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DRAFT SUPPLEMENT 2 TO REGULATION No. 99

(Gas-discharge light sources)

Note: The text reproduced below was adopted by the Administrative Committee (AC.1) of the amended 1958 Agreement at its twenty-fourth session, following the recommendation by WP.29 at its one-hundred-and-thirtieth session. It is based on document TRANS/WP.29/2003/33, as amended (English and Russian only) (TRANS/WP.29/926, para. 119).

List of contents,

ANNEXES, amend the list, to read:

"Annex 1 Sheets for gas-discharge light sources

Annex 2 Communication concerning

....."

Text of the Regulation,

Annex 1 (former), replace by new annex 1 (see next pages)

Annex 4, paragraph 10, amend to read:

"...

The following figure shows the colour tolerance area for colour white and the restricted tolerance area for the gas-discharge light sources D1R, D1S, D2R, D2S, D3R, D3S, D4R and D4S."

Annex 5 (former), replace by new annex 5 (see the last page)

Annex 1, amend to read:

"Annex 1

SHEETS FOR GAS-DISCHARGE LIGHT SOURCES

List of categories of gas-discharge light sources and their sheet numbers:

<u>Light source category</u>	<u>Sheet numbers</u>
D1R	DxR/1 to 7
D1S	DxS/1 to 6
D2R	DxR/1 to 7
D2S	DxS/1 to 6
D3R	DxR/1 to 7
D3S	DxS/1 to 6
D4R	DxR/1 to 7
D4S	DxS/1 to 6

List of sheets for gas-discharge light sources and their sequence in this annex:

<u>Sheet numbers</u>	<u>Applicable for light source categories</u>
DxR/1 to 7	D1R, D2R, D3R and D4R
DxS/1 to 6	D1S, D2S, D3S and D4S

The drawings are intended only to illustrate the essential dimensions (in mm)
of the gas-discharge light source

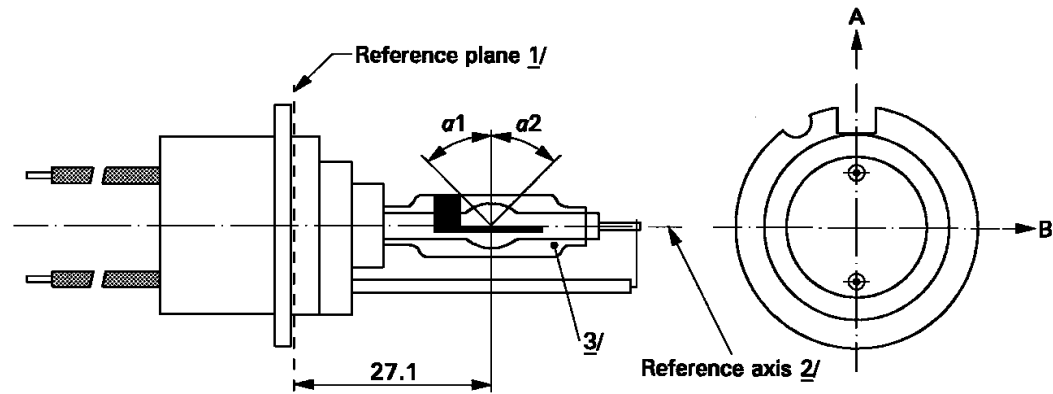


Figure 1 - Category D1R - Type with cables - Cap PK32d-3

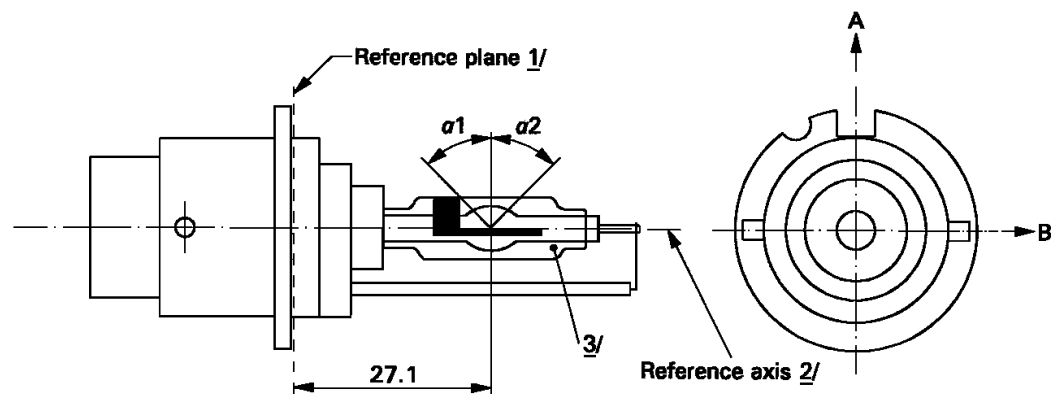


Figure 2 - Category D2R - Type with connector - Cap P32d-3

- 1/ The reference plane is defined by the positions on the surface of the holder on which the three supporting bosses of the cap ring will rest.
- 2/ See sheet DxR/3.
- 3/ With respect to the reference axis, when measured at a distance of 27.1 mm from the reference plane the eccentricity of the outer bulb shall be less than ± 0.5 mm in direction B and less than $+ 1$ mm $- 0.5$ mm in direction A.

CATEGORIES D1R, D2R, D3R AND D4R

Sheet DxR/2

The drawings are intended only to illustrate the essential dimensions (in mm)
of the gas-discharge light source

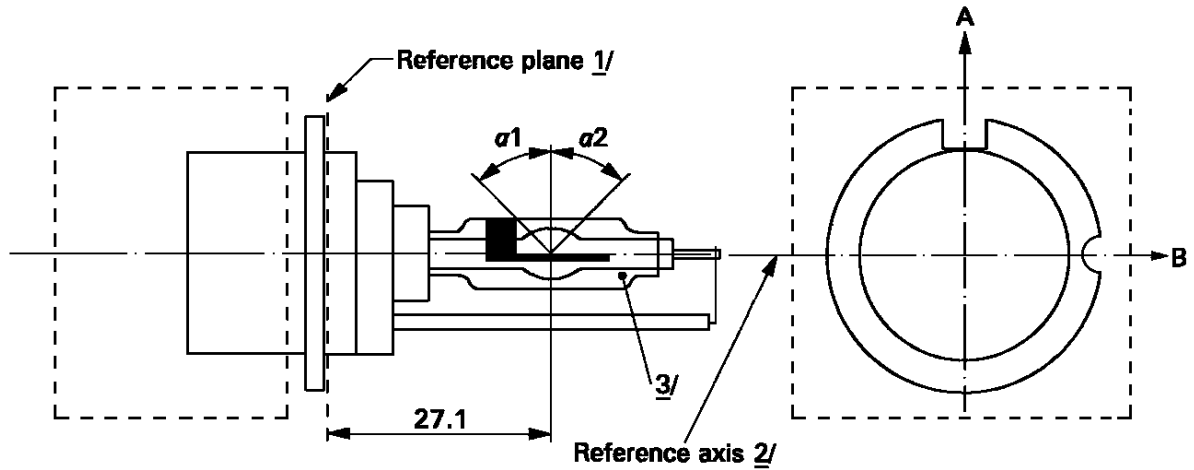


Figure 3 – Category D3R - Type with starter – Cap PK32d-6

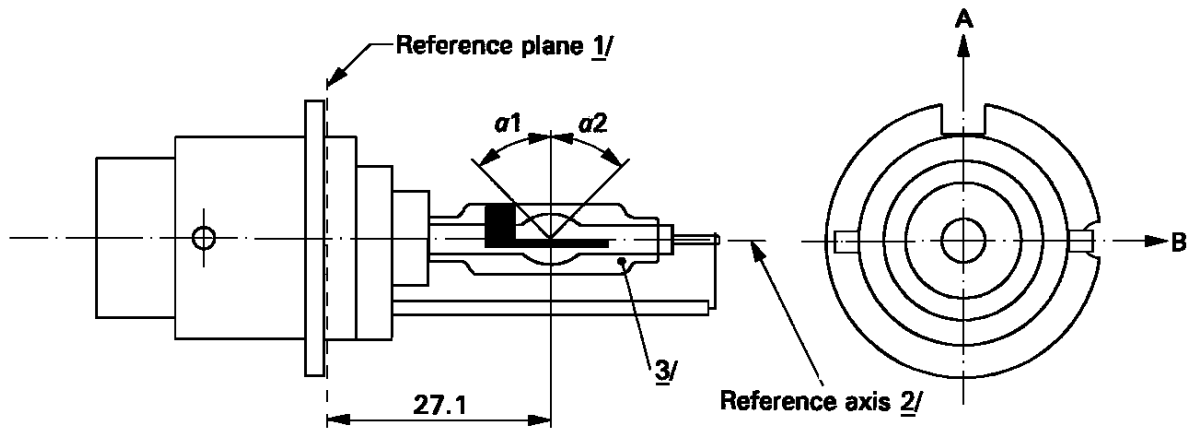


Figure 4 - Category D4R - Type with connector – Cap P32d-6

- 1/ The reference plane is defined by the positions on the surface of the holder on which the three supporting bosses of the cap ring will rest.
- 2/ See sheet DxR/3.
- 3/ With respect to the reference axis, when measured at a distance of 27.1 mm from the reference plane the eccentricity of the outer bulb shall be less than ± 0.5 mm in direction B and less than $+ 1$ mm /- 0.5 mm in direction A.

Figure 5
Definition of reference axis 1/

The cap shall be pushed in this direction

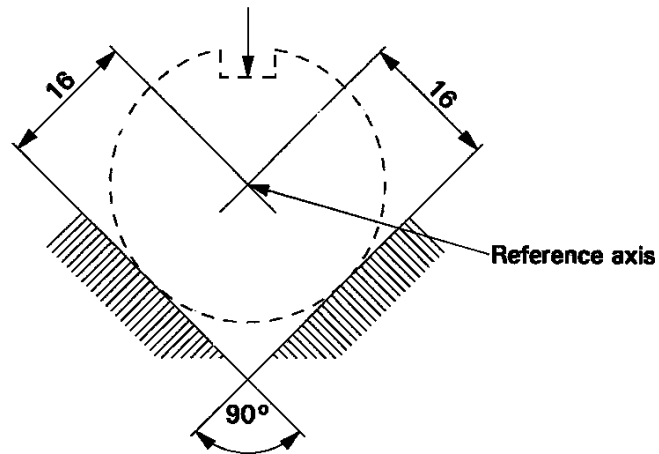
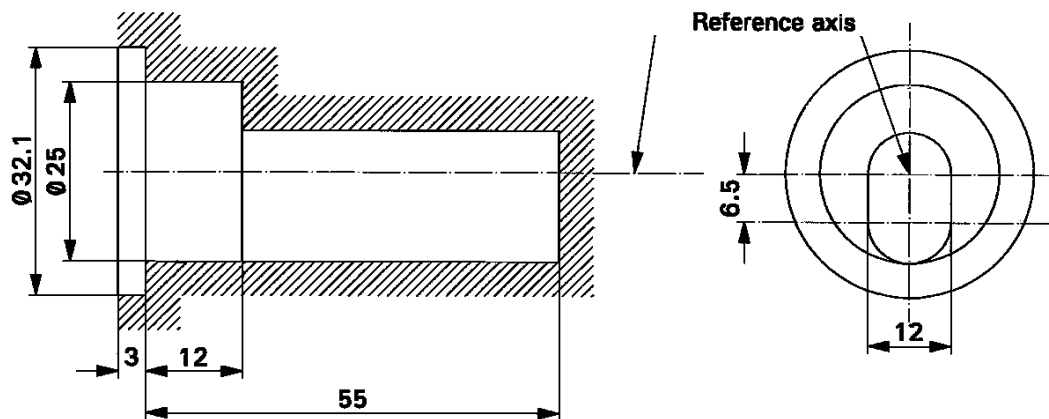


Figure 6
Maximum lamp outline 2/



- 1/ The reference axis is perpendicular to the reference plane and crosses the intersection of the two parallel lines as indicated in figure 5.
- 2/ Glass bulb and supports shall not exceed the envelope, as indicated in figure 6. The envelope is concentric with the reference axis.

CATEGORIES D1R, D2R, D3R AND D4R

Sheet DxR/4

Dimensions		Production light sources	Standard light sources		
Position of electrodes		Sheet DxR/5			
Position and form of the arc		Sheet DxR/6			
Position of the black stripes		Sheet DxR/7			
$\alpha 1$ <u>1/</u>		$45^\circ \pm 5^\circ$			
$\alpha 2$ <u>1/</u>		45° min.			
D1R: Cap PK32d-3 D2R: Cap P32d-3 D3R: Cap PK32d-6 D4R: Cap P32d-6		in accordance with IEC Publication 60061 (sheet 7004-111-2)			
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS					
		D1R/D2R	D3R/D4R	D1R/D2R	D3R/D4R
Rated voltage of the ballast	V	12	<u>2/</u>	12	
Rated wattage	W	35		35	
Test voltage	V	13.5		13.5	
Lamp voltage	Objective	85	42	85	42
	Tolerance	± 17	± 9	± 8	± 4
Lamp wattage	Objective	35		35	
	Tolerance	± 3		± 0.5	
Luminous flux	Objective	2800		2800	
	Tolerance	± 450		± 150	
Colour co-ordinates	Objective	$x = 0.375$		$y = 0.375$	
	Tolerance area <u>3/</u>	$x \geq 0.345$ $x \leq 0.405$	$y \leq 0.150 + 0.640 x$ $y \geq 0.050 + 0.750 x$		
Hot-restrike switch-off time	s	10		10	

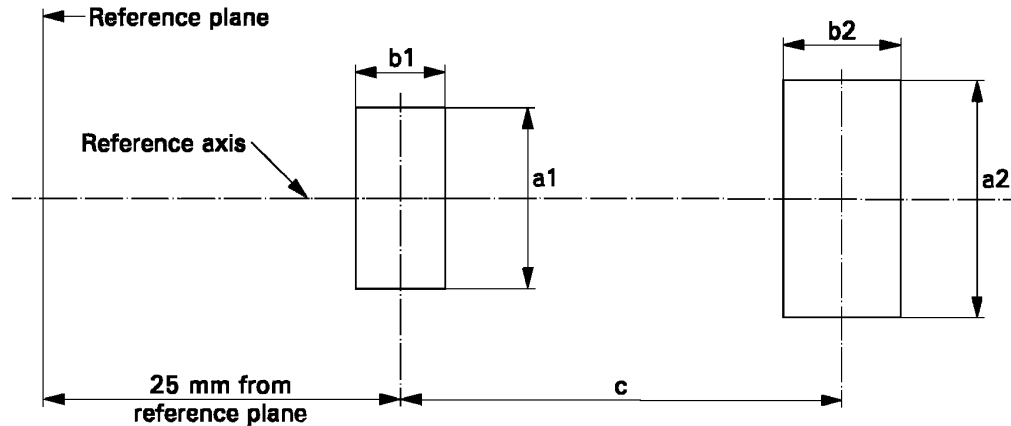
1/ The part of the bulb within the angles $\alpha 1$ and $\alpha 2$ shall be the light emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles $\alpha 1$ and $\alpha 2$ except for the black stripes.

2/ Application voltages of ballasts may differ from 12 V.

3/ See annex 4.

Position of the electrodes

This test is used to determine whether the electrodes are correctly positioned relative to the reference axis and the reference plane.



Measuring direction: light source side and top view

Dimension in mm	Production light sources	Standard light sources
a1	$d + 0.5$	$d + 0.2$
a2	$d + 0.7$	$d + 0.35$
b1	0.4	0.15
b2	0.8	0.3
c	4.2	4.2

d = diameter of the electrode;
 $d < 0.3$ for D1R and D2R;
 $d < 0.4$ for D3R and D4R.

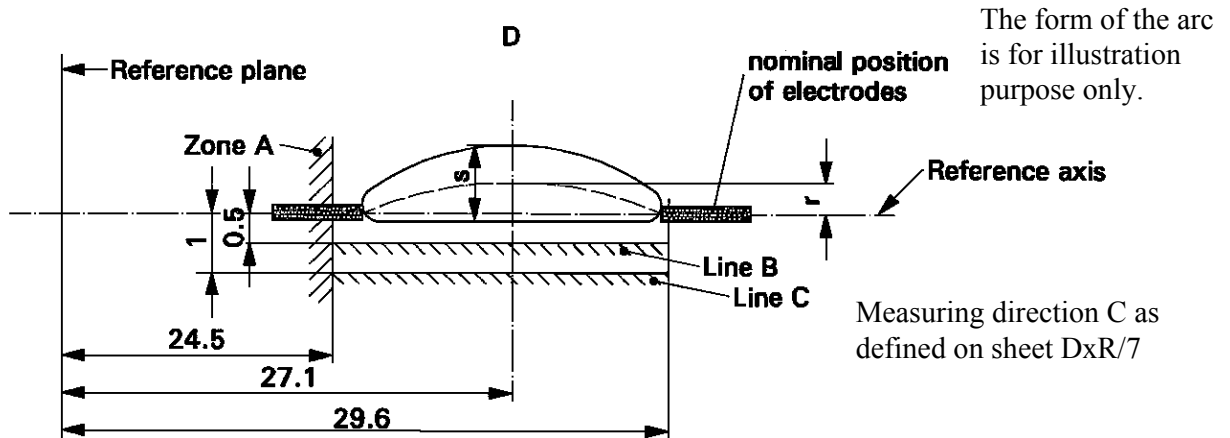
The top of the electrode nearest to the reference plane shall be positioned in the area defined by $a1$ and $b1$. The top of the electrode furthest from the reference plane shall be positioned in the area defined by $a2$ and $b2$.

CATEGORIES D1R, D2R, D3R AND D4R

Sheet DxR/6

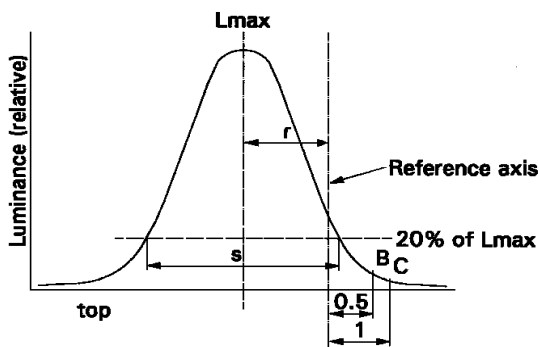
Position and form of the arc

This test is used to determine the form and sharpness of the arc and its position relative to the reference axis and plane by measuring its bending and diffusion in the central cross section D and by measuring stray light intensities in Zone A and at lines B and C.



When measuring the relative luminance distribution in the central cross section D as indicated in the drawing above, the maximum value L_{max} has the distance r from the reference axis. The points of 20% of L_{max} have the distance s , as shown in the drawing below.

Dimension in mm	Production light sources	Standard light sources
r	0.50 ± 0.25	0.50 ± 0.20
s	1.10 ± 0.25	1.10 ± 0.25



Relative luminance distribution in the central cross section D.

Determination of:

- arc bending r
- arc diffusion s
- Luminance L_{max}

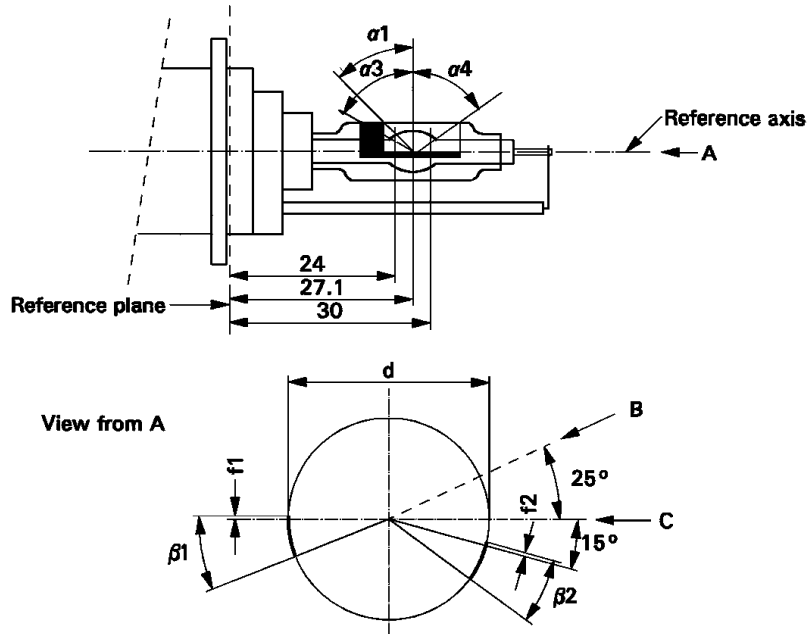
When measuring the luminances from measuring direction B as defined on sheet DxR/7 with a set-up as outlined in annex 5, however with a circular field of 0.2M mm diameter, the relative luminance expressed as a percentage of L_{max} (at cross section D) shall be:

Zone A	$\leq 4.5 \%$	Line B	$\leq 15 \%$	Line C	$\leq 5.0 \%$
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The area of zone A is defined by the black coating, the outer bulb and a plane at 24.5 mm from the reference plane.

Position of black stripes

This test is used to determine whether the black stripes are correctly positioned relative to the reference axis and the reference plane.



When measuring the luminance distribution of the arc in the central cross section as defined on sheet DxR/6, after having turned the light source so that the black stripe is covering the arc, the measured luminance shall be $\leq 0.5\%$ of L_{max} .

In the area defined by $\alpha 1$ and $\alpha 3$ the black coating may be replaced by any other means which prevents light transmission through the specified area.

Dimensions	Production light sources	Standard light sources
$\alpha 1$		$45^\circ \pm 5^\circ$
$\alpha 3$		70° min.
$\alpha 4$		65° min.
$\beta 1/24, \beta 1/30, \beta 2/24, \beta 2/30$		$25^\circ \pm 5^\circ$
$f1/24, f2/24$ <u>1/</u>	0.15 ± 0.25	0.15 ± 0.20
$f1/30$ <u>1/</u>	$f1/24 \text{ mv} \pm 0.15$ <u>2/</u>	$f1/24 \text{ mv} \pm 0.1$
$f2/30$ <u>1/</u>	$f2/24 \text{ mv} \pm 0.15$ <u>2/</u>	$f2/24 \text{ mv} \pm 0.1$
$f1/24 \text{ mv} - f2/24 \text{ mv}$	$\pm 0.3 \text{ max.}$	$\pm 0.2 \text{ max.}$
d		9 ± 1

1/ "f1/.." means dimension f1 to be measured at the distance from the reference plane indicated in mm after the stroke.

2/ " /24 mv" means the value measured at a distance of 24 mm from the reference plane.

CATEGORIES D1S, D2S, D3S AND D4S

Sheet DxS/1

The drawings are intended only to illustrate the essential dimensions (in mm)
of the gas-discharge light source

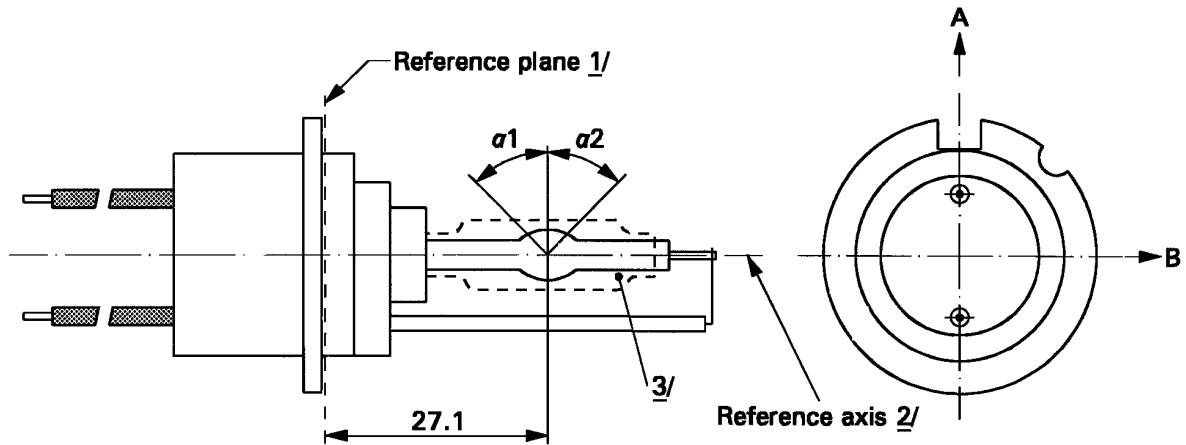


Figure 1 - Category D1S - Type with cables - Cap PK32d-2

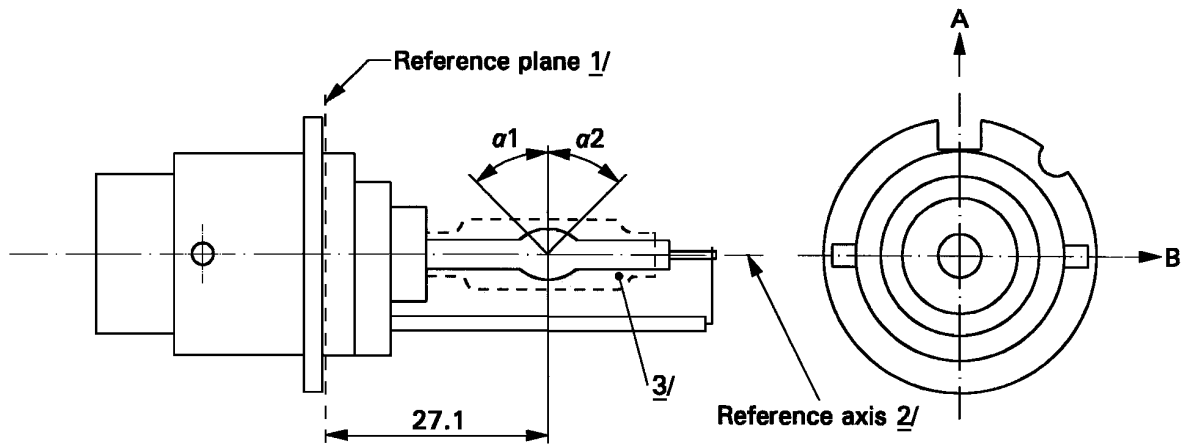


Figure 2 - Category D2S - Type with connector - Cap P32d-2

- 1/ The reference plane is defined by the positions on the surface of the holder on which the three supporting bosses of the cap ring will rest.
- 2/ See sheet DxS/3.
- 3/ When measured at a distance of 27.1 mm from the reference plane and with respect to the mid-point of the inner bulb, the outer bulb shall have an eccentricity of 1 mm max.

The drawings are intended only to illustrate the essential dimensions (in mm)
of the gas-discharge light source

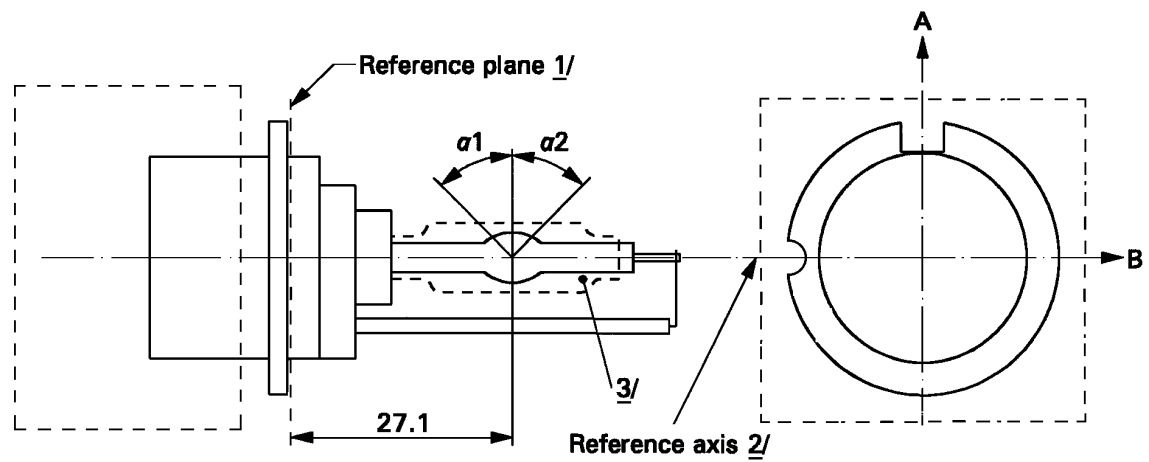


Figure 3 - Category D3S - Type with starter - Cap PK32d-5

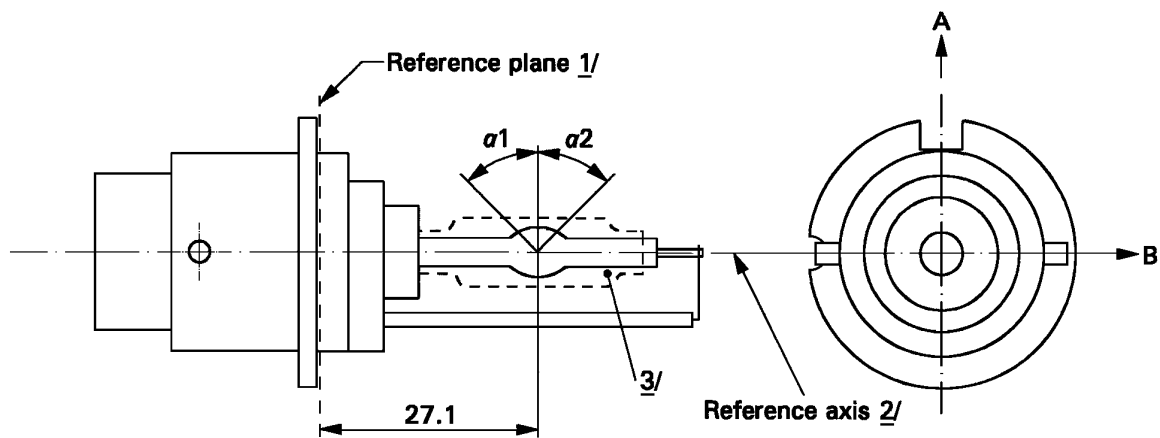


Figure 4 - Category D4S - Type with connector - Cap P32d-5

- 1/ The reference plane is defined by the positions on the surface of the holder on which the three supporting bosses of the cap ring will rest.
- 2/ See sheet DxS/3.
- 3/ When measured at a distance of 27.1 mm from the reference plane and with respect to the mid-point of the inner bulb, the outer bulb shall have an eccentricity of 1 mm max.

Figure 5
Definition of reference axis 1/

The cap shall be pushed in this direction

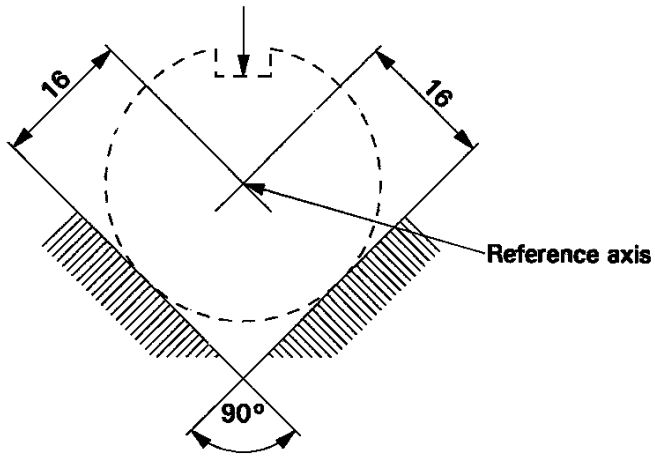
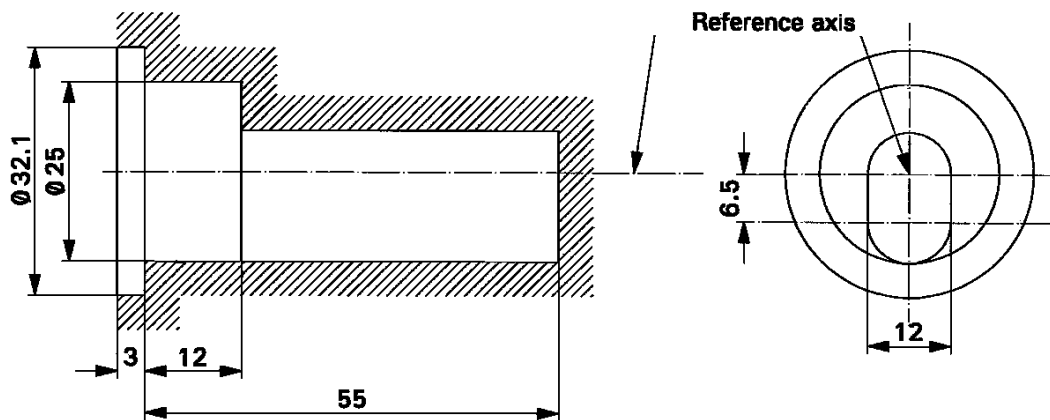


Figure 6
Maximum lamp outline 2/



- 1/ The reference axis is perpendicular to the reference plane and crosses the intersection of the two parallel lines as indicated in figure 5.
- 2/ Glass bulb and supports shall not exceed the envelope, as indicated in figure 6. The envelope is concentric with the reference axis.

CATEGORIES D1S, D2S, D3S AND D4S

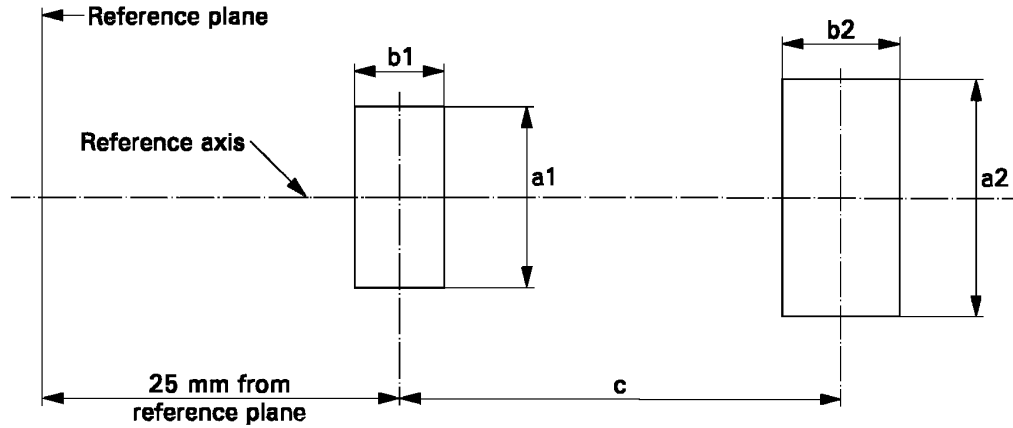
Sheet DxS/4

Dimensions		Production light sources	Standard light sources			
Position of electrodes		Sheet DxS/5				
Position and form of the arc		Sheet DxS/6				
$\alpha 1, \alpha 2$ <u>1/</u>		55° min.	55° min.			
D1S: Cap PK32d-2 D2S: Cap P32d-2 D3S: Cap PK32d-5 D4S: Cap P32d-5		in accordance with IEC Publication 60061 (sheet 7004-111-2)				
ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS						
		D1S/D2S	D3S/D4S	D1S/D2S	D3S/D4S	
Rated voltage of the ballast	V	12	<u>2/</u>	12		
Rated wattage	W	35		35		
Test voltage	V	13.5		13.5		
Lamp voltage	Objective	V	85	42	85	42
	Tolerance		± 17	± 9	± 8	± 4
Lamp wattage	Objective	W	35		35	
	Tolerance		± 3		± 0.5	
Luminous flux	Objective	lm	3200		3200	
	Tolerance		± 450		± 150	
Colour co-ordinates	Objective		x = 0.375		y = 0.375	
	Tolerance area <u>3/</u>		x ≥ 0.345		y ≤ 0.150 + 0.640 x	
			x ≤ 0.405		y ≥ 0.050 + 0.750 x	
Hot-restrike switch-off time	s	10		10		

- 1/ The part of the bulb within the angles $\alpha 1$ and $\alpha 2$ shall be the light emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles $\alpha 1$ and $\alpha 2$.
- 2/ Application voltages of ballasts may differ from 12 V.
- 3/ See annex 4.

Position of the electrodes

This test is used to determine whether the electrodes are correctly positioned relative to the reference axis and the reference plane.



Measuring direction: light source side and top view

Dimension in mm	Production light sources	Standard light sources
a1	$d + 0.2$	$d + 0.1$
a2	$d + 0.5$	$d + 0.25$
b1	0.3	0.15
b2	0.6	0.3
c	4.2	4.2

d = diameter of the electrode;
 $d < 0.3$ for D1S and D2S;
 $d < 0.4$ for D3S and D4S.

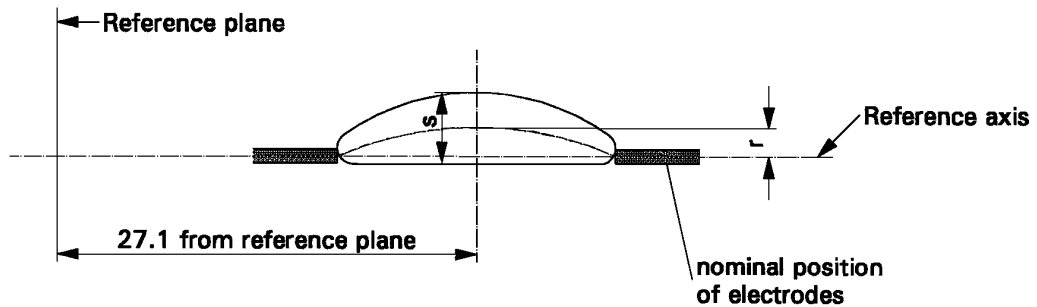
The top of the electrode nearest to the reference plane shall be positioned in the area defined by $a1$ and $b1$. The top of the electrode furthest from the reference plane shall be positioned in the area defined by $a2$ and $b2$.

Position and form of the arc

This test is used to determine the form of the arc and its position relative to the reference axis and the reference plane by measuring its bending and diffusion in the cross section at a distance 27.1 mm from the reference plane.

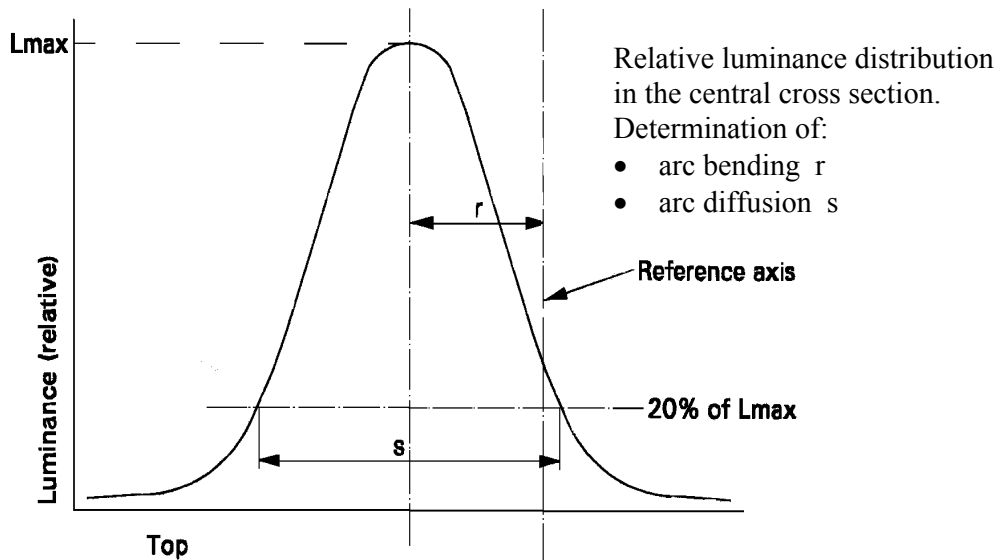
The form of the arc is for illustration purposes only.

Measuring direction: light source side view



When measuring the relative luminance distribution in the central cross section as indicated in the drawing above, the maximum value shall be located within the distance r from the reference axis. The point of 20% of the maximum value shall be within s .

Dimension in mm	Production light sources	Standard light sources
r	0.50 ± 0.40	0.50 ± 0.20
s	1.10 ± 0.40	1.10 ± 0.25



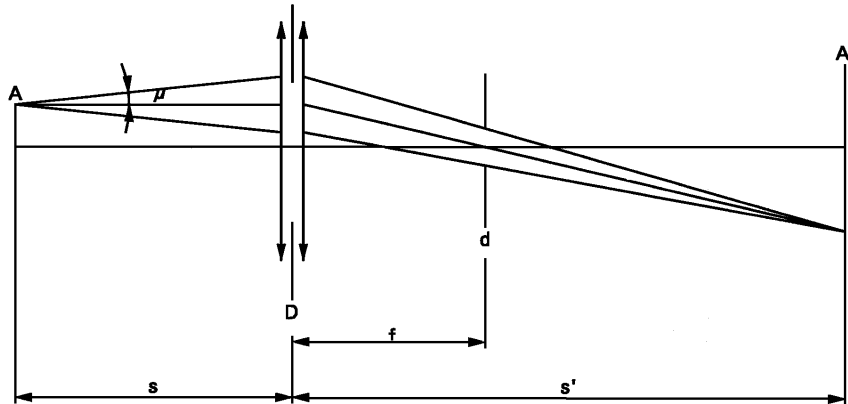
Annex 5, amend to read:

"Annex 5

OPTICAL SETUP FOR THE MEASUREMENT OF THE POSITION AND FORM
OF THE ARC AND OF THE POSITION OF THE ELECTRODES 1/

The gas-discharge light source shall be positioned as shown:

- in figure 1 or figure 2 on sheet DxR/1 or sheet DxS/1;
- in figure 3 or figure 4 on sheet DxR/2 or sheet DxS/2.



An optical system shall project a real image A' of the arc A with a magnification of preferably $M = s'/s = 20$ on a screen. The optical system shall be aplanatic and achromatic. In the focus-length f of the optical system a diaphragm d shall cause a projection of the arc with nearly parallel observation directions. To get the angle of the half divergence not larger than $\mu = 0.5^\circ$, the diameter of the focus-diaphragm with respect to the focus-length of the optical system shall be not more than $d = 2f \tan(\mu)$. The active diameter of the optical system shall be not more than:
 $D = (1 + 1/M)d + c + (b_1 + b_2)/2$. (c , b_1 and b_2 are given on sheet DxS/5, respectively sheet DxR/5).

A scale on the screen shall enable to measure the position of the electrodes. The calibration of the arrangement advantageously can be done by using a separate projector with a parallel beam in connection with a gauge whose shadow is projected to the screen. The gauge shall show the reference axis and the plane parallel to the reference plane and at distance "e" mm from it ($e = 27.1$ for D1R, D1S, D2R, D2S, D3R, D3S, D4R and D4S).

In the plane of the screen a receiver has to be mounted movable in a vertical direction on a line corresponding to the plane at "e" from the reference plane of the gas discharge light source.

The receiver shall have the relative spectral sensitivity of the human eye.

The size of the receiver shall be not more than $0.2 M$ mm in the horizontal and not more than $0.025 M$ mm in the vertical direction ($M =$ the magnification). The range of measurable movement shall be such that the required measures of the arc bending r and arc diffusion s can be measured.

1/ This method is an example of a measurement method; any method with equivalent measurement accuracy may be used.