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

Regulation No 99 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of gas-discharge light sources for use in approved gas-discharge lamp units of power-driven vehicles

Incorporating all valid text up to:

Supplement 9 to the original version of the Regulation — Date of entry into force: 10 June 2014

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1. SCOPE

This Regulation applies to gas-discharge light sources shown in Annex 1 and intended for use in approved gas-discharge lamp units of power-driven vehicles.

2. ADMINISTRATIVE PROVISIONS

2.1. Definitions

2.1.1. The term 'category' is used in this Regulation to describe different basic design of standardised gas-discharge light sources. Each category has a specific designation, as for example: 'D2S'.

2.1.2. 'Gas-discharge light sources of different types' ([1]) are gas-discharge light sources within the same category which differ in such essential respects as:

2.1.2.1. Trade name or mark; that means:

(a) gas-discharge light sources bearing the same trade name or mark but produced by different manufacturers are considered as being of different types;

(b) gas-discharge light sources produced by the same manufacturer differing only by the trade name or mark may be considered to be of the same type;

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

2.2. Application for approval

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

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

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

2.2.2.2. a technical description including, if the ballast is not integrated with the light source, ballast identification;

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

2.2.2.4. one sample of the ballast in case the ballast is not integrated with the light source.

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

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

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

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

2.3. Inscriptions

2.3.1. Gas-discharge light sources submitted for approval shall bear on the cap or bulb:

2.3.1.1. the trade name or mark of the applicant;

2.3.1.2. the international designation of the relevant category;

2.3.1.3. the rated wattage; this need not to be indicated separately if it is part of the international designation of the relevant category;

2.3.1.4. a space of sufficient size to accommodate the approval mark.

2.3.2. The space mentioned in paragraph 2.3.1.4 shall be indicated in the drawings accompanying the application for approval.

([1]) A selective yellow bulb or an additional selective yellow outer bulb, solely intended to change the colour but not the other characteristics of a gas-discharge light source emitting white light, does not constitute a change of type of the gas-discharge light source

2.3.3. Other inscriptions than those covered by paragraphs 2.3.1 and 2.4.4 may be affixed on the cap.

2.3.4. In case the ballast is not integrated with the light source, the ballast used for the type-approval of the light source shall be marked with type and trade mark identification and with the rated voltage and wattage, as indicated on the relevant lamp data sheet.

2.4. Approval

2.4.1. If all samples of a type of gas-discharge light source which are submitted in accordance with paragraphs 2.2.2.3 or 2.2.3.2 comply with the requirements of this Regulation, when tested with the ballast according to paragraph 2.2.2.4 in case the ballast is not integrated with the light source, approval shall be granted.

2.4.2. An approval code shall be assigned to each type approved. Its first character shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval.

This will be followed by an identification code comprising not more than three characters. Only the Arabic numerals and capital letters listed in footnote ([1]) shall be used.

The same Contracting Party may not assign the same code to another type of gas-discharge light source. If the applicant so desires the same approval code may be assigned to both gas-discharge light sources emitting white and selective yellow light (see paragraph 2.1.2).

2.4.3. Notice of approval or of extension or refusal or withdrawal of approval or production definitely discontinued of a type of gas-discharge light source pursuant to this Regulation shall be communicated to the Parties of the Agreement which apply this Regulation by means of a form conforming to the model in Annex 2 to this Regulation and of a drawing, supplied by the applicant for approval in a format not exceeding A4 (210 × 297 mm) and on a scale of at least 2:1.

2.4.4. To every gas-discharge light source conforming to a type approved under this Regulation there shall be affixed in the space referred to in paragraph 2.3.1.4, in addition to the inscriptions required under paragraph 2.3.1, an international approval mark consisting of:

2.4.4.1. a truncated circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ([2]);

2.4.4.2. the approval code, placed close to the truncated circle.

2.4.5. If the applicant has obtained the same approval code for several trade names or marks, one or more of them will suffice to meet the requirements of paragraph 2.3.1.1.

2.4.6. The marks and inscriptions specified in paragraphs 2.3.1 and 2.4.3 shall be clearly legible and be indelible.

2.4.7. Annex 3 to this Regulation gives an example of arrangement of the approval mark.

3. TECHNICAL REQUIREMENTS

3.1. Definitions

3.1.1. 'Gas-discharge light source': light source in which the light is produced by a stabilised discharge arc.

3.1.2. 'Ballast': specific electrical supply for the gas-discharge light source, optionally integrated with the light source.

([1]) 0 1 2 3 4 5 6 7 8 9
A B C D E F G H J K L M N P R S T U V W X Y Z

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

3.1.3. 'Rated voltage': input voltage marked on the ballast or on the light source in the case that the ballast is integrated with the light source.

3.1.4. 'Rated wattage': wattage marked on the gas-discharge light source and ballast.

3.1.5. 'Test voltage': voltage, at the input terminals of the ballast or at the terminals of the light source in the case that the ballast is integrated with the light source, for which the electrical and photometric characteristics of the gas-discharge light source are intended and are to be tested.

3.1.6. 'Objective value': design value of an electrical or photometric characteristic. To be achieved, within the specified tolerances, when the gas-discharge light source is energised by the ballast, optionally integrated with the light source, and operated at test voltage.

3.1.7. 'Standard (etalon) gas-discharge light source': special gas-discharge light source used for the testing of headlamps. It has reduced dimensional, electrical and photometric characteristics as specified on the relevant data sheet.

3.1.8. 'Reference axis': an axis defined with reference to the cap and to which certain dimensions of the gas-discharge light source are referred.

3.1.9. 'Reference plane': a plane defined with reference to the cap and to which certain dimensions of the gas-discharge light source are referred.

3.2. General specifications

3.2.1. Each sample submitted shall conform to the relevant specifications of this Regulation when tested, in the case the ballast is not integrated with the light source with the ballast according to paragraph 2.2.2.4.

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

3.3. Manufacture

3.3.1. The bulbs of the gas-discharge light sources shall exhibit no scores or spots which might impair their efficiency and their optical performance.

3.3.2. In the case of a coloured (outer) bulb, after an operating period of 15 hours with the ballast or the light source with the ballast integrated at test voltage, the surface of the bulb shall be lightly wiped with a cotton cloth soaked in a mixture of 70 volume per cent of n-heptane and 30 volume per cent of toluol. After about five minutes, the surface shall be inspected visually. It shall not show any apparent changes.

3.3.3. Gas-discharge light sources shall be equipped with standard caps complying with the cap data sheets of IEC Publication 60061, third edition, as specified on the individual data sheets of Annex 1.

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

3.3.5. To ascertain whether gas-discharge light sources conform to the requirements of paragraphs 3.3.3 to 3.3.4, a visual inspection, a dimension check and, where appropriate, a trial fitting shall be carried out.

3.4. Tests

3.4.1. Gas-discharge light sources shall be aged as indicated in Annex 4.

3.4.2. All samples shall be tested with the ballast, according to paragraph 2.2.2.4, in case the ballast is not integrated with the light source.

3.4.3. Electrical measurements shall be carried out with instruments of at least class 0,2. (0,2 % full scale accuracy).

3.5. Position and dimensions of electrodes, arc and stripes

3.5.1. The geometric position of the electrodes shall be as specified on the relevant data sheet. An example of a method of measuring arc and electrodes position is given in Annex 5. Other methods may be used.

3.5.1.1. The position and dimensions of the light source electrodes shall be measured before the ageing period, the gas-discharge light source unlit and using optical methods through the glass envelope.

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

3.5.2.1. The measurement shall be made after ageing with the light source supplied by the ballast at test voltage or the light source with the ballast integrated at test voltage.

3.5.3. The position and dimension and transmission of the stripes shall comply with the requirements as given on the relevant data sheet.

3.5.3.1. The measurement shall be made after ageing with the light source supplied by the ballast at test voltage or the light source with the ballast integrated at test voltage.

3.6. Starting, run-up and hot-restrike characteristics

3.6.1. Starting

When tested according to the conditions specified in Annex 4, the gas-discharge light source shall start directly and remain alight.

3.6.2. Run-up

3.6.2.1. For gas-discharge light sources having an objective luminous flux which exceeds 2 000 lm:

When measured according to the conditions specified in Annex 4, the gas-discharge light source shall emit at least:

after 1 second: 25 % of its objective luminous flux

after 4 seconds: 80 % of its objective luminous flux.

The objective luminous flux as indicated on the relevant data sheet.

3.6.2.2. For gas-discharge light sources having an objective luminous flux which does not exceed 2 000 lm:

When measured according to the conditions specified in Annex 4, the gas-discharge light sources shall emit at least 800 lm after 1 second and at least 1 000 lm after 4 seconds.

The objective luminous flux as indicated on the relevant data sheet.

3.6.3. Hot-restrike

When tested according to the conditions specified in Annex 4, the gas-discharge light source shall restart directly after being switched off for a period as indicated on the data sheet. After one second the light source shall emit at least 80 % of its objective luminous flux.

3.7. Electrical characteristics

When measured according to the conditions specified in Annex 4, the voltage and wattage of the light source shall be within the limits given on the relevant data sheet.

3.8. Luminous flux

When measured according to the conditions specified in Annex 4, the luminous flux shall be within the limits given on the relevant data sheet. In the case where white and selective yellow is specified for the same type, the objective value applies to light sources emitting white light, whereas the luminous flux of the light source emitting selective yellow light shall be at least 68 % of the specified value.

3.9. Colour

3.9.1. The colour of the light emitted shall be white or selective yellow. Moreover, the colorimetric characteristics, expressed in CIE chromaticity coordinates, shall lie within the boundaries given on the relevant data sheet.

3.9.2. The definitions of the colour of the light emitted, given in Regulation No 48 and its series of amendments in force at the time of application for type-approval shall apply to this Regulation.

3.9.3. The colour shall be measured according to the conditions specified in Annex 4, paragraph 10.

3.9.4. The minimum red content of a gas-discharge light source shall be such that:

$$k_{red} = \frac{\int_{\lambda=610\,nm}^{780\,nm} E_e(\lambda) \cdot V(\lambda) \cdot d\lambda}{\int_{\lambda=380\,nm}^{780\,nm} E_e(\lambda) \cdot V(\lambda) \cdot d\lambda} \geq 0{,}05$$

where:

E_e (λ)	(W/nm)	is the spectral distribution of the radiant flux
V (λ)	(l)	is the spectral luminous efficiency
λ	(nm)	is the wavelength.

This value shall be calculated using intervals of one nanometre.

3.10. UV radiation

The UV radiation of the gas-discharge light source shall be such that the gas-discharge light source is of the low UV type complying with:

$$k_{uv} = \frac{\int_{\lambda=250\,nm}^{400\,nm} E_e(\lambda) \cdot S(\lambda) \cdot d\lambda}{k_m \cdot \int_{\lambda=380\,nm}^{400\,nm} E_e(\lambda) \cdot V(\lambda) \cdot d\lambda} \leq 10^{-5}\,W/lm$$

where:

S (λ)	(1)	is the spectral weighting function
k_m = 683	(lm/W)	is the photometric radiation equivalent.

(For definitions of other symbols see paragraph 3.9.4 above.)

This value shall be calculated using intervals of one nanometre.

The UV radiation shall be weighted according to the values as indicated in the following table.

λ	S(λ)	λ	S(λ)	λ	S(λ)
250	0,430	305	0,060	355	0,00016
255	0,520	310	0,015	360	0,00013

λ	S(λ)	λ	S(λ)	λ	S(λ)
260	0,650	315	0,003	365	0,00011
265	0,810	320	0,001	370	0,000090
270	1,000	325	0,00050	375	0,000077
275	0,960	330	0,00041	380	0,000064
280	0,880	335	0,00034	385	0,000053
285	0,770	340	0,00028	390	0,000044
290	0,640	345	0,00024	395	0,000036
295	0,540	350	0,00020	400	0,000030
300	0,300				

Wavelengths chosen are representative; other values should be interpolated.

Values according to 'IRPA/INIRC Guidelines on limits of exposure to ultraviolet radiation'.

3.11. Standard gas-discharge light sources

Standard (etalon) gas-discharge light sources shall comply with the requirements applicable to type-approval light sources and to the specific requirements as stated in the relevant data sheet. In case of a type emitting white and selective yellow light, the standard light source shall emit white light.

4. CONFORMITY OF PRODUCTION

4.1. Gas-discharge light sources approved to this Regulation shall be so manufactured as to conform to the type approved by meeting the inscriptions and technical requirements set forth in paragraph 3 above and Annexes 1 and 3 to this Regulation.

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

4.3. The holder of the approval shall in particular:

4.3.1. ensure existence of procedures for the effective control of the quality of products;

4.3.2. have access to the control equipment necessary for checking the conformity to each approved type;

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

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

4.3.5. ensure that for each type of gas-discharge light source, at least the tests prescribed in Annex 6 to this Regulation are carried out;

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

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

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

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

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

4.4.4. The Competent Authority may carry out any tests prescribed in this Regulation. These tests will be on samples selected at random without causing distortion of the manufacturer's delivery commitments and in accordance with criteria of Annex 8.

4.4.5. The Competent Authority shall strive to obtain a frequency of inspection of once every two years. However, this is at the discretion of the Competent Authority and their confidence in the arrangements for ensuring effective control of conformity of production. In the case where negative results are recorded, the Competent Authority shall ensure that all necessary steps are taken to re-establish the conformity of production as rapidly as possible.

5. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

5.1. The approval granted in respect of a gas-discharge light source pursuant to this Regulation may be withdrawn if the prescribed conformity of production requirements are not met.

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

6. PRODUCTION DEFINITELY DISCONTINUED

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

7. NAMES AND ADDRESSES OF THE TECHNICAL SERVICES RESPONSIBLE FOR CONDUCTING APPROVAL TESTS, AND OF ADMINISTRATIVE DEPARTMENTS

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

ANNEX 1

SHEETS FOR GAS-DISCHARGE LIGHT SOURCES

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

Light source category	Sheet numbers
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
D5S	D5S/1 to 5
D6S	D6S/1 to 5
D8S	D8S/1 to 5

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

Sheet numbers	
DxR/1 to 7	(Sheet DxR/6: two pages)
DxS/1 to 6	
D5S/1 to 5	
D6S/1 to 5	
D8S/1 to 5	

Categories D1R, D2R, D3R and D4R — Sheet DxR/1

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

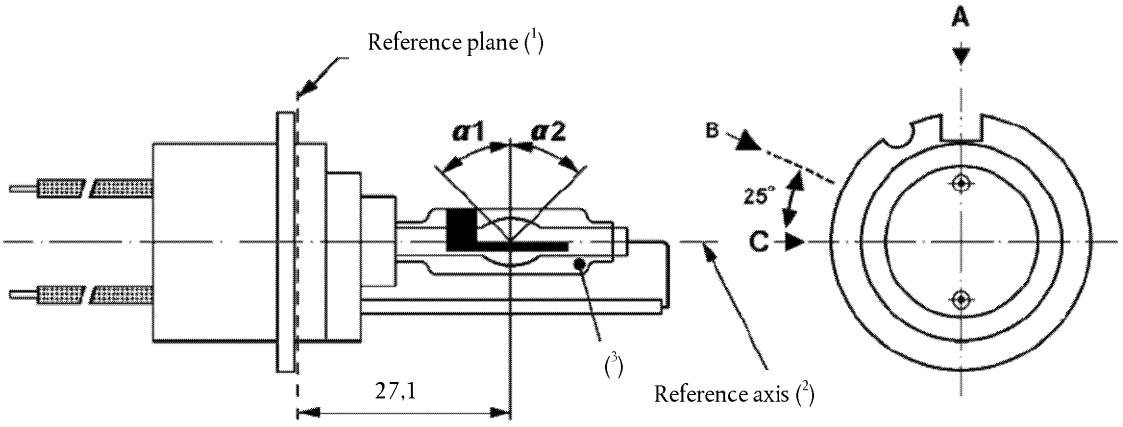
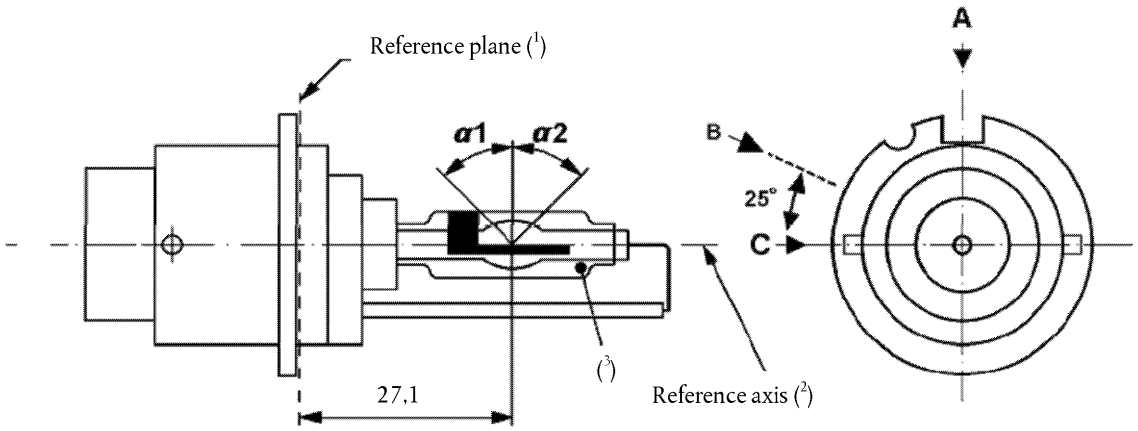


Figure 2

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 C 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

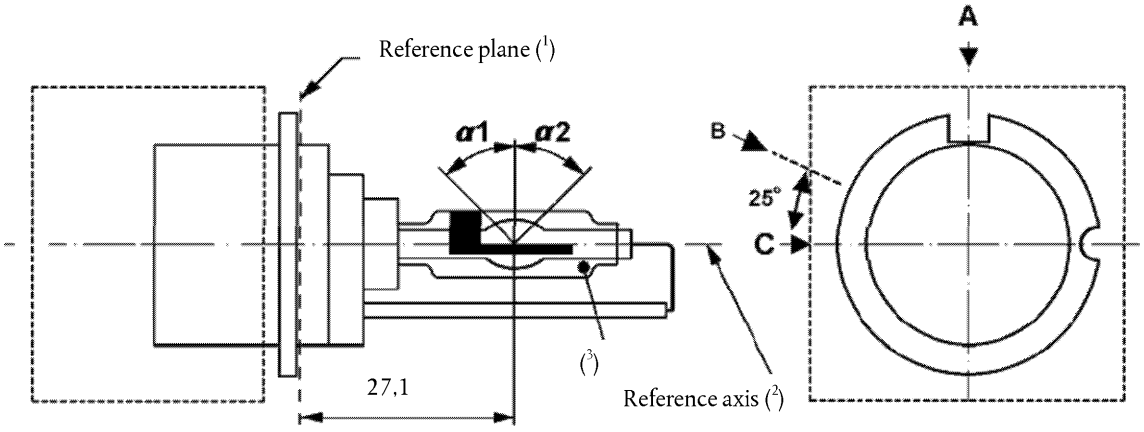
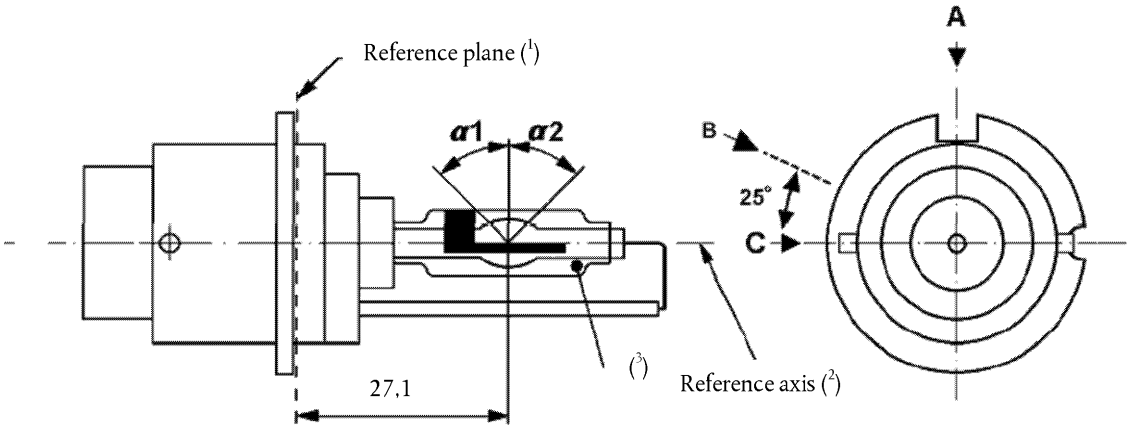


Figure 4

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 C and less than − 1 mm/+ 0,5 mm in direction A.

Categories D1R, D2R, D3R and D4R — Sheet DxR/3

Figure 5

Definition of reference axis (1)

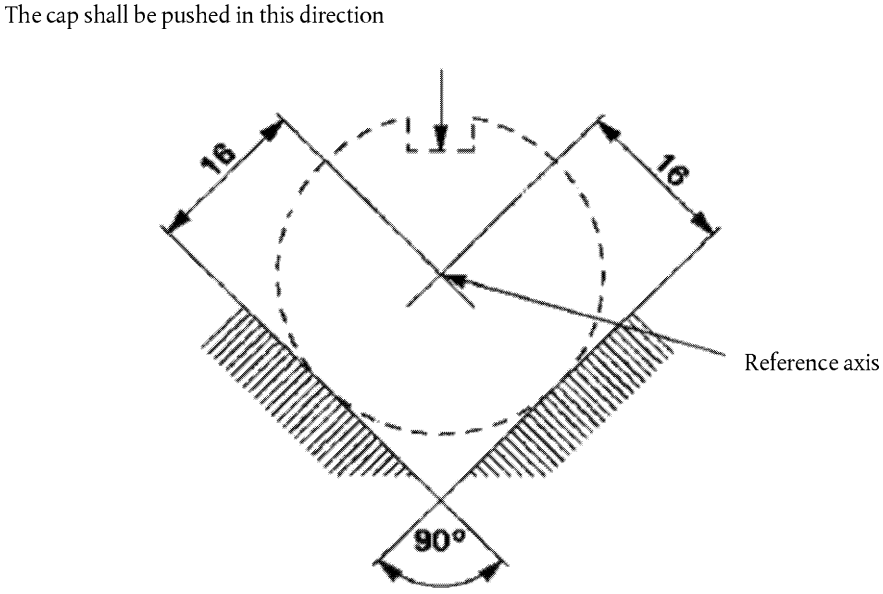
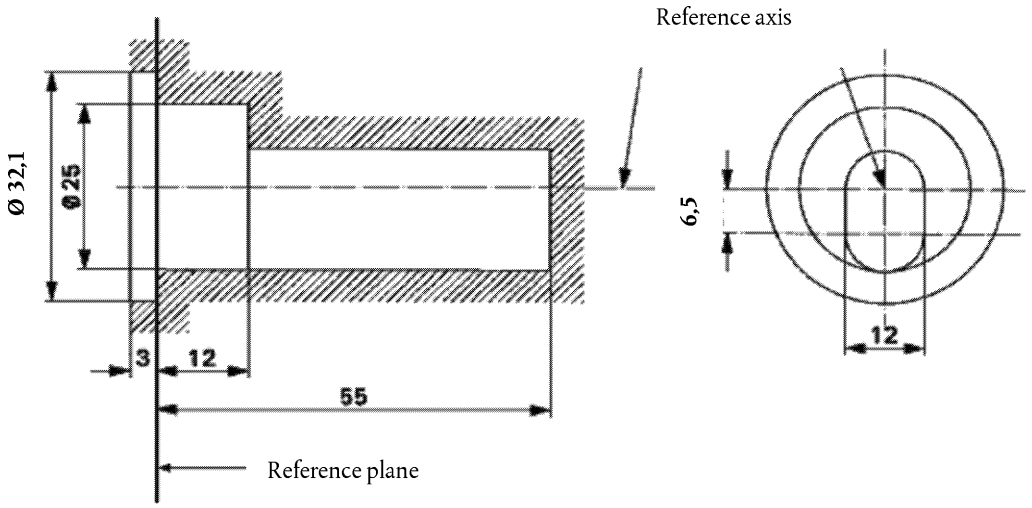


Figure 6

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	
α1 ([1])	45° ± 5°	
α2 ([1])	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 7004-111-4)

ELECTRICAL AND PHOTOMETRIC CHARCTERISTICS

		D1R/D2R	D3R/D4R	D1R/D2R	D3R/D4R
Rated voltage of the ballast	V	12 ([2])		12	
Rated wattage	W	35		35	
Test voltage	V	13,5		13,5	

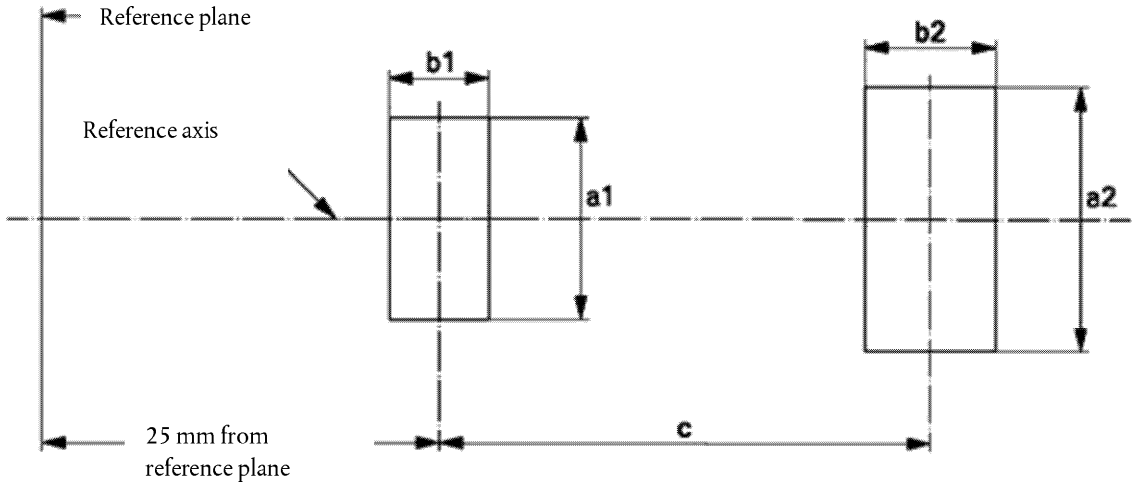
Dimensions			Production light sources		Standard light sources	
			D1R/D2R	D3R/D4R	D1R/D2R	D3R/D4R
Lamp voltage	Objective	V	85	42	85	42
	Tolerance		± 17	± 9	± 8	± 4
Lamp wattage	Objective	W	35		35	
	Tolerance		± 3		± 0,5	
Luminous flux	Objective	lm	2 800		2 800	
	Tolerance		± 450		± 150	
Chromaticity coordinates in the case of white light	Objective		x = 0,375		y = 0,375	
	Tolerance area (3)	Boundaries	x = 0,345 x = 0,405		y = 0,150 + 0,640 x y = 0,050 + 0,750 x	
		Intersection points	x = 0,345 x = 0,405 x = 0,405 x = 0,345		y = 0,371 y = 0,409 y = 0,354 y = 0,309	
Hot-restrike switch-off time		s	10		10	

(1) The part of the bulb within the angles α1 and α2 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 α1 and α2 except for the black stripes.
(2) Application voltages of ballasts may differ from 12 V.
(3) See Annex 4.

Categories D1R, D2R, D3R and D4R — Sheet DxR/5

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

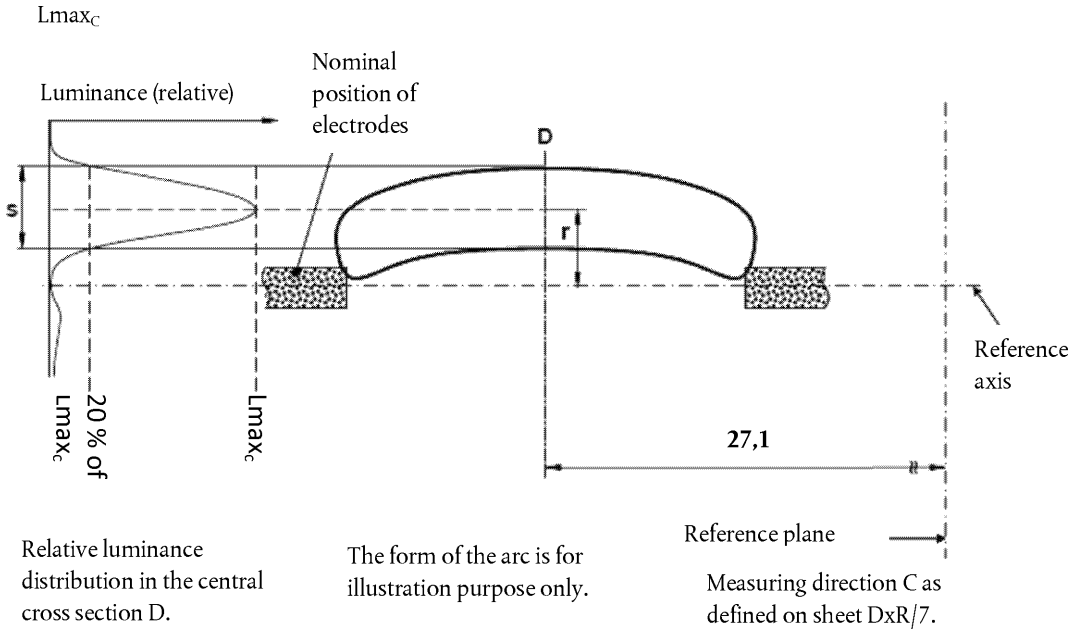
d = diameter of the electrode:
d < 0,3 for D1R and D2R
d < 0,4 for D3R and D4R.

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 (Page 1 out of 2)

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 determining its bending and diffusion; by measuring the luminance in the central cross section D, where $Lmax_C$ is the maximum luminance of the arc measured from viewing direction C; see sheet DxR/2.



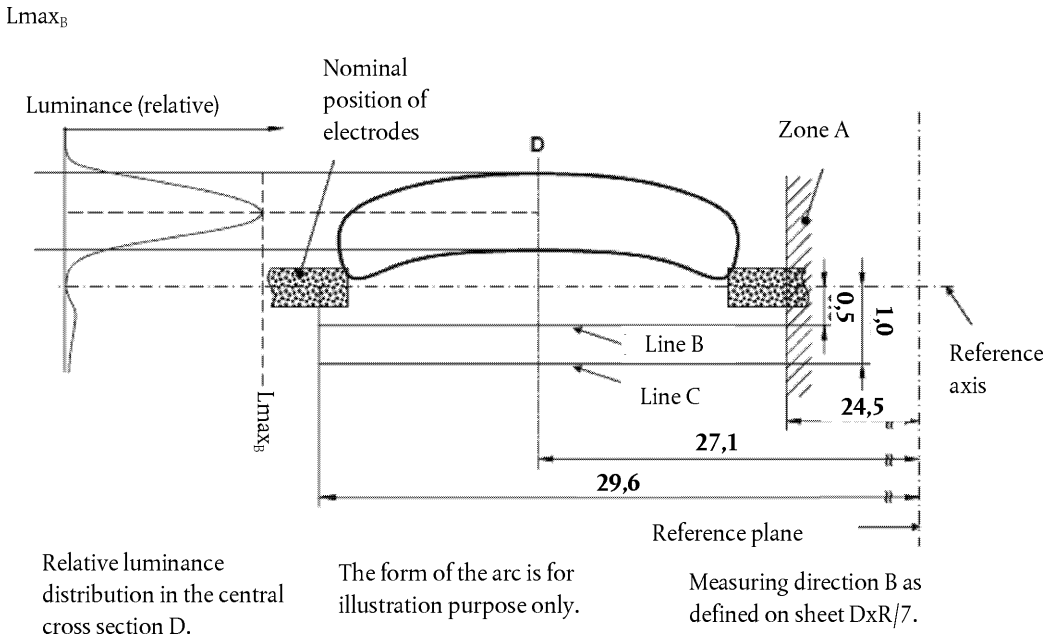
When measuring the relative luminance distribution in the central cross section D as indicated in the drawing above, the maximum value $Lmax_C$ has the distance r from the reference axis. The points of 20 % of $Lmax_C$ have the distance s, as shown in the drawing above.

Dimension in mm	Production light sources		Standard light sources
	D1R/D2R	D3R/D4R	
r (arc bending)	0,50 ± 0,25	0,50 ± 0,25	0,50 ± 0,20
s (arc diffusion)	1,10 ± 0,25	1,10 + 0,25/– 0,40	1,10 ± 0,25

Categories D1R, D2R, D3R and D4R — Sheet DxR/6 (Page 2 out of 2)

Stray light

This test is used to determine unwanted reflected stray light by measuring the luminance in Zone A and at lines B and C, where $Lmax_B$ is the maximum luminance of the arc measured from viewing direction B; see sheet DxR/2.



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 0,2 M mm diameter, the relative luminance expressed as a percentage of $Lmax_B$ (at cross section D) shall be:

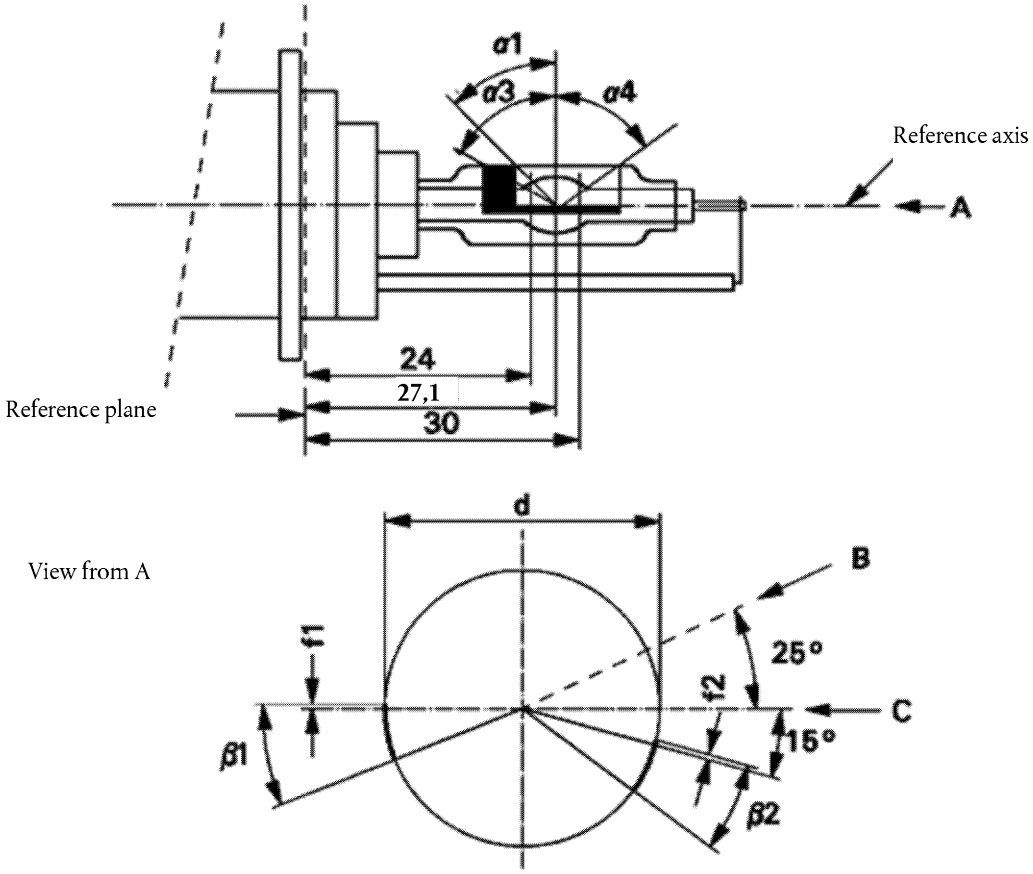
Zone A	≤ 4,5 %
Line B	≤ 15 %
Line C	≤ 5,0 %

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.

Categories D1R, D2R, D3R and D4R — Sheet DxR/7

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 ≤ 0,5 % of Lmax.

In the area defined by α1 and α3 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
α1	45° ± 5°	
α3	70° min.	
α4	65° min.	
β1/24, β1/30, β2/24, β2/30	25° ± 5°	
f1/24, f2/24 (1)	0,15 ± 0,25	0,15 ± 0,20
f1/30 (1)	f1/24 mv ± 0,15 (2)	f1/24 mv ± 0,1
f2/30 (1)	f2/24 mv ± 0,15 (2)	f2/24 mv ± 0,1

Dimensions	Production light sources	Standard light sources
f1/24 mv - f2/24 mv	± 0,3 max.	± 0,2 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

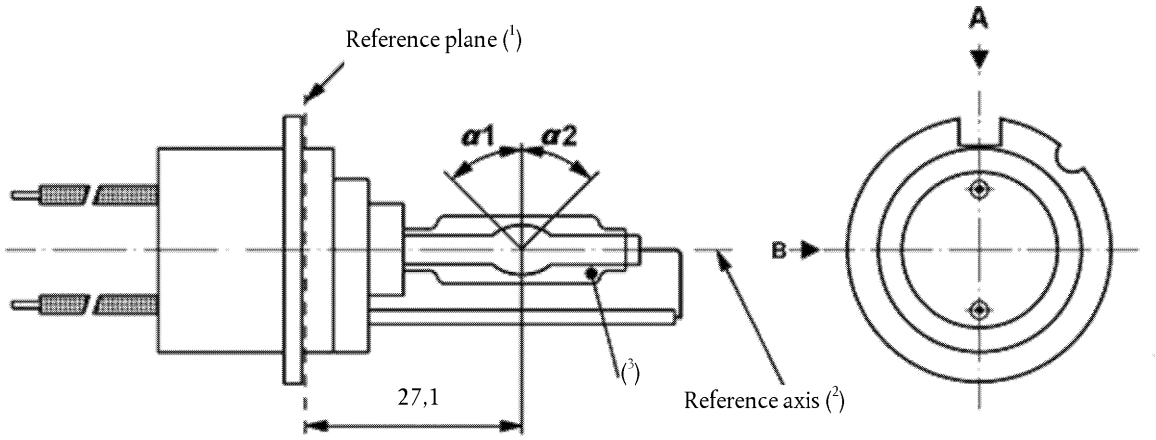
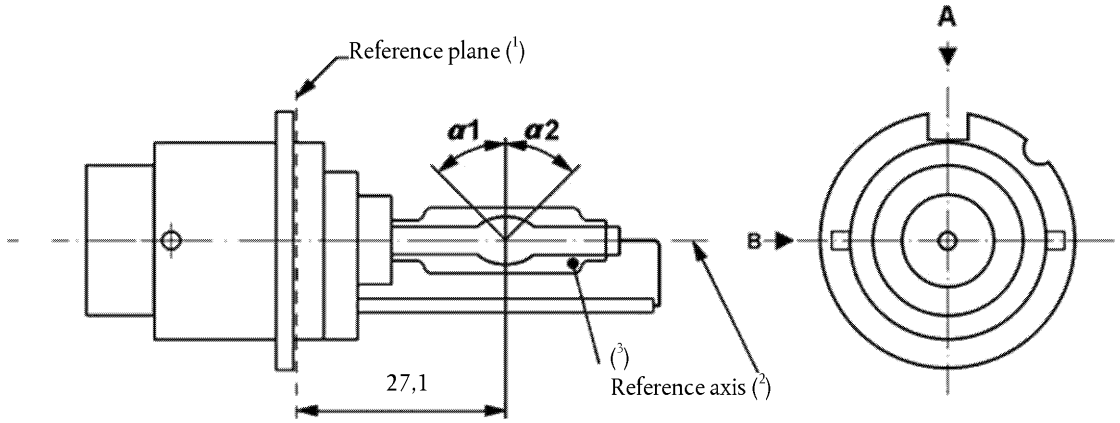


Figure 2

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.

Categories D1S, D2S, D3S and D4S — Sheet DxS/2

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

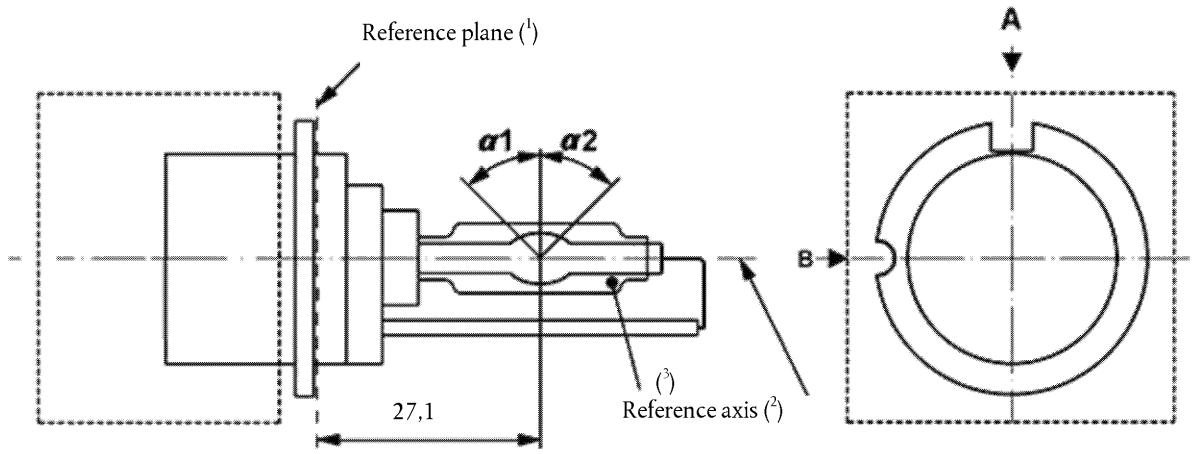
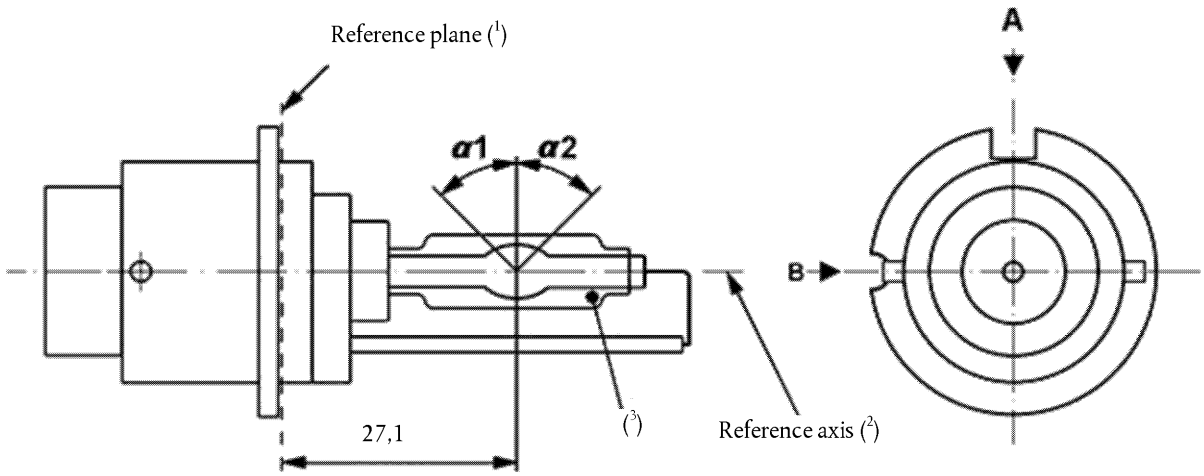


Figure 4

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.

Categories D1S, D2S, D3S and D4S — Sheet DxS/3

Figure 5

Definition of reference axis ([1])

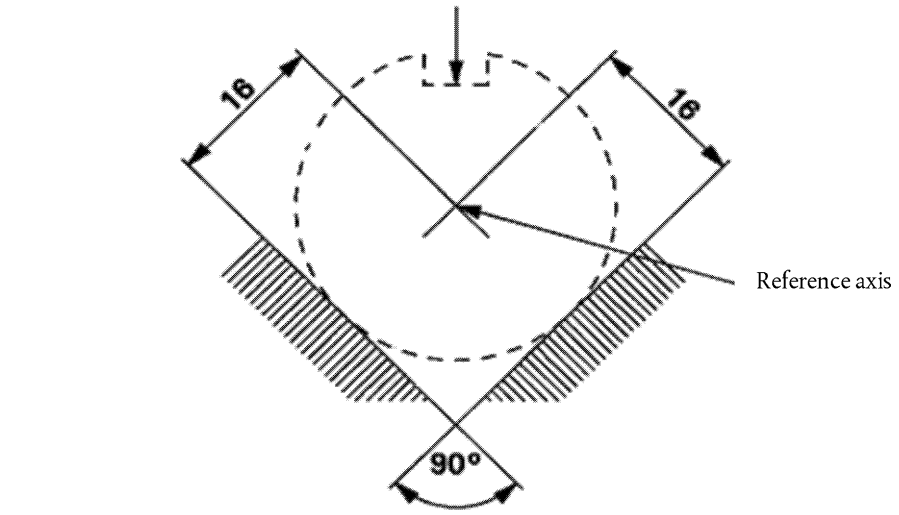
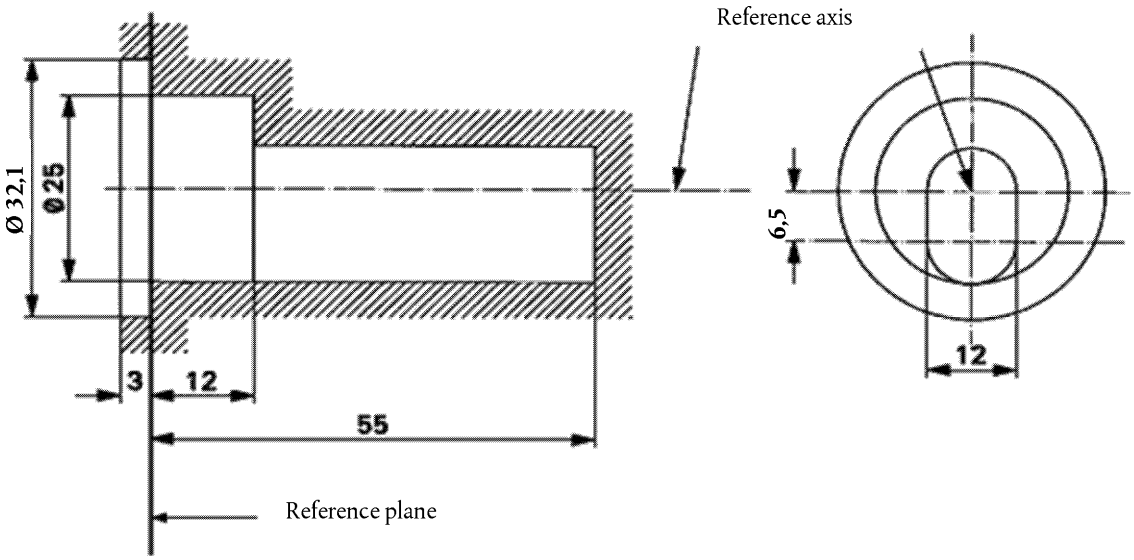


Figure 6

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	
α1, α2 (1)	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 7004-111-4)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

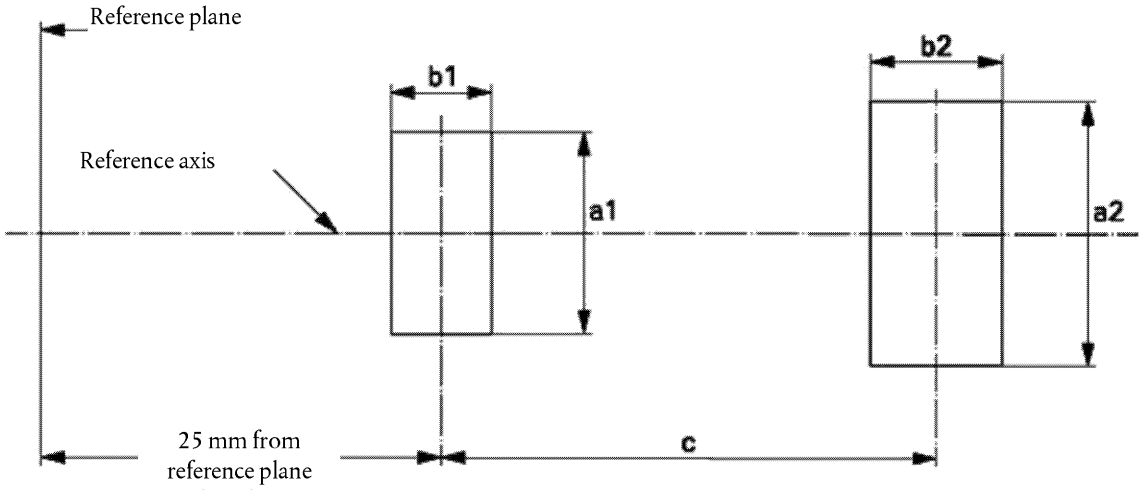
			D1S/D2S	D3S/D4S	D1S/D2S	D3S/D4S
Rated voltage of the ballast		V	12 (2)		12	
Rated wattage		W	35		35	
Test voltage		V	13,5		13,5	
Lamp voltage	Objective	V	85	42	85	42
	Tolerance		± 17	± 9	± 8	± 4
Lamp wattage	Objective	W	35		35	
	Tolerance		± 3		± 0,5	
Luminous flux	Objective	lm	3 200		3 200	
	Tolerance		± 450		± 150	
Chromaticity coordinates	Objective		x = 0,375		y = 0,375	
	Tolerance area (3)	Boundaries	x = 0,345 x = 0,405		y = 0,150 + 0,640 x y = 0,050 + 0,750 x	
		Intersection points	x = 0,345 x = 0,405 x = 0,405 x = 0,345		y = 0,371 y = 0,409 y = 0,354 y = 0,309	
Hot-restrike switch-off time		s	10		10	

(1) The part of the bulb within the angles α1 and α2 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 α1 and α2.
(2) Application voltages of ballasts may differ from 12 V.
(3) See Annex 4.

Categories D1S, D2S, D3S and D4S — Sheet DxS/5

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

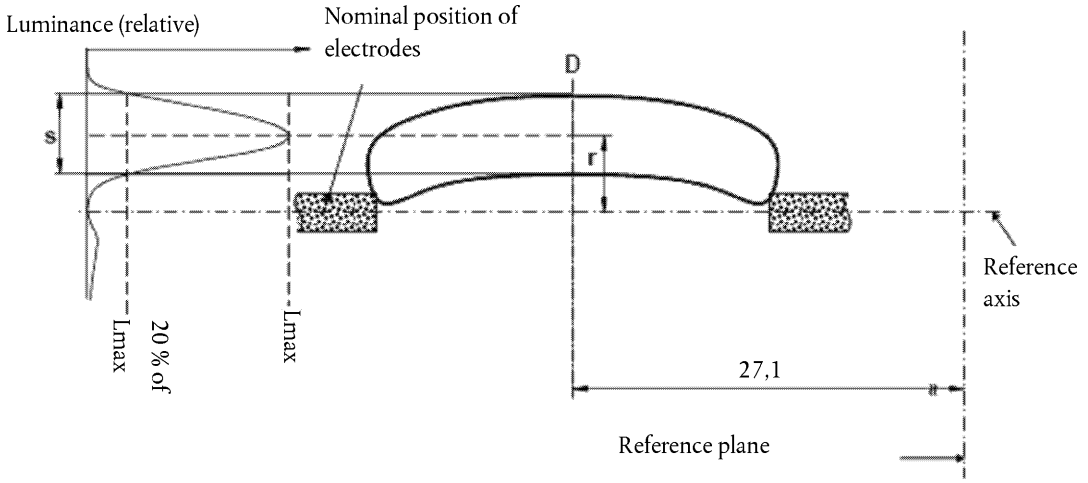
d = diameter of the electrode:
d < 0,3 for D1S and D2S
d < 0,4 for D3S and D4S.

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.

Categories D1S, D2S, D3S and D4S — Sheet DxS/6

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.



Relative luminance distribution in the central cross section D.

The form of the arc is for illustration purpose only.

Measuring direction B: 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:

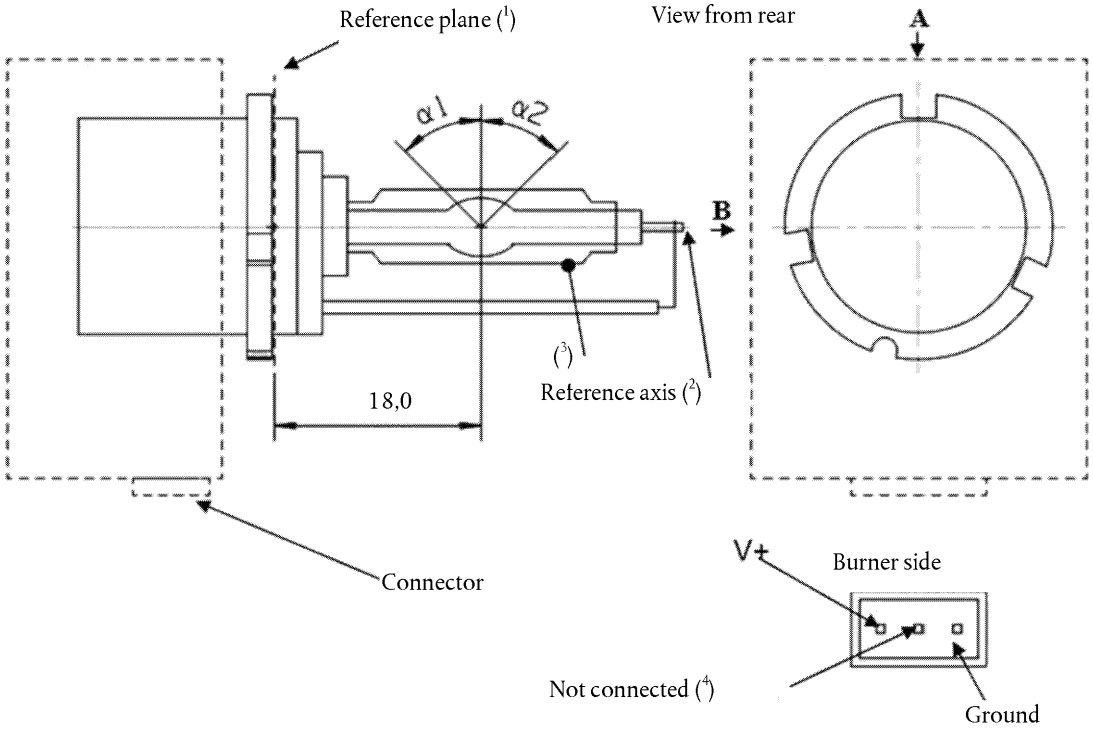
Dimension in mm	Production light sources	Standard light sources
r (arc bending)	0,50 ± 0,40	0,50 ± 0,20
s (arc diffusion)	1,10 ± 0,40	1,10 ± 0,25

Category D5S — Sheet D5S/1

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

Figure 1

Category D5S — Cap PK32d-7



(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 D5S/2.
(3) When measured at a distance of 18,0 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.
(4) Optional pin.

Category D5S — Sheet D5S/2

Figure 2

Definition of reference axis ([1])

The cap shall be pushed in this direction

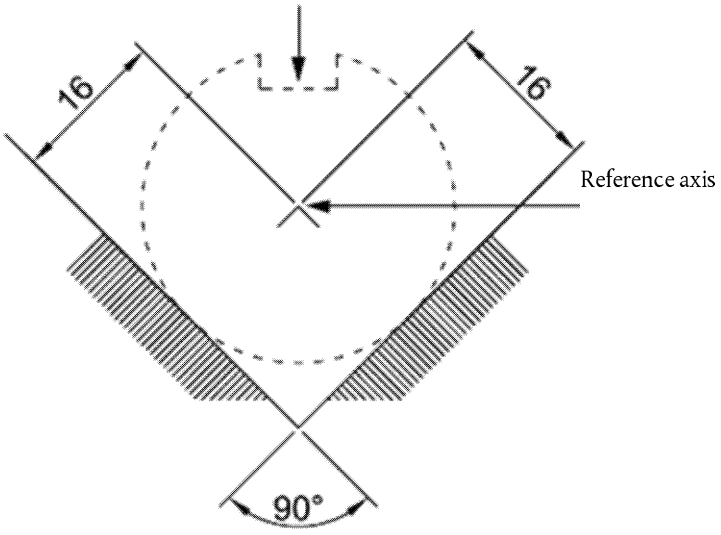
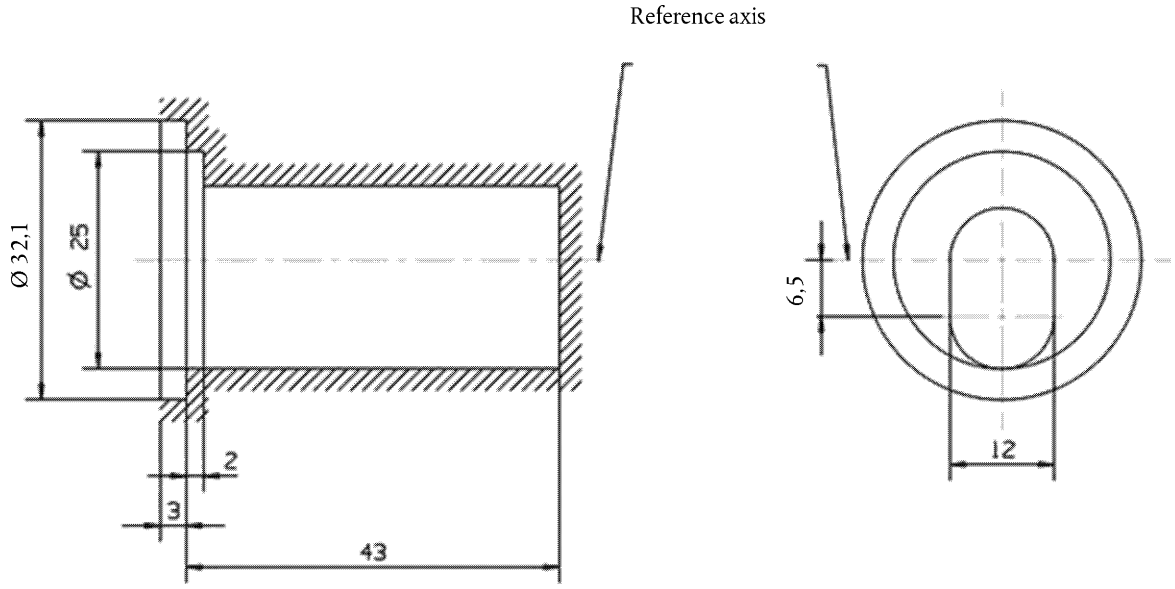


Figure 3

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 2.

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

Category D5S — Sheet D5S/3

Dimensions	Production light sources	Standard light sources
Position of the electrodes	Sheet D5S/4	
Position and form of the arc	Sheet D5S/5	
α1, α2 (1)	55° min.	55° min.

D5S: Cap PK32d-7 in accordance with IEC Publication 60061 (sheet 7004-111-4)

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated voltage		V	12/24	12/24
Rated wattage		W	25	25
Test voltage		V	13,2/28	13,2/28
Objective lamp wattage (2)		W	31 max.	31 max.
Chromaticity coordinates	Objective		x = 0,375	y = 0,375
	Tolerance area (3)	Boundaries	x = 0,345 x = 0,405	y = 0,150 + 0,640 x y = 0,050 + 0,750 x
		Intersection points	x = 0,345 x = 0,405 x = 0,405 x = 0,345	y = 0,371 y = 0,409 y = 0,354 y = 0,309
Objective luminous flux		lm	2 000 ± 300	2 000 ± 100
Hot-restrike switch-off time		s	10	10

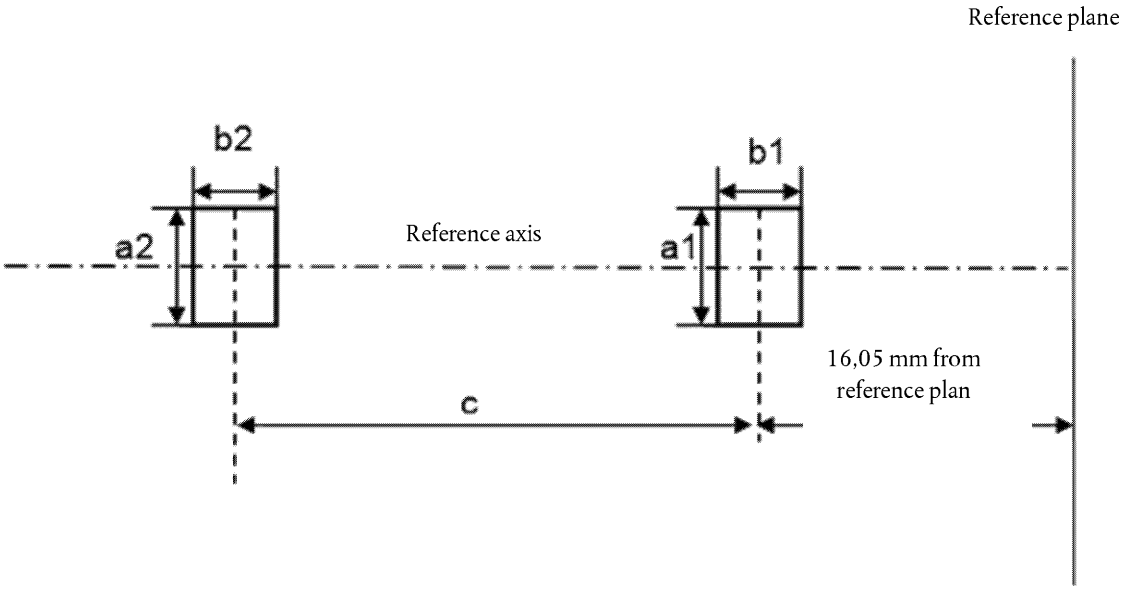
(1) The part of the bulb within the angles α1 and α2 shall be the light-emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles α1 and α2.
(2) Wattage of lamp with ballast integrated.
(3) See Annex 4.

Category D5S — Sheet D5S/4

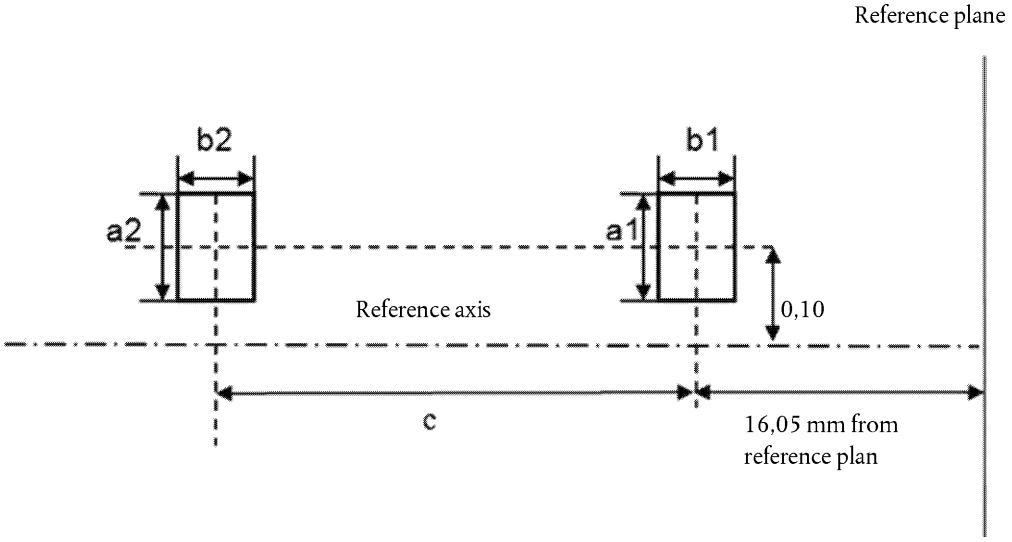
Position of the electrodes

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

Top view (schematic):



Side view (schematic):



Measuring direction: light source side and top view

Dimension in mm	Production light sources	Standard light sources
a1	0,30	0,20
a2	0,50	0,25
b1	0,30	0,15

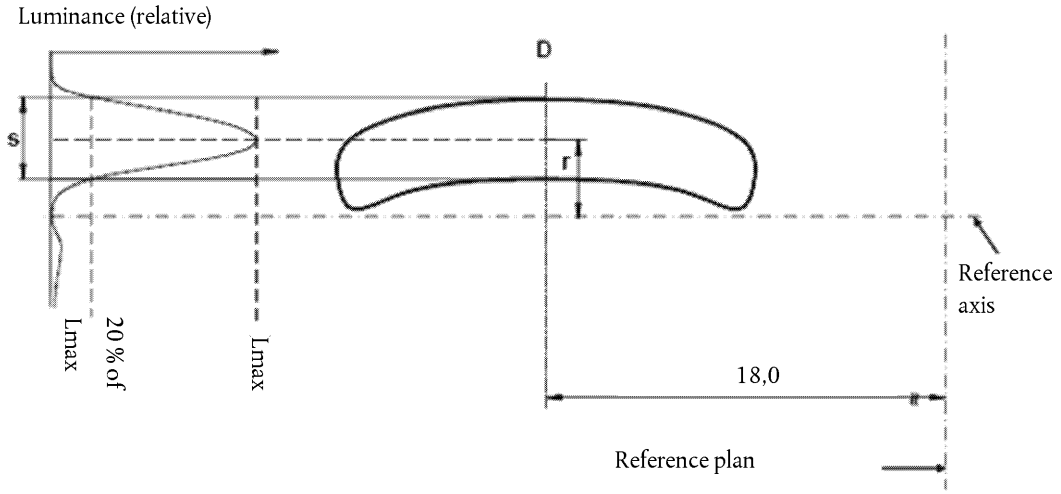
Dimension in mm	Production light sources	Standard light sources
b2	0,60	0,30
c	3,90	3,90

The arc attachment point to the electrode nearest to the reference plane shall be positioned in the area defined by a1 and b1. The arc attachment point to the electrode furthest from the reference plane shall be positioned in the area defined by a2 and b2.

Category D5S — Sheet D5S/5

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 18,0 mm from the reference plane.



Relative luminance distribution in the central cross section D.

The form of the arc is for illustration purpose 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.

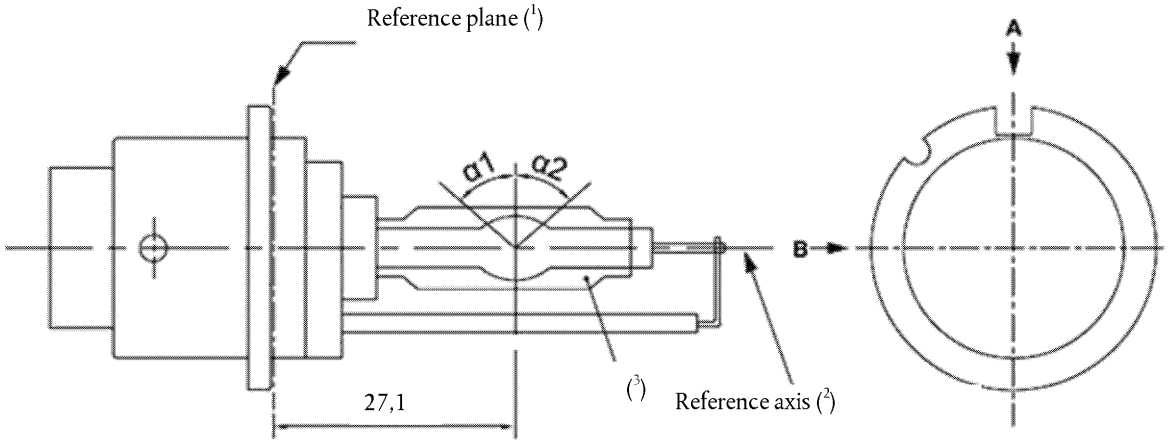
Dimension in mm	Production light sources	Standard light sources
r (arc bending)	0,50 +/- 0,25	0,50 +/- 0,15
s (arc diffusion)	0,70 +/- 0,25	0,70 +/- 0,15

Category D6S — Sheet D6S/1

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

Figure 1

Category D6S — Cap P32d-1



(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 D6S/2.
(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.

Category D6S — Sheet D6S/2

Figure 2

Definition of reference axis (1)

The cap shall be pushed in this direction

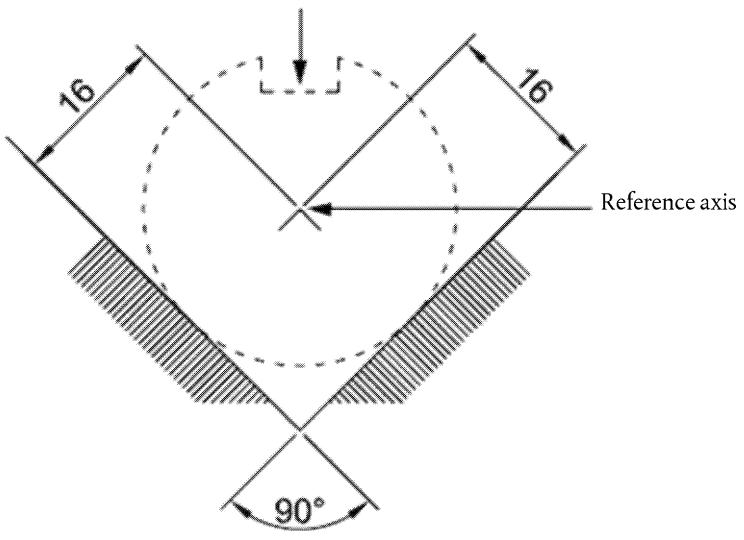
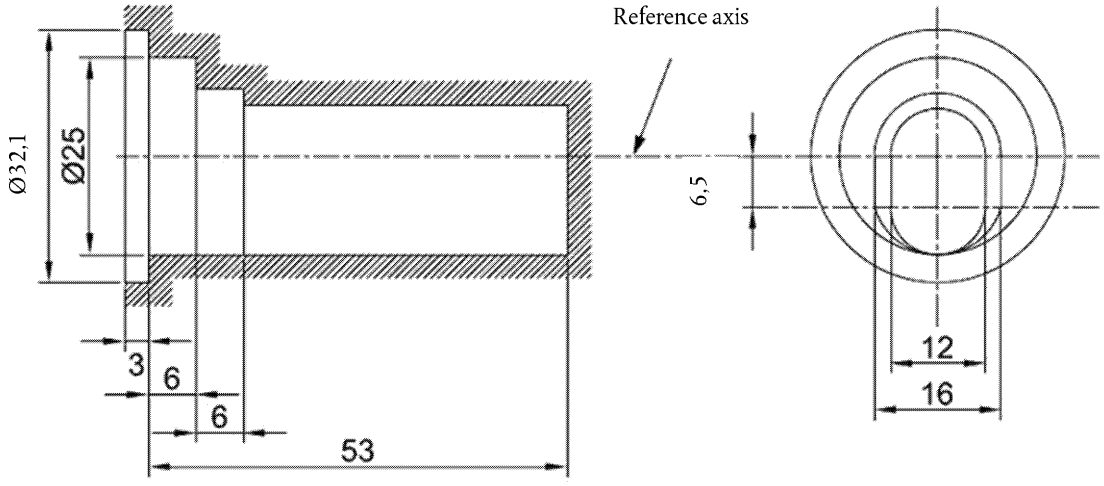


Figure 3

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

Category D6S — Sheet D6S/3

Dimensions	Production light sources	Standard light sources
Position of the electrodes	Sheet D6S/4	
Position and form of the arc	Sheet D6S/5	
α1, α2 ([1])	55° min.	55° min.
D6S: Cap P32d-1 in accordance with IEC Publication 60061 (sheet 7004-111-4)		

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated voltage of the ballast	V	12 ([2])	12
Rated wattage	W	25	25
Test voltage	V	13,2	13,2
Objective lamp voltage	V	42 ± 9	42 ± 4
Objective lamp wattage	W	25± 3	25± 0,5
Objective Luminous flux	lm	2 000 ± 300	2 000 ± 100

Dimensions			Production light sources	Standard light sources
Chromaticity coordinates	Objective		x = 0,375	y = 0,375
	Tolerance area ([3])	Boundaries	x = 0,345 x = 0,405	y = 0,150 + 0,640 x y = 0,050 + 0,750 x
		Intersection points	x = 0,345	y = 0,371
			x = 0,405	y = 0,409
			x = 0,405	y = 0,354
			x = 0,345	y = 0,309
Hot-restrike switch-off time		s	10	10

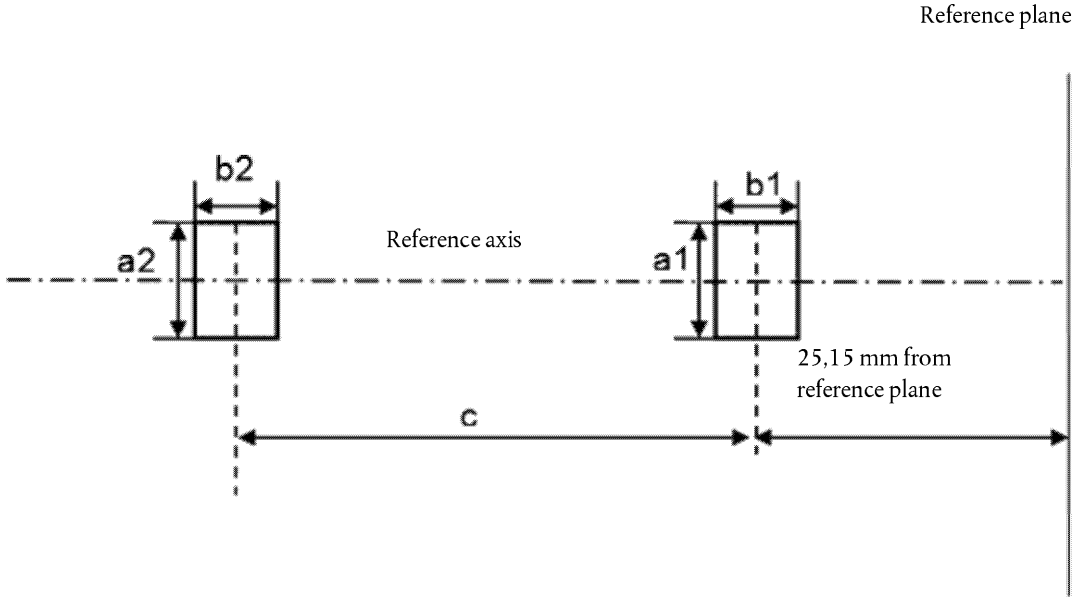
([1]) The part of the bulb within the angles α1 and α2 shall be the light-emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles α1 and α2.
([2]) Application voltages of ballasts may differ from 12 V.
([3]) See Annex 4.

Category D6S — Sheet D6S/4

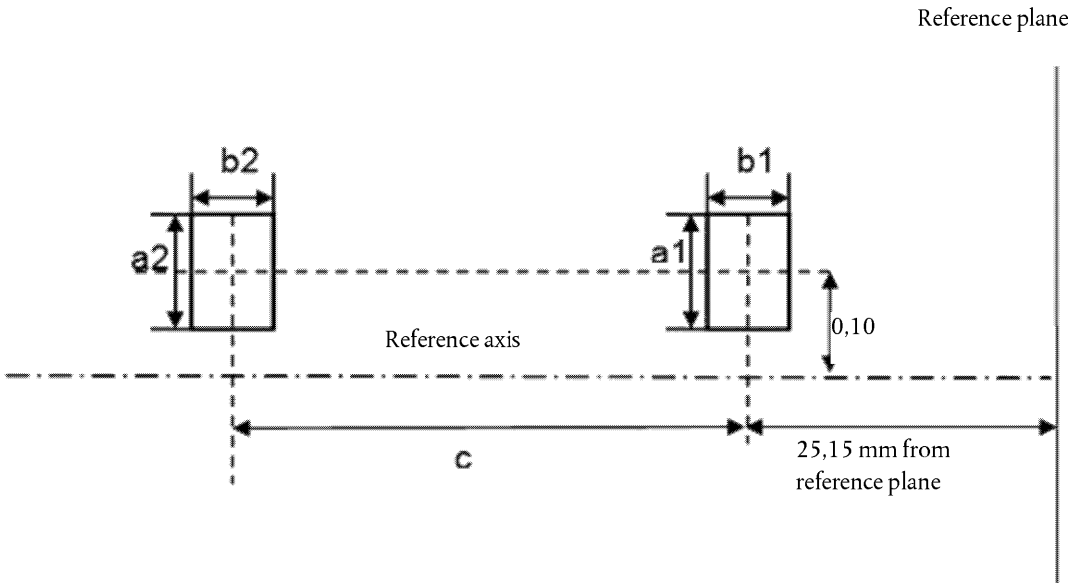
Position of the electrodes

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

Top view (schematic):



Side view (schematic):



Measuring direction: light source side and top view

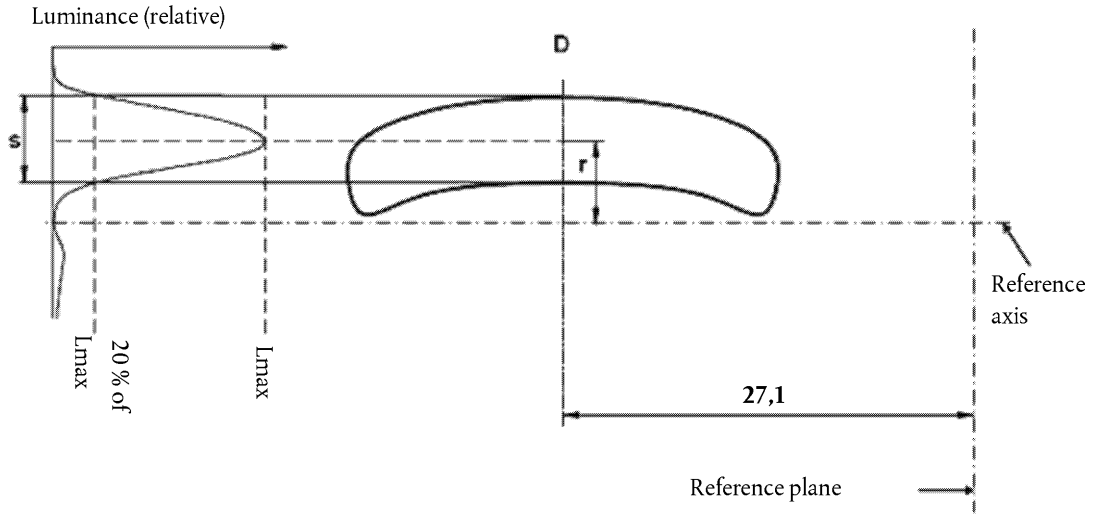
Dimension in mm	Production light sources	Standard light sources
a1	0,30	0,20
a2	0,50	0,25
b1	0,30	0,15
b2	0,60	0,30
c	3,90	3,90

The arc attachment point to the electrode nearest to the reference plane shall be positioned in the area defined by a1 and b1. The arc attachment point to the electrode furthest from the reference plane shall be positioned in the area defined by a2 and b2.

Category D6S — Sheet D6S/5

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.



Relative luminance distribution in the central cross section D.

The form of the arc is for illustration purpose 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.

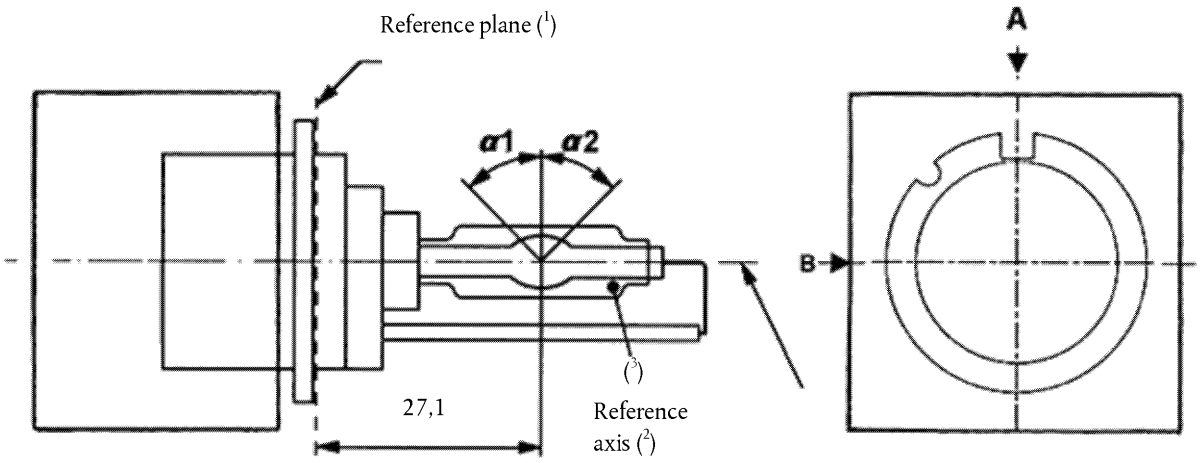
Dimension in mm	Production light sources	Standard light sources
r (arc bending)	0,50 +/- 0,25	0,50 +/- 0,15
s (arc diffusion)	0,70 +/- 0,25	0,70 +/- 0,15

Category D8S — Sheet D8S/1

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

Figure 1

Category D8S — Cap PK32d-1



(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 D8S/2.
(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.

Category D8S — Sheet D8S/2

Figure 2

Definition of reference axis (1)

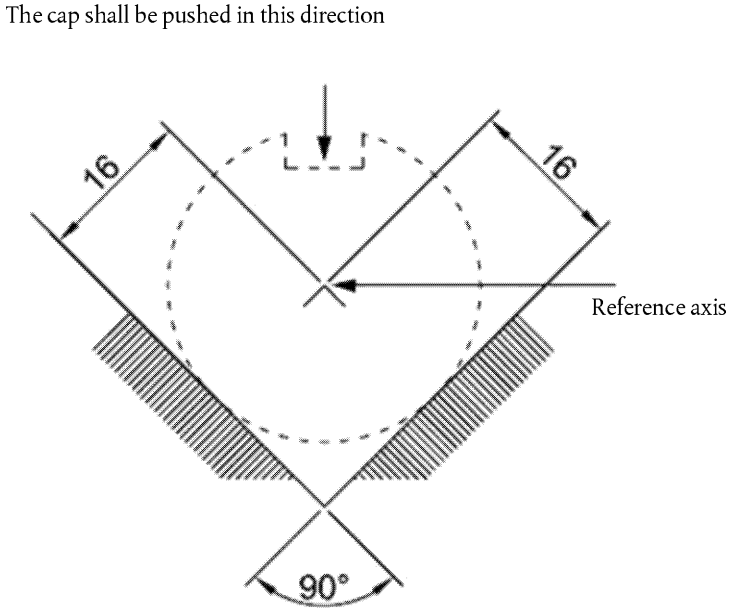
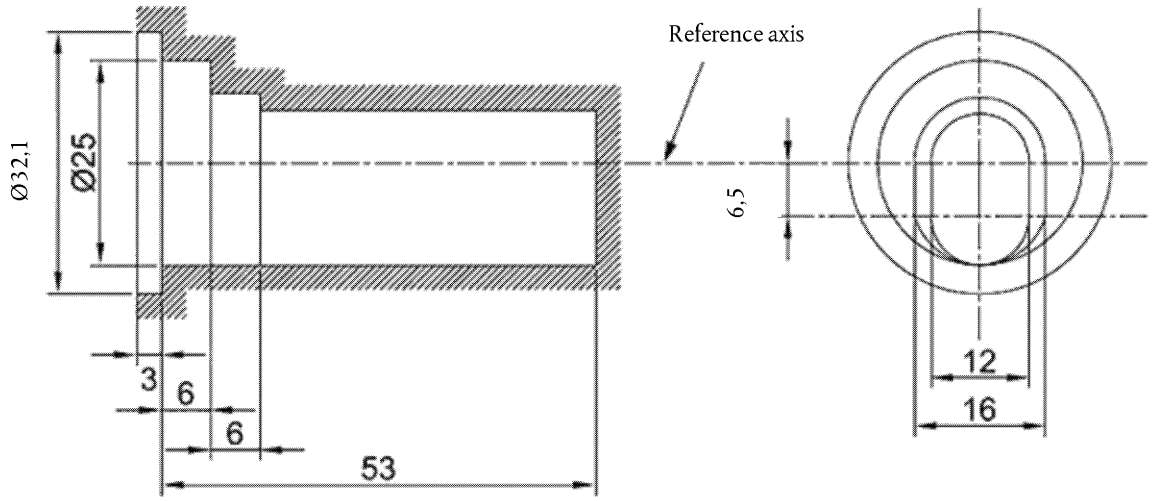


Figure 3

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

Category D8S — Sheet D8S/3

Dimensions	Production light sources	Standard light sources
Position of the electrodes	Sheet D8S/4	
Position and form of the arc	Sheet D8S/5	
α1, α2 (1)	55° min.	55° min.
D8S: Cap PK32d-1 in accordance with IEC Publication 60061 (sheet 7004-111-4)		

ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

Rated voltage of the ballast	V	12 (2)	12
Rated wattage	W	25	25
Test voltage	V	13,2	13,2
Objective lamp voltage	V	42 ± 9	42 ± 4
Objective lamp wattage	W	25 ± 3	25 ± 0,5
Objective Luminous flux	lm	2 000 ± 300	2 000 ± 100

Dimensions			Production light sources	Standard light sources
Chromaticity coordinates	Objective		x = 0,375	y = 0,375
	Tolerance area (3)	Boundaries	x = 0,345 x = 0,405	y = 0,150 + 0,640 x y = 0,050 + 0,750 x
		Intersection points	x = 0,345	y = 0,371
			x = 0,405	y = 0,409
			x = 0,405	y = 0,354
			x = 0,345	y = 0,309
Hot-restrike switch-off time		s	10	10

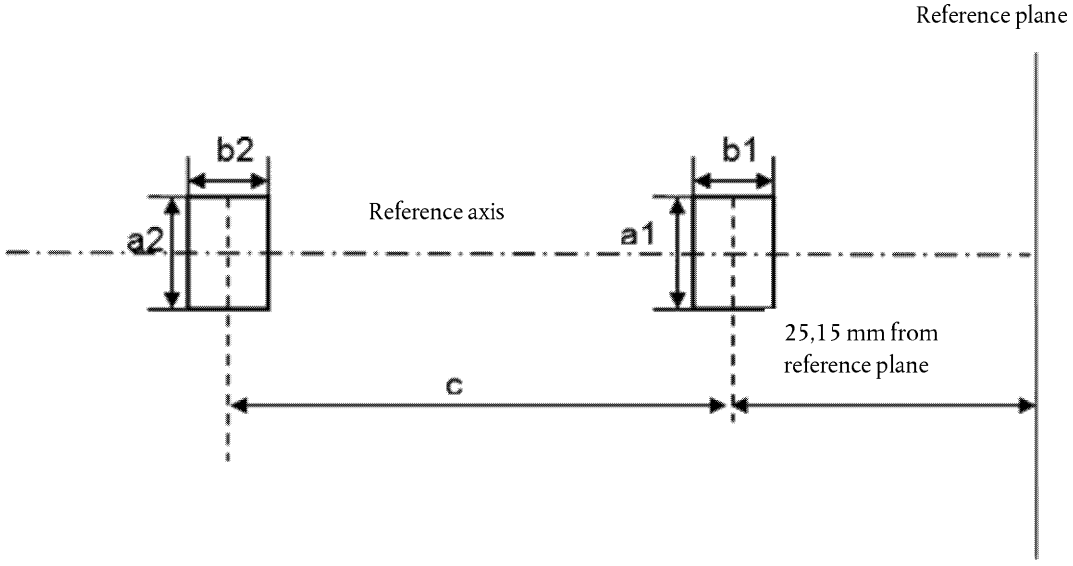
(1) The part of the bulb within the angles α1 and α2 shall be the light-emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles α1 and α2.
(2) Application voltages of ballasts may differ from 12 V.
(3) See Annex 4.

Category D8S — Sheet D8S/4

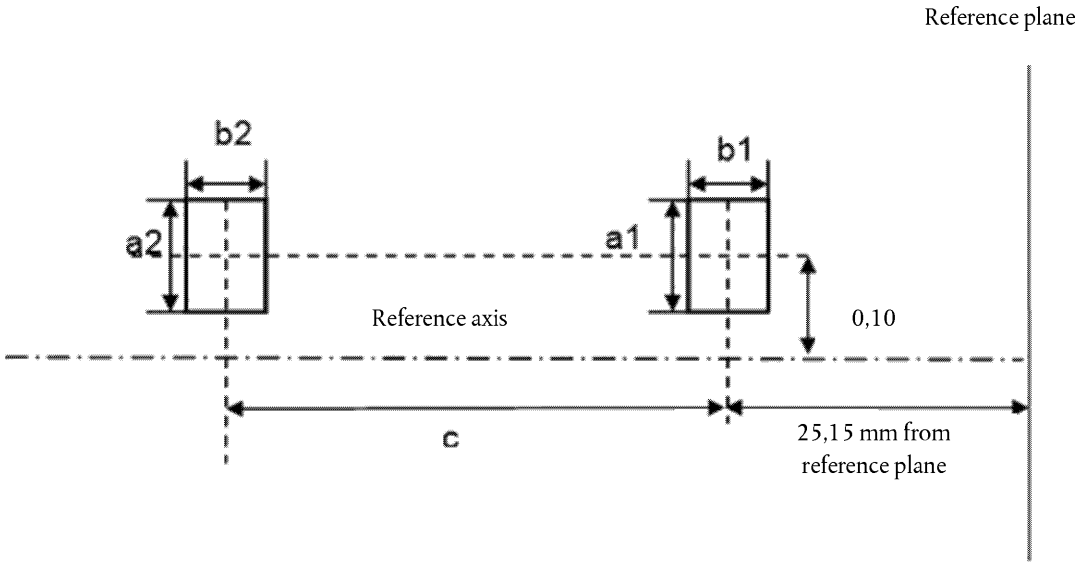
Position of the electrodes

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

Top view (schematic):



Side view (schematic):



Measuring direction: light source side and top view

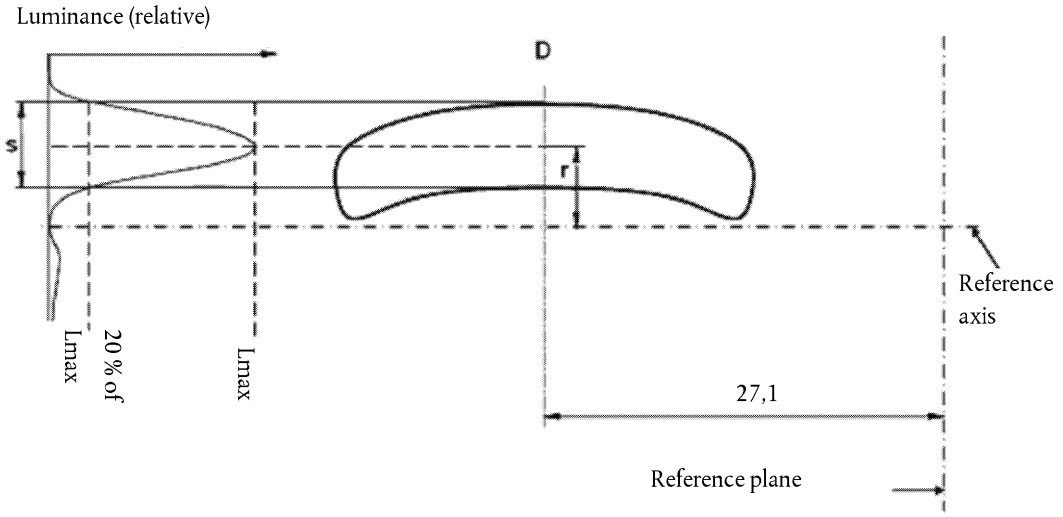
Dimension in mm	Production light sources	Standard light sources
a1	0,30	0,20
a2	0,50	0,25
b1	0,30	0,15
b2	0,60	0,30
c	3,90	3,90

The arc attachment point to the electrode nearest to the reference plane shall be positioned in the area defined by a1 and b1. The arc attachment point to the electrode furthest from the reference plane shall be positioned in the area defined by a2 and b2.

Category D8S — Sheet D8S/5

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.



Relative luminance distribution in the central cross section D.

The form of the arc is for illustration purpose only.

Measuring direction: light source side view

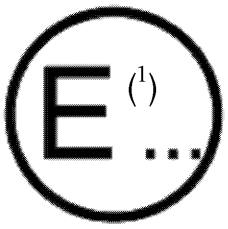
When measuring the relative luminance distribution in the central cross section as indicated in the drawing above, the maximum value shall be located within the distance r from the reference axis. The point of 20 % of the maximum value shall be within s.

Dimension in mm	Production light sources	Standard light sources
r (arc bending)	0,50 +/- 0,25	0,50 +/- 0,15
s (arc diffusion)	0,70 +/- 0,25	0,70 +/- 0,15

ANNEX 2

COMMUNICATION

(maximum format: A4 (210 × 297 mm))



issued by: Name of administration

.....

.....

.....

Concerning (2): APPROVAL GRANTED

APPROVAL EXTENDED

APPROVAL REFUSED

APPROVAL WITHDRAWN

PRODUCTION DEFINITELY DISCONTINUED

of a type of gas-discharge light source pursuant to Regulation No 99

Approval No ..... Extension No .....

1. Gas-discharge light source — category .....
   — rated wattage .....
2. Trade name or mark .....
3. Manufacturer's name and address .....
4. If applicable, name and address of manufacturer's representative .....
5. Brand and type number of the ballast (In case the ballast is not integrated with the light source.) .....
6. Submitted for approval on .....
7. Technical service responsible for conducting approval test .....
8. Date of report issued by that service .....
9. Number of report issued by that service .....
10. Approval granted/refused/extended/withdrawn (2)
11. Place .....
12. Date .....
13. Signature .....
14. The attached drawing No ..... shows the entire light source.

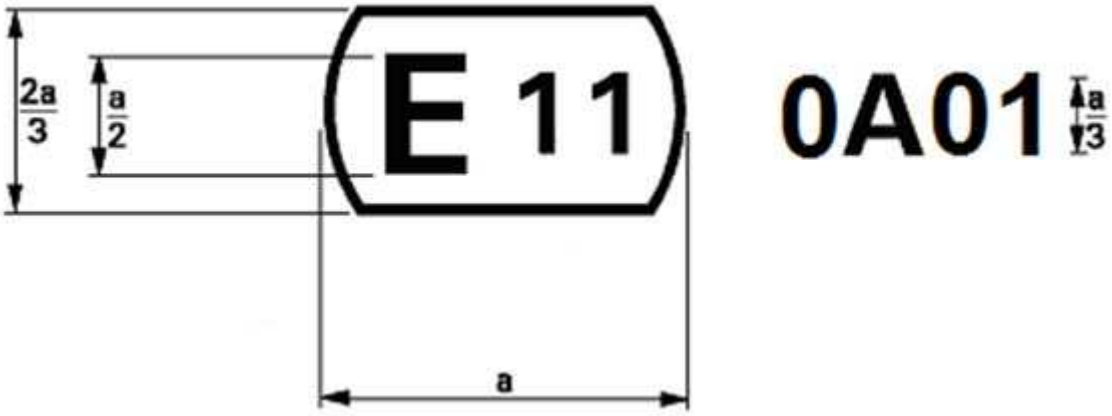
(1) Distinguishing number of the country which has granted/extended/refused/ withdrawn approval (see approval provisions in the Regulation).

(2) Strike out what does not apply.

ANNEX 3

EXAMPLE OF THE ARRANGEMENT OF THE APPROVAL MARK

(see paragraph 2.4.4)



a = 2,5 mm min.

The above approval mark affixed to a gas-discharge light source indicates that the light source has been approved in the United Kingdom (E11) under the approval code 0A01. The first character of the approval code indicates that the approval was granted in accordance with the requirements of Regulation No 99 in its original form.

ANNEX 4

METHOD OF MEASUREMENT OF ELECTRICAL AND PHOTOMETRIC CHARACTERISTICS

1. GENERAL

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

2. BALLAST

In the case the ballast is not integrated with the light source, all tests and measurements shall be carried out with the ballast as per paragraph 2.2.2.4 of this Regulation. The power supply used for the starting and run-up tests shall be qualified to secure the quick rise of the high current pulse.

3. BURNING POSITION

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

4. AGEING

All tests shall be carried out with light sources which have been aged for a minimum of 15 cycles having the following switching cycle:

45 minutes on, 15 seconds off, 5 minutes on, 10 minutes off.

5. SUPPLY VOLTAGE

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

6. STARTING TEST

The starting test shall be applied to light sources which have not been aged and have not been used for a period of at least 24 hours prior to the test.

7. RUN-UP TEST

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

8. HOT-RESTRIKE TEST

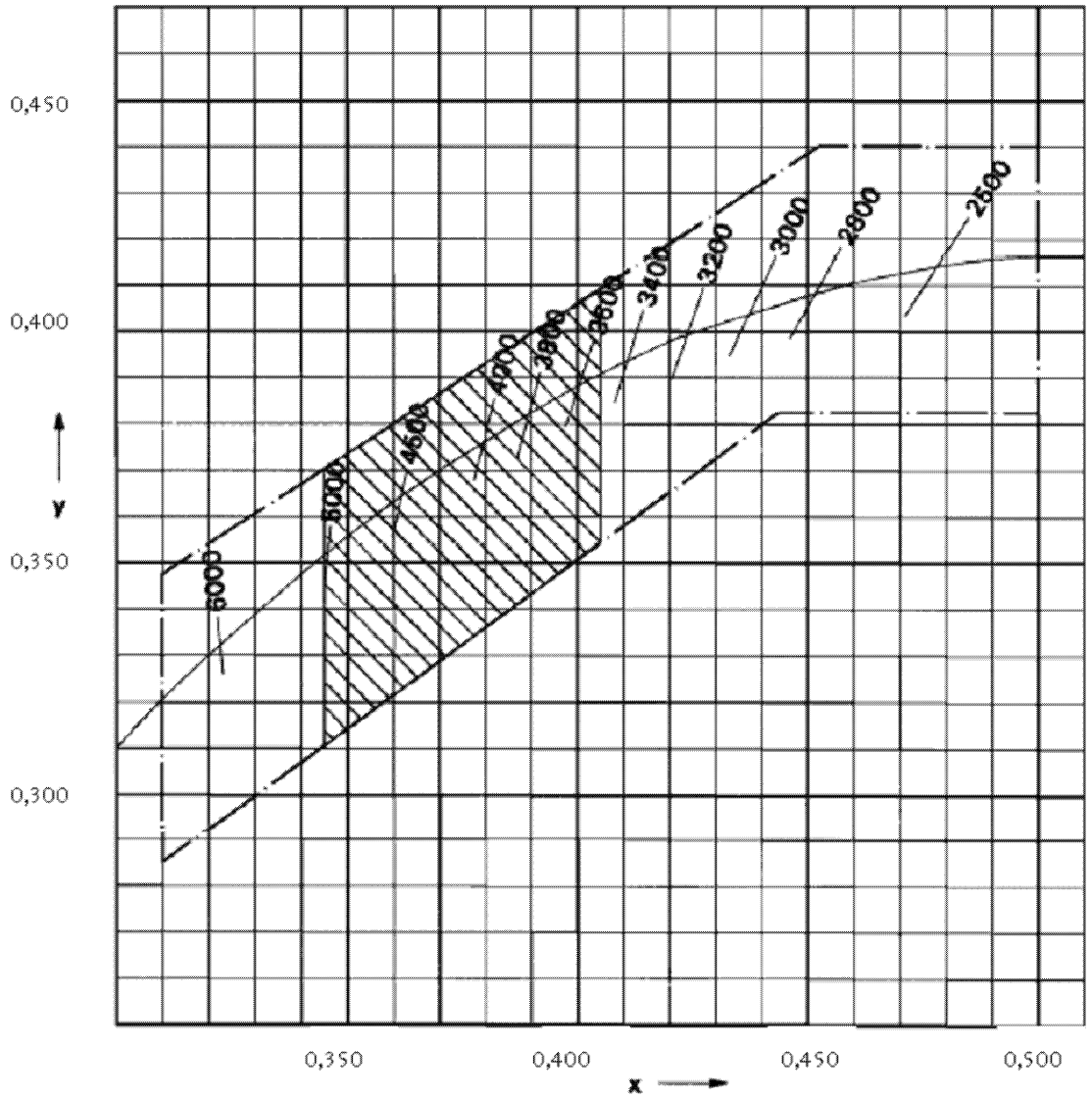
The light source shall be started and be operated with the ballast (possibly integrated) at test voltage for a period of 15 minutes. Then the supply voltage to the ballast or the light source with the ballast integrated shall be switched off for a switch-off period as indicated on the relevant data sheet and be switched on again.

9. ELECTRICAL AND PHOTOMETRIC TEST

Before any measurement, the light source shall be stabilised for a period of 15 minutes.

10. COLOUR

The colour of the light source shall be measured in an integrating sphere using a measuring system which shows the CIE chromaticity coordinates of the received light with a resolution of ± 0,002. 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, D4S, D5S, D6S and D8S.


0,450
0,400
0,350
0,300
y
0,350
0,400
0,450
0,500
x
6000
5000
4600
4200
3800
3600
3400
3200
3000
2800
2500

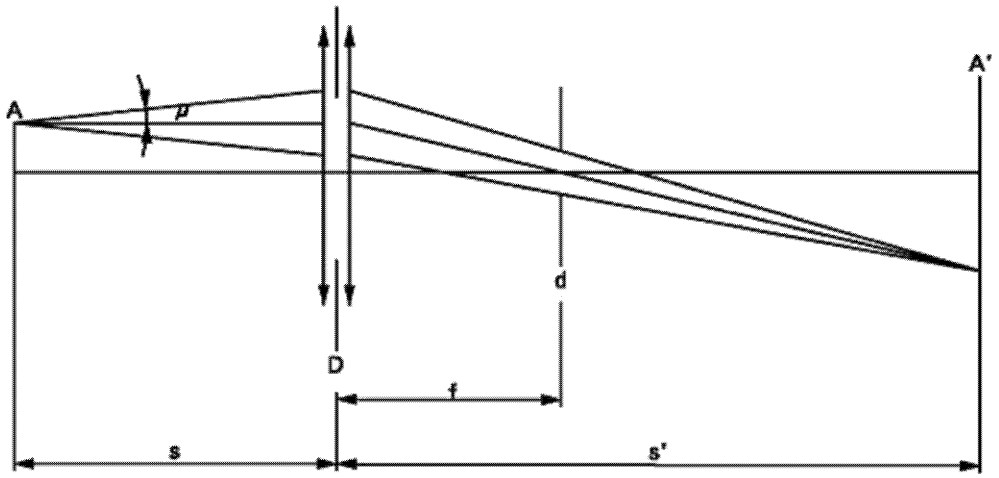
ANNEX 5

OPTICAL SET-UP FOR THE MEASUREMENT OF THE POSITION AND FORMOF 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 μ = 0,5° the diameter of the focus-diaphragm with respect to the focus-length of the optical system shall be not more than d = 2f tan(μ). The active diameter of the optical system shall be not more than:

D = (1 + 1/M)d + c + (b1 + b2)/2. (c, b1 and b2 are given on 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.

ANNEX 6

MINIMUM REQUIREMENTS FOR QUALITY CONTROL PROCEDURES BY THE MANUFACTURER

1. GENERAL

The conformity requirements shall be considered satisfied from a photometric (including UV radiation), geometrical, visual and electrical standpoint if the specified tolerances for production gas-discharge light sources in the relevant data sheet of Annex 1 and the relevant data sheet for the caps are met.

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

For each type of gas-discharge light source the manufacturer or the holder of the approval mark shall carry out tests, in accordance with the provisions of this Regulation, at appropriate intervals.

2.1. Nature of tests

Tests of conformity of these specifications shall cover their photometric, geometrical and optical characteristics.

2.2. Methods used in tests

2.2.1. Tests shall generally be carried out in accordance with the methods set out in this Regulation.

2.2.2. The application of paragraph 2.2.1 requires regular calibration of test apparatus and its correlation with measurements made by a competent authority.

2.3. Nature of sampling

Samples of gas-discharge light sources shall be selected at random from the production of a uniform batch. A uniform batch means a set of gas-discharge light sources of the same type, defined according to the production methods of the manufacturer.

2.4. Inspected and recorded characteristics

The gas-discharge light sources shall be inspected and test results recorded following the grouping of characteristics as listed in Annex 7, Table 1.

2.5. Criteria governing acceptability

The manufacturer or the holder of approval is responsible for carrying out a statistical study of the test results in order to meet the specification laid down for verification of conformity of products in paragraph 4.1 of this Regulation.

Compliance shall be assured if the level of acceptable non-compliance per grouping of characteristics given in Table 1 of Annex 7 is not exceeded. This means that the number of gas-discharge light sources not complying with the requirement for any grouping of characteristics of any gas-discharge light source type does not exceed the qualifying limits in the relevant Tables 2, 3 or 4 of Annex 7.

Note: Each individual gas-discharge light source requirement shall be considered as a characteristic.

ANNEX 7

SAMPLING AND COMPLIANCE LEVELS FOR MANUFACTURER'S TEST RECORDS

Table 1

Characteristics

Grouping of characteristics	Grouping (*) of test records between gas-discharge light source types	Minimum 12 monthly sample per grouping (*)	Acceptable level of non-compliance per grouping of characteristics (%)
Marking, legibility and durability	All types with the same external dimensions	315	1
Bulb quality	All types with the same bulb	315	1
External dimensions (excluding cap)	All types of the same category	315	1
Position and dimensions of arc and stripes	All types of the same category	200	6,5
Starting, run-up and hot-restrike	All types of the same category	200	1
Lamp voltage and wattage	All types of the same category	200	1
Luminous flux, colour and UV radiation	All types of the same category	200	1

(*) The assessment shall in general cover series production gas-discharge light sources from individual factories. A manufacturer may group together records concerning the same type from several factories, provided these operate under the same quality system and quality management.

Qualifying limits for acceptance based on different numbers of test results for each grouping of characteristics are listed in Table 2 as maximum number of non-compliances. The limits are based on an acceptable level of 1 % of non-compliances, assuming an acceptance probability of at least 0,95.

Table 2

Number of test results of each characteristics	Qualifying limits for acceptance
- 200	5
201 - 260	6
261 - 315	7
316 - 370	8
371 - 435	9
436 - 500	10
501 - 570	11
571 - 645	12
646 - 720	13
721 - 800	14
801 - 860	15

Number of test results of each characteristics	Qualifying limits for acceptance
861 - 920	16
921 - 990	17
991 - 1 060	18
1 061 - 1 125	19
1 126 - 1 190	20
1 191 - 1 249	21

Qualifying limits for acceptance based on different numbers of test results for each grouping of characteristics are listed in Table 3 given as maximum number of non-compliances. The limits are based on an acceptable level of 6.5 % of non-compliances, assuming an acceptance probability of at least 0,95.

Table 3

Number of lamps in records	Qualifying limit	Number of lamps in records	Qualifying limit	Number of lamps in records	Qualifying limit
- 200	21	541 - 553	47	894 - 907	73
201 - 213	22	554 - 567	48	908 - 920	74
214 - 227	23	568 - 580	49	921 - 934	75
228 - 240	24	581 - 594	50	935 - 948	76
241 - 254	25	595 - 608	51	949 - 961	77
255 - 268	26	609 - 621	52	962 - 975	78
269 - 281	27	622 - 635	53	976 - 988	79
282 - 295	28	636 - 648	54	989 - 1 002	80
296 - 308	29	649 - 662	55	1 003 -1 016	81
309 - 322	30	663 - 676	56	1 017 - 1 029	82
323 - 336	31	677 - 689	57	1 030 - 1 043	83
337 - 349	32	690 - 703	58	1 044 - 1 056	84
350 - 363	33	704 - 716	59	1 057 - 1 070	85
364 - 376	34	717 - 730	60	1 071 - 1 084	86
377 - 390	35	731 - 744	61	1 085 - 1 097	87
391 - 404	36	745 - 757	62	1 098 - 1 111	88
405 - 417	37	758 - 771	63	1 112 - 1 124	89
418 - 431	38	772 - 784	64	1 125 - 1 138	90
432 - 444	39	785 - 798	65	1 139 - 1 152	91
445 - 458	40	799 - 812	66	1 153 - 1 165	92
459 - 472	41	813 - 825	67	1 166 - 1 179	93
473 - 485	42	826 - 839	68	1 180 - 1 192	94
486 - 499	43	840 - 852	69	1 193 - 1 206	95
500 - 512	44	853 - 866	70	1 207 - 1 220	96
513 - 526	45	867 - 880	71	1 221 - 1 233	97
527 - 540	46	881 - 893	72	1 234 - 1 249	98

Qualifying limits for acceptance based on different numbers of test results for each grouping of characteristics are listed in Table 4 given as a percentage of the results, assuming an acceptance probability of at least 0,95.

Table 4

Number of test results of each characteristic	Qualifying limits shown as a percentage of results. Acceptable level of 1 % of non-compliances	Qualifying limits shown as a percentage of results. Acceptable level of 6,5 % of non-compliances
1 250	1,68	7,91
2 000	1,52	7,61
4 000	1,37	7,29
6 000	1,30	7,15
8 000	1,26	7,06
10 000	1,23	7,00
20 000	1,16	6,85
40 000	1,12	6,75
80 000	1,09	6,68
100 000	1,08	6,65
1 000 000	1,02	6,55

ANNEX 8

MINIMUM REQUIREMENTS FOR SAMPLING BY AN INSPECTOR

1. The conformity requirements shall be considered satisfied from a photometric, geometrical, visual and electrical standpoint if the specified tolerances for production gas-discharge light sources in the relevant data sheet of Annex 1 and the relevant data sheet for the caps are met.
2. The conformity of mass-produced gas-discharge light sources shall not be contested if the results are in agreement with paragraph 5 of this annex.
3. Conformity shall be contested and the manufacturer requested to make the production meet the requirements if the results are not in agreement with paragraph 5 of this annex.
4. If paragraph 3 of this annex is applied, a further sample of 250 gas-discharge light sources, selected at random from a recent production run, shall be taken within two months.
5. Compliance approved or disapproved shall be decided according to the values in Table 1. For each grouping of characteristics gas-discharge light sources shall be either accepted or rejected according to the values in Table 1 ([1]).

Table 1

Sample	1 % (*)		6,5 % (*)	
	Accept	Reject	Accept	Reject
First sample size: 125	2	5	11	16
If the number of non-conforming units is greater than 2 (11) and less than 5 (16) take a second sample size of 125 and assess the 250	6	7	26	27

(*) The gas-discharge light sources shall be inspected and test results recorded following the grouping of characteristics as listed in Annex 7, Table 1.

([1]) The proposed scheme is designed to assess the compliance of gas-discharge light sources to an acceptance level of non-compliance of 1 % and 6,5 % respectively and is based on the Double Sampling Plan for Normal Inspection in IEC Publication 60410: Sampling Plans and Procedures for Inspection by Attributes.