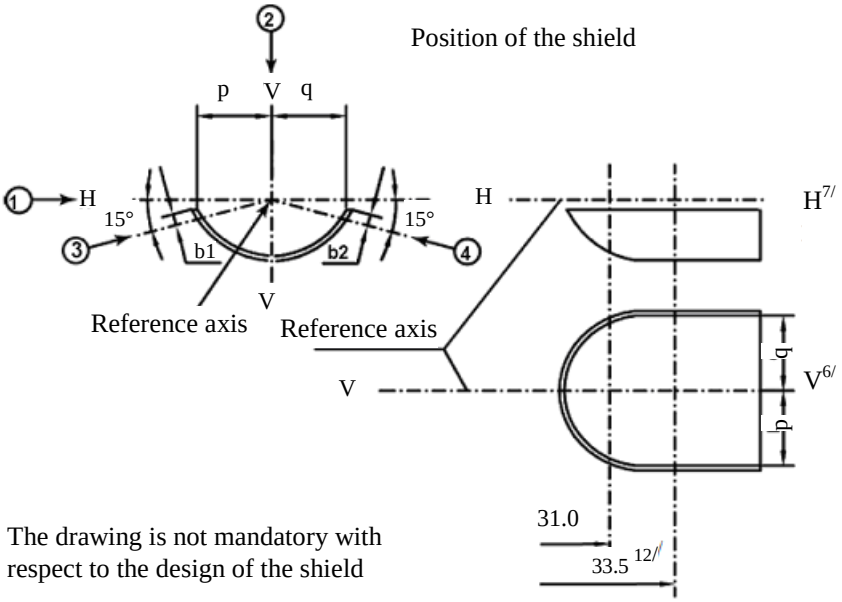
2/ The reference axis is perpendicular to the reference plane and crosses the intersection of the two perpendiculars as indicated in Figure 2 on sheet H15/1.

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.

Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*				*Standard ~~filament lamp~~filament light source*	
		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.



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

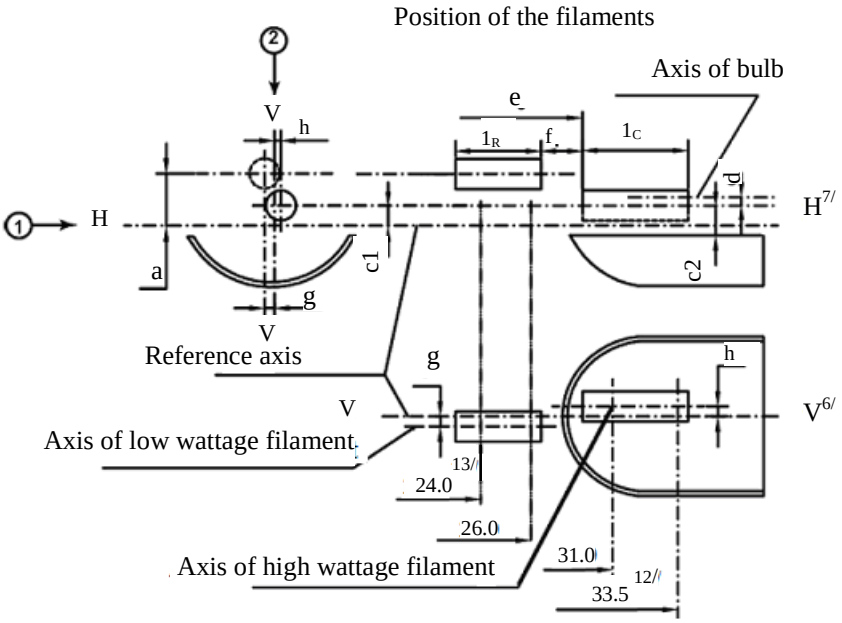


Table of the dimensions (in mm) referred to in the drawings on sheet H15/3

*Reference**		*Dimension***		*Tolerance*			
				~~Filament lamp~~Filament light sources of normal production		*Standard ~~filament lamp~~filament light source*	
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~~filament light source

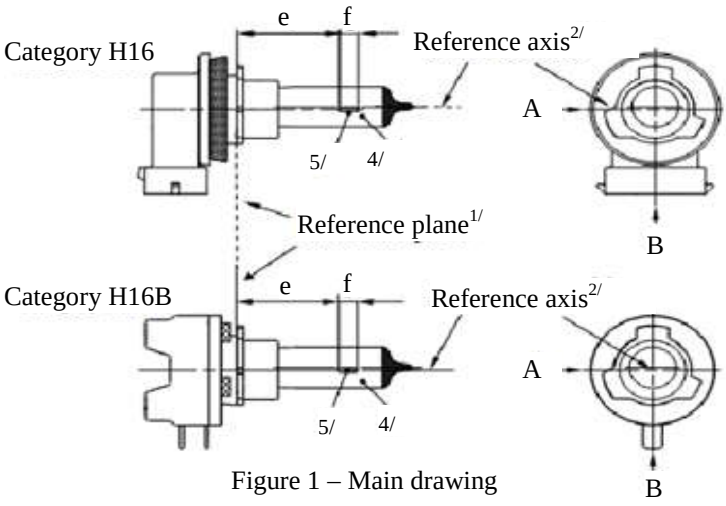


Figure 1 – Main drawing

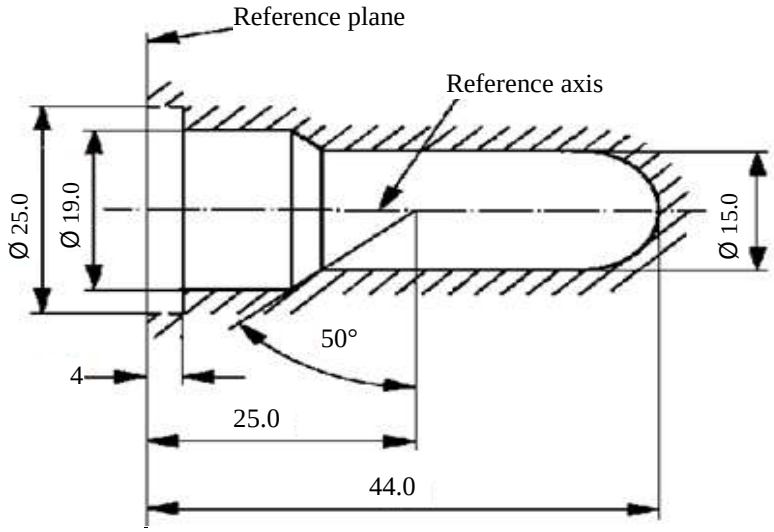


Figure 2 - Maximum ~~filament lamp~~filament light

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.

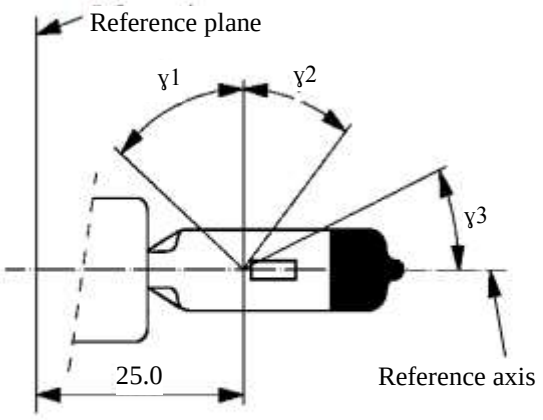
3/ Glass bulb and supports shall not exceed the envelope as indicated in Figure 2. The envelope is concentric to the reference axis.

4/ The light emitted shall be white or selective yellow.

5/ Notes concerning the filament diameter.

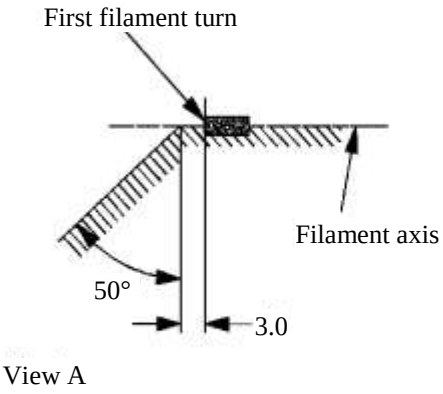
(a) No actual diameter restrictions apply but the objective for future developments is to have d max. = 1.1 mm.

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



View B

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



View A

Figure 4 – Metal free zone[8/]

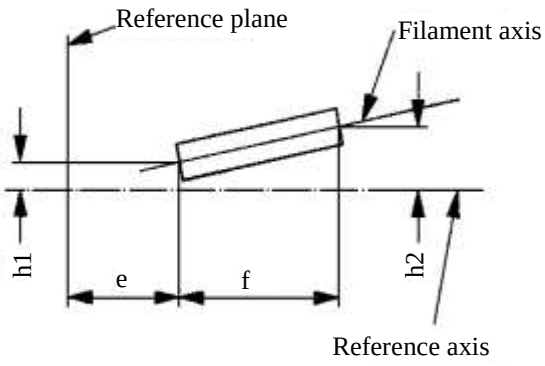


Figure 5 – Permissible offset of filament axis[9/] (for standard ~~filament lamp~~filament light sources

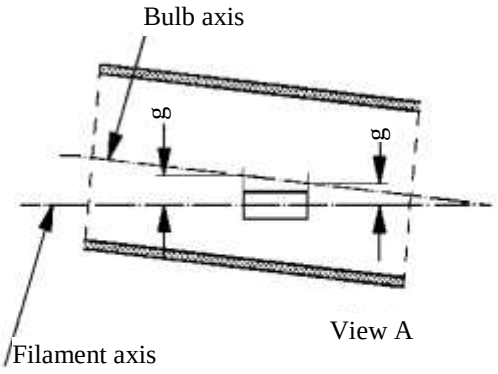


Figure 6 – Bulb eccentricity[10/]

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 ~~filament lamp~~filament light source 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.

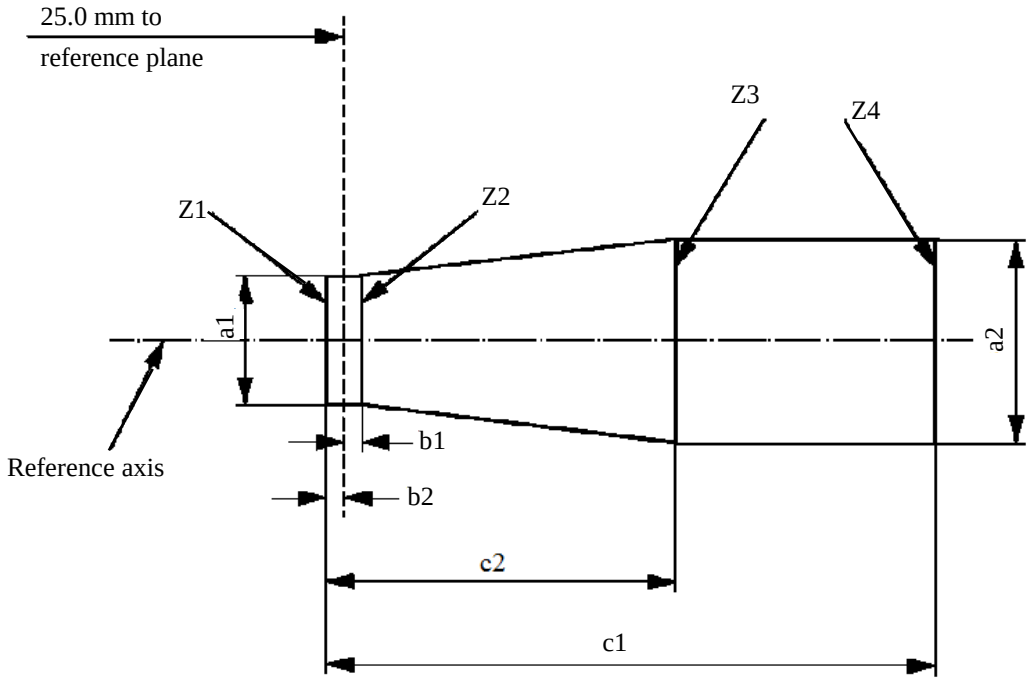
Dimensions in mm		*~~Filament lamp~~Filament light source~~s~~ of normal production*	*Standard ~~filament lamp~~filament light source*
		12 V	*12 V*
e [11/]		25.0 [12/]	25.0 ± 0.1
f [11/]		3.2 [12/]	3.2 ± 0.1
g		0.5 min.	u.c.
h1		0 [12/]	0 ± 0.1
h2		0 [12/]	0 ± 0.15
γ1		50° min.	50° min.
γ2		40° min.	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

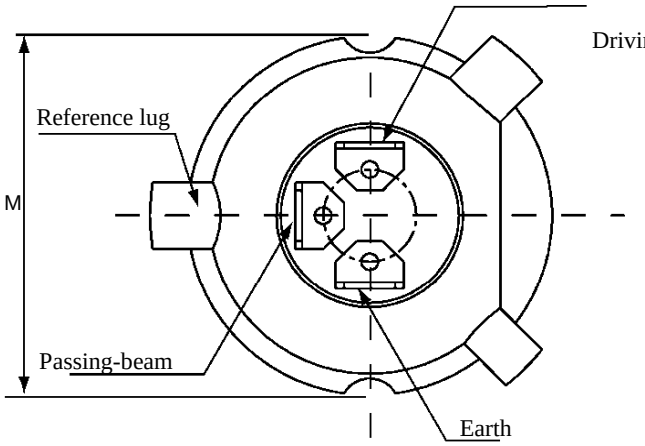
d = diameter of filament

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.

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



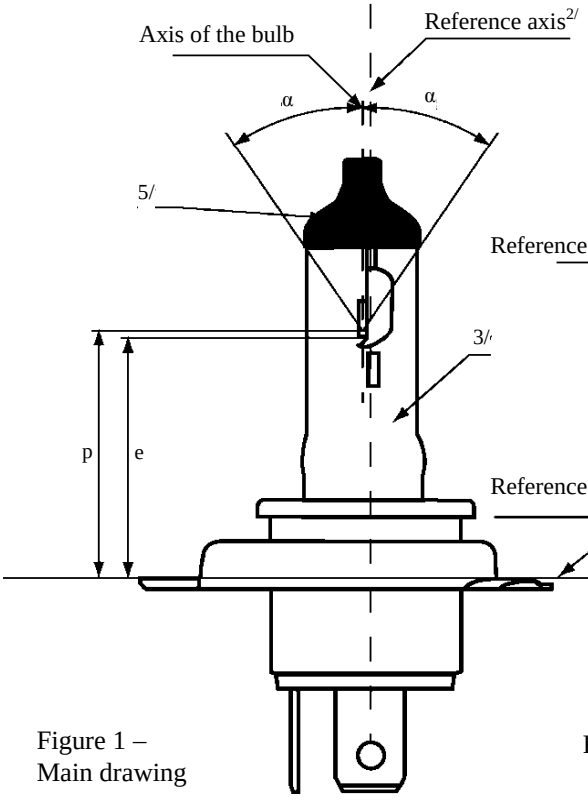


Figure 1 –
Main drawing

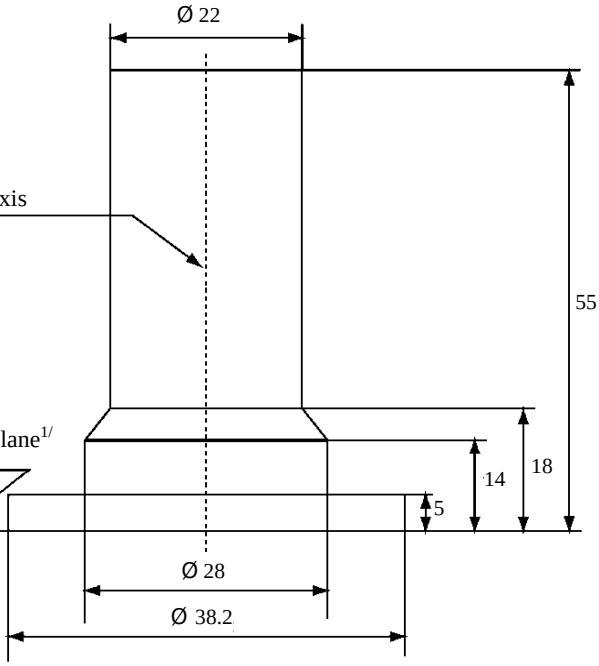


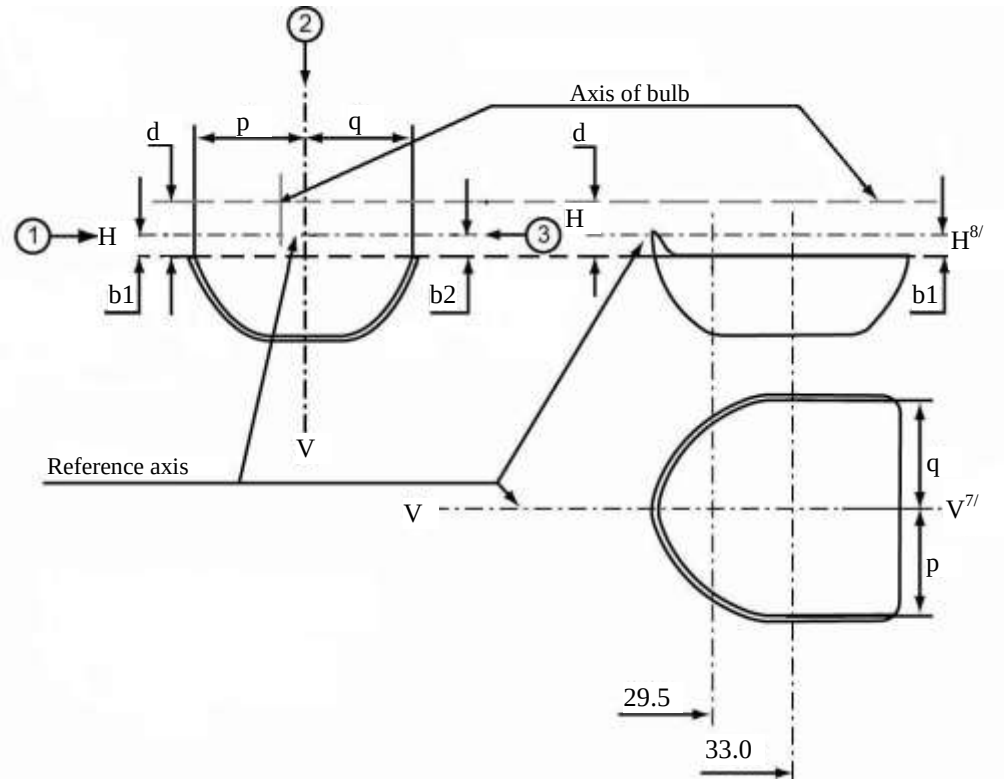
Figure 2 - Maximum ~~filament lamp~~filament light

For the notes see sheet H17/6

Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production* *12 V*		*Standard ~~filament lamp~~filament light source* *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

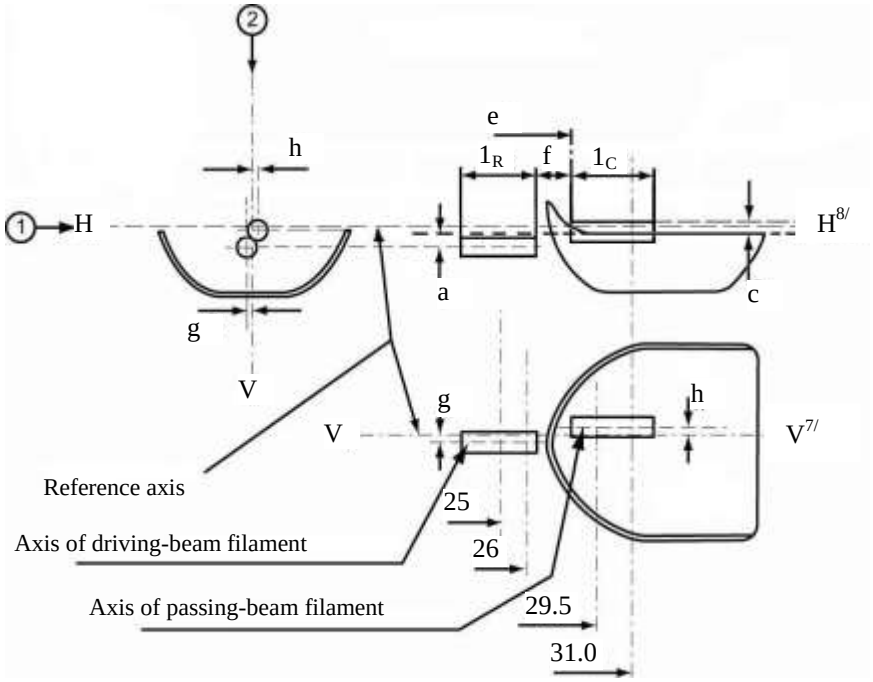


Table of the dimensions (in mm) referred to in the drawings on sheets H17/3 and H17/4

*Reference**	*Dimension***	*Tolerance*	
		~~Filament lamp~~Filament light sources of normal production	*Standard ~~filament lamp~~filament light source*
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 lamp~~filament light sources and from normal production ~~filament lamp~~filament light sources 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~~filament light source

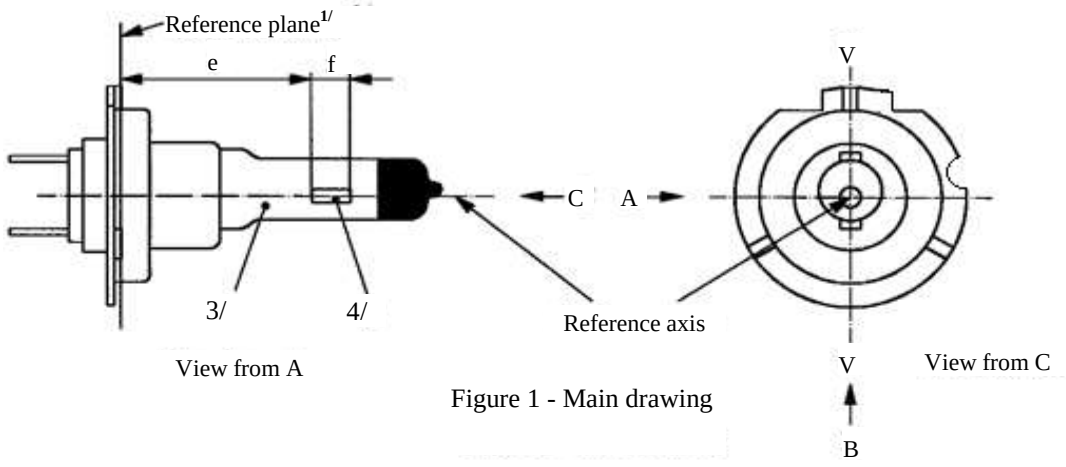


Figure 1 - Main drawing

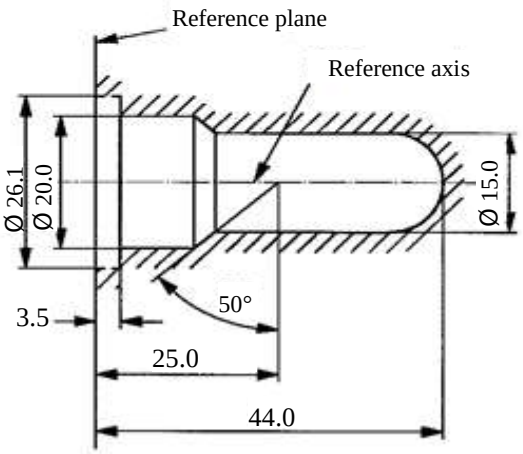


Figure 2 - Maximum ~~filament lamp~~filament light source outline 5/

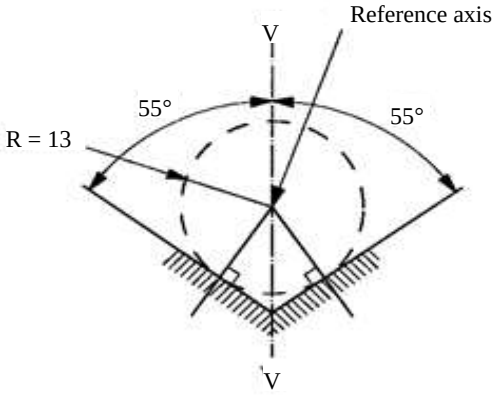


Figure 3 - Definition of reference axis 2/

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~~filament light source and ~~filament lamp~~filament light source 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.

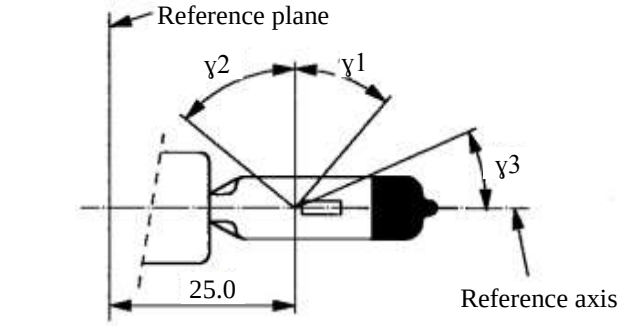


Figure 4 - Distortion free area and black top[6/, 7/]

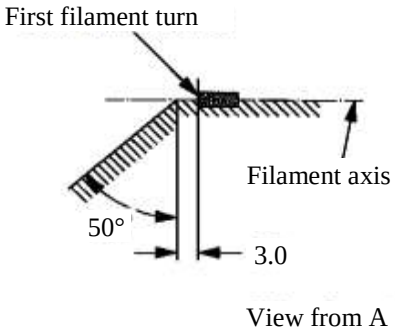


Figure 5 - Metal free zone[8/]

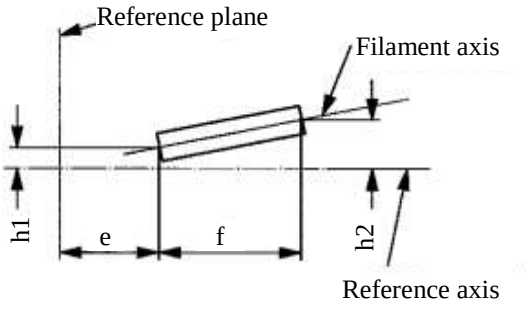


Figure 6 - Permissible offset of filament axis (for standard ~~filament lamp~~filament light sources only)

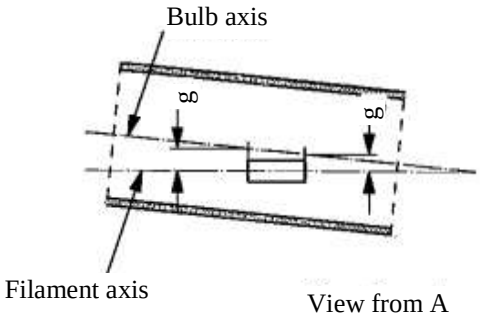


Figure 7 - Bulb eccentricity

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 ~~filament lamp~~filament light source 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~~ light sources of normal production	*Standard ~~filament lamp~~filament light source*
		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.

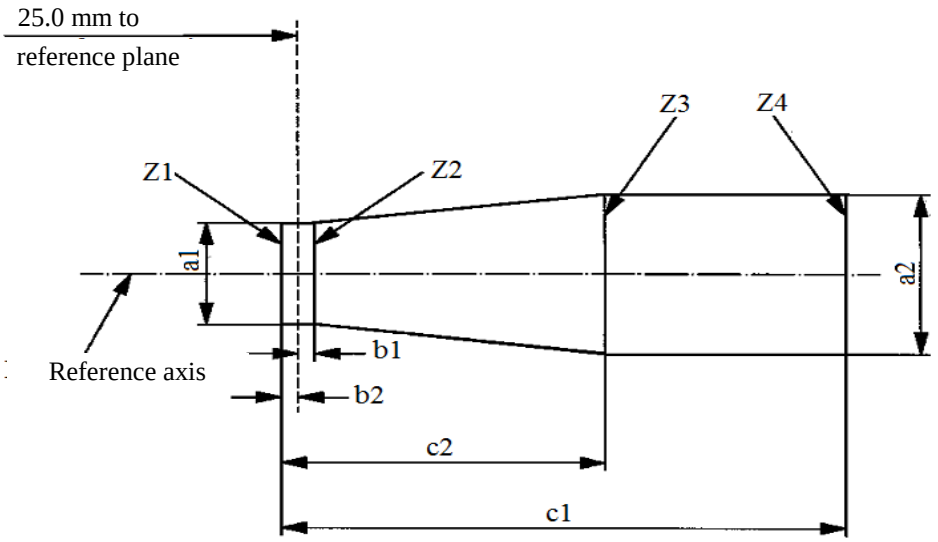
11/ The offset of the filament with respect to the reference axis is measured only in viewing directions A and B as shown in Figure 1 in sheet H18/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament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

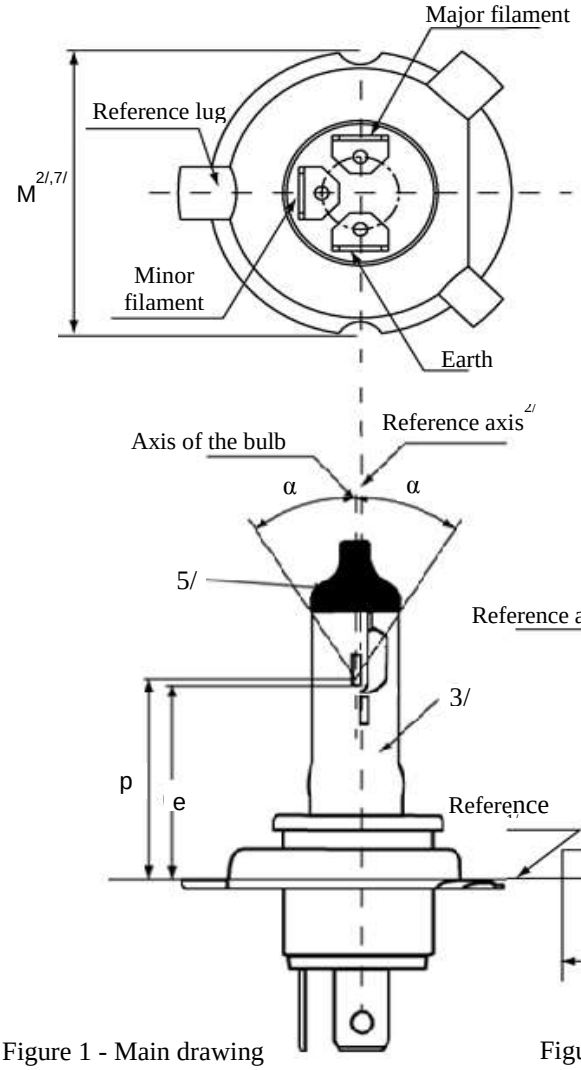


Figure 1 - Main drawing

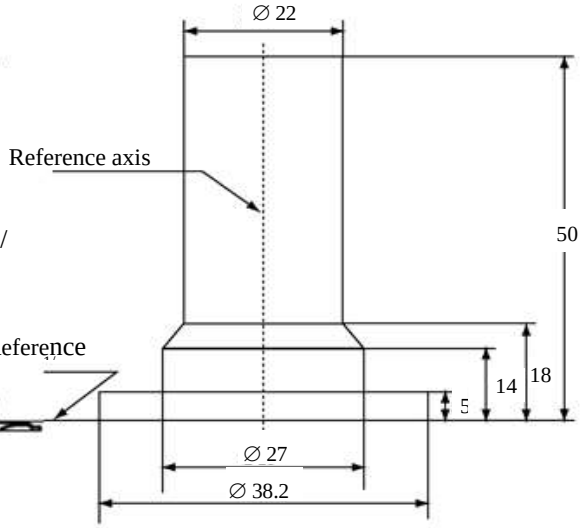


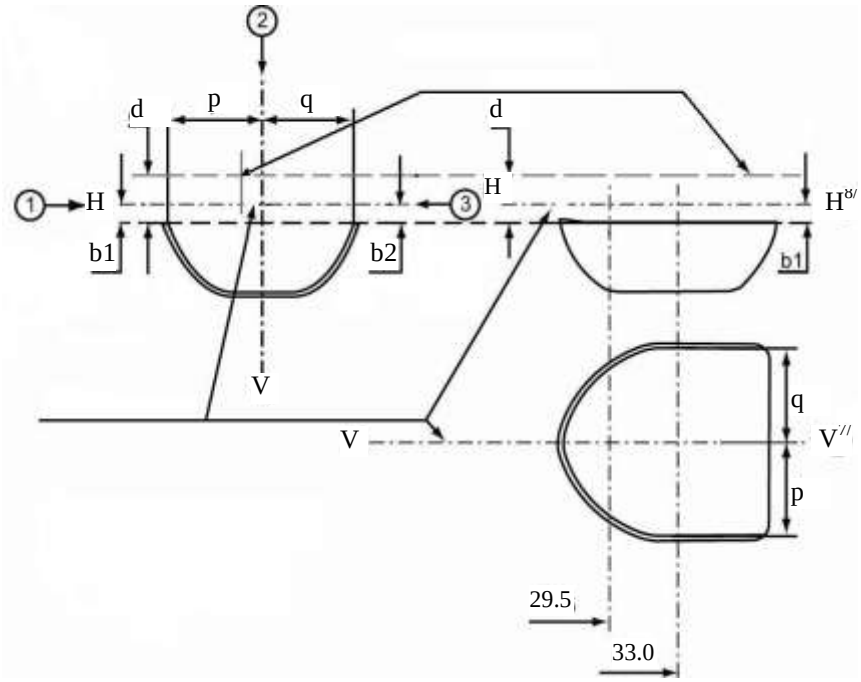
Figure 2 - Maximum ~~filament lamp~~filament light source outlines 4/

For the notes see sheet H19/5.

Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*		*Standard ~~filament lamp~~filament light source*	
		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~~2)					
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

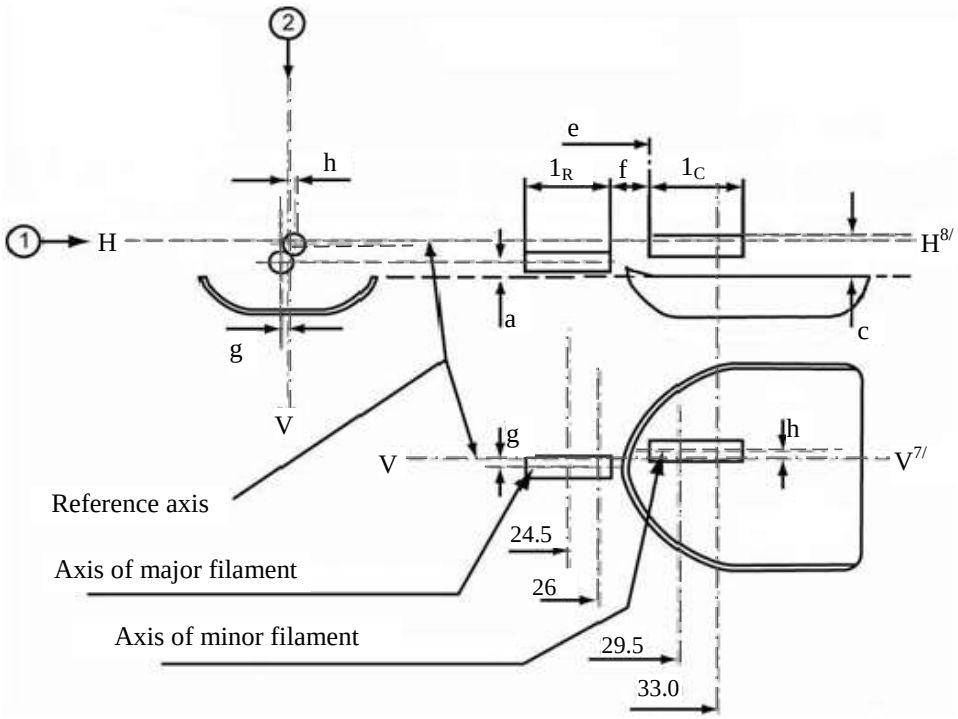


Table of the dimensions (in mm) referred to in the drawings on sheet H19/3

*Reference**	*Dimension***	*Tolerance*	
		~~Filament lamp~~Filament light sources of normal production	*Standard ~~filament lamp~~filament light source*
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 lamp~~filament light sources and from normal production ~~filament lamp~~filament light sources 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~~filament light source

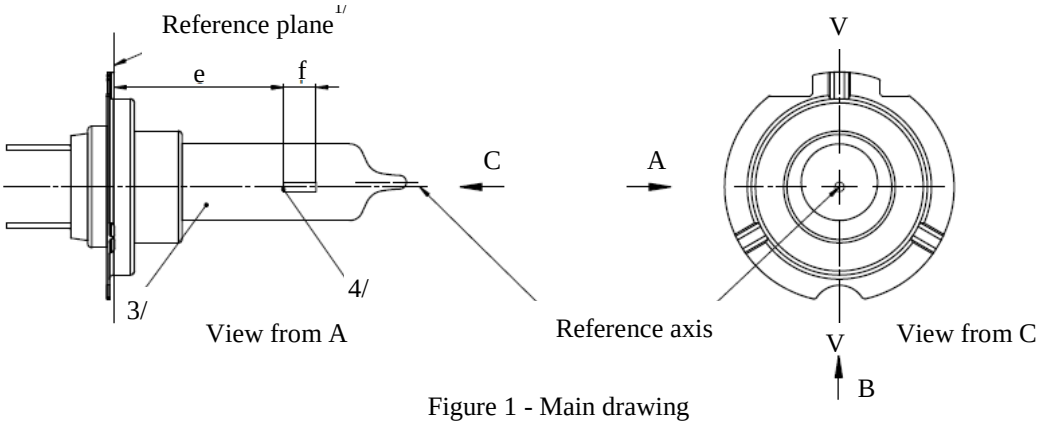


Figure 1 - Main drawing

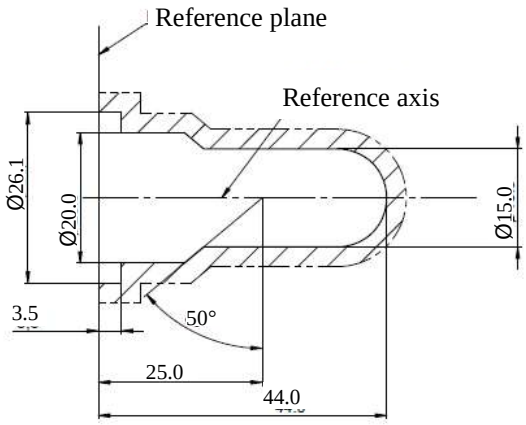


Figure 2 - Maximum ~~filament lamp~~filament light source outline 5/

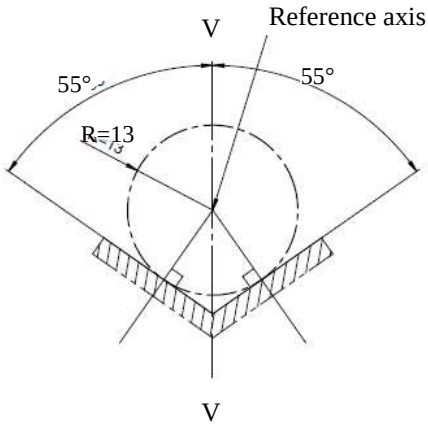


Figure 3 - Definition of reference axis 2/

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~~filament light source and ~~filament lamp~~filament light source 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.

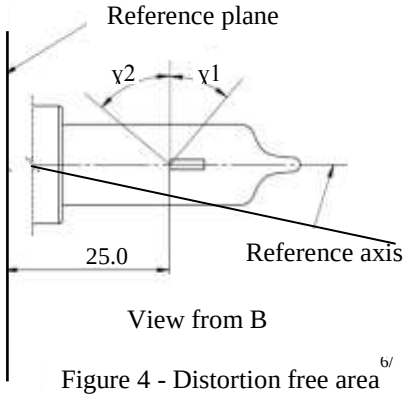


Figure 4 - Distortion free area[6/]

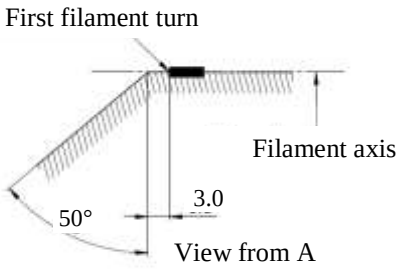


Figure 5 - Metal free zone[7/]

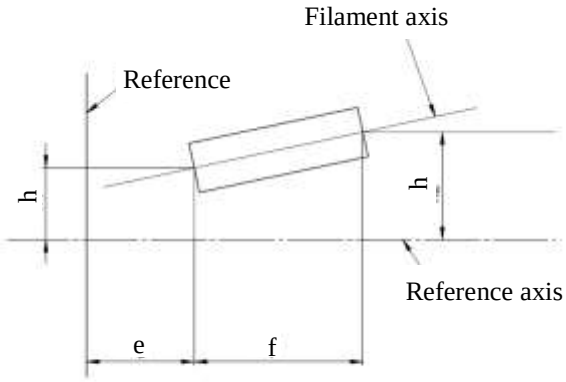


Figure 6 - Permissible offset of filament axis (for standard ~~filament lamp~~filament light sources only)

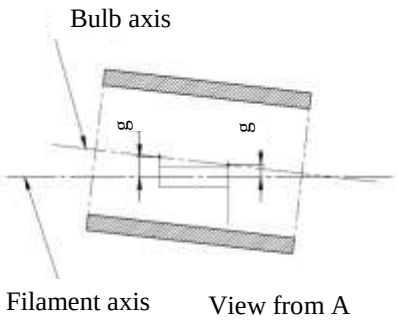


Figure 7 - Bulb eccentricity

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 ~~filament lamp~~filament light source 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~~ light sources of normal production* 12 V	*Standard ~~filament lamp~~filament light source* 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	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.

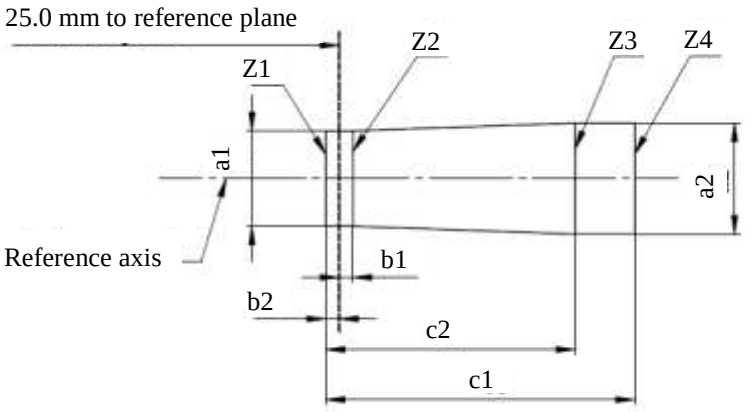
10/ The offset of the filament with respect to the reference axis is measured only in viewing directions A and B as shown in Figure 1 in sheet H20/1. The points to be measured are those where the projection of the outside of the end turns nearest to or furthest from the reference plane crosses the filament 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.

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~~filament light source 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

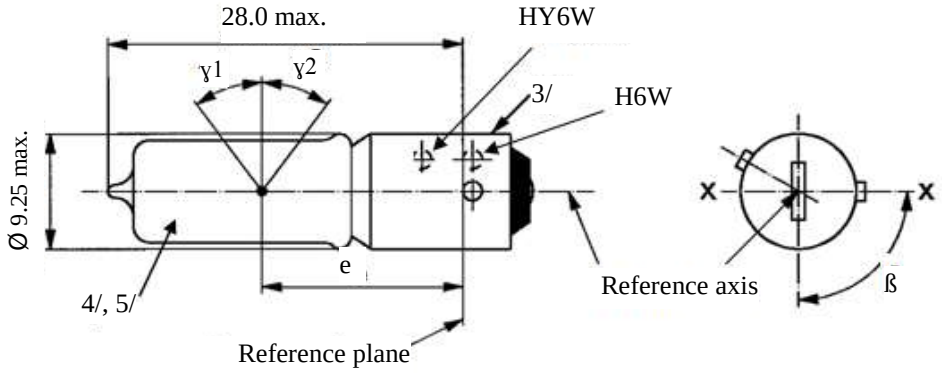
d = diameter of filament

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.

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



Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
			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.

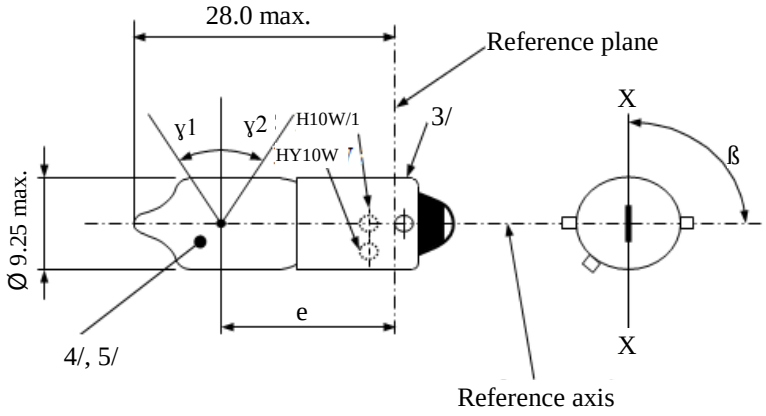
2/ In the area between the outer legs of the angles γ1 and γ2, the bulb shall have no optically distorting areas and the curvature of the bulb shall have a radius not less than 50 per cent of the actual bulb diameter.

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 lamp~~filament light sources of normal production shall be white for category H6W and amber for category HY6W.

5/ The light emitted from standard ~~filament lamp~~filament light sources 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~~filament light source



Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
			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.

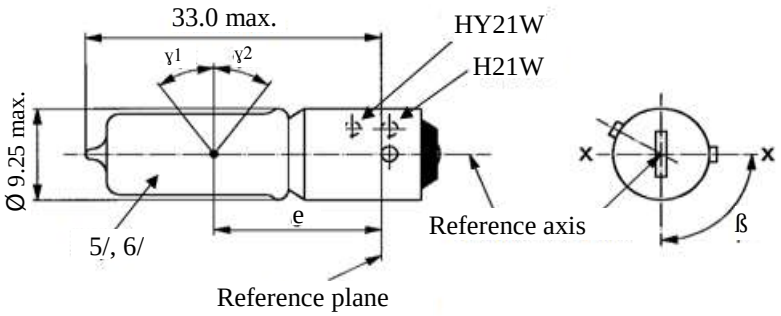
2/ In the area between the outer legs of the angles γ1 and γ2, the bulb shall have no optically distorting areas and the curvature of the bulb shall have a radius not less than 50 per cent of the actual bulb diameter.

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 lamp~~filament light sources of normal production shall be white for category H10W/1 and amber for category HY10W.

5/ The light emitted from standard ~~filament lamp~~filament light sources shall be white for category H10W/1 and amber or white for category HY10W.

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



Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
			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 7004-149-1)			
Electrical and photometric characteristics						
Rated values	Volts		12	24		12
	Watts		21	21		21
Test voltage	Volts		13.5	28.0		13.5
Objective values	Watts		26.25 max.	29.4 max.		26.25 max.
	Luminous flux	H21W	600 ± 12 %	600 ± 15 %		
		HY21W	300 ± 17 %	300 ± 20 %		
Reference luminous flux at approximately				12 V		White: 415 lm
				13.2 V		White: 560 lm
				13.5 V		White: 600 lm Amber: 300 lm

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

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

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

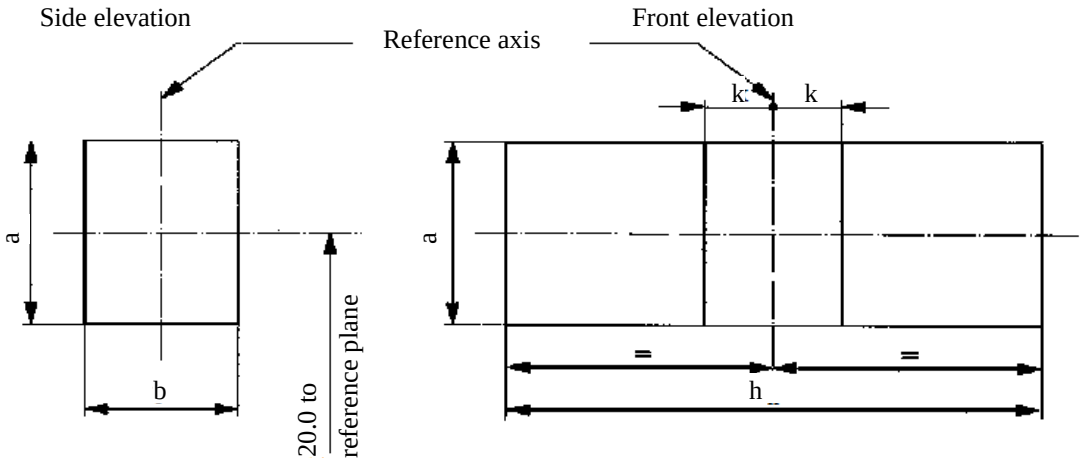
4/ In the area between the outer legs of the angles γ1 and γ2, the bulb shall have no optical distorting areas and the curvature of the bulb shall have a radius not less than 50 per cent of the actual bulb diameter.

5/ The light emitted from ~~filament lamp~~filament light sources of normal production shall be white for category H21W and amber for category HY21W.

6/ The light emitted from standard ~~filament lamp~~filament light sources 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~~filament light source 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~~filament light source 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~~filament light source 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.

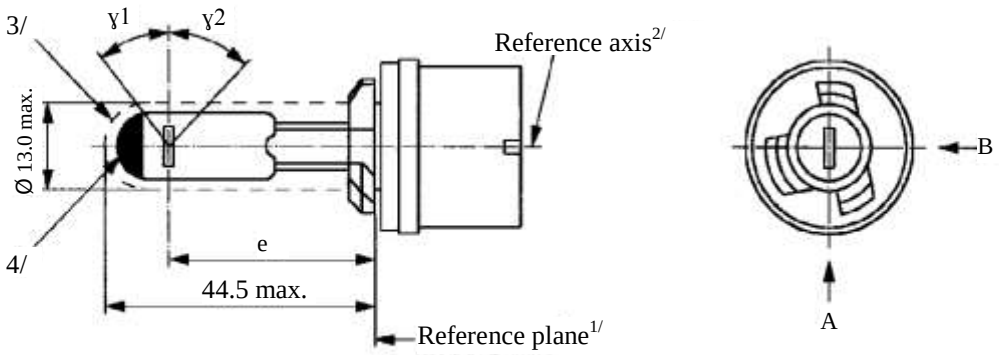
3. Front elevation

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

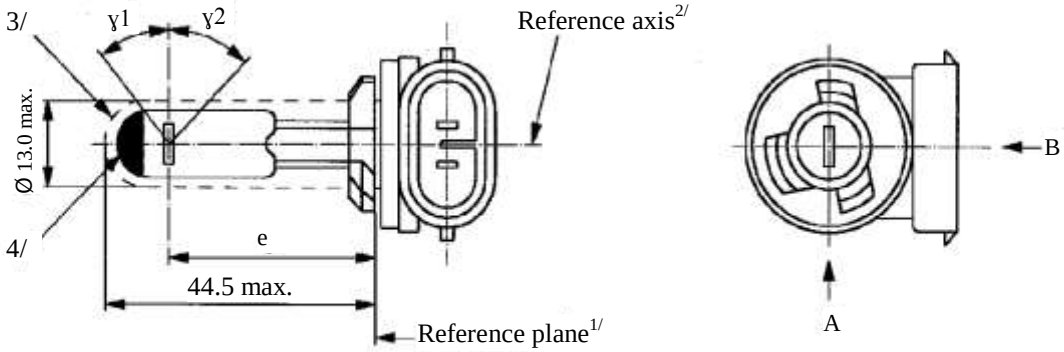
3.1. The projection of the filament shall lie entirely within a rectangle of height "a" and width "h", having its centre at the theoretical position of the centre of the filament;

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

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



Category H27W/1



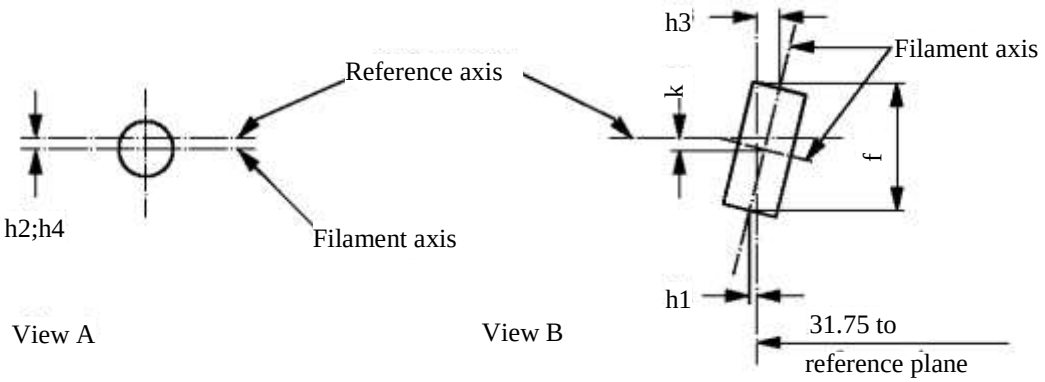
Category H27W/2

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 lamp~~filament light sources)
(Dimensions h1, h2, h3, h4 and k for standard ~~filament lamp~~filament light sources only)

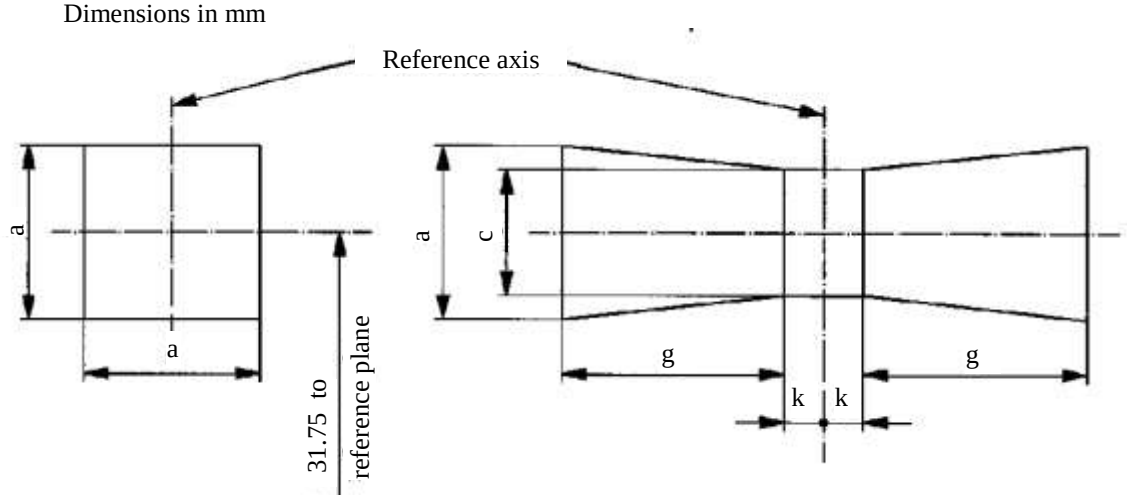
Dimensions in mm		*~~Filament lamp~~Filament light source of normal production*	*Standard ~~filament lamp~~filament light source*
e		31.75 [6/]	31.75 ± 0.25
f [8/]		4.8 max.	4.2 ± 0.20
k		0 [6/]	0.0 ± 0.25
h1, h2, h3, h4 [7/]		0 [6/]	0.0 ± 0.25
γ1 [5/]		38° nom.	38° nom.
γ2 [5/]		44° nom.	44° nom.
Cap:	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 lamp~~filament light sources, 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~~filament light source complies with the requirements.

Dimensions in mm



Reference	*a*	*c*	*k*	*g*
Dimensions	d + 1.2	d + 1.0	0.5	2.4

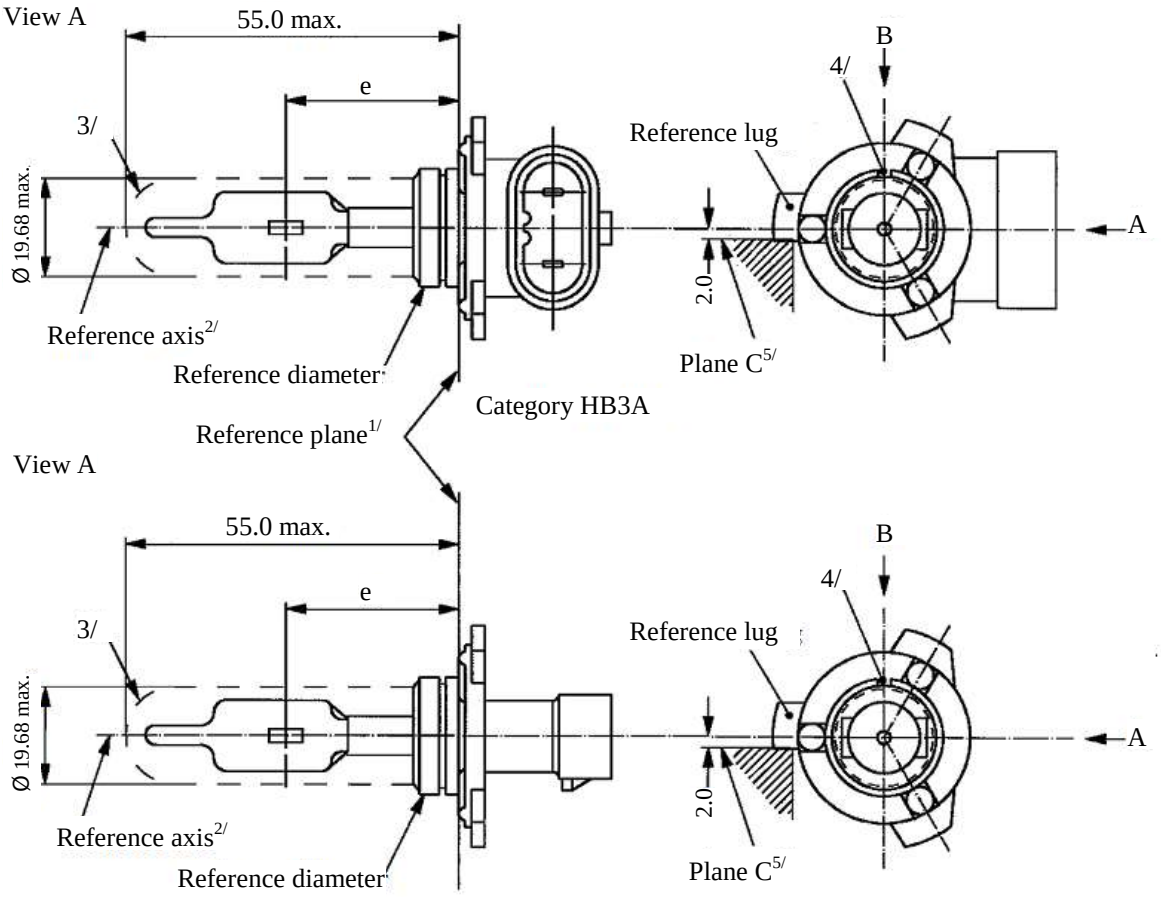
d = actual diameter of filament

The filament shall lie entirely within the limits shown.

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

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

Category HB3



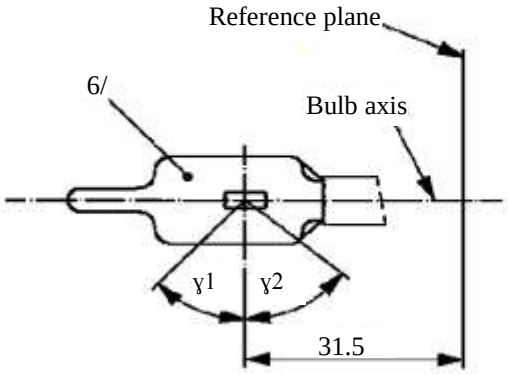
1/ The reference plane is the plane defined by the meeting points of cap-holder fit.

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

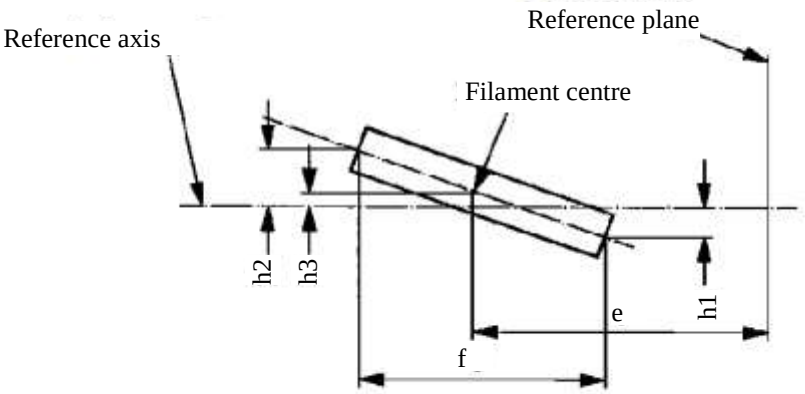
3/ Glass bulb and supports shall not exceed the envelope and shall not interfere with insertion past the ~~filament lamp~~filament light source key.

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

5/ The ~~filament lamp~~filament light source 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 lamp~~Filament light sources of normal production	*Standard ~~filament lamp~~filament light source*
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.

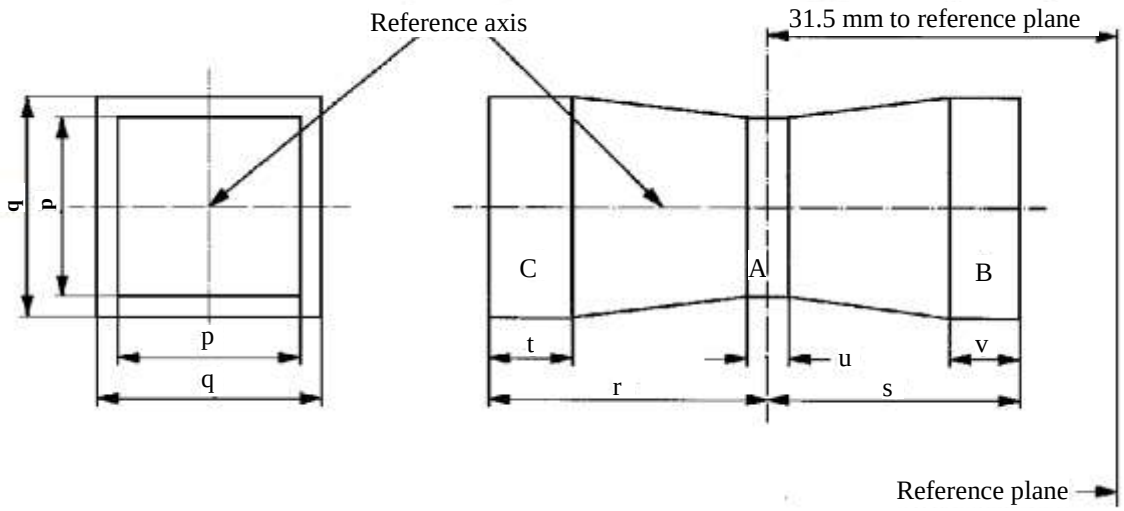
[12/] Dimensions shall be checked with O-ring removed.

[13/] ~~Filament lamp~~Filament light source HB3 shall be equipped with the right-angle cap and ~~filament lamp~~filament light source 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~~filament light source 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

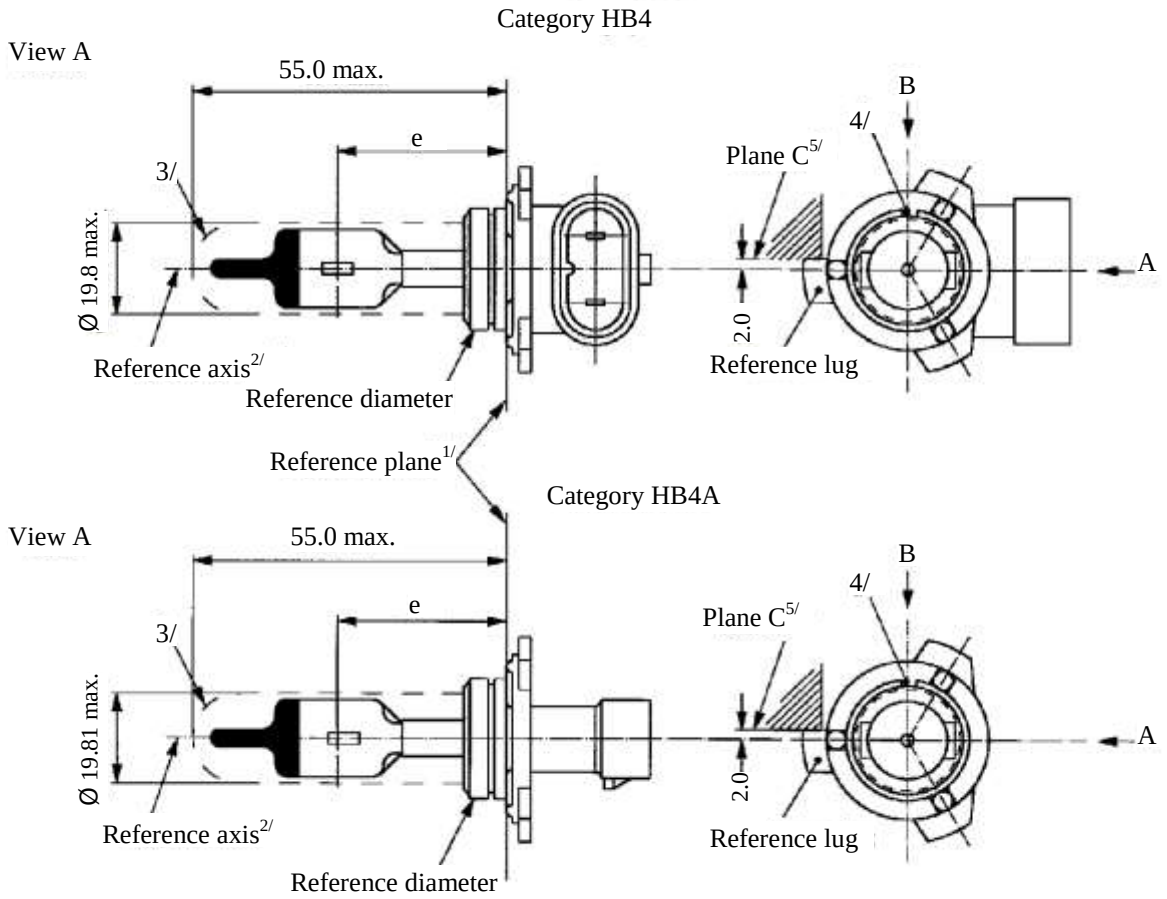
The filament position is checked solely in directions A and B as shown on sheet HB3/1.

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.

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



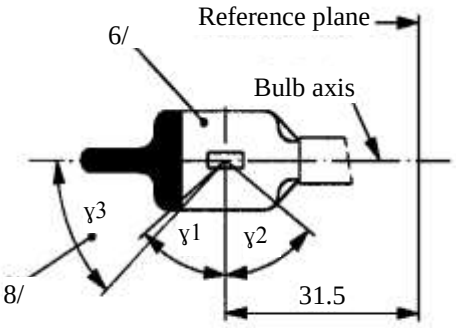
1/ The reference plane is the plane defined by the meeting points of cap-holder fit.

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

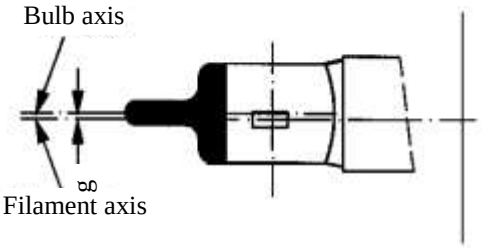
3/ Glass bulb and supports shall not exceed the envelope and shall not interfere with insertion past the ~~filament lamp~~filament light source key. The envelope is concentric to the reference axis.

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

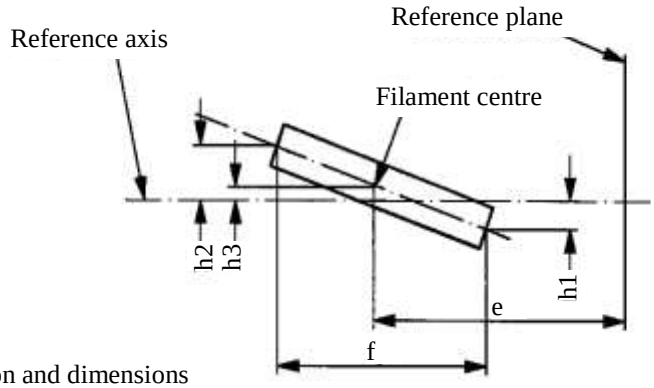
5/ The filament shall be rotated in the measuring holder until the reference lug contacts plane C of the holder.



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 lamp*~~*Filament light sources of normal production*	*Standard ~~filament lamp~~filament light source*
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.

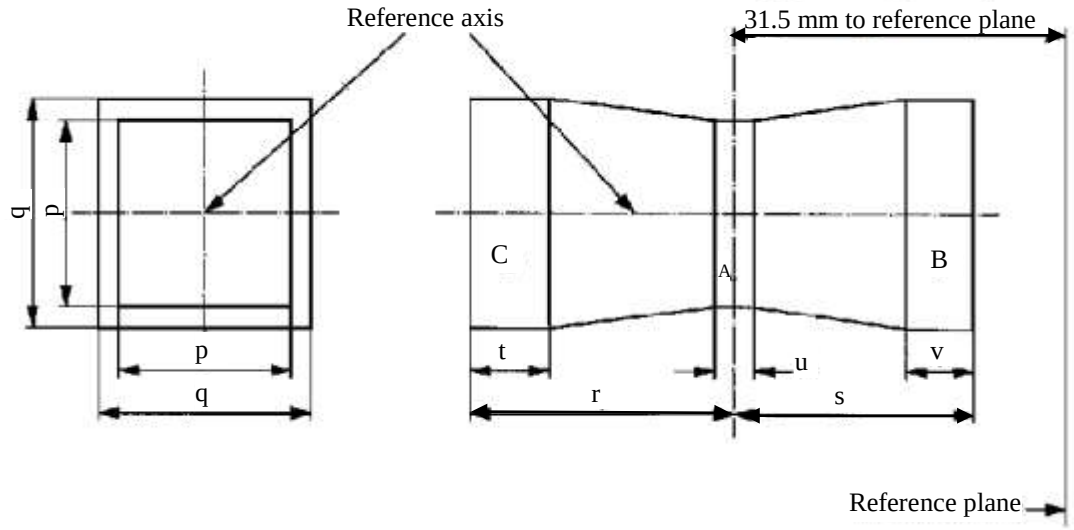
[13/] Dimensions shall be checked with O-ring removed.

[14/] ~~Filament lamp~~Filament light source HB4 shall be equipped with the right-angle cap and ~~filament lamp~~filament light source 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~~filament light source 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

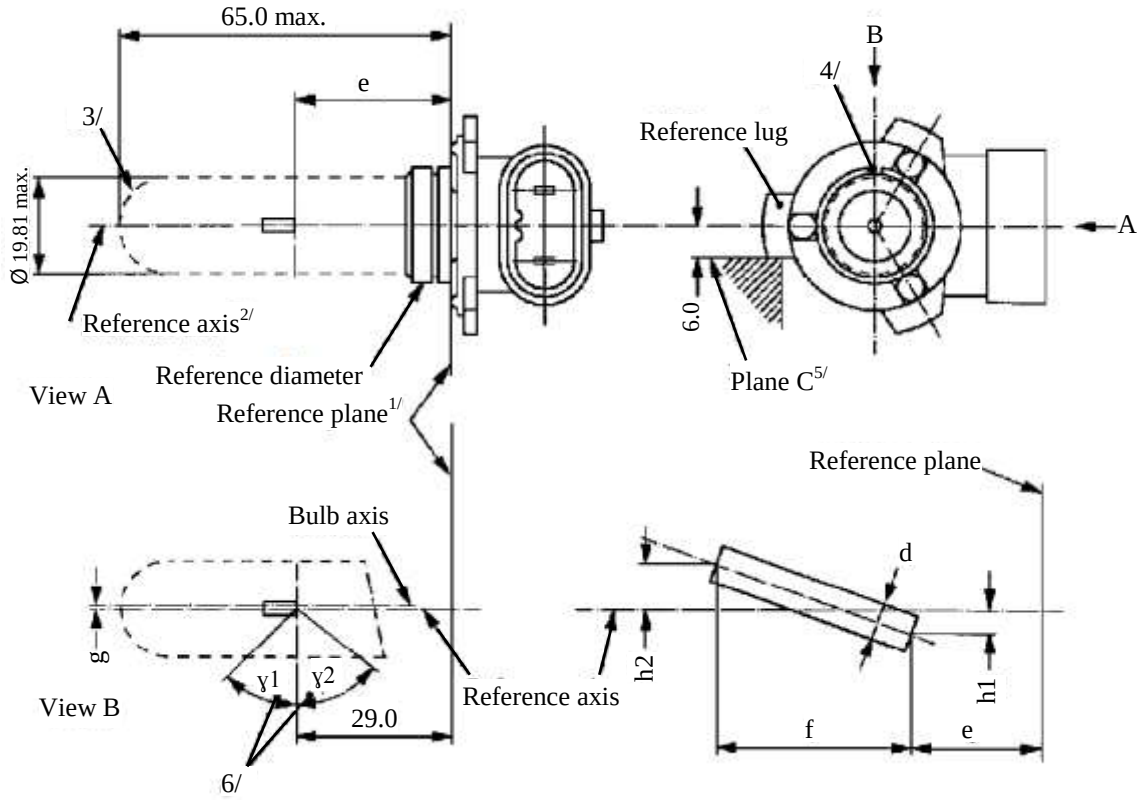
The filament position is checked solely in directions A and B as shown on sheet HB4/1.

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.

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



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.

Dimensions in mm [11/]			*Tolerance*	
			~~*Filament lamp*~~*Filament light sources of normal production*	*Standard ~~filament lamp~~filament light source*
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.

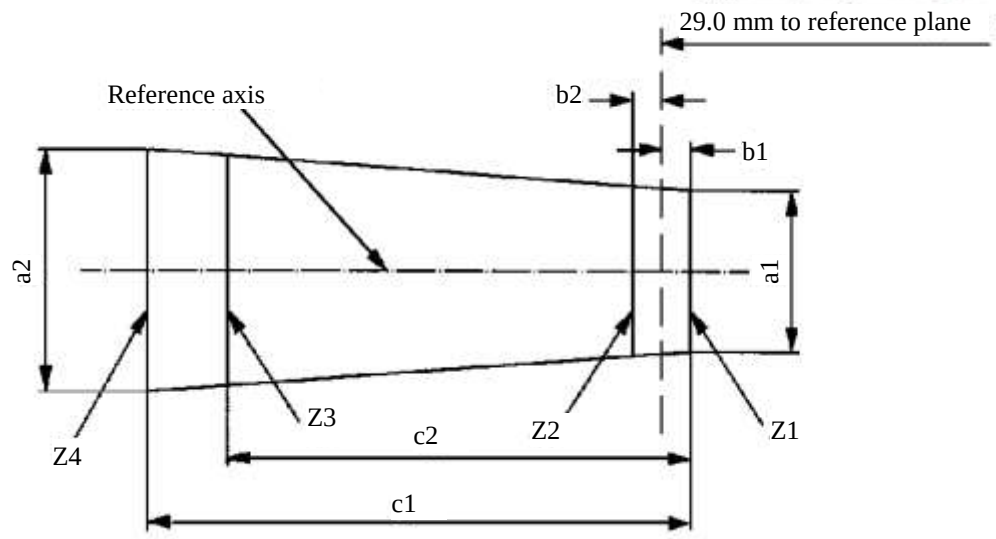
[9/] To be checked by means of a "Box system"; sheet HIR1/3.

[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~~filament light source complies with the requirements.



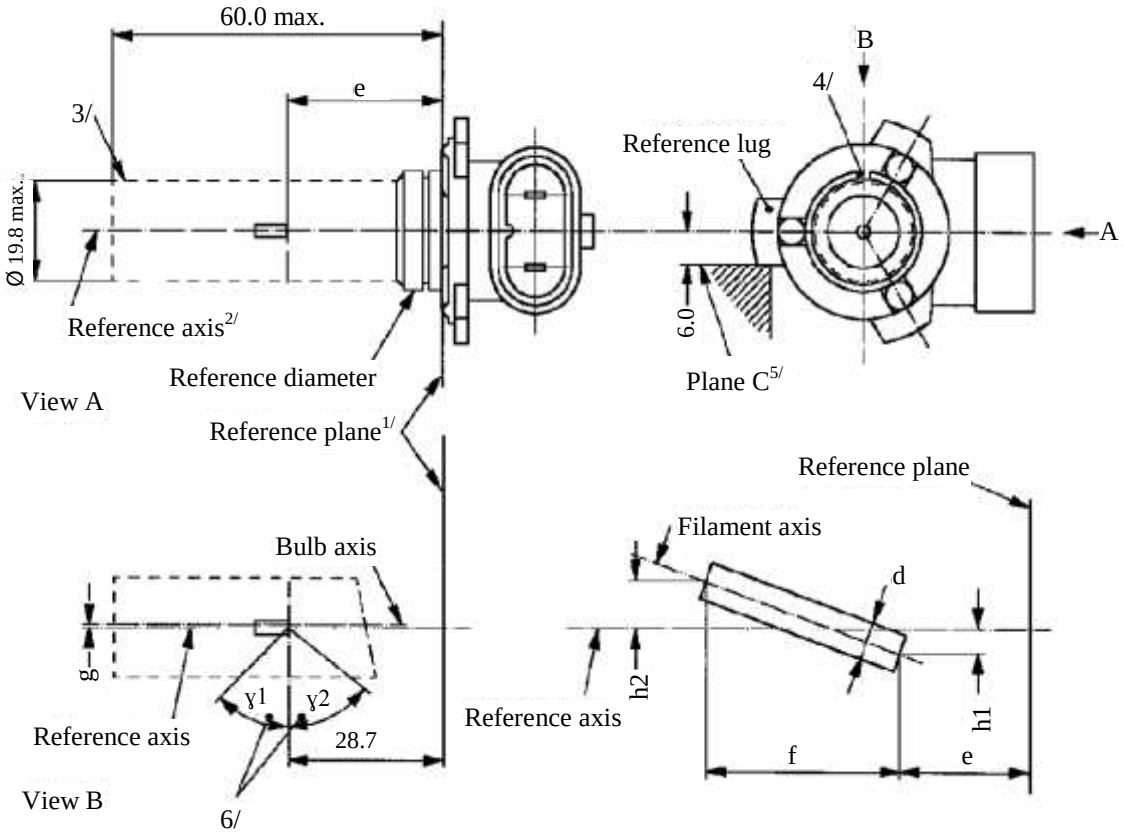
	a1	*a2*	*b1*	*b2*	*c1*	*c2*
12 V	d + 0.4	d + 0.8	0.35		6.1	5.2

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.

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



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~~filament light source 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.

Dimensions in mm [11/]		*Tolerance*	
		~~Filament lamp~~Filament light source~~s~~ of normal production	*Standard ~~filament lamp~~filament light source*
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.

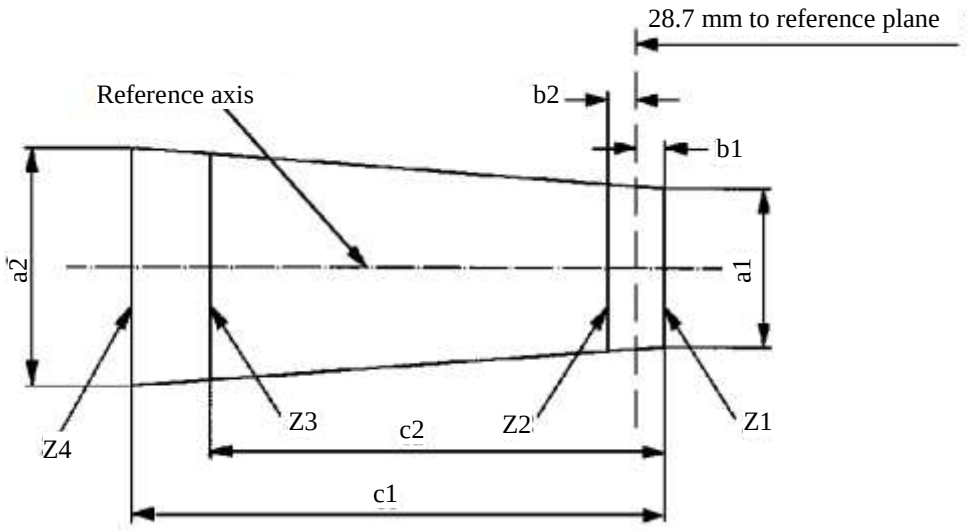
9/ To be checked by means of a "Box system"; sheet HIR2/3.

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.

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~~filament light source 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.

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

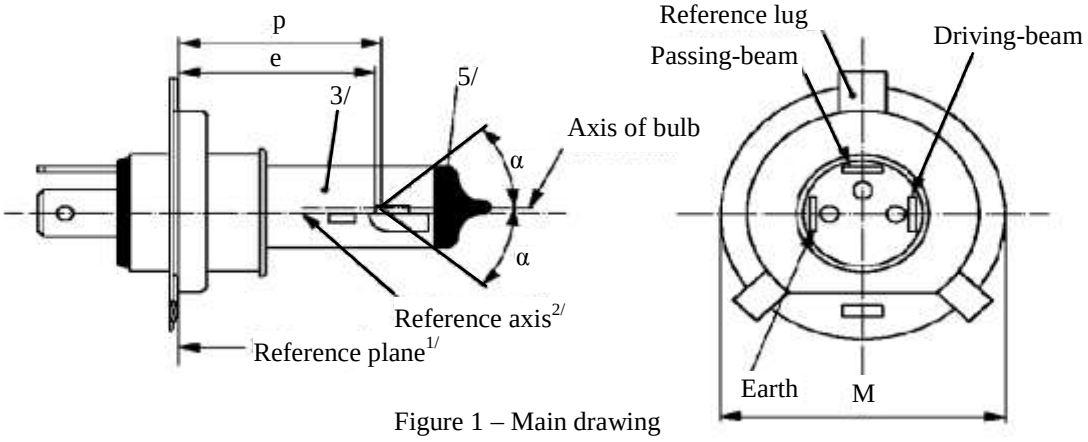


Figure 1 – Main drawing

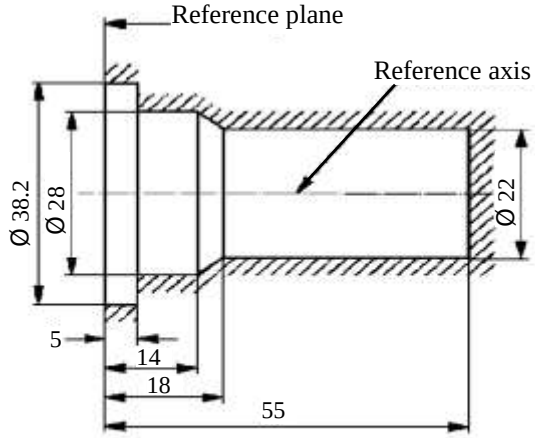


Figure 2

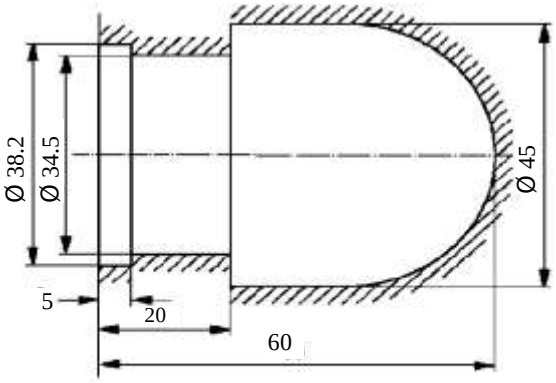


Figure 3

Maximumfilament ~~lamp~~ light source

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.

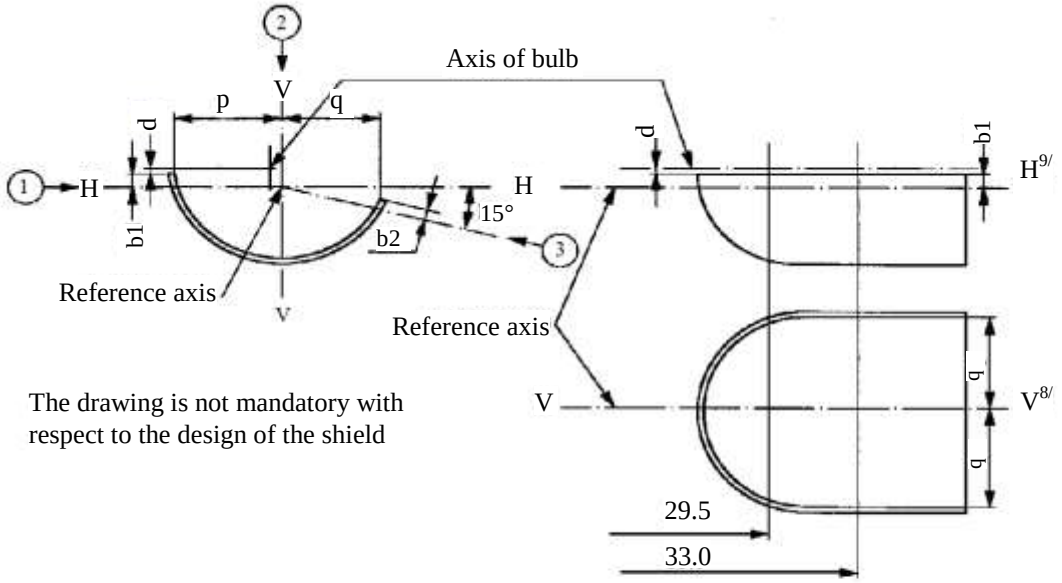
5/ The obscuration shall extend at least as far as the cylindrical part of the bulb. It shall also overlap the internal shield when the latter is viewed in a direction perpendicular to the reference axis.

Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*				*Standard ~~filament lamp~~filament light source*	
			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 the provisions for ~~filament lamp~~filament light sources with an internal shield to produce the cut-off.

Position of shield



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

Position of filaments

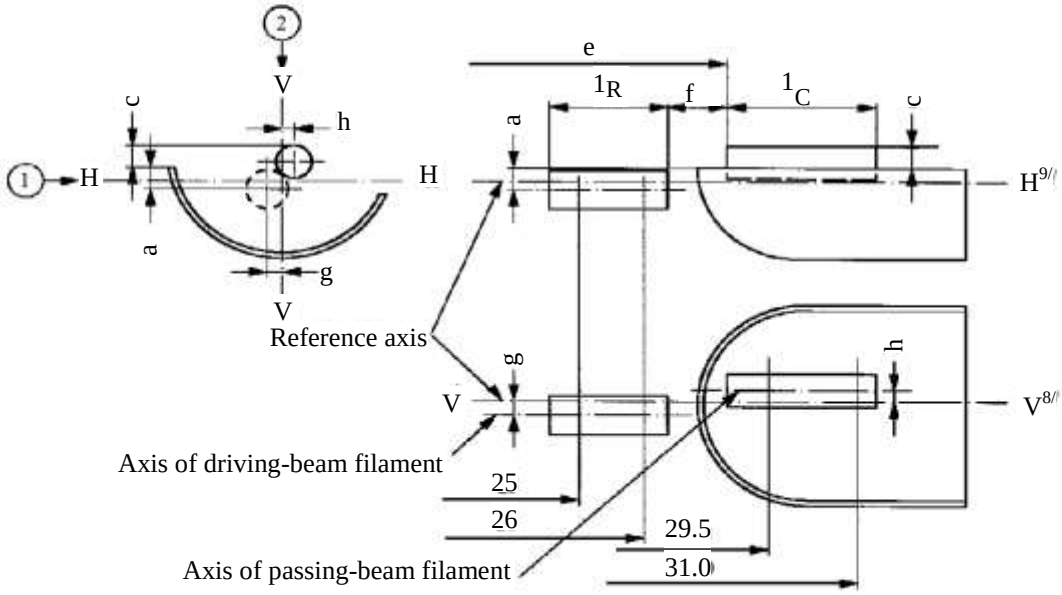


Table of the dimensions (in mm) referred to in the drawings on sheet HS1/3

*Reference**		*Dimensions***		*Tolerance*		
				~~Filament lamp~~Filament light source~~s~~ of normal production		*Standard ~~filament lamp~~filament light source*
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.

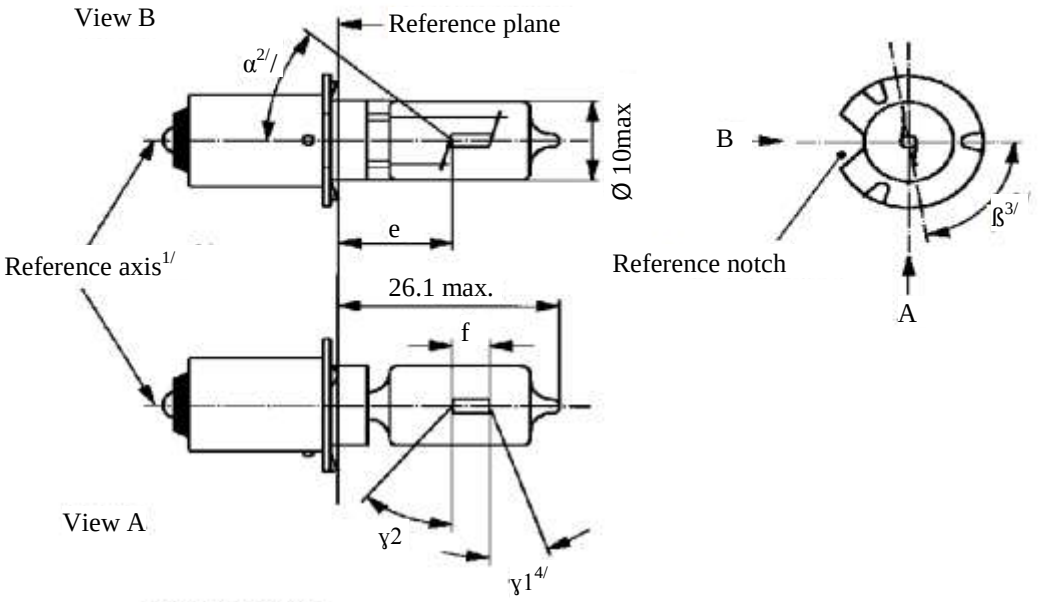
Dimensions b1 and b2 are measured in planes parallel to and 29.5 mm and 33 mm away from the reference plane.

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.

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



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.

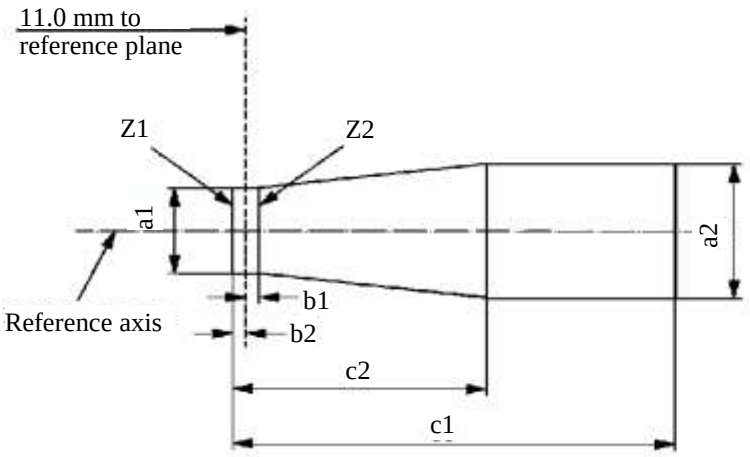
Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		Min.	*Nom.*	*Max.*	
e			11.0 [5/]		11.0 ± 0.15
f [6/]	6 V	1.5	2.5	3.0	2.5 ± 0.15
	12 V	2.0	3.0	4.0	
h1, h2			[5/]		0 ± 0.15
α [2/]				40°	
β [3/]		75°	90°	105°	90° ± 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 lamp~~filament light sources and
15 V for 12 V types.

Screen projection requirements

This test is used to determine, by checking whether the ~~filament lamp~~filament light source complies with the requirements by checking whether the ~~filament lamp~~filament light source 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.

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

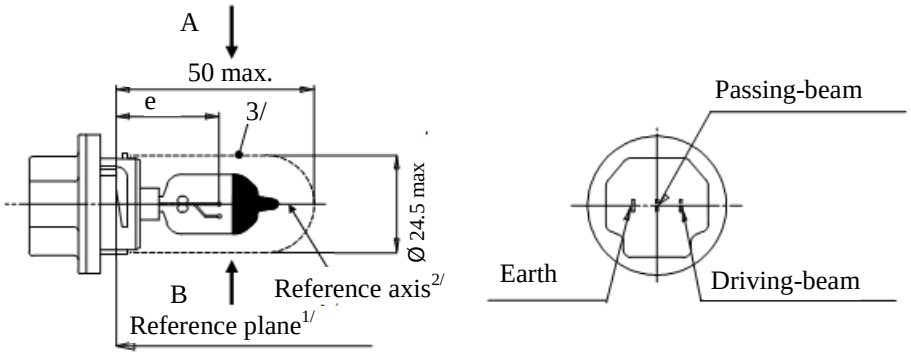


Figure 1 – Main drawing

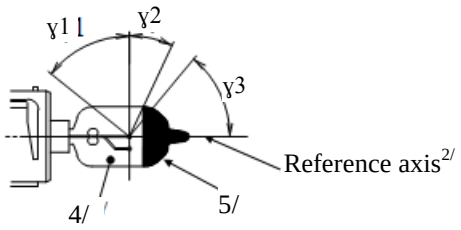


Figure 2 - Distorsion free area4/ and black top5/

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

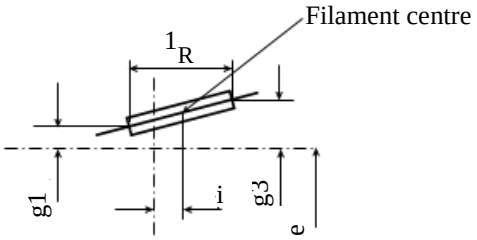
2/ The reference axis is perpendicular to the reference plane and passing through the centre of the 23 mm cap diameter.

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

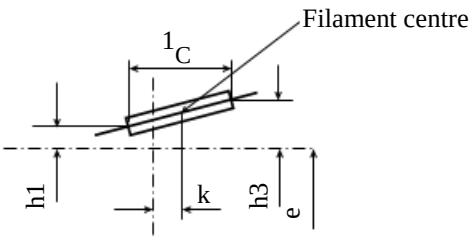
4/ Glass bulb shall be optically distortion free within the angles γ1 and γ2. This requirement applies to the whole bulb circumference within the angles γ1 and γ2.

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.

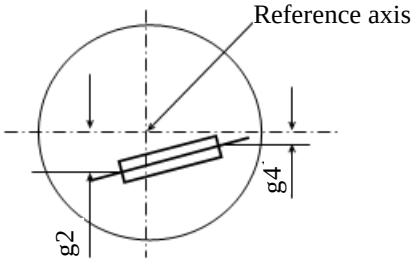
View B of driving-beam filament



View A of passing-beam filament



Top view of driving-beam filament



Top view of passing-beam filament

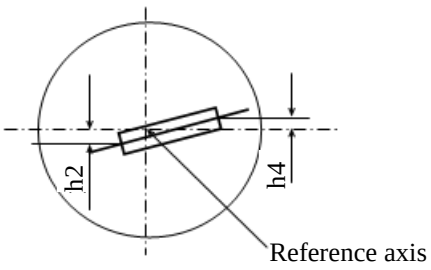


Figure 3 – Filament position and dimensions

Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*	*Standard ~~filament lamp~~filament light source*
		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.

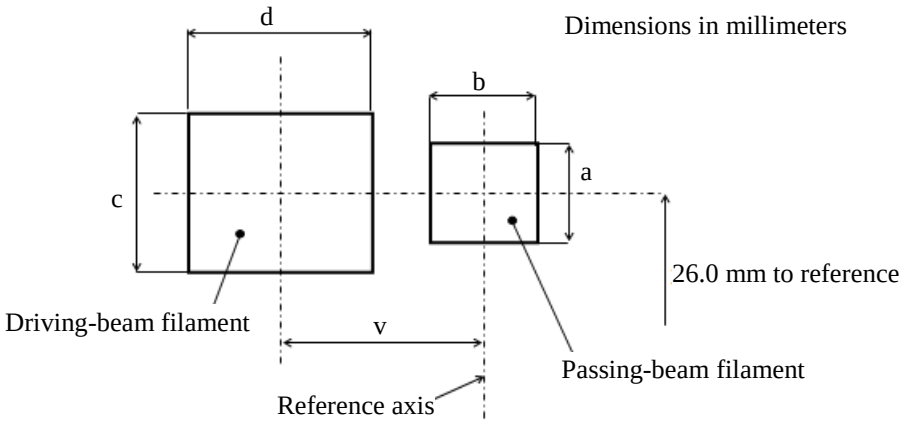
Screen projection requirement

This test is used to determine whether a ~~filament lamp~~filament light source 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.

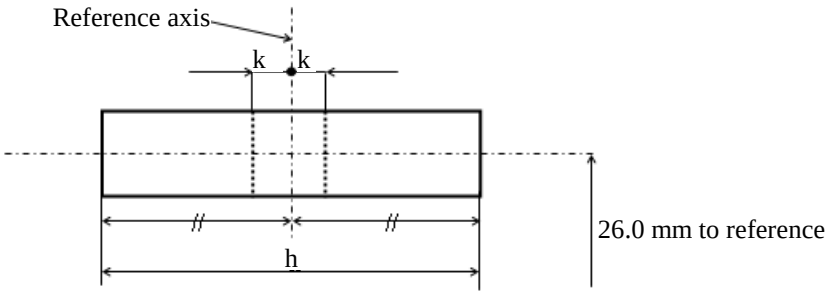
Side elevation



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 light source.

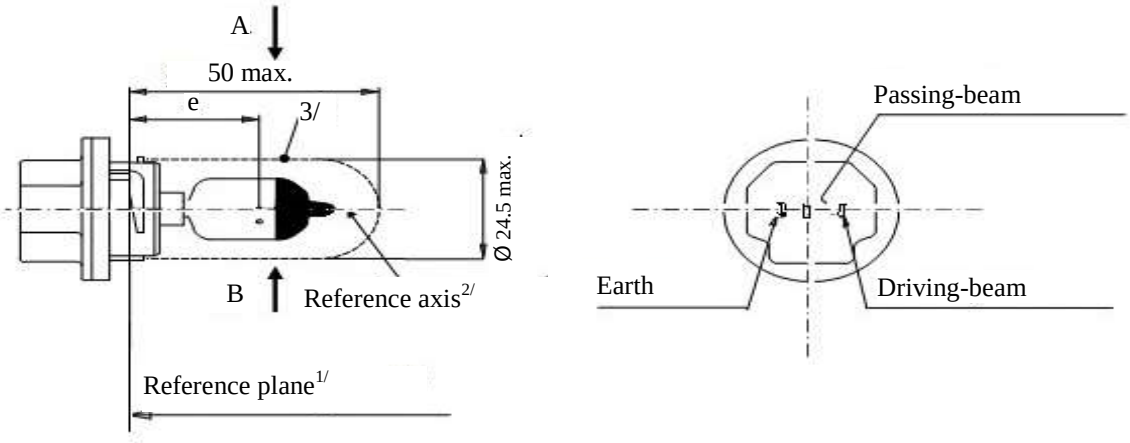


Figure 1 – Main drawing

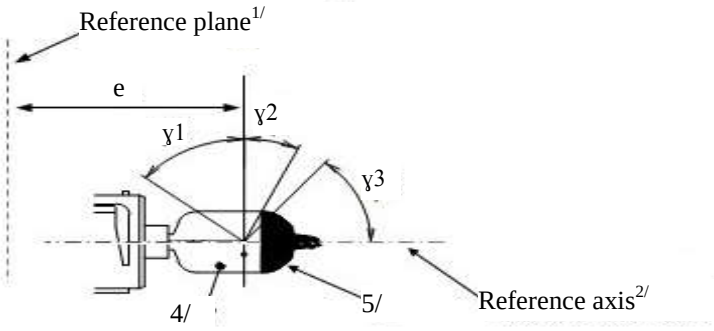


Figure 2 - Distorsion free area4/ and black top5/

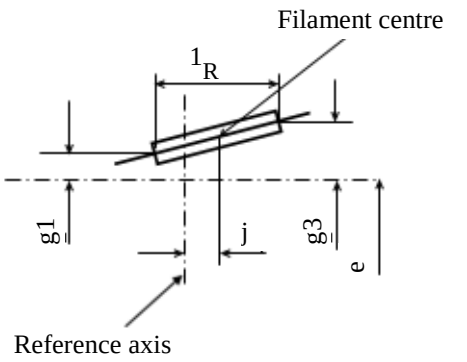
1/ The reference plane is defined by three ramps inside surface.

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

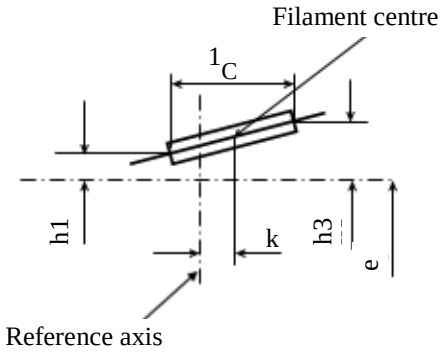
3/ Glass bulb and supports shall not exceed the envelope as indicated in Figure 1. The envelope is concentric to the reference axis.

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.

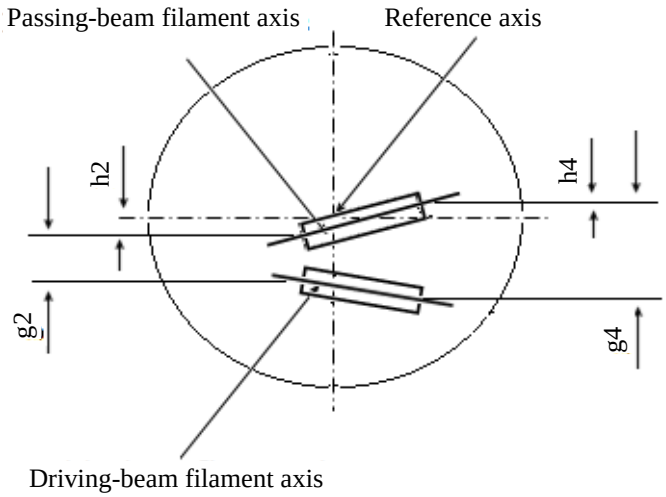
5/ The obscuration shall extend at least to angle γ3 and shall extend at least to the cylindrical part of the bulb on the whole top circumference.



View B - Driving-beam filament



View A - Passing-beam filament



Top view of driving-beam and passing-beam filament

Figure 3 – Filament position and dimensions

Dimensions in mm			*~~Filament lamp~~Filament light source~~s~~ of normal production*		*Standard ~~filament lamp~~filament light source*	
			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~~filament light source.

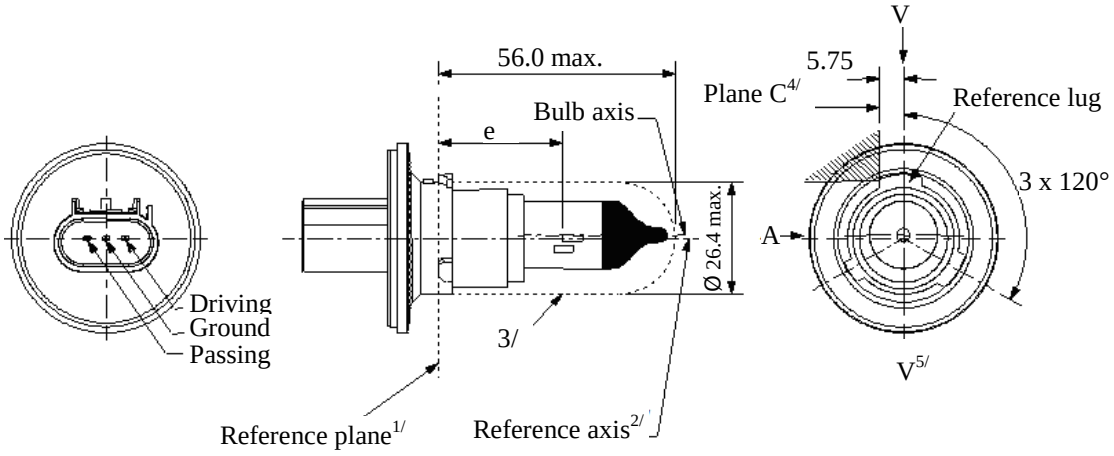


Figure 1 - Main drawings

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~~filament light source 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.

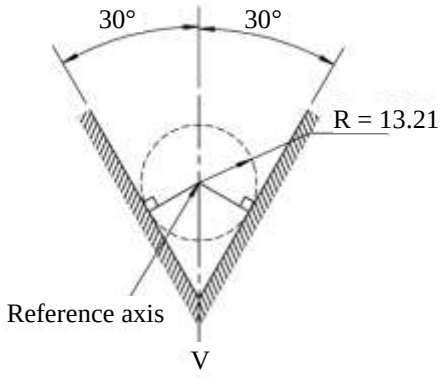


Figure 2 – Definition of reference axis[2/]

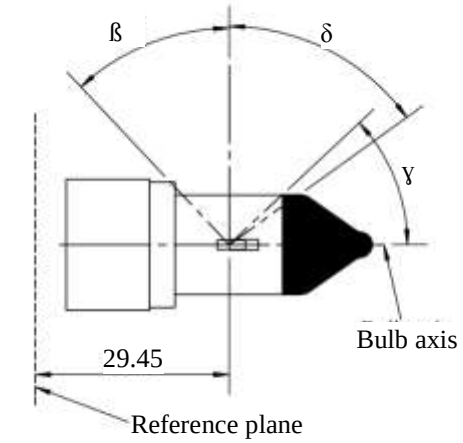
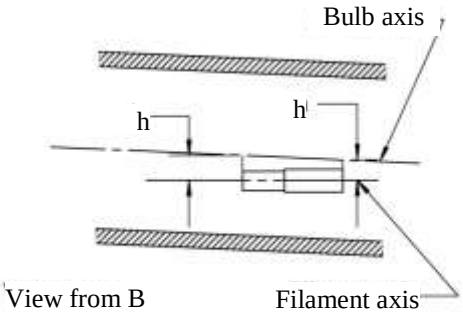


Figure 3 - Undistorted area[6/] and opaque coating[7/]



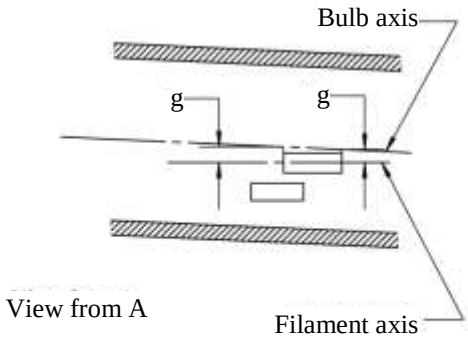


Figure 4 – Bulb offset[8/]

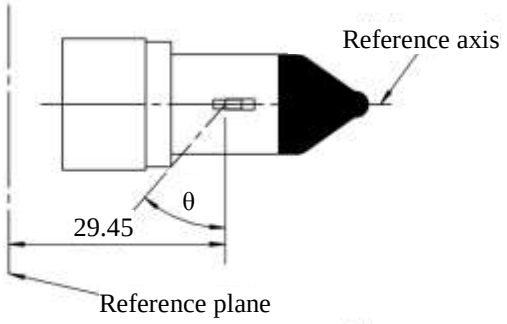


Figure 5 – Light blocking toward[9/] cap

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.

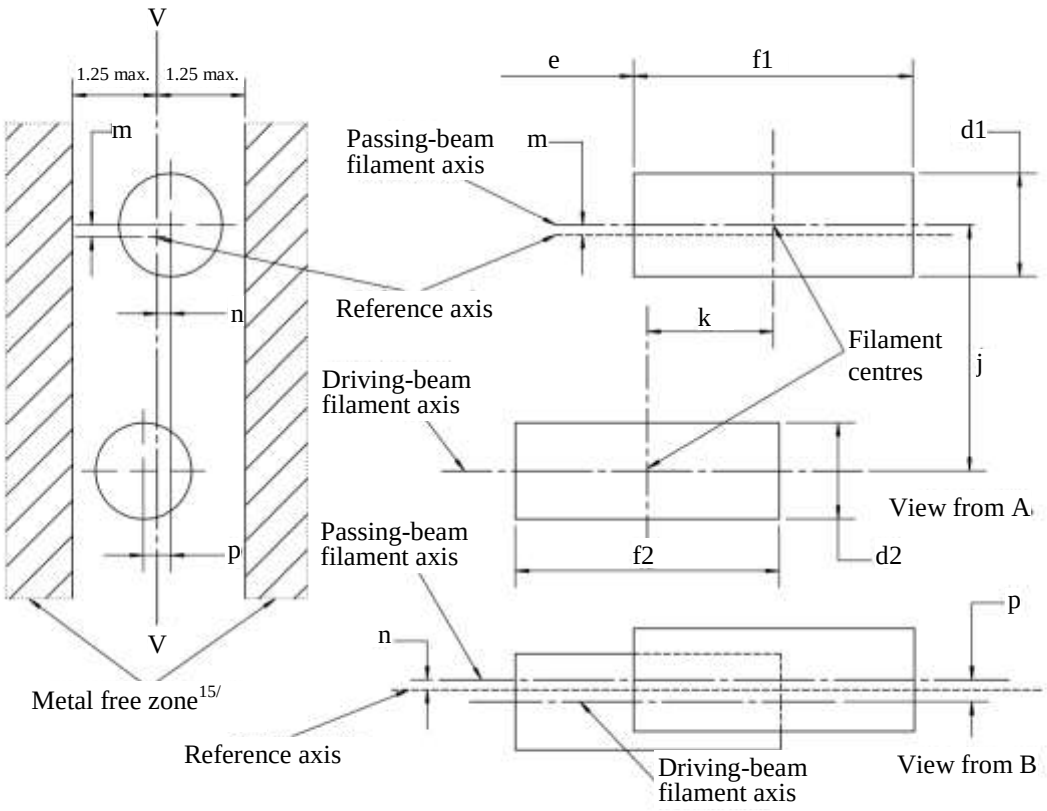


Figure 6 – Position and dimensions of filaments[10/, 11/, 12/, 13/, 14/]

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~~filament light source and ~~filament lamp~~filament light source 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.

Dimensions in mm		*Tolerance*	
		~~Filament lamp~~Filament light sources of normal production	*Standard ~~filament lamp~~filament light source*
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~~filament light source.

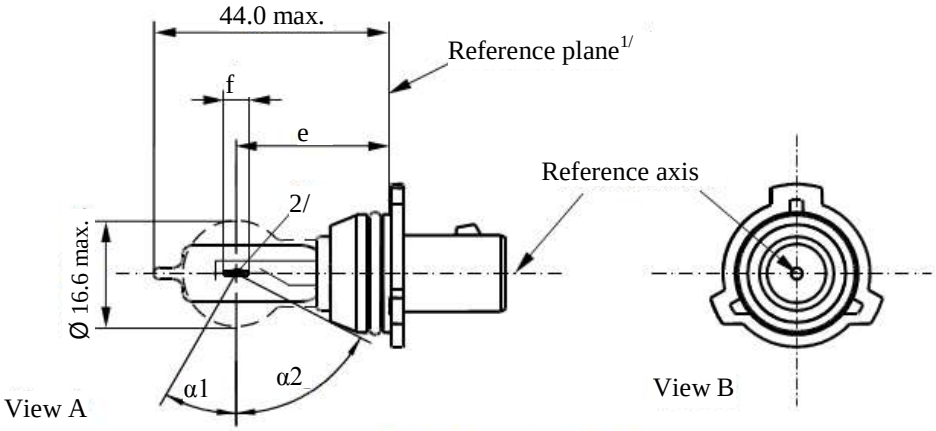


Figure 1 – Main drawing P13W

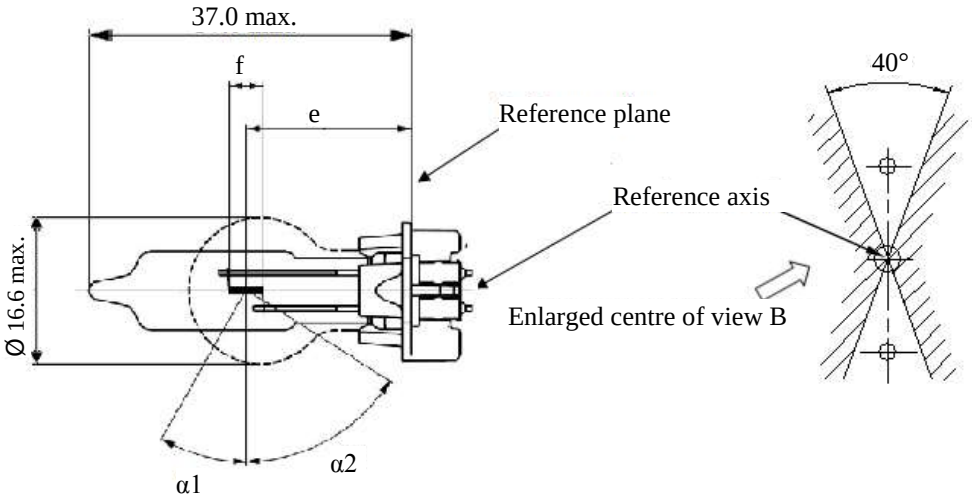


Figure 3 – Main drawing PW13W

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 $\alpha_1 + \alpha_2$.

Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*	*Standard ~~filament lamp~~filament light source*
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~~2)	
Electrical and photometric characteristics				
Rated values	Voltage	V	12	12
	Wattage	W	13	13
Test voltage		V	13.5	13.5
Objective values	Wattage	W	19 max.	19 max.
	Luminous flux	lm	250	
		±	+15 % / –20 %	
Reference luminous flux at approximately 13.5 V				250 lm

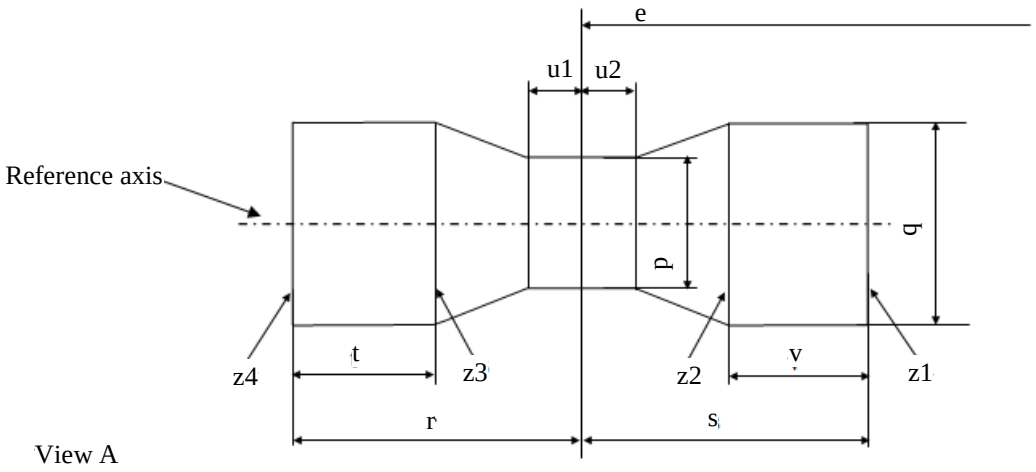
4/ To be checked by means of a "Box system"; sheet P13W/3.

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

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

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~~filament light source complies with the requirements.



View A

	p	*q*	*u1,u2*	*r,s*	*t,v*
~~Filament lamp~~Filament light sources of normal production	1.7	1.9	0.3	2.6	0.9
Standard ~~filament lamp~~filament light sources	1.5	1.7	0.25	2.45	0.6

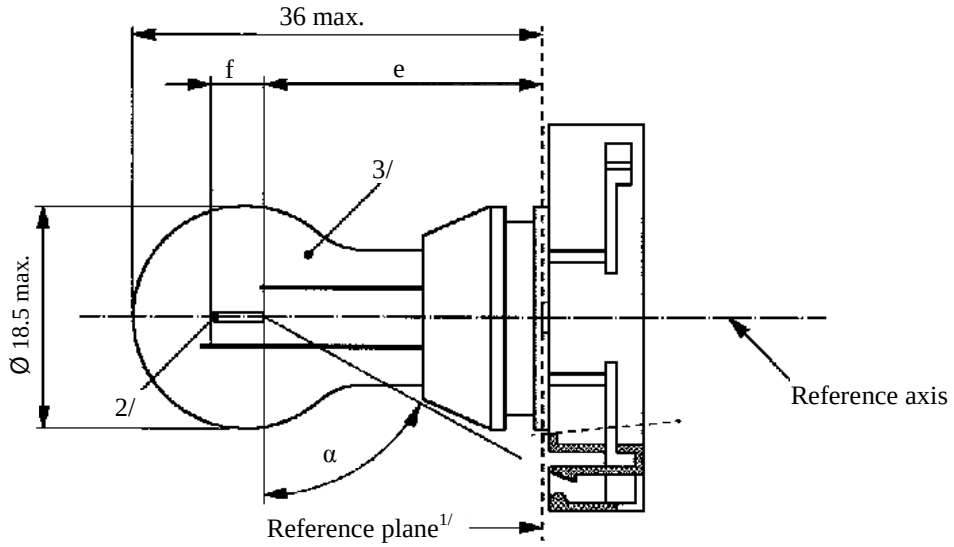
The filament position is checked in two mutually perpendicular planes, one of them being the plane through the lead-in wires.

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.

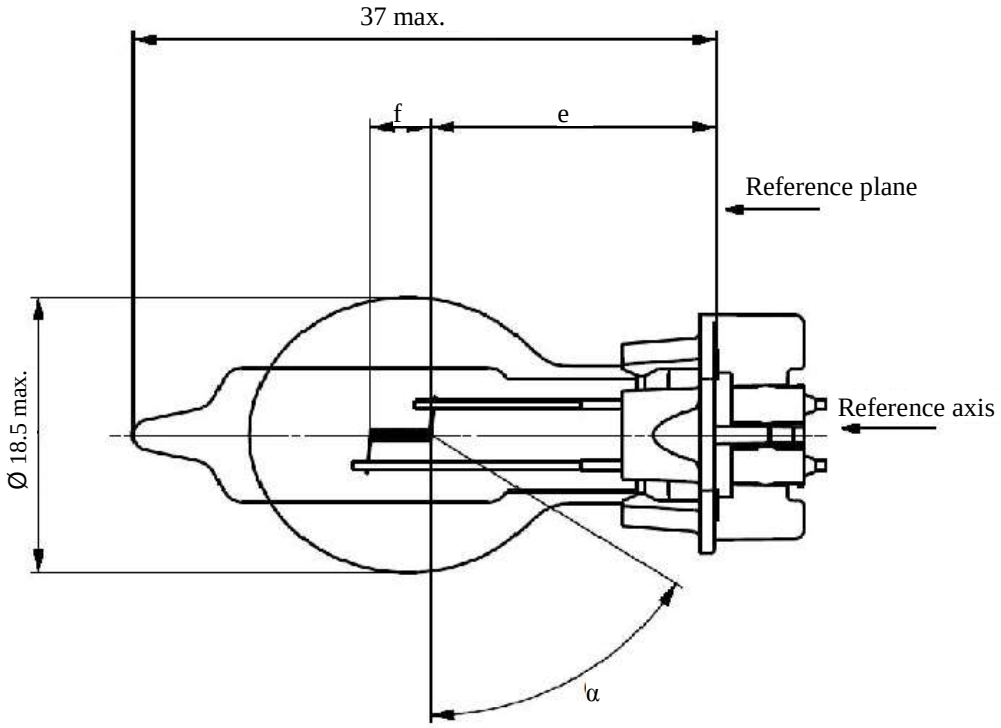
The filament shall lie entirely within the limits shown.

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

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 ~~filament lamp~~filament light sources 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/).

Dimensions in mm [4/]			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* [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~~2)			
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.

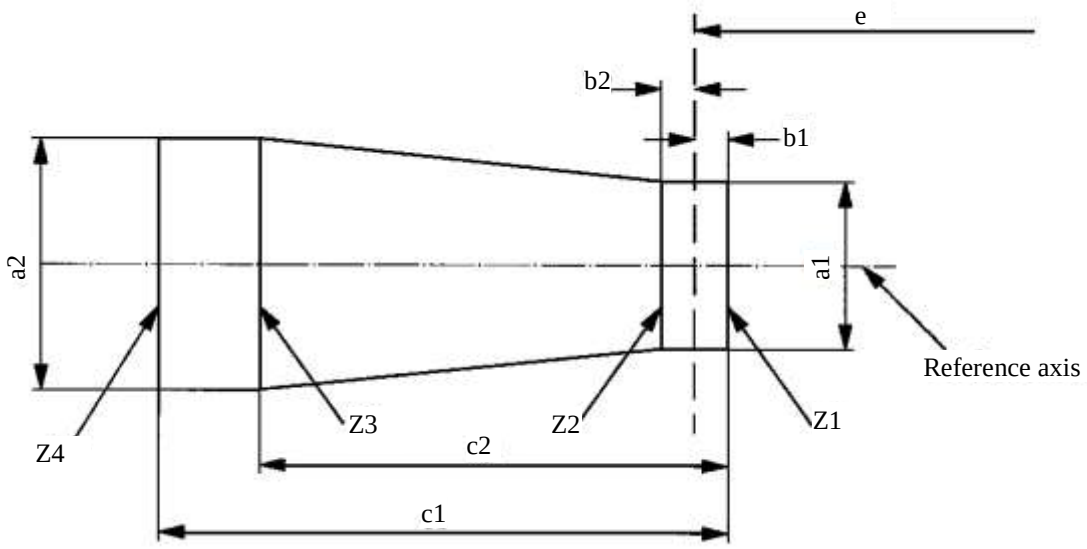
[6/] The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires as showed in the drawing on sheet P19W/1, the projection of the outside of the end turns crosses the filament axis.

[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 lamp~~filament light sources 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~~filament light source complies with the requirements.



P19W, PY19W, PR19W, PS19W, PSY19W, PSR19W	*a1*	*a2*	*b1, b2*	*c1*	*c2*
~~Filament lamp~~Filament light sources of normal production	2.9	3.9	0.5	5.2	3.8
Standard ~~filament lamp~~filament light sources	1.5	1.7	0.25	4.7	3.8

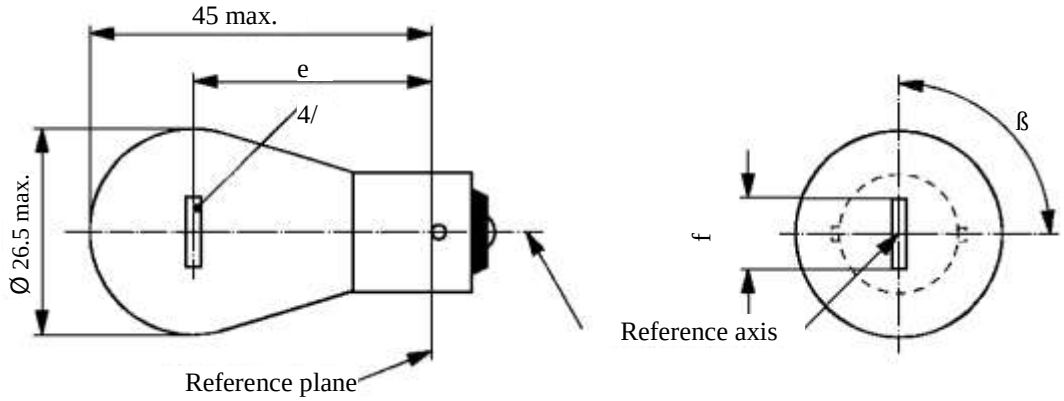
PW19W, PWY19W and PWR19W	*a1*	*a2*	*b1, b2*	*c1*	*c2*
~~Filament lamp~~Filament light sources of normal production	2.5	2.5	0.4	5.2	3.8
Standard ~~filament lamp~~filament light sources	1.5	1.7	0.25	4.7	3.8

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.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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 lamp~~Filament light sources with cap BA15d may be used for special purposes; they have the same dimensions.

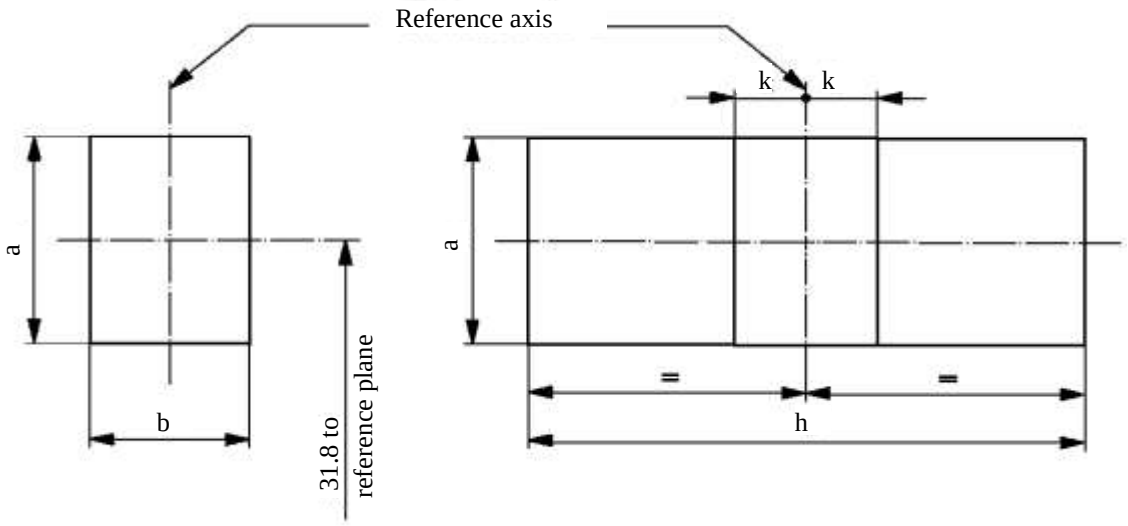
3/ To be checked by means of a "Box system"; sheet P21W/2.

4/ In this view the filament of the 24 V type may be straight or V-shaped. 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~~filament light source 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~~filament light source 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~~filament light source 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

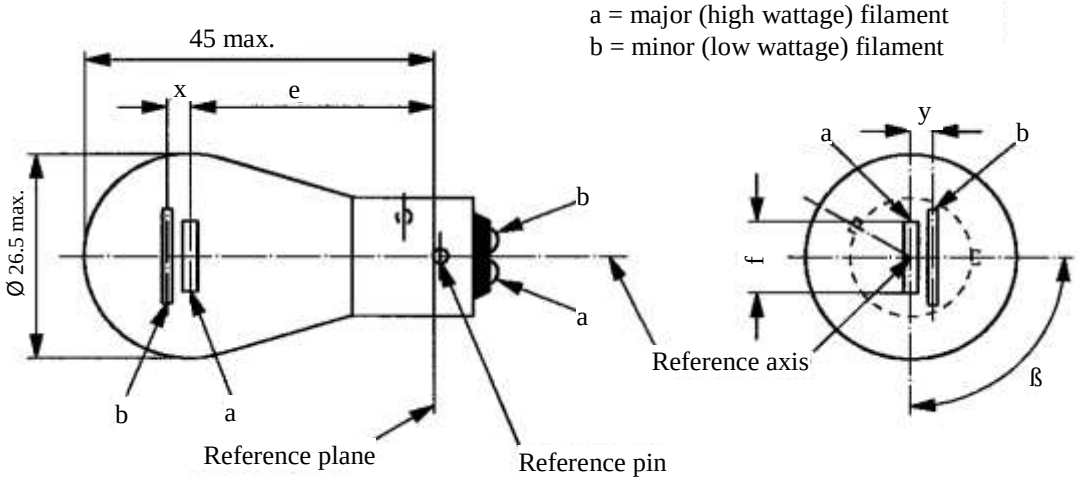
   The ~~filament lamp~~filament light source placed with the cap down and the reference axis vertical, the ~~filament lamp~~filament light source being viewed in a direction at right angles to the filament axis:

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.

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

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



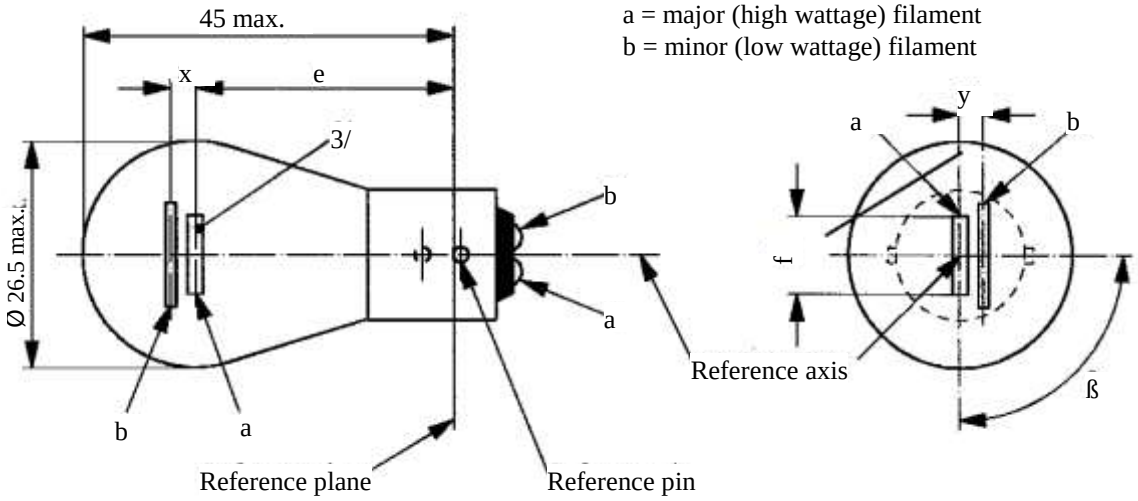
Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*				*Standard ~~filament lamp~~filament light source*
		Min.	*Nom.*	*Max.*		
e			31.8 [1/]			31.8 ± 0.3
f				7.0		7.0 + 0 /- 2
Lateral deviation				[1/]		0.3 max. [2/]
x,y		[1/]				2.8 ± 0.5
β		75° [1/]	90° [1/]	105° [1/]		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~~filament light source P21/5W; see sheets P21/5W/2 to 3.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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. 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~~filament light source complies with the requirements.

Test procedure and requirements

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

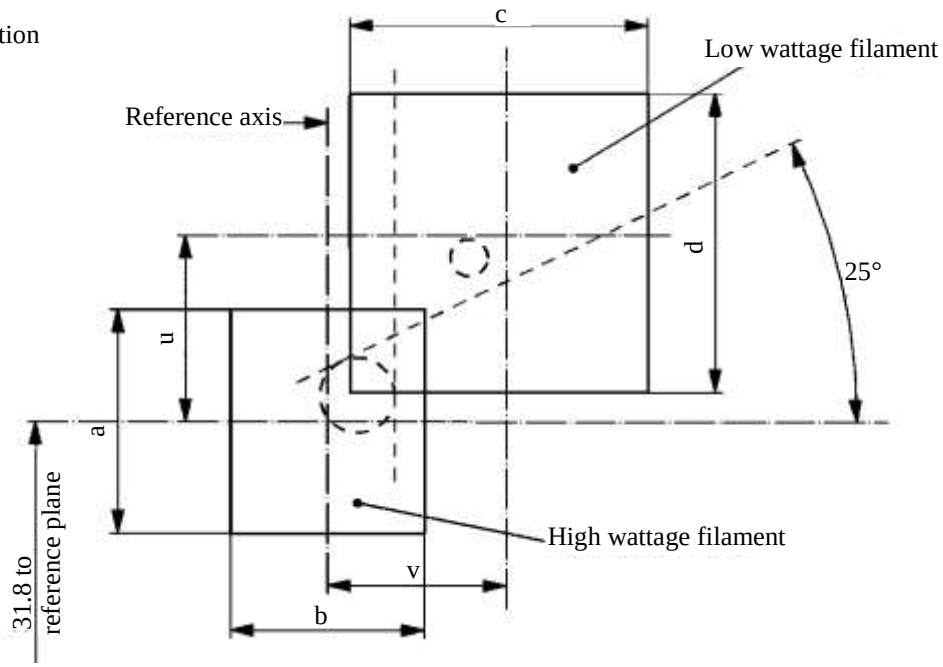
3.1. The projection of the major filament shall lie entirely within a rectangle of height "a" and width "h", centred on the theoretical position of the centre of the filament;

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 lamp~~filament light sources).

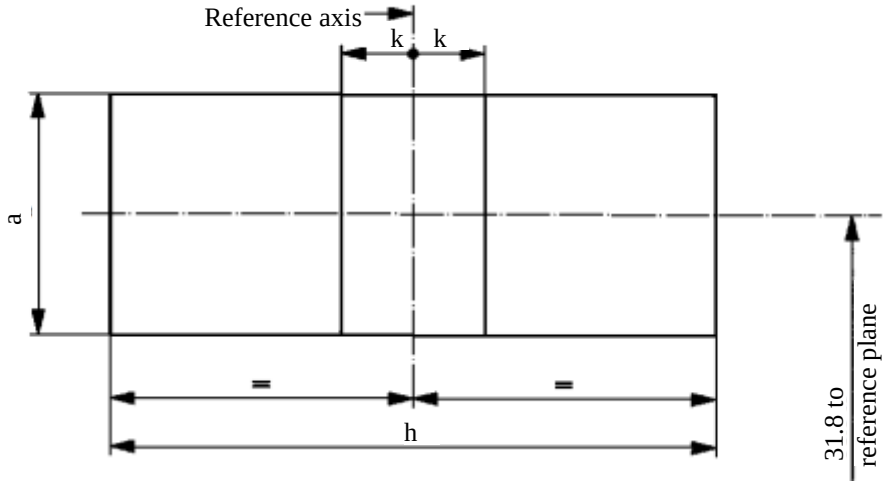
Dimensions in mm

Side elevation



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

Front elevation

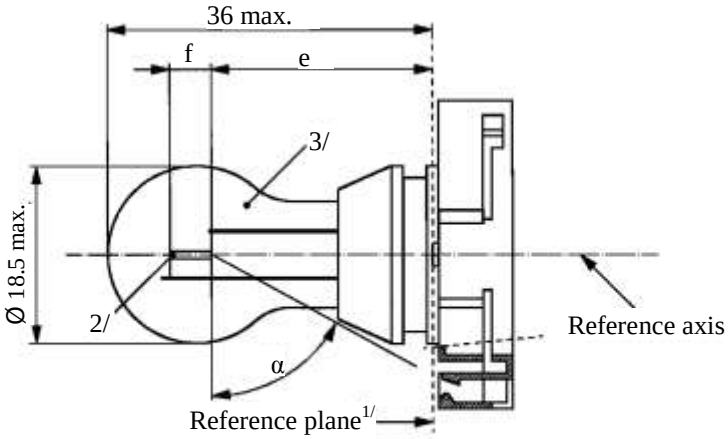


Reference	*a*	*h*	*k*
Dimensions	3.5	9.0	1.0

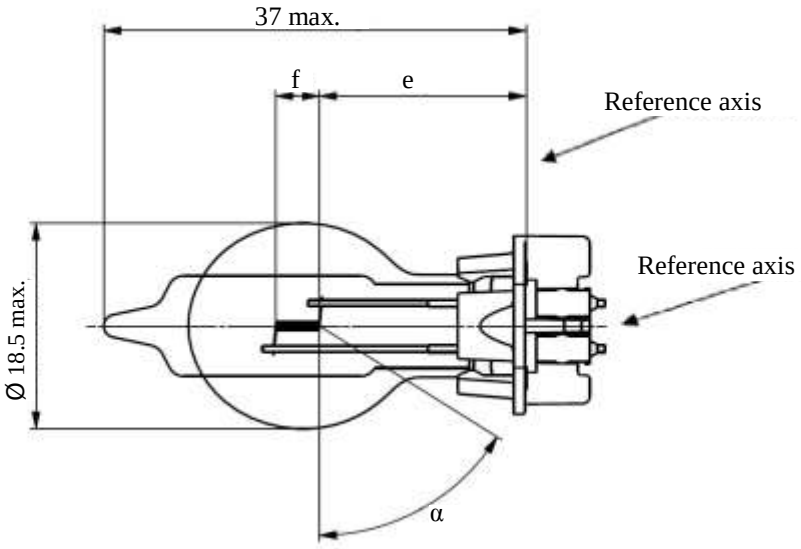
Categories P24W, PX24W, PY24W, PR24W, PS24W, PSX24W, PSY24W, PSR24W, PW24W, PWY24W and PWR24W

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

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 ~~filament lamp~~filament light sources 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/).

Dimensions in mm [4/]			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* [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~~2)			
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.

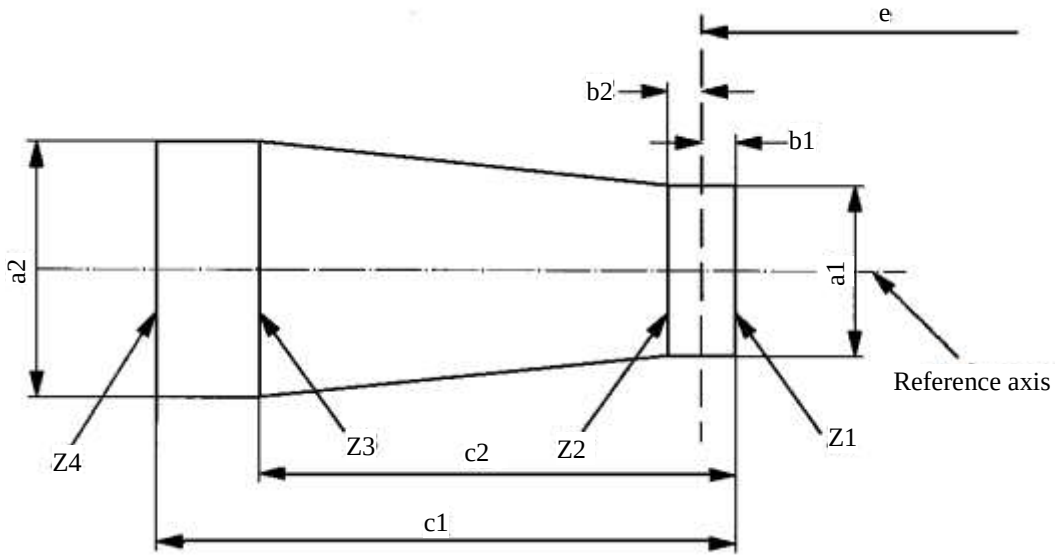
6/ The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires as showed in the drawing on sheet P24W/1, the projection of the outside of the end turns crosses the filament axis.

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 lamp~~filament light sources 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~~filament light source complies with the requirements.



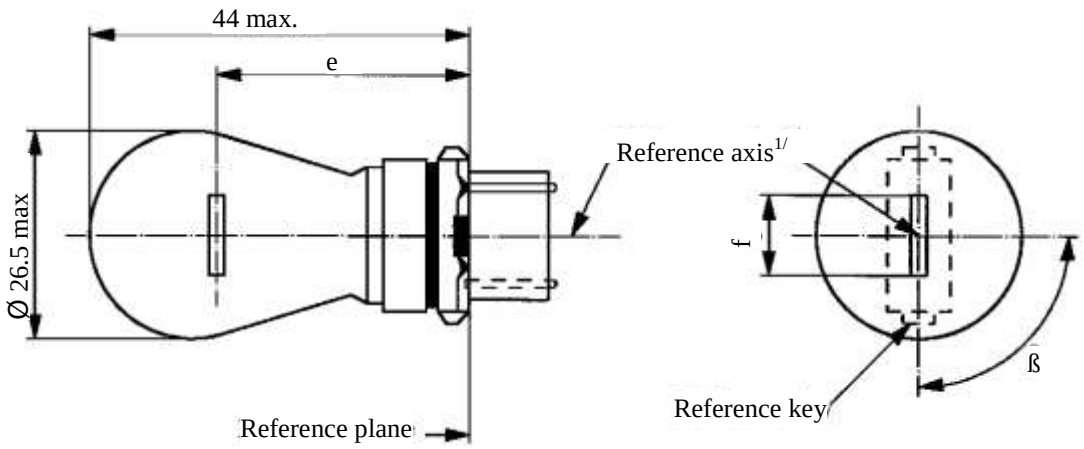
P24W, PY24W, PR24W, PS24W, PSY24W, PSR24W	*a1*	*a2*	*b1, b2*	*c1*	*c2*
~~Filament lamp~~Filament light sources of normal production	2.9	3.9	0.5	5.2	3.8
Standard ~~filament lamp~~filament light sources	1.5	1.7	0.25	4.7	3.8

PW24W, PWY24W, PWR24W	*a1*	*a2*	*b1, b2*	*c1*	*c2*
~~Filament lamp~~Filament light sources of normal production	2.5	2.5	0.4	5.0	3.8
Standard ~~filament lamp~~filament light sources	1.5	1.7	0.25	4.7	3.8

PX24W, PSX24W	*a1*	*a2*	*b1, b2*	*c1*	*c2*
~~Filament lamp~~Filament light sources of normal production	1.9	1.9	0.35	5.0	4.0
Standard ~~filament lamp~~filament light sources	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.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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					

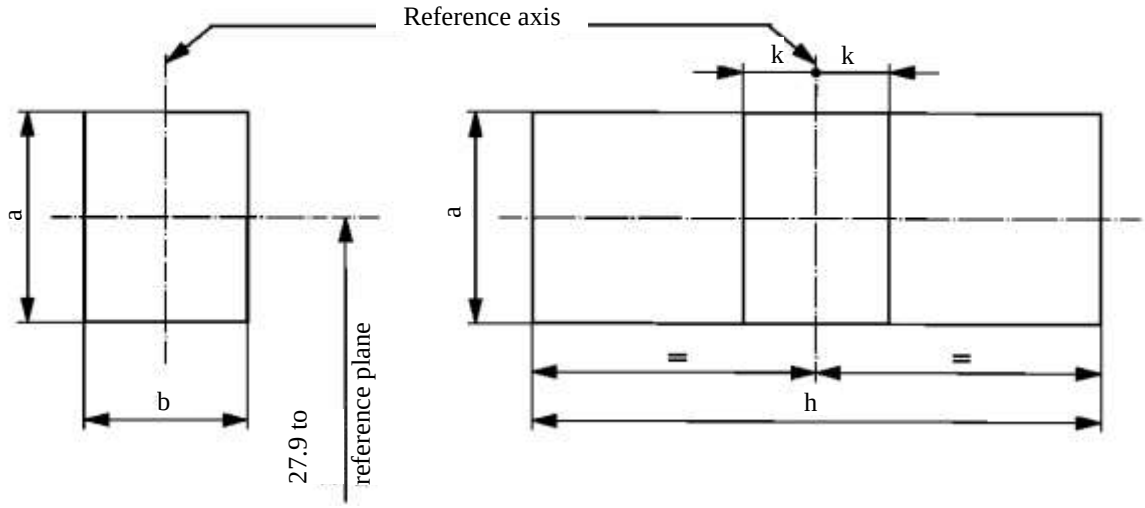
1/ The reference axis is defined with respect to the reference keys and is perpendicular to the reference plane.
2/ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis through the reference keys.
3/ To be checked by means of a "Box system", sheet P27W/2.

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~~filament light source 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~~filament light source 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~~filament light source 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

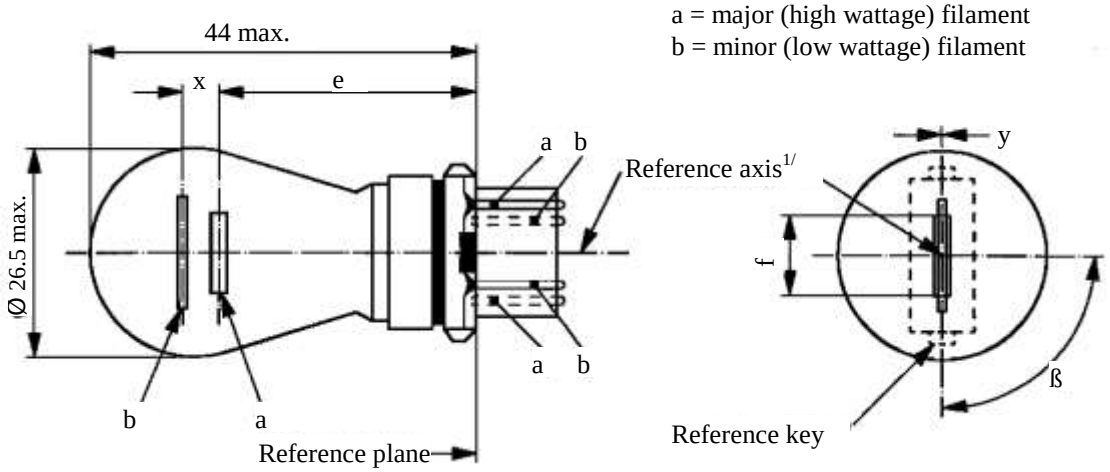
   The ~~filament lamp~~filament light source placed with the cap down and the reference axis vertical, the ~~filament lamp~~filament light source being viewed in a direction at right angles to the filament axis:

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.

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

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*	
		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~~filament light source complies with the requirements.

Test procedure and requirements.

1. The ~~filament lamp~~filament light source 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~~filament light source 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

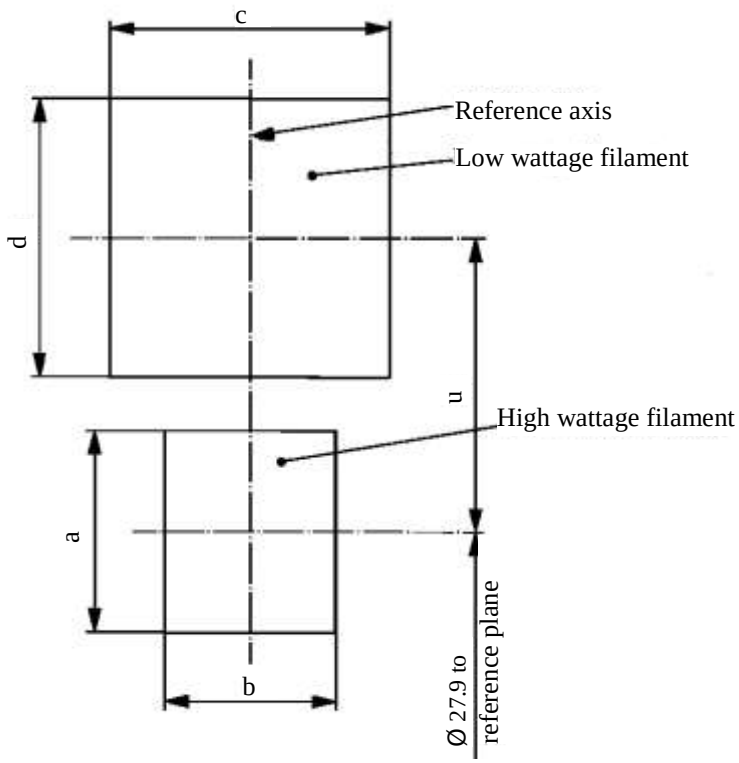
   The ~~filament lamp~~filament light source being placed with the cap down and the reference axis vertical, the ~~filament lamp~~filament light source being viewed in a direction at right angles to axis of the major filament:

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;

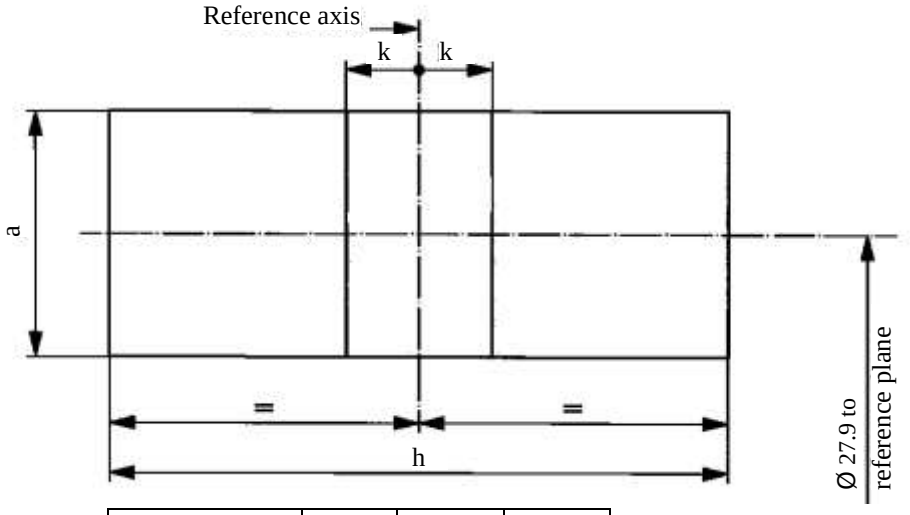
3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ±2 mm (±0.4 mm for standard ~~filament lamp~~filament light sources).

Side elevation



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

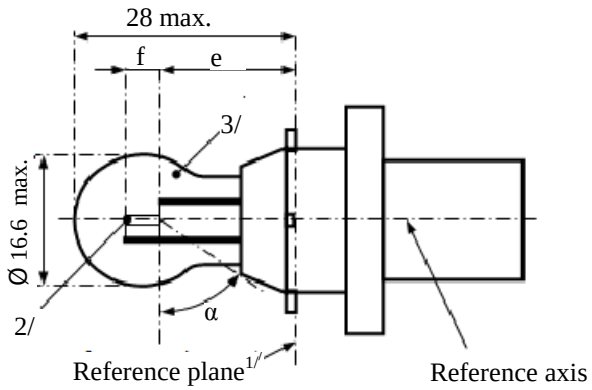
Front elevation



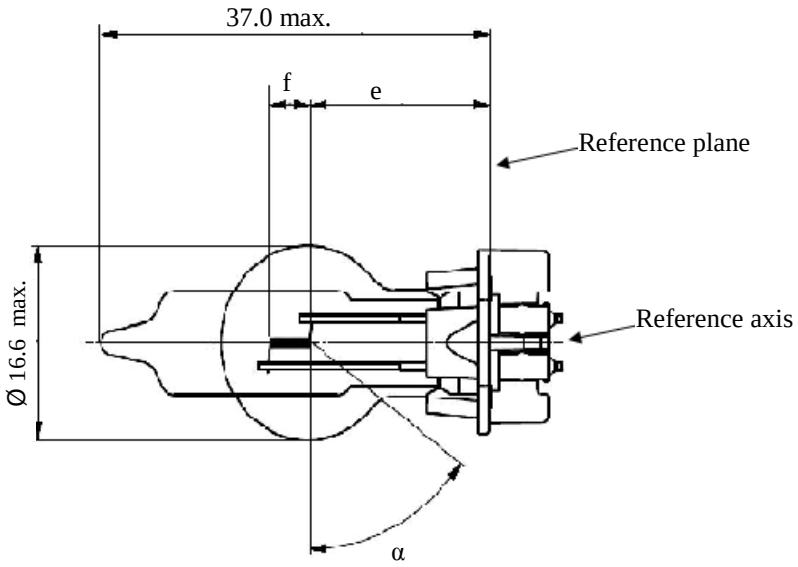
Reference	*a*	*h*	*k*
Dimension	3.5	11.9	1.0

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

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 ~~filament lamp~~filament light sources shall be white for category PC16W and PW16W; amber for category PCY16W and PWY16W; red for category PCR16W and PWR16W. (see also footnote 7/).

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

Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* [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-~~12~~)			
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.

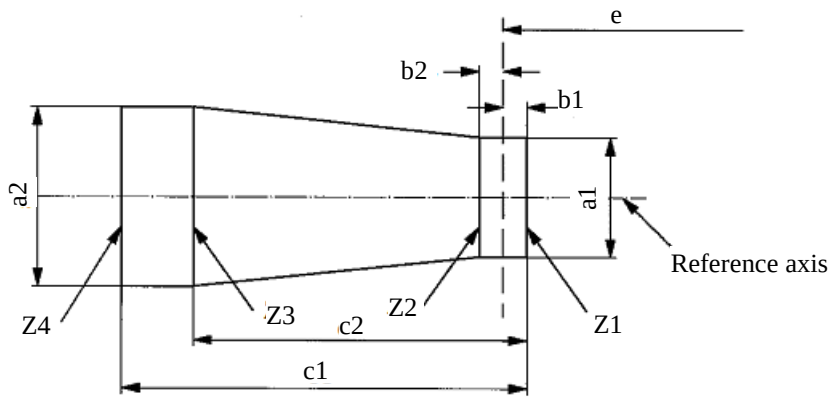
5/ The ends of the filament are defined as the points where, when the viewing direction is perpendicular to the plane through the filament lead-in wires as showed in the drawing on sheet PC16W/1, the projection of the outside of the end turns crosses the filament axis.

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 lamp~~filament light sources 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~~filament light source complies with the requirements.



PC16W, PCY16W, PCR16W	*a1*	*a2*	*b1, b2*	*c1*	*c2*
~~Filament lamp~~Filament light sources of normal production	2.9	3.9	0.5	5.2	3.8
Standard ~~filament lamp~~filament light sources	1.5	1.7	0.25	4.7	3.8

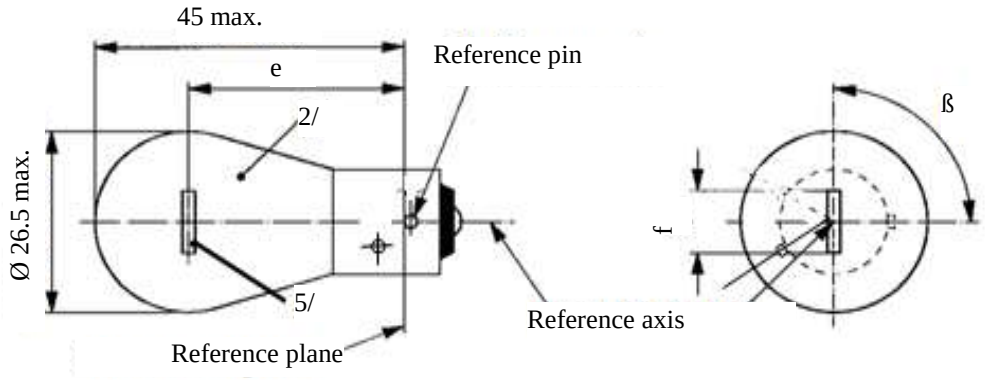
PW16W, PWY16W and PWR16W	*a1*	*a2*	*b1, b2*	*c1*	*c2*
~~Filament lamp~~Filament light sources of normal production	2.5	2.5	0.4	5.2	3.8
Standard ~~filament lamp~~filament light sources	1.5	1.7	0.25	4.7	3.8

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.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* [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.

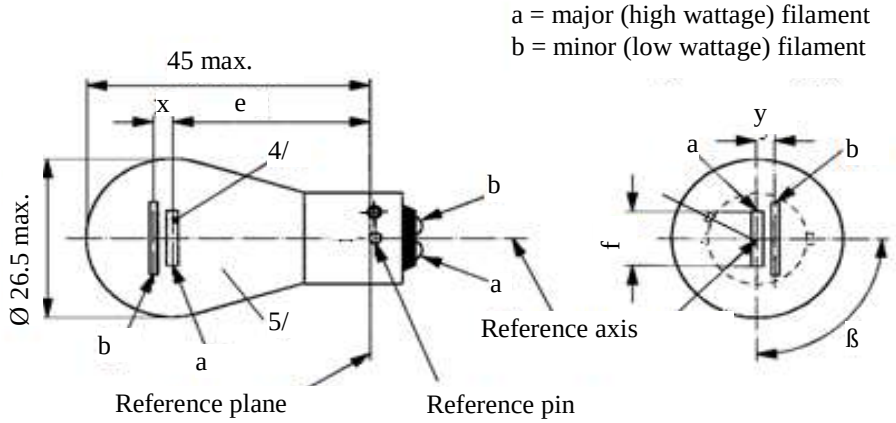
2/ The light emitted from normal production filament ~~lamps~~ light sources shall be red (see also footnote 4/).

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

4/ The light emitted from standard ~~filament lamp~~filament light sources shall be white or red.

5/ In this view the filament of the 24 V type may be straight or V-shaped. 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.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production* [5/]				*Standard ~~filament lamp~~filament light source* [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.

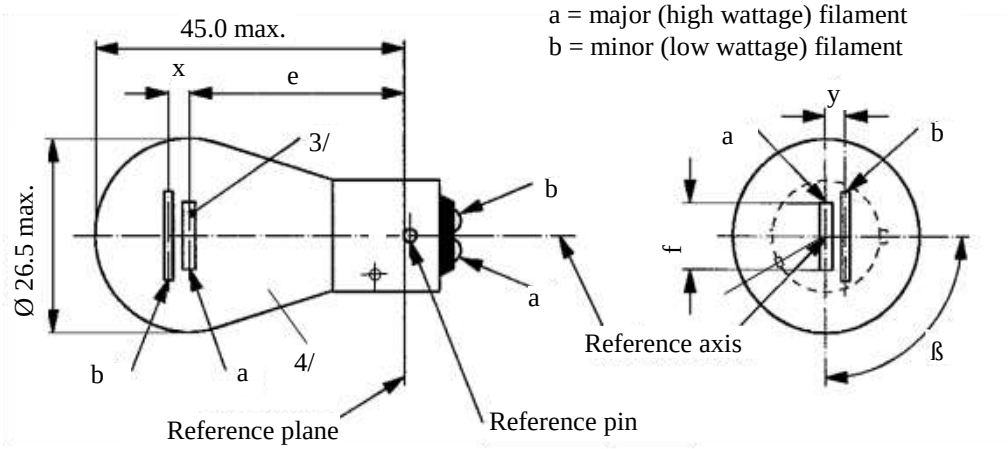
3/ The "Box system" is the same as for ~~filament lamp~~filament light source P21/5W; see sheets P21/5W/2 to 3.

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

5/ The light emitted from normal production ~~filament lamp~~filament light sources shall be red (see also footnote 6/).

6/ The light emitted from standard ~~filament lamp~~filament light sources shall be white or red.

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



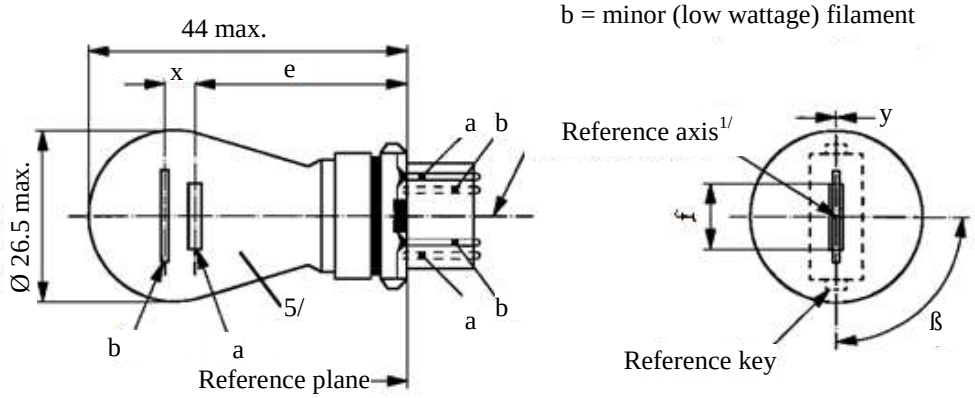
Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production* [4/]			*Standard ~~filament lamp~~filament light source* [5/]
		Min.	*Nom.*	*Max.*	
e	12 V		31.8 [1/]		31.8 ± 0.3
	24 V	30.8	31.8	32.8	
f	12 V			7.0	7.0 + 0 / -2
Lateral deviation [2/]	12 V			[1/]	0.3 max.
	24 V			1.5	
x, 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 ~~filament lamp~~filament light sources shall be red (see also footnote 5/).
5/ The light emitted from standard ~~filament lamp~~filament light sources shall be white or red.

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

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



Dimensions in mm	*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* 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 ~~filament lamp~~filament light sources shall be red (see also footnote 6/).
6/ The light emitted from standard ~~filament lamp~~filament light sources shall be white or red.

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

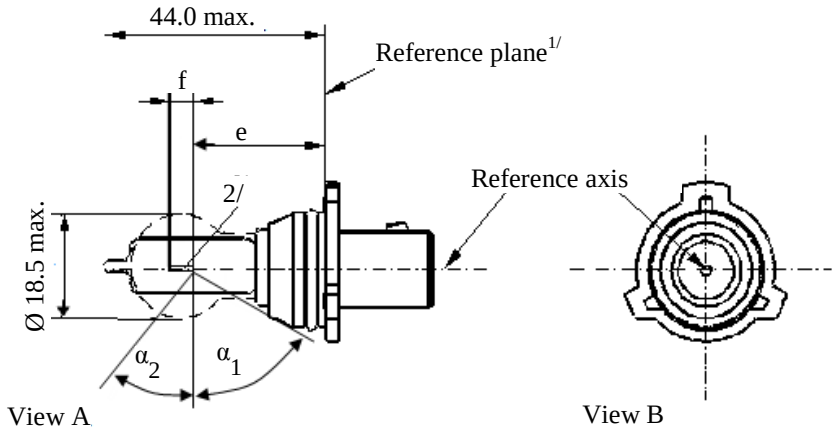


Figure 1 – Main drawing

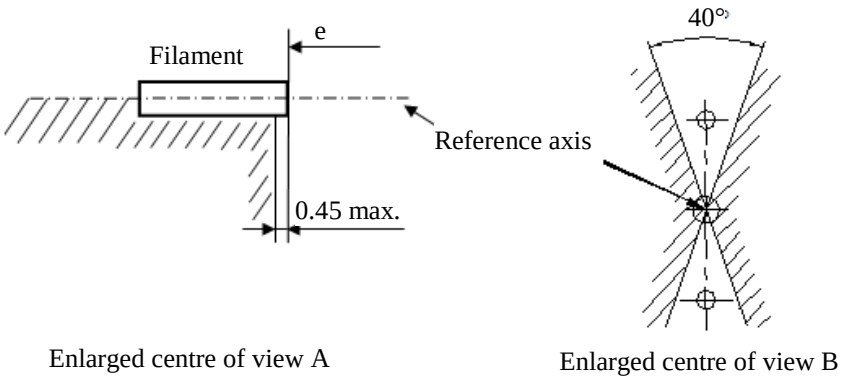


Figure 2 – Metal free zone3/

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 $\alpha_1 + \alpha_2$.

Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*	*Standard ~~filament lamp~~filament light source*
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

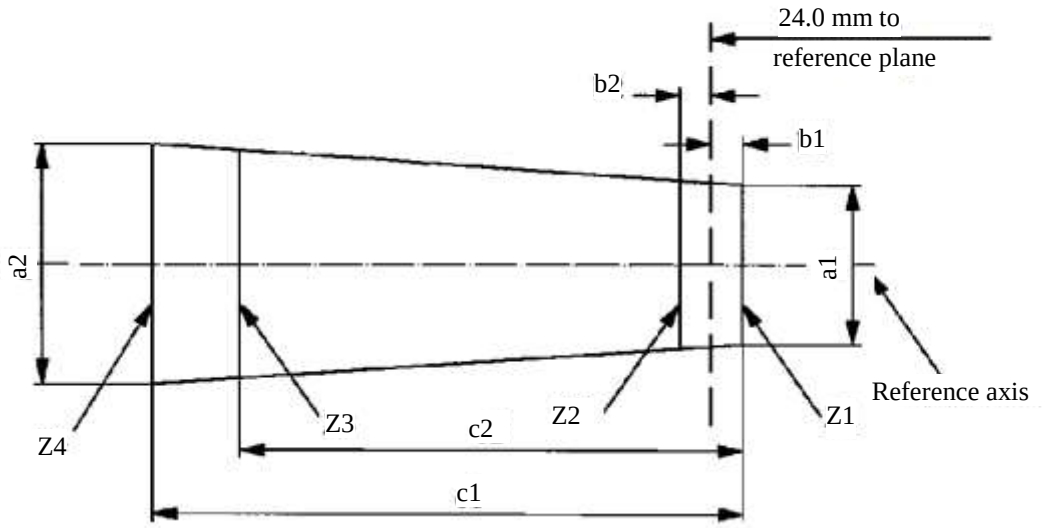
[4/] To be checked by means of a "Box system"; sheet PSX26W/3.

[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.

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~~filament light source complies with the requirements.



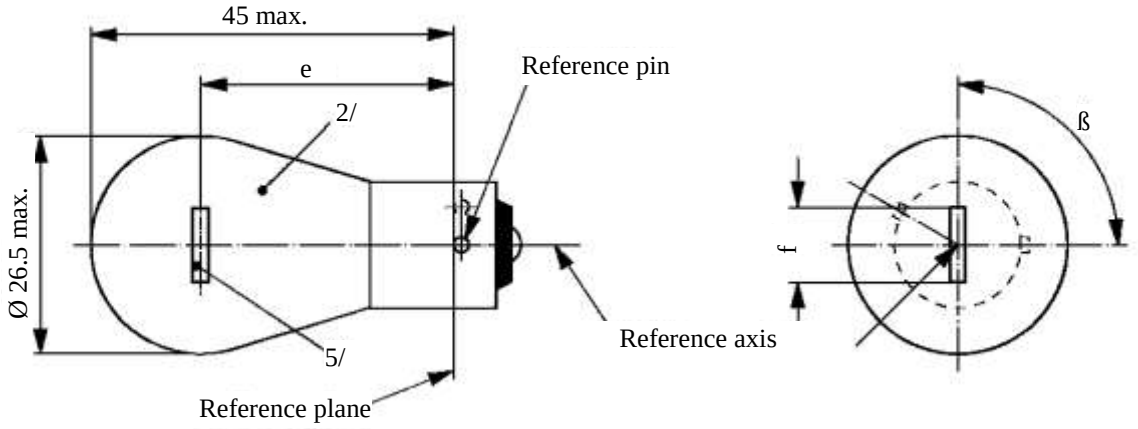
	a1	*a2*	*b1,b2*	*c1*	*c2*
~~Filament lamp~~Filament light sources of normal production	1.7	1.7	0.30	5.0	4.0
Standard ~~filament lamp~~filament light sources	1.5	1.5	0.25	4.7	4.0

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.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* [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.

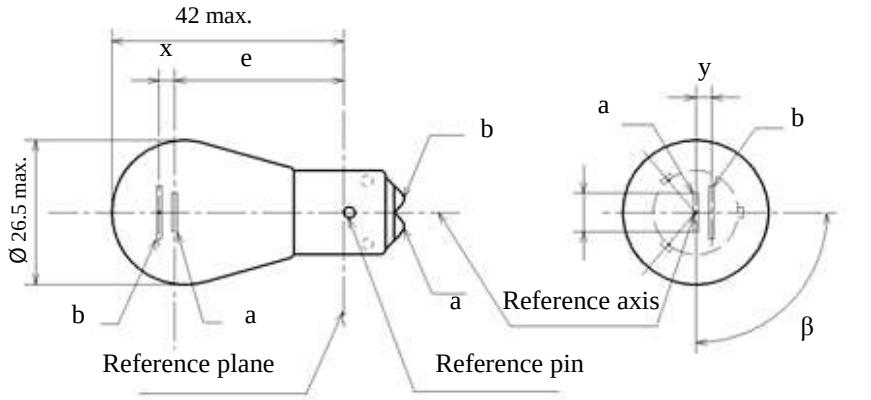
2/ The light emitted from production ~~filament lamp~~filament light sources shall be amber (see also footnote 4/).

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

4/ The light emitted from standard ~~filament lamp~~filament light sources shall be amber or white.

5/ In this view the filament of the 24 V type may be straight or V-shaped. 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.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production* [3/]			*Standard ~~filament lamp~~filament light source* [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 ~~filament lamp~~filament light sources shall be amber (see also note 4/).

4/ The light emitted from standard ~~filament lamp~~filament light sources shall be white or amber.

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~~filament light source complies with the requirements.

Test procedure and requirements

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

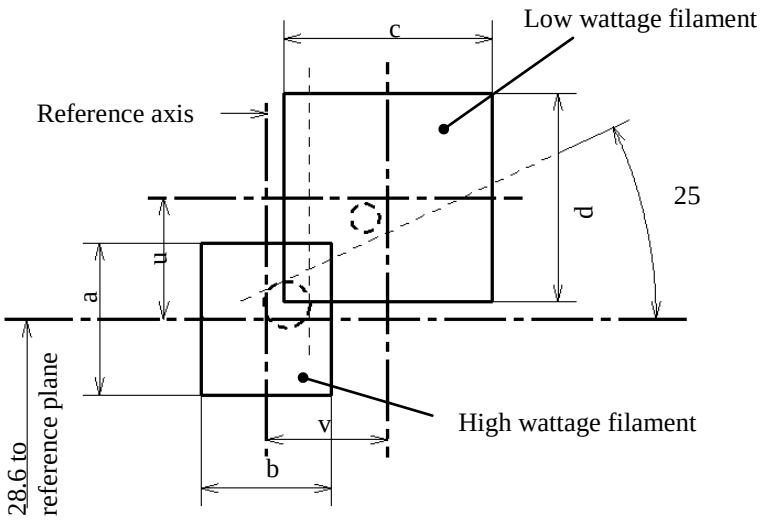
3.1. The projection of the major filament shall lie entirely within a rectangle of height "a" and width "h", centred on the theoretical position of the centre of the filament;

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 lamp~~filament light sources).

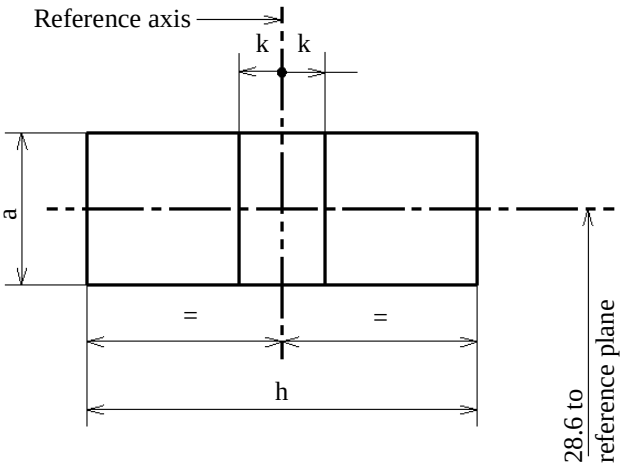
Dimensions in mm

Side elevation



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

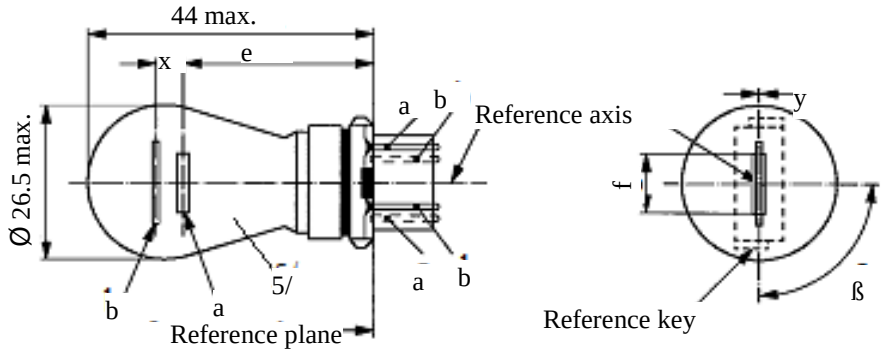
Front elevation



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

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

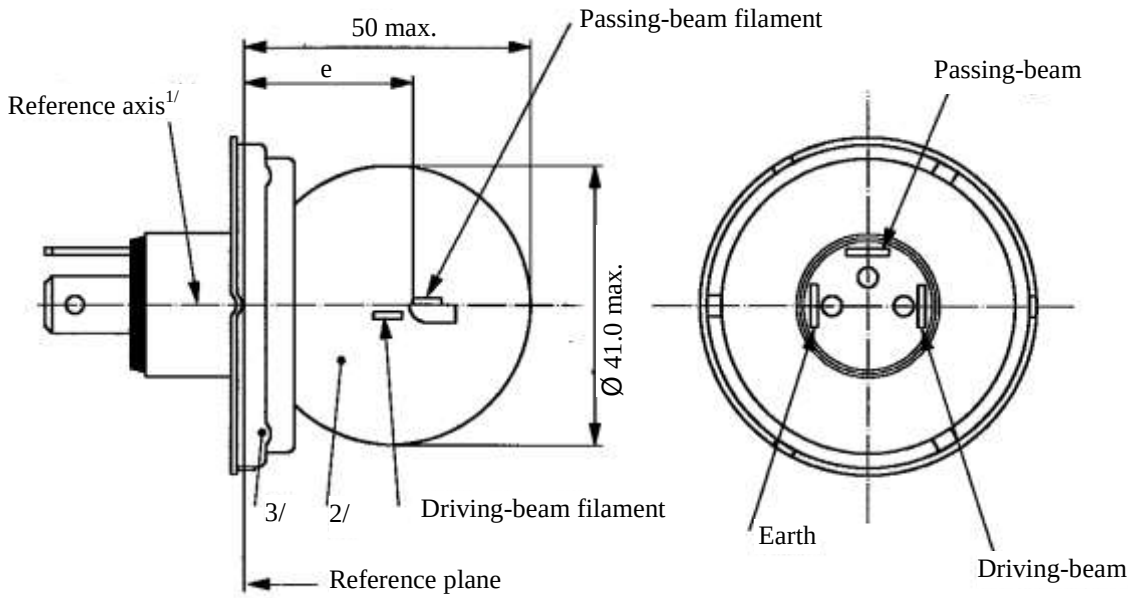
a = major (high wattage) filament
b = minor (low wattage) filament



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* 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 lamp~~filament light sources of normal production shall be amber (see also footnote 6/).
6/ The light emitted from standard ~~filament lamp~~filament light sources shall be amber or white.

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

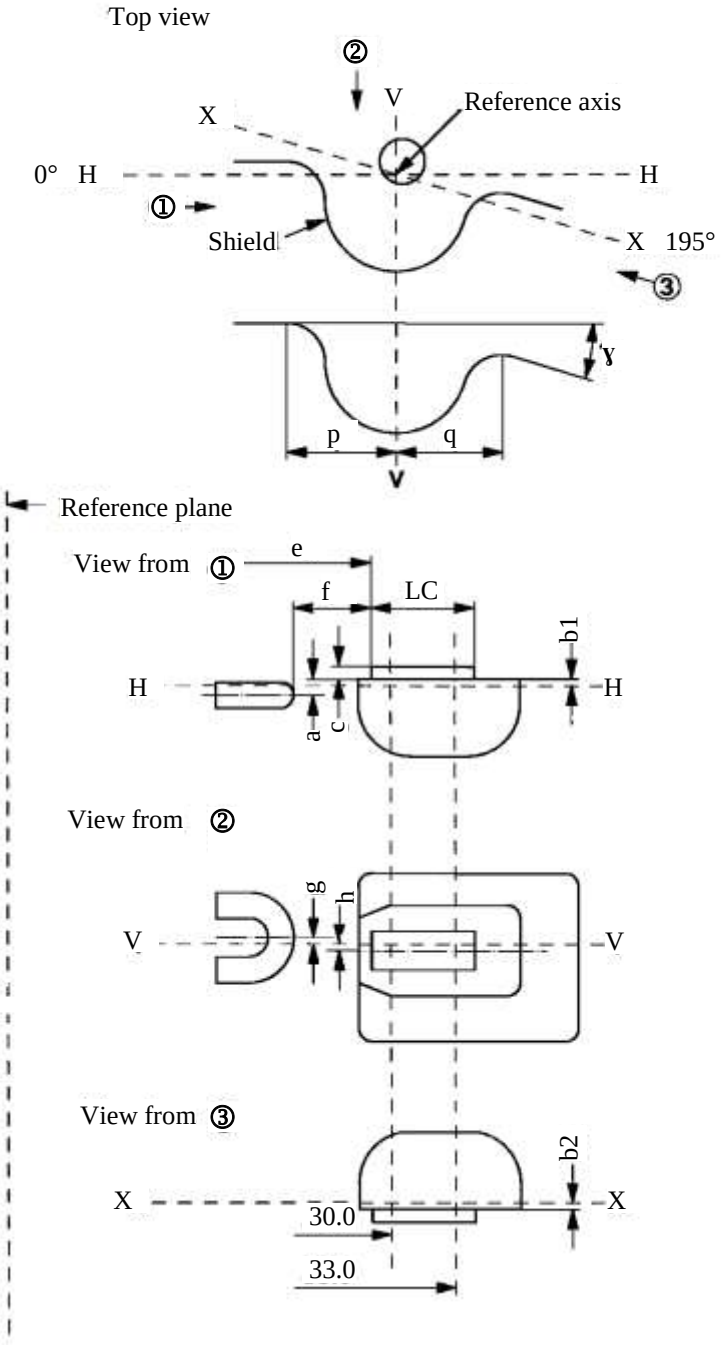


Electrical and photometric characteristics									
		~~Filament lamp~~Filament light sources of normal production						*Standard ~~filament lamp~~filament light source*	
Rated values	Volts	6 4/		12 4/		24 4/		12 4/	
	Watts	45	40	45	40	55	50	45	40
Test voltage	Volts	6.3		13.2		28.0		13.2	
Objective values	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~~filament light source 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 according to the provisions for ~~filament lamp~~filament light sources with an internal shield to produce the cut-off.

Position and dimensions (in mm) of shield and filaments

The drawings are not mandatory with respect to the design of the shield and filaments.



Filaments and shield position and dimensions [1/]				
			Tolerance	
			~~Filament lamp~~Filament light sources of normal production	*Standard ~~filament lamp~~filament light source*
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)				

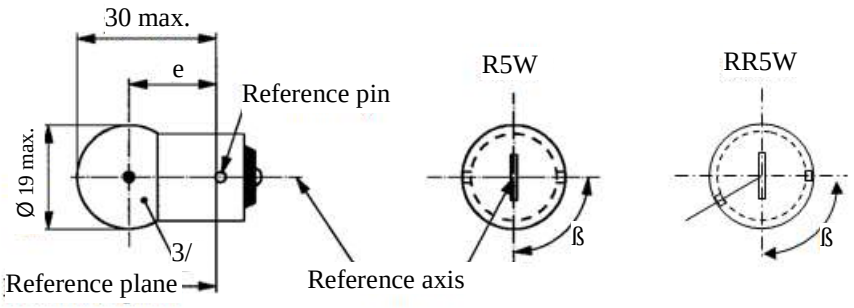
[1/] The position and dimensions of the shield and filaments shall be checked by means of the method of measurement as described in IEC Publication 60809.

[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 lamp~~filament light sources.

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



Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* [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 lamp~~Filament light sources with cap BA15d may be used for special purposes; they have the same dimensions.

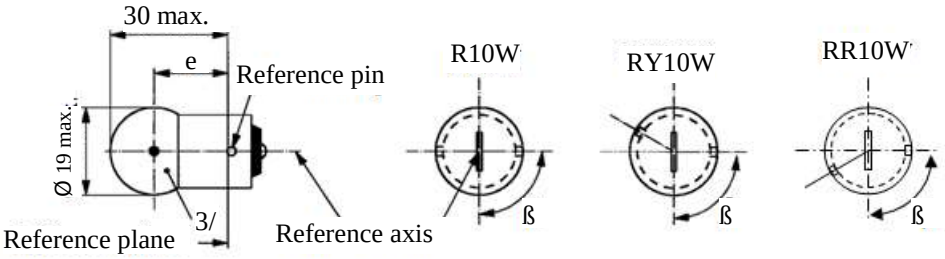
2/ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the reference pin.

3/ The light emitted from ~~filament lamp~~filament light sources 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 lamp~~filament light sources shall be white for category R5W; white or red for category RR5W.

5/ Within RR5W no 6 V rated voltage type specified.

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



Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* 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 lamp~~Filament light sources R10W with cap BA15d may be used for special purposes; they have the same dimensions.

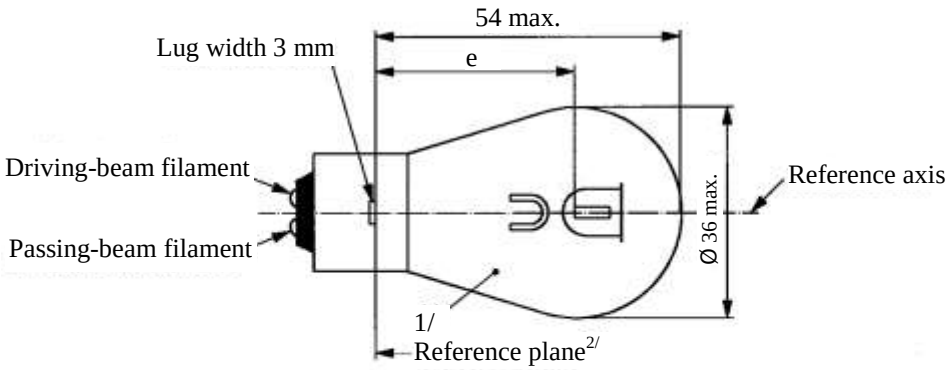
2/ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing the axis of the reference pin.

3/ The light emitted from ~~filament lamp~~filament light sources of normal production shall be white for category R10W, amber for category RY10W and red for category RR10W (see also footnote 4/)

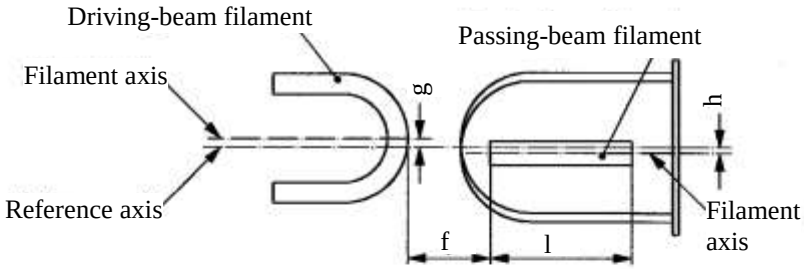
4/ The light emitted from standard ~~filament lamp~~filament light sources shall be white for category R10W; white or amber for category RY10W; white or red for category RR10W.

5/ Within RR10W no 6 V rated voltage type specified.

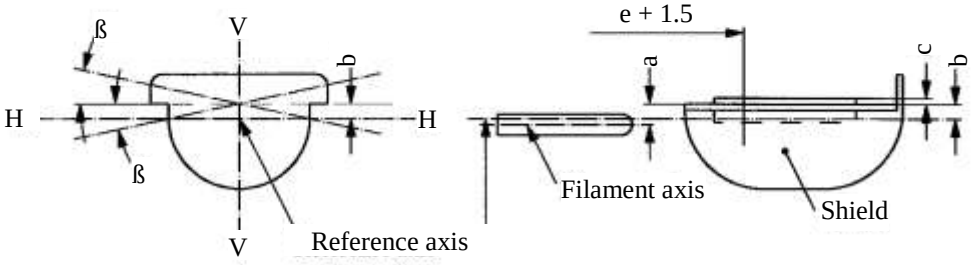
The drawings are intended only to illustrate the essential dimensions (in mm) of the ~~filament lamp~~filament light source.



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.

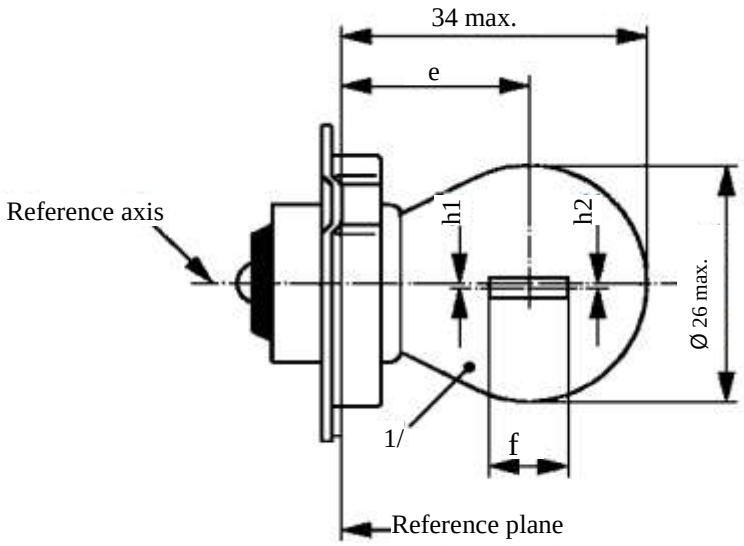
Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*	
			Min.	*Nom.*	*Max.*		
e			32.35	32.70	33.05	32.7 ± 0.15	
f			1.4	1.8	2.2	1.8 ± 0.2	
l			4.0	5.5	7.0	5.5 ± 0.5	
c [5/]			0.2	0.5	0.8	0.5 ± 0.15	
b [5/]			-0.15	0.2	0.55	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.

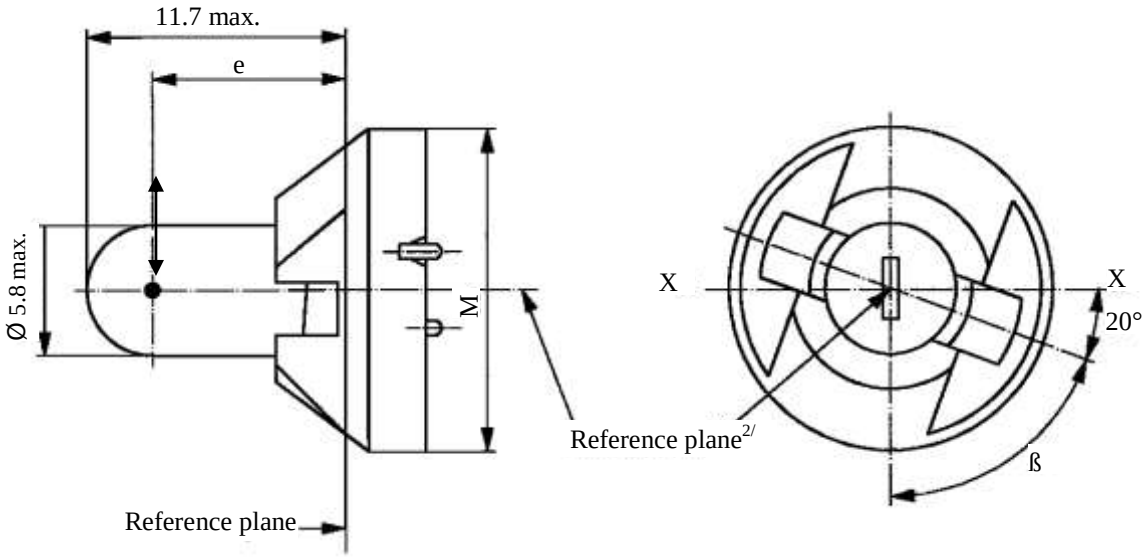
The drawings are intended only to illustrate the essential dimensions (in mm) of the ~~filament lamp~~filament light source.



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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.

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

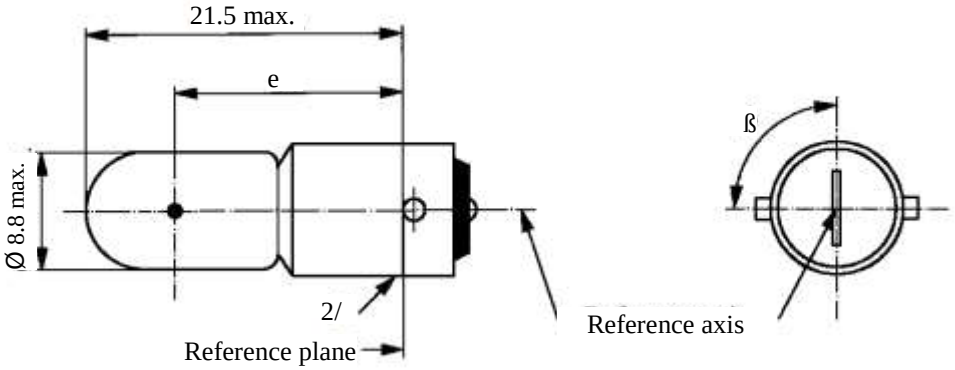


Dimensions in mm		~~*Filament lamp*~~*Filament light source*s *of normal production*			*Standard ~~filament lamp~~filament light source*
		Min.	*Nom.*	*Max.*	
e		7.6	8.3	9.0	8.3 ± 0.35
Lateral deviation 1/				0.7	0.35 max
β		55°	70°	85°	70° ± 5°
Cap P11.5d in accordance with IEC Publication 60061 (sheet 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".

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

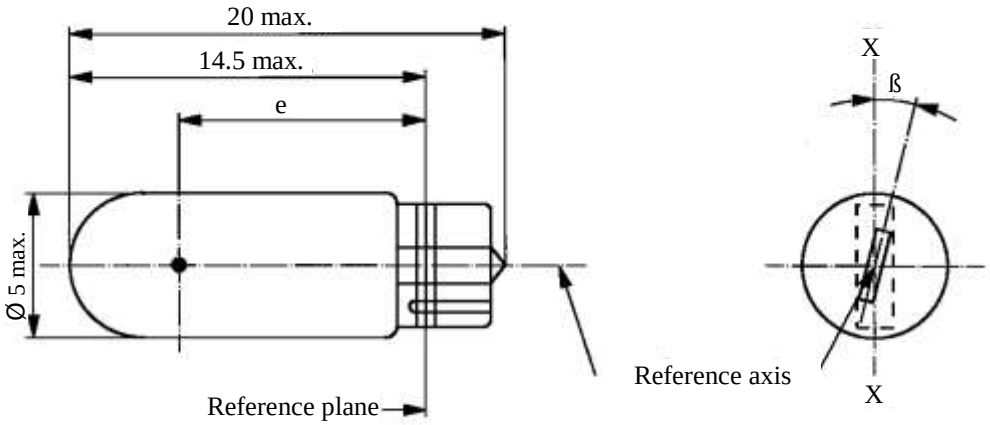


Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		Min.	*Nom.*	*Max.*	
e		13.5	15.0	16.5	15.0 ± 0.3
Lateral deviation [1/]				1.5	0.5 max
β			90°		90° ± 5°
Cap BA9s in accordance with IEC Publication 60061 (sheet 7004-14-9)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

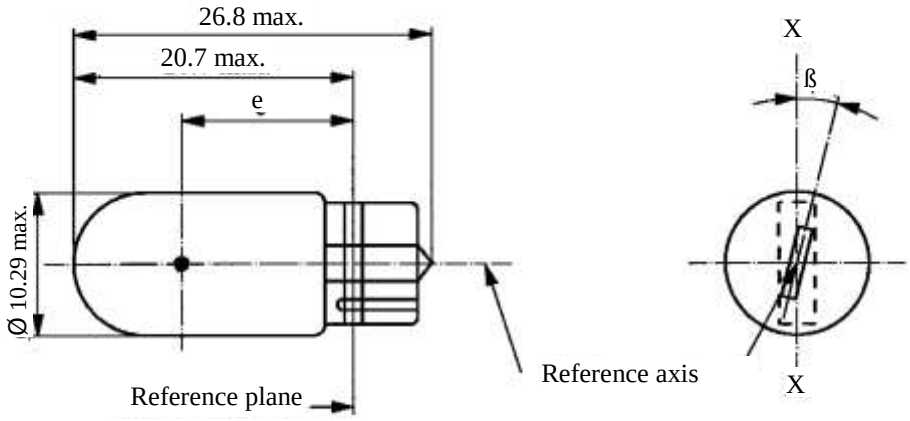
The drawings are intended only to illustrate the essential dimensions (in mm) of the ~~filament lamp~~filament light source.



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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.

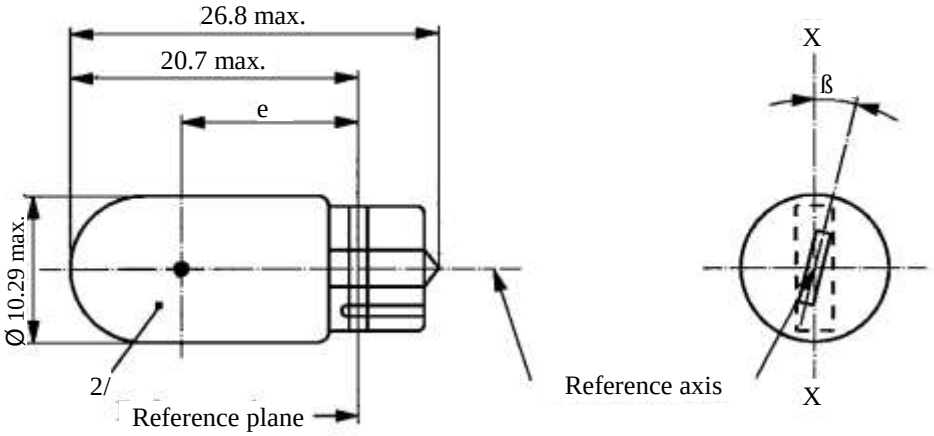
The drawings are intended only to illustrate the essential dimensions (in mm) of the ~~filament lamp~~filament light source.



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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.

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



Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* [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

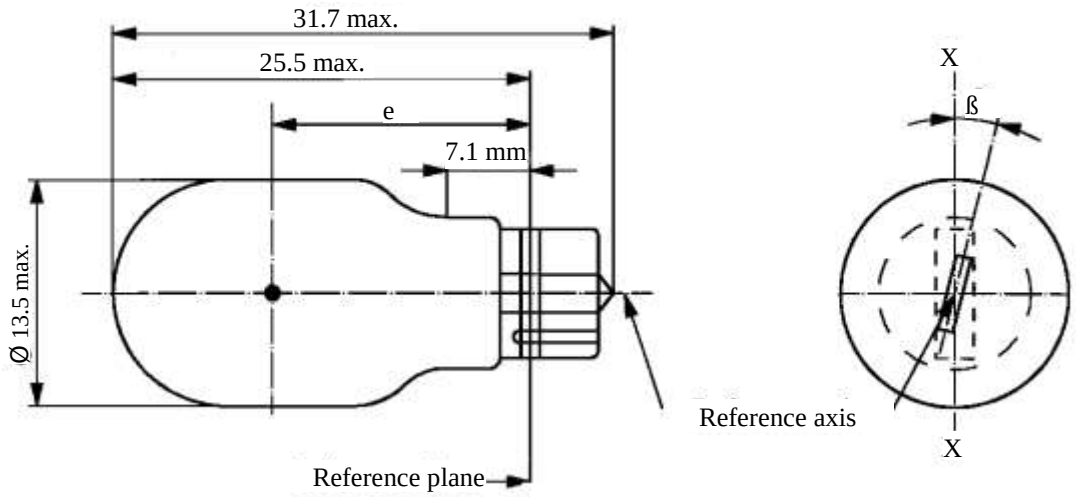
1/ Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

2/ The light emitted from ~~filament lamp~~filament light sources 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 lamp~~filament light sources 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.

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

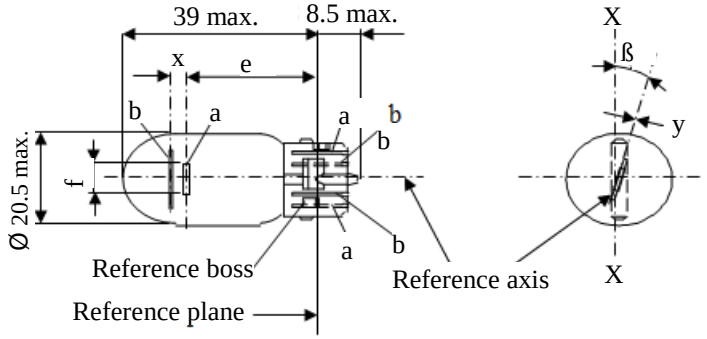


Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
			Min.	*Nom.*	*Max.*	
e			15.5	17.0	18.5	17.0 ± 0.3
Lateral deviation [1/]					1.0	0.5 max.
β			-15°	0°	+15°	0° ± 5°
Cap W2.1x9.5d in accordance with IEC Publication 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.

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

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*	
		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.

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~~filament light source complies with the requirements.

Test procedure and requirements.

1. The ~~filament lamp~~filament light source 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~~filament light source 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

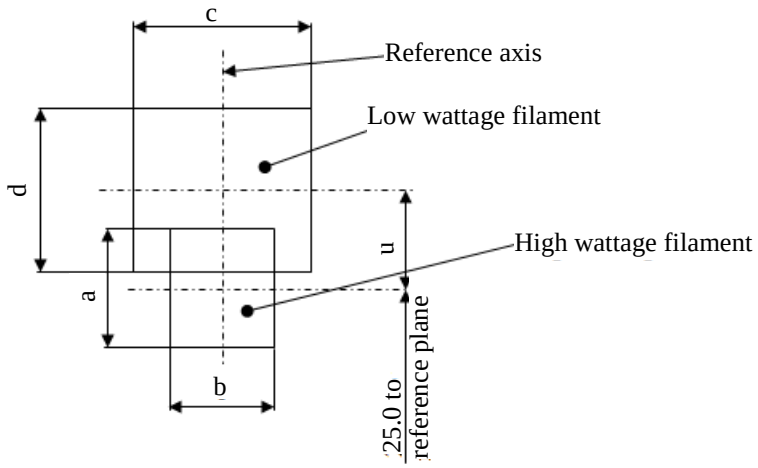
The ~~filament lamp~~filament light source being placed with the cap down and the reference axis vertical, the ~~filament lamp~~filament light source being viewed in a direction at right angles to axis of the major filament:

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.

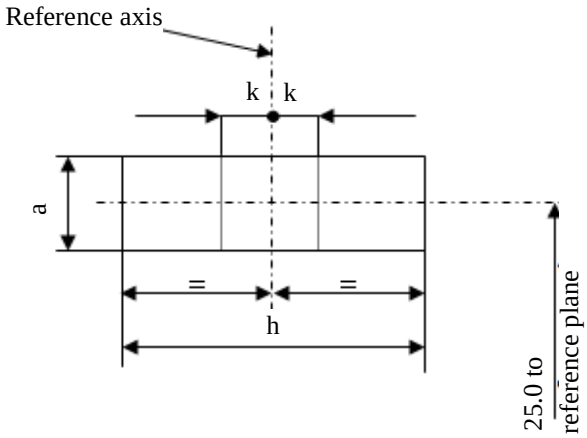
3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ±2 mm (±0.4 mm for standard ~~filament lamp~~filament light sources).

Side elevation Dimensions in millimeters



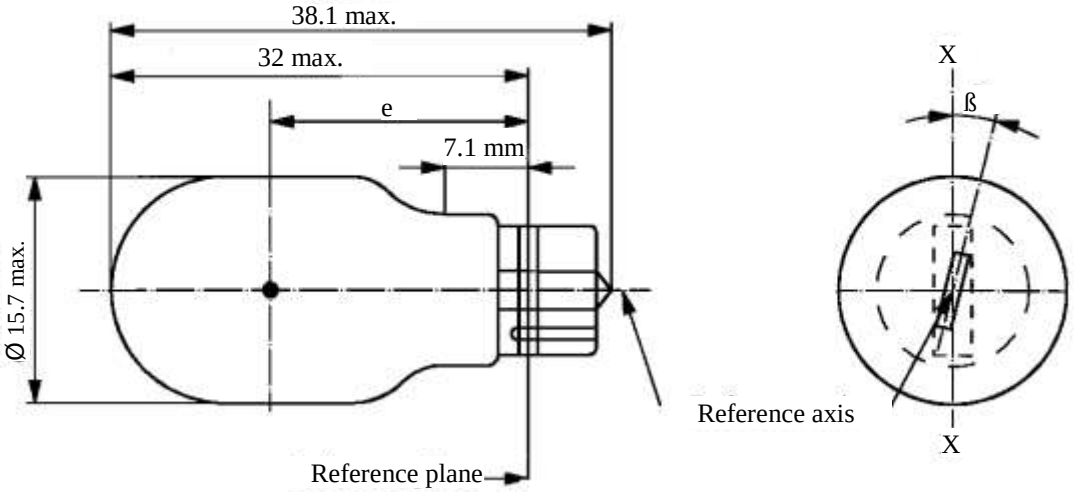
Reference	*a*	*b*	*c*	*d*	*u*
Dimensions	3.3	2.8	4.8		2.8

Front elevation



Reference	*a*	*h*	*k*
Dimensions	3.3	9.5	1.0

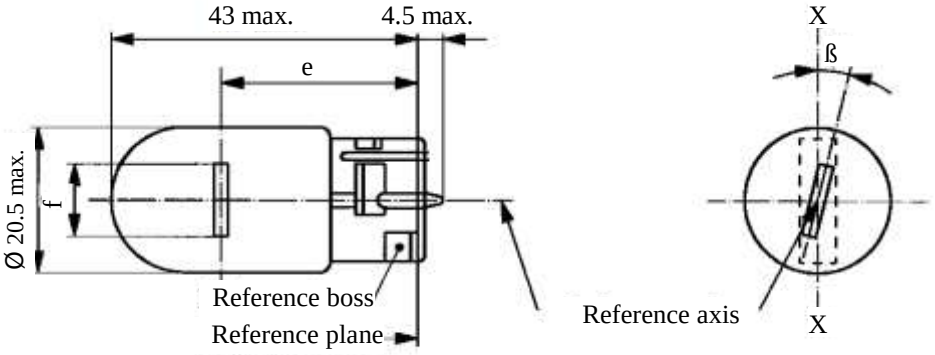
The drawings are intended only to illustrate the essential dimensions (in mm) of the ~~filament lamp~~filament light source.



Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
			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.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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					

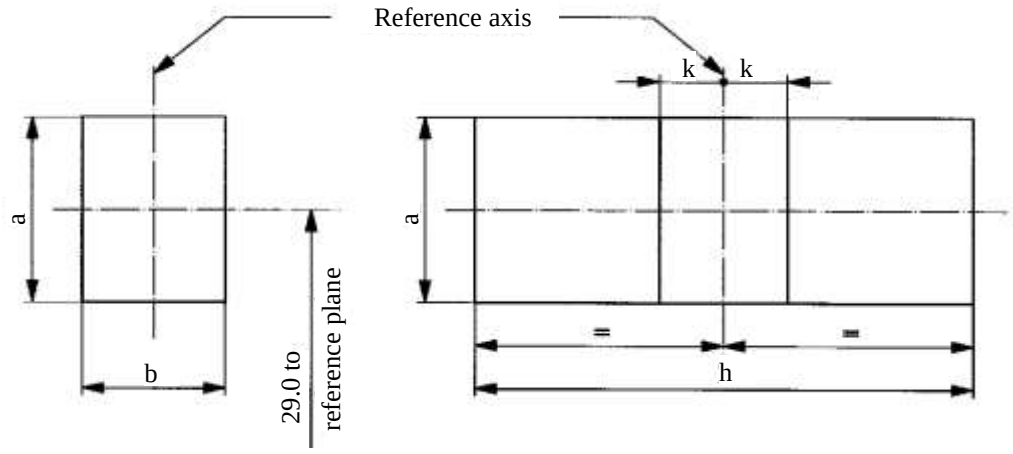
[1/] Maximum lateral deviation of filament centre from two mutually perpendicular planes both containing the reference axis and one containing axis X-X.

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

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~~filament light source 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~~filament light source 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~~filament light source 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

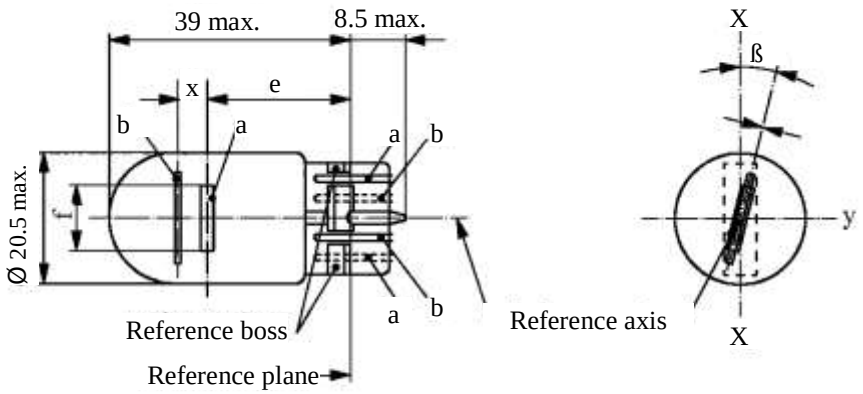
   The ~~filament lamp~~filament light source placed with the cap down and the reference axis vertical, the ~~filament lamp~~filament light source being viewed in a direction at right angles to the filament axis:

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.

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

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*	
		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.

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~~filament light source complies with the requirements.

Test procedure and requirements.

1. The ~~filament lamp~~filament light source 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~~filament light source 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

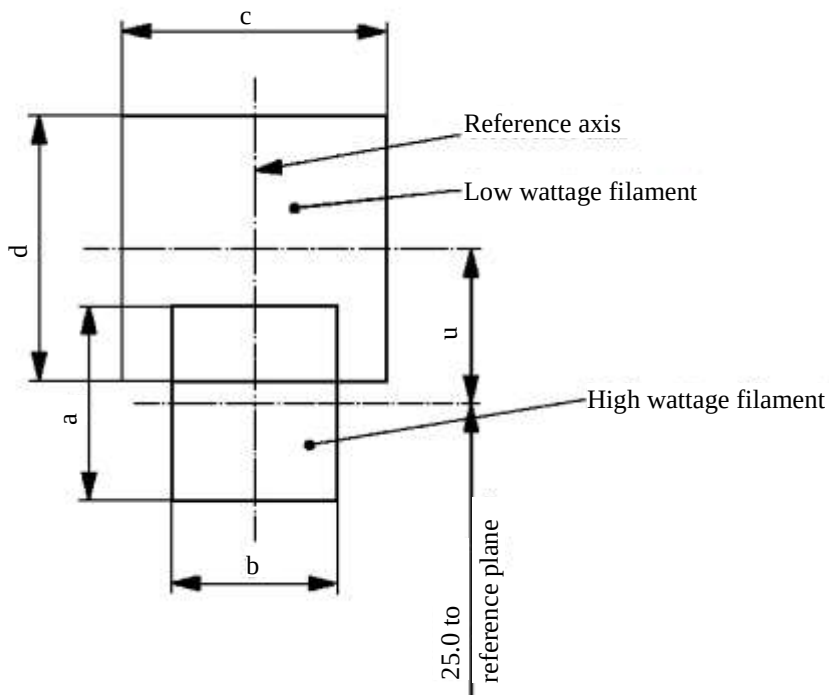
The ~~filament lamp~~filament light source being placed with the cap down and the reference axis vertical, the ~~filament lamp~~filament light source being viewed in a direction at right angles to axis of the major filament:

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;

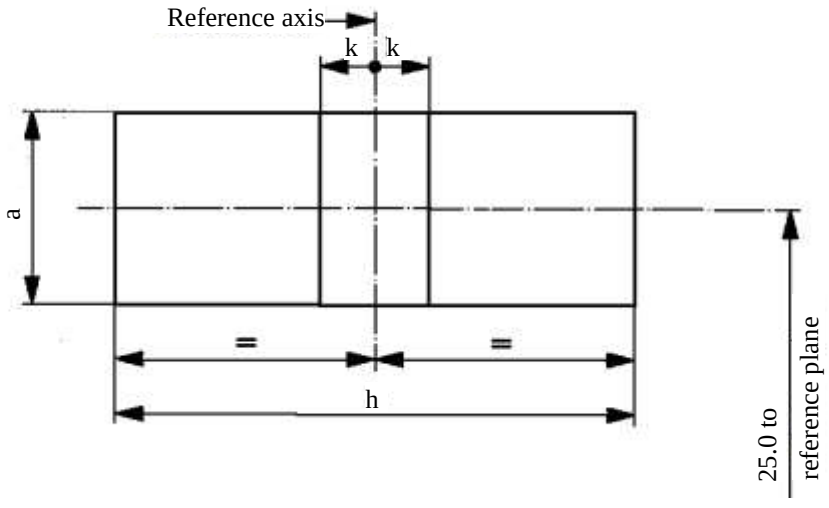
3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ±2 mm (±0.4 mm for standard ~~filament lamp~~filament light sources).

Side elevation



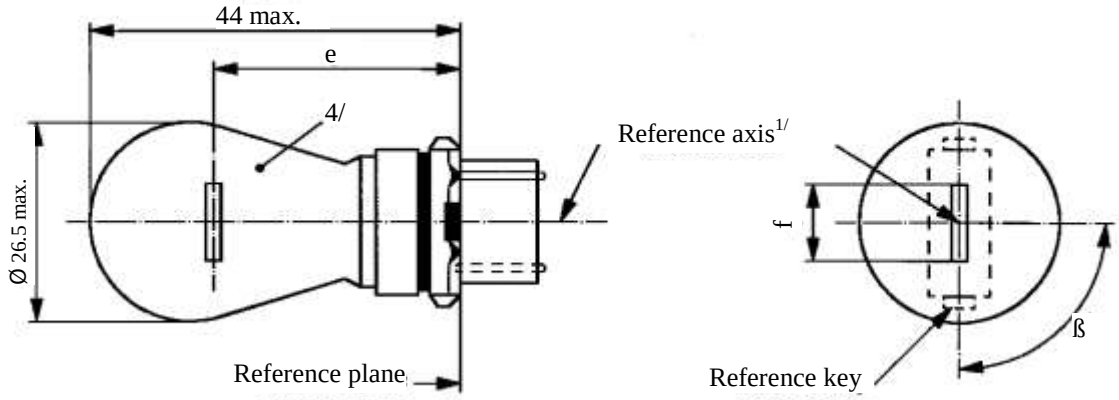
Reference	*a*	*b*	*c*	*d*	*u*
Dimension	3.5	3.0	4.8		2.8

Front elevation



Reference	*a*	*h*	*k*
Dimension	3.5	9.5	1.0

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



Dimensions in mm			*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
			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.

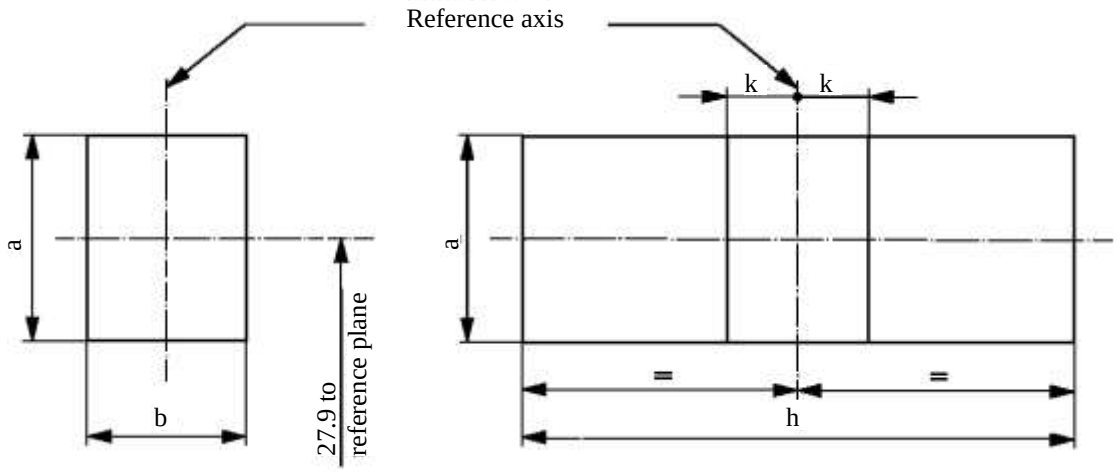
4/ The light emitted from ~~filament lamp~~filament light sources of normal production shall be white for category WP21W and amber for category WPY21W (see also footnote 5/).

5/ The light emitted from standard ~~filament lamp~~filament light sources 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~~filament light source 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~~filament light source 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~~filament light source 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

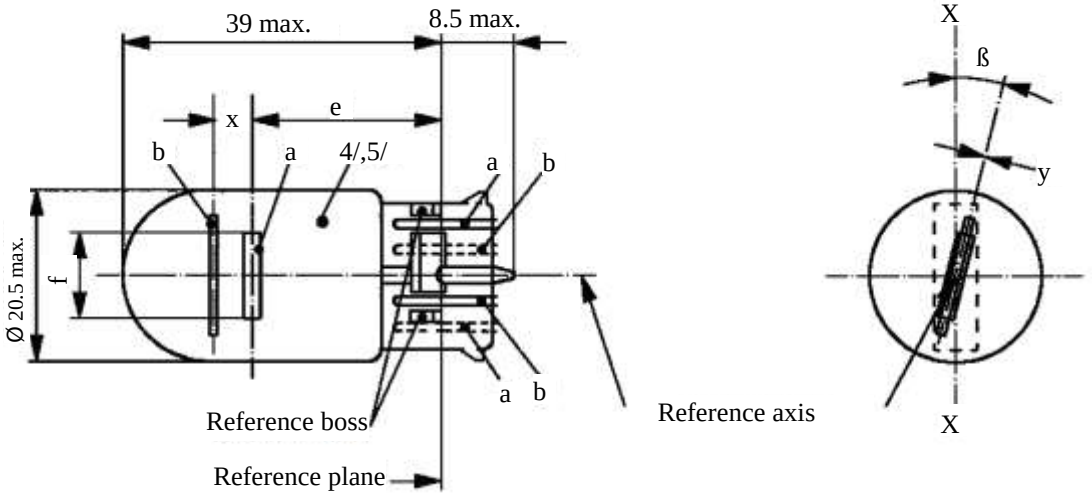
   The ~~filament lamp~~filament light source placed with the cap down and the reference axis vertical, the ~~filament lamp~~filament light source being viewed in a direction at right angles to the filament axis:

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.

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

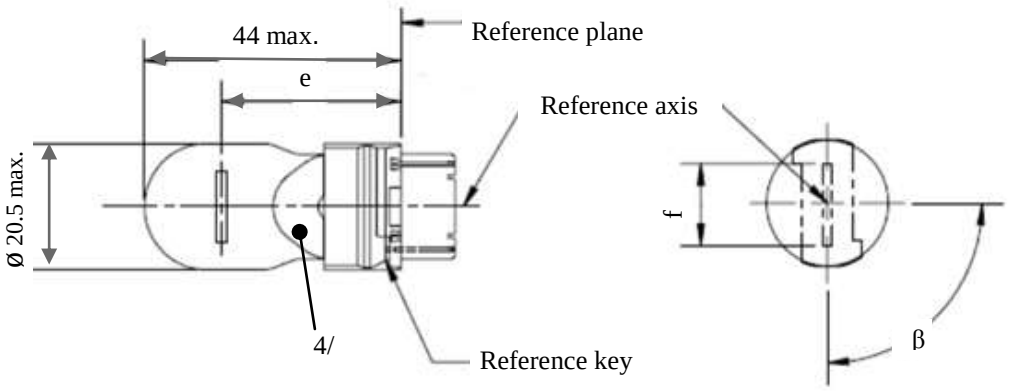
a = major (high wattage) filament
b = minor (low wattage) filament



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*	
		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 ~~filament lamp~~filament light sources shall be red (see also footnote 5/).
5/ The light emitted from standard ~~filament lamp~~filament light sources shall be white or red.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source* [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 %			
	Luminous flux 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.

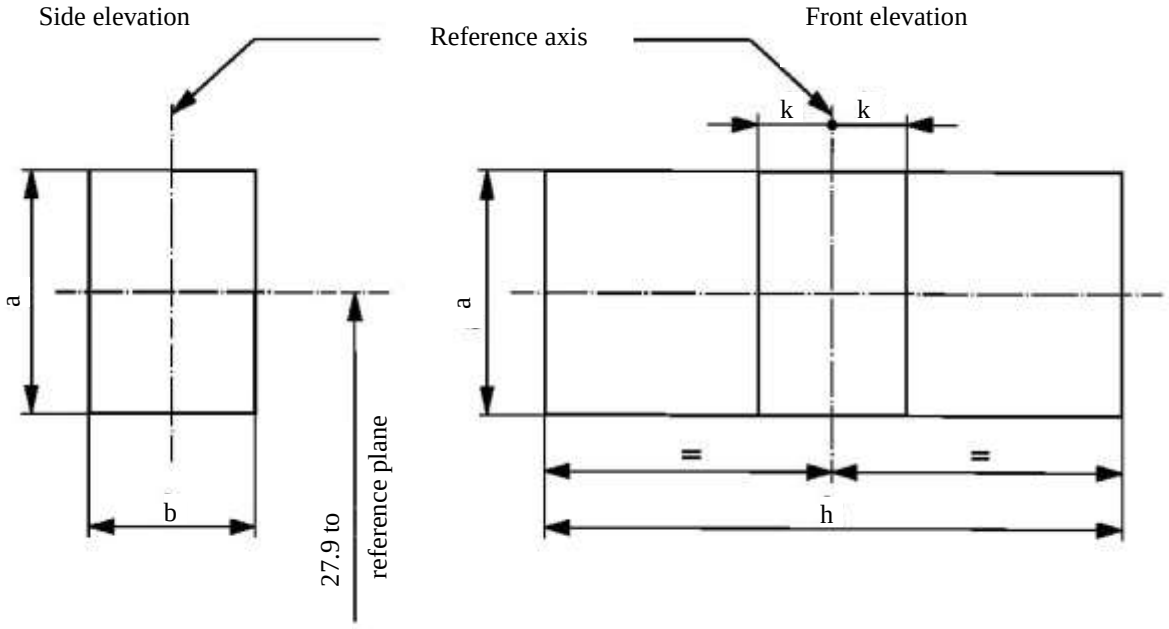
3/ To be checked by means of a "Box system", sheets WT21W/2.

4/ The light emitted from ~~filament lamp~~filament light sources 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 lamp~~filament light sources shall be white for category WT21W and white or amber for category WTY21W.

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~~filament light source 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~~filament light source 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~~filament light source 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.

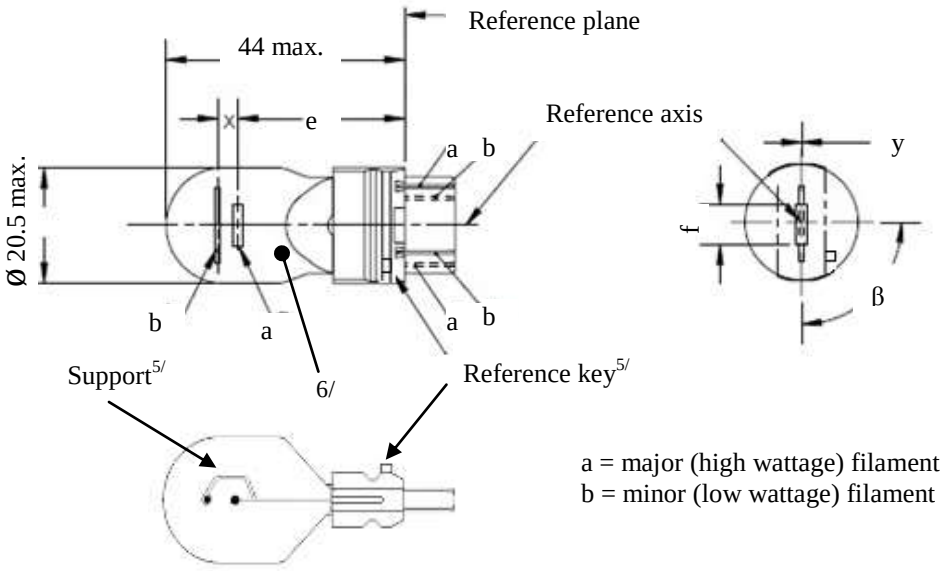
3. Front elevation

   The ~~filament lamp~~filament light source placed with the cap down and the reference axis vertical, the ~~filament lamp~~filament light source 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.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production* 6/			*Standard ~~filament lamp~~filament light source* 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.

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~~filament light source.

6/ The light emitted from ~~filament lamp~~filament light sources 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 lamp~~filament light sources 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~~filament light source complies with the requirements.

Test procedure and requirements.

1. The ~~filament lamp~~filament light source 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~~filament light source 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

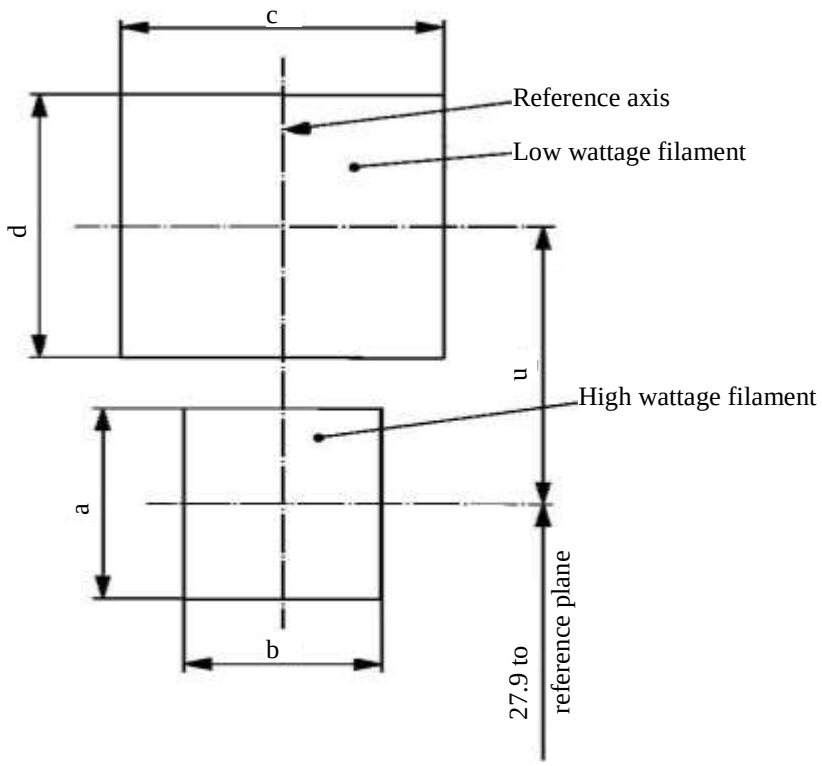
The ~~filament lamp~~filament light source being placed with the cap down and the reference axis vertical, the ~~filament lamp~~filament light source being viewed in a direction at right angles to axis of the major filament:

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;

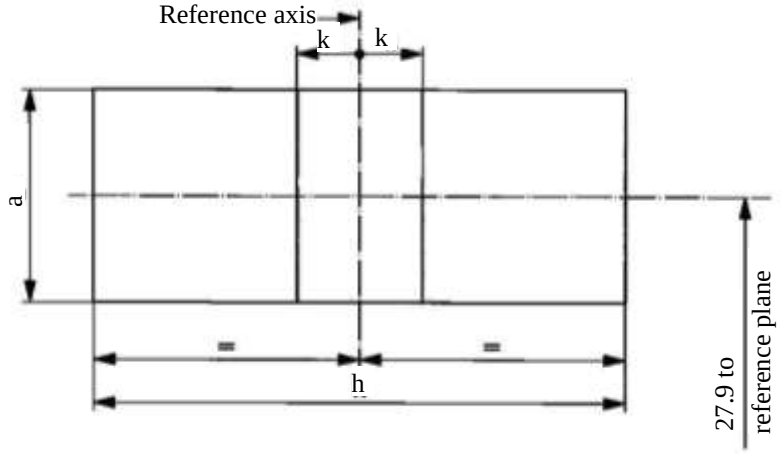
3.3. The centre of the minor filament axis shall not be offset from the reference axis by more than ±2 mm (±0.4 mm for standard ~~filament lamp~~filament light sources).

Side elevation



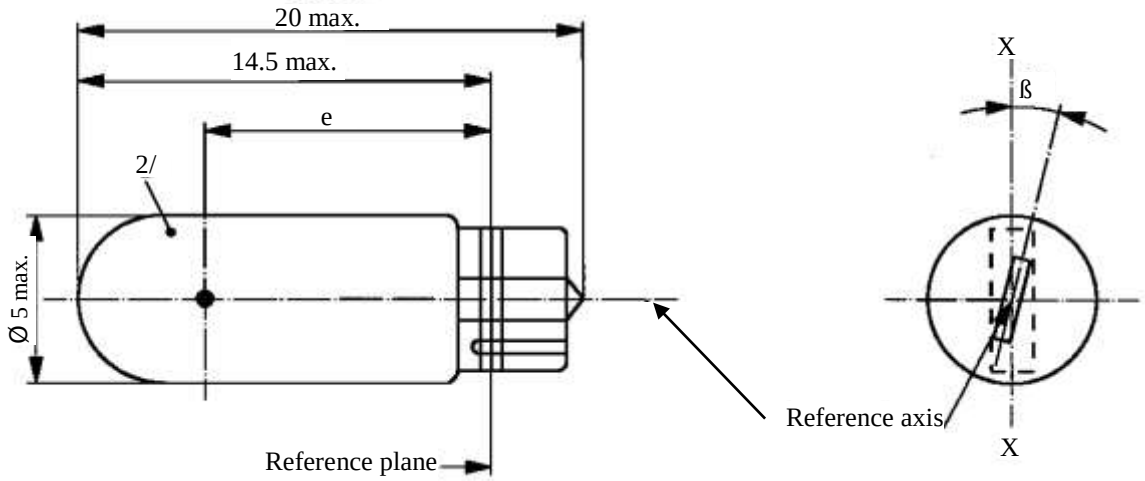
Reference	*a*	*b*	*c*	*d*	*u*
Dimensions	3.5	3.0	4.8		5.1

Front elevation



Reference	*a*	*h*	*k*
Dimensions	3.5	9.5	1.0

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



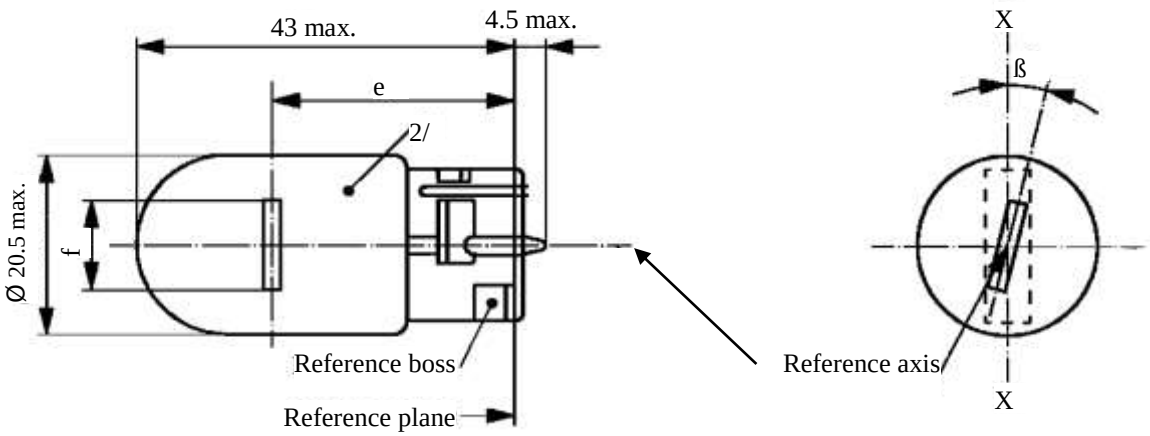
Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		Min.	*Nom.*	*Max.*	
e		10.3	10.8	11.3	10.8 ± 0.3
Lateral deviation [1/]				1.0	0.5 max.
β		-15°	0°	+15°	0° ± 5°
Cap W2x4.6d in accordance with IEC Publication 60061 (sheet 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 ~~filament lamp~~filament light sources shall be amber (see also footnote 3/).

3/ The light emitted from standard ~~filament lamp~~filament light sources shall be amber or white.

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



Dimensions in mm		*~~Filament lamp~~Filament light sources of normal production*			*Standard ~~filament lamp~~filament light source*
		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 lamp~~filament light sources of normal production shall be amber (see also footnote 4/).

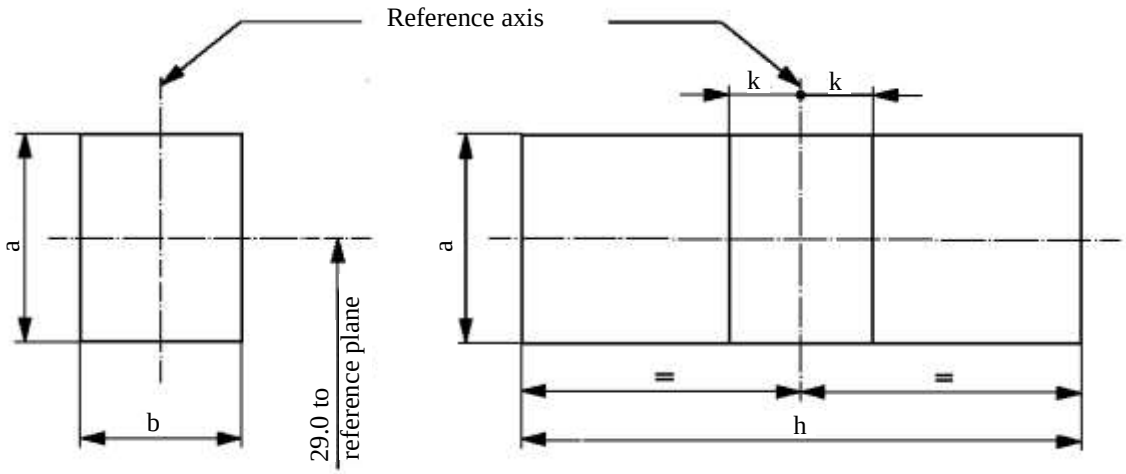
3/ To be checked by means of a "Box system"; sheet WY21W/2.

4/ The light emitted from standard ~~filament lamp~~filament light sources shall be amber or white.

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~~filament light source 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~~filament light source 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~~filament light source 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~~filament light source placed with the cap down and the reference axis vertical, the ~~filament lamp~~filament light source 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.