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

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

II

(Non-legislative acts)

ACTS ADOPTED BY BODIES CREATED BY INTERNATIONAL AGREEMENTS

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

Regulation No 7 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of front and rear position lamps, stop-lamps and end-outline marker lamps for motor vehicles (except motor cycles) and their trailers

Incorporating all valid text up to:

Supplement 23 to the 02 series of amendments — Date of entry into force: 9 October 2014

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REGULATION

ANNEXES

SCOPE

This Regulation applies to:

front and rear position lamps and stop lamps for vehicles of categories L, M, N, O and T ([1]); and

end-outline marker lamps for vehicles of categories M, N, O and T.

1. DEFINITIONS

For the purpose of this Regulation,

1.1. 'Front position lamp' means the lamp used to indicate the presence and the width of the vehicle when viewed from the front;

1.2. 'Rear position lamp' means the lamp used to indicate the presence and the width of the vehicle when viewed from the rear;

1.3. 'Stop-lamp' means the lamp used to indicate to other road-users to the rear of the vehicle that its driver is applying the service brake. The stop-lamps may be activated by the application of a retarder or a similar device;

1.4. 'End-outline marker lamp' means a lamp fitted near to the extreme outer edges and as close as possible to the top of the vehicle and intended to indicate clearly the vehicle's overall width. In the case of certain power-driven vehicles and trailers, this lamp is intended to complement the vehicle's position lamps and draw special attention to its outline;

1.5. Definitions of terms:

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

1.6. 'Front and rear position lamps, stop-lamps and end-outline marker lamps of different type' means lamps which differ in each said category in such essential respects as:

(a) the trade name or mark;

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

(c) the system used to reduce illumination at night — in the case of stop-lamps with two levels of intensity.

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

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

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

2. APPLICATION FOR APPROVAL

2.1. The application for approval shall be submitted by the holder of the trade name or mark or by his duly accredited representative. It shall specify:

2.1.1. The purpose or purposes for which the device submitted for approval is intended and whether it may also be used in an assembly of two lamps of the same kind/type;

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

2.1.2. In the case of an end-outline marker lamp, whether it is intended to emit white or red light;

2.1.3. In the case of a category S3 or S4 stop lamp, whether it is intended to be mounted outside or inside (behind the rear window) the vehicle;

2.1.4. Whether the device produces steady luminous intensity (category R, R1, RM1, S1 or S3) or variable luminous intensity (category R2, RM2, S2 or S4);

2.1.5. At the choice of the applicant, that the device may be installed on the vehicle with different inclinations of the reference axis in respect to the vehicle reference planes and to the ground or rotate around its reference axis; these different conditions of installation shall be indicated in the communication form.

2.2. For each type of device, the application shall be accompanied by:

2.2.1. Drawings, in triplicate, in sufficient detail to permit identification of the type of the device and showing the following:

(a) in what geometrical position(s) the device (and if applicable for category S3 or S4 lamps the rear window) may be mounted on the vehicle; the axis of observation to be taken is the axis of reference in the tests (horizontal angle H = 0°, vertical angle V = 0°); and the point to be taken as the centre of reference in the said tests;

(b) the geometrical conditions of installation of the device(s) that meet(s) the requirements of paragraph 6;

(c) in the case of an interdependent lamp system, the interdependent lamp or the combination of interdependent lamps that fulfil the requirements of paragraphs 5.10 and 6.1 and of Annex 4 to this Regulation;

(d) the position intended for the approval number and the additional symbols in relation to the circle of the approval mark.

2.2.2. A brief technical description stating, in particular, with the exception of lamps with non-replaceable light sources:

(a) the category or categories of filament lamp(s) prescribed; this filament lamp category shall be one of those contained in Regulation No 37 and its series of amendments in force at the time of application for type-approval; in the case of a category S3 or S4 stop lamp, which is intended to be mounted inside the vehicle, the technical description shall contain the specification of the optical properties (transmission, colour, inclination, etc.) of the rear window(s); and/or

(b) the category or categories of LED light source(s) prescribed; this LED light source category shall be one of those contained in Regulation No 128 and its series of amendments in force at the time of application for type-approval; and/or

(c) the light source module specific identification code.

In the case of a category S3 or S4 stop lamp, which is intended to be mounted inside the vehicle, the technical description shall contain the specification of the optical properties (transmission, colour, inclination, etc.) of the rear window(s).

2.2.3. In the case of a lamp with variable luminous intensity, a concise description of the variable intensity control, an arrangement diagram and a specification of the characteristics of the system ensuring the two levels of intensity;

2.2.4. Two samples; if the approval is applied for devices which are not identical but are symmetrical and suitable for mounting one on the left and one on the right side of the vehicle, the two samples submitted may be identical and be suitable for mounting only on the right or only on the left side of the vehicle.

In the case of a lamp with variable luminous intensity the application shall also be accompanied by the variable intensity control or a generator providing the same signal(s).

2.2.5. In the case of a category S3 or S4 stop lamp which is intended to be mounted inside the vehicle, a sample plate or sample plates (in case of different possibilities) having the equivalent optical properties corresponding to those of the actual rear window(s).

3. MARKINGS

Devices submitted for approval:

3.1. Must bear the trade name or mark of the applicant; this marking must be clearly legible and be indelible;

3.2. With the exception of lamps with non-replaceable light sources, must bear a clearly legible and indelible marking indicating:

(a) the category or categories of light source(s) prescribed; and/or

(b) the light source module specific identification code.

3.3. Must comprise a space of sufficient size for the approval marking and the additional symbols prescribed in paragraph 4.2 below; this space shall be shown in the drawings mentioned in paragraph 2.2.1 above;

3.4. In the case of lamps with an electronic light source control gear or a variable intensity control and/or non-replaceable light sources and/or light source module(s), must bear the marking of the rated voltage or range of voltage and rated maximum wattage;

3.5. Lamps operating at voltages other than the nominal rated voltages of 6 V, 12 V or 24 V respectively, by the application of an electronic light source control gear or a variable intensity control being not part of the lamp, or having a secondary operating mode, must also bear a marking denoting the rated secondary design voltage;

3.6. In the case of lamps with light source module(s), the light source module(s) shall bear:

3.6.1. The trade name or mark of the applicant; this marking must be clearly legible and indelible;

3.6.2. The specific identification code of the module; this marking must be clearly legible and indelible. This specific identification code shall comprise the starting letters 'MD' for 'Module' followed by the approval marking without the circle as prescribed in paragraph 4.2.1.1 below and, in the case several non-identical light source modules are used, followed by additional symbols or characters; this specific identification code shall be shown in the drawings mentioned in paragraph 2.2.1 above.

The approval marking does not have to be the same as the one on the lamp in which the module is used, but both markings shall be from the same applicant.

3.6.3. The marking of the rated voltage or range of voltage and rated maximum wattage.

3.7. An electronic light source control gear or a variable intensity control being part of the lamp but not included into the lamp body shall bear the name of the manufacturer and its identification number.

4. APPROVAL

4.1. General

4.1.1. If the two devices which are submitted in pursuance of paragraph 2.2.4 above satisfy the provisions of this Regulation, approval shall be granted. All the devices of an interdependent lamp system must be submitted for type-approval by the same applicant.

4.1.2. When two or more lamps are part of the same unit of grouped, combined or reciprocally incorporated lamps, approval may be granted only if each of these lamps satisfies the provisions set out in this Regulation or in another Regulation. Lamps not satisfying the provisions of any of those Regulations shall not be part of such unit of grouped, combined or reciprocally incorporated lamps. This provision shall not apply to head-lamps fitted with a double-filament bulb, where only one beam is approved.

4.1.3. An approval number shall be assigned to each type approved. Its first two digits (at present 02) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another type of device covered by this Regulation, except in case approval is extended to a device which only differs from the already approved device by the colour of the light emitted.

4.1.4. Notice of approval or of extension or refusal or of withdrawal of approval or production definitively discontinued of a type of device pursuant to this Regulation shall be communicated to the Parties to the 1958 Agreement applying this Regulation, by means of a form conforming to the model in Annex 2 to this Regulation.

4.1.5. Every device conforming to a type approved under this Regulation shall bear, in the space referred to in paragraph 3.3 above, and in addition to the markings prescribed in paragraphs 3.1 and 3.2 or 3.4 respectively, an approval mark as described in paragraphs 4.2 and 4.3 below.

4.2. Composition of the approval mark

The approval mark shall consist of:

4.2.1. An international approval mark, comprising:

4.2.1.1. A circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted approval ([1]);

4.2.1.2. The approval number prescribed in paragraph 4.1.3 above.

4.2.2. The following additional symbol or symbols:

4.2.2.1. On devices meeting the requirements of this Regulation in respect of the front position lamps, the letter 'A';

4.2.2.2. On devices meeting the requirements of this Regulation in respect of the rear position lamps, the letter 'R' followed or not by the Figure '1' when the device produces steady luminous intensity and by the Figure '2' when the device produces variable luminous intensity.

4.2.2.3. On devices meeting the requirements of this Regulation in respect of the front end-outline marker lamps, the letters 'AM';

4.2.2.4. On devices meeting the requirements of this Regulation in respect of the rear end-outline marker lamps, the letters 'RM' followed by the Figure '1' when the device produces steady luminous intensity and by the Figure '2' when the device produces variable luminous intensity;

4.2.2.5. On devices meeting the requirements of this Regulation in respect of the stop-lamps, the letter 'S' followed by the figure:

'1' when the device produces steady luminous intensity;

'2' when the device produces variable luminous intensity;

'3' when the device meets the specific requirements for category S3 stop-lamps and produces steady luminous intensity;

'4' when the device meets the specific requirements for category S4 stop-lamps and produces variable luminous intensity;

4.2.2.6. On devices comprising both a rear position lamp and a stop- lamp meeting the requirements of this Regulation in respect of such lamps, the letters 'R' or 'R1' or 'R2' and 'S1' or 'S2' as the case may be, separated by a horizontal dash;

4.2.2.7. On front or rear position lamps of which the visibility angles are asymmetrical with regard to the reference axis in a horizontal direction, and on front or rear end-outline marker lamps, a horizontal arrow pointing towards the side on which the photometric specifications are met up to an angle of 80° H;

4.2.2.8. On devices which may be used as part of an assembly of two lamps, the additional letter 'D' to the right of the symbol mentioned in paragraphs 4.2.2.1 and 4.2.2.6;

4.2.2.9. On devices with reduced light distribution in conformity to paragraph 2.3 in Annex 4 to this Regulation a vertical arrow starting from a horizontal segment and directed downwards.

([1]) 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.

4.2.2.10. On interdependent lamps, which may be used as part of an interdependent lamp system, the additional letter 'Y' to the right of the symbol mentioned in paragraph 4.2.2.1 to 4.2.2.6 shall be marked on each device.

4.2.3. The two digits of the approval number (at present 02 corresponding to the 02 series of amendments which entered into force on 5 May 1991), which indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval and, if necessary, the required arrow may be marked close to the above additional symbols.

4.2.4. The marks and symbols referred to in paragraphs 4.2.1 and 4.2.2 above shall be clearly legible and indelible even when the device is fitted in the vehicle.

4.3. Arrangement of the approval mark

4.3.1. Independent lamps

Annex 3, paragraphs 1 to 6, gives examples of the approval mark with the abovementioned additional symbols.

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

4.3.1.1. It is visible after their installation.

4.3.1.2. The identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval and if necessary, the required arrow shall be marked.

4.3.1.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks by the Regulation under which approval has been granted.

4.3.1.4. The main body of the lamp shall include the space described in paragraph 3.3 above and shall bear the approval mark of the actual function(s).

4.3.1.5. Paragraph 7 of Annex 3 to this Regulation gives examples of an approval mark with the abovementioned additional symbols.

4.3.2. Grouped, combined or reciprocally incorporated lamps

4.3.2.1. Where grouped, combined or reciprocally incorporated lamps have been found to comply with the requirements of several Regulations, a single international approval mark may be affixed, consisting of a circle surrounding the letter 'E' followed by the distinguishing number of the country which has granted the approval, and an approval number. This approval mark may be located anywhere on the grouped, combined or reciprocally incorporated lamps, provided that:

4.3.2.1.1. It is visible after their installation;

4.3.2.1.2. No part of the grouped, combined or reciprocally incorporated lamps that transmits light can be removed without at the same time removing the approval mark.

4.3.2.2. The identification symbol for each lamp appropriate to each Regulation under which approval has been granted, together with the corresponding series of amendments incorporating the most recent major technical amendments to the Regulation at the time of issue of the approval and, if necessary, the required arrow shall be marked:

4.3.2.2.1. Either on the appropriate light-emitting surface,

4.3.2.2.2. Or in a group, in such a way that each of the grouped, combined or reciprocally incorporated lamps may be clearly identified.

4.3.2.3. The size of the components of a single approval mark shall not be less than the minimum size required for the smallest of the individual marks under which approval has been granted.

4.3.2.4. An approval number shall be assigned to each type approved. The same Contracting Party may not assign the same number to another type of grouped, combined or reciprocally incorporated lamps covered by this Regulation.

4.3.2.5. Paragraph 8 of Annex 3 to this Regulation gives examples of approval marks for grouped, combined or reciprocally incorporated lamps with all the abovementioned additional symbols.

4.3.3. Lamps reciprocally incorporated with a type of headlamp of which the lens is also used for other types of headlamps

The provisions laid down in paragraph 4.3.2 above are applicable.

4.3.3.1. However, if different types of headlamps or of units of lamps including a headlamp comprise the same lens, the latter may bear the different approval marks relating to these types of headlamps or units or lamps, provided that the main body of the headlamp, even if it cannot be separated from the lens, also comprises the space described in paragraph 3.3 above and bears the approval marks of the actual functions. If different types of headlamps comprise the same main body, the latter may bear the different approval marks.

4.3.3.2. Paragraph 9 of Annex 3 to this Regulation gives examples of approval marks relating to lamps which are reciprocally incorporated with a headlamp.

4.3.4. The approval marking shall be clearly legible and indelible. It may be placed on an inner or outer part (transparent or not) of the device which cannot be separated from the transparent part of the device emitting the light. In any case the marking shall be visible when the device is fitted on the vehicle or when a movable part such as the hood or boot lid or a door is opened.

5. GENERAL SPECIFICATIONS

5.1. Each device supplied shall conform to the specifications set forth in paragraphs 6 and 8 below.

5.2. The devices must be so designed and constructed that in normal conditions of use, and notwithstanding the vibrations to which they may be subjected in such use, their satisfactory operation remains assured and they retain the characteristics prescribed by this Regulation.

5.3. Lamps having been approved as front or rear position lamps, are deemed being also approved end-outline marker lamps.

5.4. Front and rear position lamps which are grouped or combined or reciprocally incorporated may also be used as end-outline marker lamps.

5.5. Position lamps, which are reciprocally incorporated with another function, using a common light source, and designed to operate permanently with an additional system to regulate the intensity of the light emitted, are permitted.

5.5.1. However, in the case of rear position lamp reciprocally incorporated with a stop lamp, the device shall either:

(a) be a part of a multiple light source arrangement, or

(b) be intended for use in a vehicle equipped with a failure monitoring system for that function.

In either case, a note shall be made within the communication document.

5.6. In the case of light source modules, it shall be checked that:

5.6.1. The design of the light source module(s) shall be such as:

(a) that each light source module can only be fitted in no other position than the designated and correct one and can only be removed with the use of tool(s);

(b) if there are more than one light source modules used in the housing for a device, light source modules having different characteristics can not be interchanged within the same lamp housing.

5.6.2. The light source module(s) shall be tamperproof.

5.6.3. A light source module shall be so designed that regardless of the use of tool(s), it shall not be mechanically interchangeable with any replaceable approved light source.

5.7. If the front position lamp incorporates one or more infrared radiation generators, the photometric and colour requirements for this front position lamp shall be met with and without the operation of the infrared radiation generator(s).

5.8. In case of failure of the variable intensity control of:

(a) a rear position lamp category R2 emitting more than the maximum value of category R or R1;

(b) a rear end-outline marker lamp category RM2 emitting more than the maximum value of category RM1;

(c) a stop lamp category S2 emitting more than the maximum value of category S1;

(d) a stop lamp category S4 emitting more than the maximum value of category S3;

Requirements of steady luminous intensity of the respective category shall be fulfilled automatically.

5.9. In the case of replaceable light source(s):

5.9.1. Any category or categories of light source(s) approved according to Regulation No 37 and/or Regulation No 128 may be used, provided that no restriction on the use is made in Regulation No 37 and its series of amendments in force at the time of application for type-approval or in Regulation No 128 and its series of amendments in force at the time of application for type-approval.

5.9.2. The design of the device shall be such that the light source can be fixed in no other position but the correct one.

5.9.3. The light source holder shall conform to the characteristics given in IEC Publication 60061. The holder data sheet relevant to the category of light source used, applies.

5.10. An interdependent lamp system shall meet the requirements when all its interdependent lamps are operated together. However, if the interdependent lamp system providing the rear position lamp function is partly mounted on the fixed component and partly mounted on a movable component, the interdependent lamp(s) specified by the applicant shall meet the outboard geometric visibility, colorimetric and photometric requirement, at all fixed positions of the movable component(s). In this case, the inboard geometric visibility requirement is deemed to be satisfied if this (these) interdependent lamp(s) still conform to the photometric values prescribed in the field of light distribution for the approval of the device, at all fixed positions of the moveable component(s).

6. INTENSITY OF LIGHT EMITTED

6.1. The light emitted by each of the two devices supplied shall be in the reference axis, of not less than the minimum intensity and of not more than the maximum intensity specified below:

	Minimum luminous intensity in cd	Maximum luminous intensity in cd when used as	
		Single lamp	Lamp (single) marked 'D' paragraph (4.2.2.6)
6.1.1. Front position lamps, front end-outline marker lamp A or AM	4	140	70
6.1.2. Front position lamps incorporated in a headlamp or front fog lamp	4	140	—

	Minimum luminous intensity in cd	Maximum luminous intensity in cd when used as	
		Single lamp	Lamp (single) marked 'D' paragraph (4.2.2.6)
6.1.3. Rear position lamps, rear end-outline marker lamp			
6.1.3.1. R, R1 or RM1 (steady)	4	17	8,5
6.1.3.2. R2 or RM2 (variable)	4	42	21
6.1.4. Stop-lamps			
6.1.4.1. S1 (steady)	60	260	130
6.1.4.2. S2 (variable)	60	730	365
6.1.4.3. S3 (steady)	25	110	55
6.1.4.4. S4 (variable)	25	160	80

6.1.5. For an assembly of two or more lamps the total intensity shall not exceed the maximum value prescribed for a single lamp.

6.1.6. When an assembly of two independent lamps to be type approved as 'D' lamps having the same function is deemed to be a single lamp, it shall comply with the requirements for:

(a) maximum intensity if all lamps together are lit;

(b) minimum intensity if either lamp has failed.

6.1.7. In case of failure of a single lamp containing more than one light source the following provisions shall apply:

6.1.7.1. A group of light sources, wired so that the failure of any one of them causes all of them to stop emitting light, shall be considered to be one light source.

6.1.7.2. The lamp shall comply with the minimum intensity required in the table of standard light distribution in space as shown in Annex 4 when any one light source has failed. However, for lamps designed for only two light sources, 50 % of the minimum intensity in the axis of reference of the lamp shall be considered sufficient, provided that a note in the communication form states that the lamp is only for use on a vehicle fitted with an operating tell-tale which indicates when any one of these two light sources has failed.

6.2. Outside the reference axis and within the angular fields defined in the diagrams in Annex 1 to this Regulation, the intensity of the light emitted by each of the two devices supplied must:

6.2.1. In each direction corresponding to the points in the light distribution table reproduced in Annex 4 to this Regulation, be not less than the product of the minimum specified in the table of paragraph 6.1 above, by the percentage specified in the said table of the direction in question;

6.2.2. In no direction within the space from which the light-signalling device is visible, exceed the maximum specified in the table of paragraph 6.1 above;

6.2.3. However, a luminous intensity of 60 cd shall be permitted for rear position lamps reciprocally incorporated with stop-lamps (see paragraph 6.1.3 above) below a plane forming an angle of 5° with and downward from the horizontal plane;

6.2.4. Moreover,

6.2.4.1. Throughout the fields defined in the diagrams in Annex 1, the luminous intensity of the light emitted must be not less than 0,05 cd for front and rear position lamps and end-outline marker lamps, not less than 0,3 cd for devices of categories S1, S3 and for those of categories S2 and S4 by day; it shall not be less than 0,07 cd for devices of categories S2 and S4 by night;

6.2.4.2. If a rear position lamp and/or a rear end-outline marker lamp is reciprocally incorporated with a stop-lamp producing either steady or variable luminous intensity, the ratio between the luminous intensities actually measured of the two lamps when turned on simultaneously at the intensity of the rear position lamp or end-outline marker lamp when turned on alone should be at least 5:1 in the field delimited by the straight horizontal lines passing through ± 5° V and the straight vertical lines passing through ± 10° H of the light distribution table.

If the one or both of the two reciprocally incorporated lamps contain(s) more than one light source and is (are) considered as a single lamp, the values to be considered are those obtained with all light sources in operation;

6.2.4.3. The provisions of paragraph 2.2 of Annex 4 to this Regulation on local variations of intensity must be observed.

6.3. The intensities shall be measured with the light source(s) continuously alight and, in the case of devices emitting red light, in coloured light.

6.4. In the case of devices of categories R2, RM2, S2 and S4 the time that elapses between energising the light source(s) and the light output measured on the reference axis to reach 90 % of the value measured in accordance with paragraph 6.3 above shall be measured for the extreme levels of luminous intensity produced by the device. The time measured to obtain the lowest luminous intensity shall not exceed the time measured to obtain the highest luminous intensity.

6.5. The variable intensity control shall not generate signals which cause luminous intensities:

6.5.1. Outside the range specified in paragraph 6.1 above and

6.5.2. Exceeding the respective steady luminous intensity maximum specified in paragraph 6.1 for the specific device:

(a) for systems depending only on daytime and night time conditions: under night time conditions;

(b) for other systems: under standard conditions ([1]).

6.6. Annex 4, to which reference is made in paragraph 6.2.1 above, gives particulars of the methods of measurement to be used.

7. TEST PROCEDURE

7.1. All measurements, photometric and colorimetric, shall be made:

7.1.1. In the case of a lamp with replaceable light source, if not supplied by an electronic light source control gear or a variable intensity control, with an uncoloured or coloured standard light source of the category prescribed for the device, supplied with the voltage:

(a) in the case of filament lamp(s), that is necessary to produce the reference luminous flux required for that category of filament lamp;

(b) in the case of LED light source(s) of 6,75 V, 13,5 V or 28,0 V; the luminous flux value produced shall be corrected. The correction factor is the ratio between the objective luminous flux and the value of the luminous flux found at the voltage applied.

7.1.2. In the case of a lamp equipped with non-replaceable light sources (filament lamps and other), at 6,75 V, 13,5 V or 28,0 V respectively.

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

7.1.3. In the case of a system that uses an electronic light source control gear or a variable intensity control, being part of the lamp ([1]) applying at the input terminals of the lamp the voltage declared by the manufacturer or, if not indicated, 6,75 V, 13,5 V or 28,0 V respectively.

7.1.4. In the case of a system that uses an electronic light source control gear or a variable intensity control, not being part of the lamp the voltage declared by the manufacturer shall be applied to the input terminals of the lamp.

7.2. However, in the case of light sources operated by a variable intensity control to obtain variable luminous intensity, photometric measurements shall be performed according to the applicant's description.

7.3. The test laboratory shall require from the manufacturer the light source control gear or a variable intensity control needed to supply the light source and the applicable functions.

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

7.5. The limits of the apparent surface in the direction of the reference axis of a light-signalling device shall be determined.

7.6. In the case of a category S3 or S4 stop lamp, which is intended to be mounted inside the vehicle a sample plate or sample plates (in case of different possibilities) as supplied (see paragraph 2.2.5) shall be positioned in front of the lamp to be tested, in the geometrical position(s) as described in the application drawing(s) (see paragraph 2.2.1).

8. COLOUR OF LIGHT EMITTED

The colour of the light emitted inside the field of the light distribution grid defined in paragraph 2 of Annex 4 shall be red or white. Outside this field, no sharp variation of colour shall be observed. To check these colorimetric characteristics, the test procedure described in paragraph 7 of this Regulation shall be applied.

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

In the case of a category S3 or S4 stop lamp, which is intended to be mounted inside the vehicle, the colorimetric characteristics shall be verified with the worst case combination(s) of lamp and rear window(s) or sample plate(s).

These requirements shall also apply within the range of variable luminous intensity produced by:

(a) rear position lamps of category R2;

(b) rear end-outline marker lamps of category RM2;

(c) stop lamps of categories S2 and S4.

9. CONFORMITY OF PRODUCTION

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

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

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

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

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

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

10. PENALTIES FOR NON-CONFORMITY OF PRODUCTION

10.1. The approval granted in respect of a device may be withdrawn if the foregoing conditions are not satisfied.

10.2. 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.

11. PRODUCTION DEFINITIVELY DISCONTINUED

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

12. REMARKS CONCERNING COLOURS AND PARTICULAR DEVICES

The Contracting Parties to the Agreement to which this Regulation is annexed are not precluded by Article 3 of that Agreement from prohibiting, for devices installed on vehicles registered by them, certain colours for which provision is made in this Regulation, or from prohibiting for all categories or for certain categories of vehicles registered by them stop-lamps having only steady luminous intensity.

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

The Contracting Parties to the 1958 Agreement applying this Regulation shall communicate to the United Nations Secretariat the names and addresses of the technical services responsible for conducting approval tests and of the type-approval authorities which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval or production definitively discontinued, issued in other countries, are to be sent.

14. TRANSITIONAL PROVISIONS

14.1. Signalling lamps not equipped with filament lamps and category S3 stop lamps intended to be mounted inside a vehicle.

14.1.1. As from the date of entry into force of Supplement 6 to the 02 series of amendments, no Contracting Party applying this Regulation shall refuse to grant approvals under this Regulation as amended by Supplement 6 to the 02 series of amendments.

14.1.2. As from 36 months after the date of entry into force of Supplement 6 to the 02 series of amendments, Contracting Parties applying this Regulation shall grant approvals only if the type of lamps as described in paragraph 14.1 above meets the requirements of this Regulation as amended by Supplement 6 to the 02 series of amendments.

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

14.1.4. Contracting Parties applying this Regulation shall continue to grant approvals to those types of lamps as described in paragraph 14.1 above which comply with the requirements of this Regulation as amended by the preceding series of amendments during the 36 months' period which follows the date of entry into force of Supplement 6 to the 02 series of amendments.

14.2. Fitting of lamps described in paragraph 14.1 above on a vehicle.

14.2.1. As from the date of entry into force of Supplement 6 to the 02 series of amendments, no Contracting Party applying this Regulation shall prohibit the fitting on a vehicle of lamps described in paragraph 14.1 above approved under this Regulation as amended by Supplement 6 to the 02 series of amendments.

14.2.2. Contracting Parties applying this Regulation shall continue to allow the fitting on a vehicle of lamps described in paragraph 14.1 above approved to this Regulation as amended by the preceding series of amendments during the 48 months' period which follows the date of entry into force of Supplement 6 to the 02 series of amendments.

14.2.3. Upon the expiration of a period of 48 months after the date of entry into force of Supplement 6 to the 02 series of amendments, Contracting Parties applying this Regulation may prohibit the fitting of lamps described in paragraph 14.1 above which do not meet the requirements of this Regulation as amended by Supplement 6 to the 02 series of amendments on a new vehicle for which type-approval or individual approval was granted more than 24 months after the entry into force of Supplement 6 to the 02 series of amendments to this Regulation.

14.2.4. Upon expiration of a period of 60 months after the date of entry into force of Supplement 6 to the 02 series of amendments, Contracting Parties applying this Regulation may prohibit the fitting of lamps as described in paragraph 14.1 above which do not meet the requirements of this Regulation as amended by Supplement 6 to the 02 series of amendments on a new vehicle first registered more than 60 months after the date of entry into force of Supplement 6 to the 02 series of amendments to this Regulation.

ANNEX 1

FRONT AND REAR POSITION LAMPS, END-OUTLINE MARKER LAMPS AND STOP-LAMPS: MINIMUM ANGLES REQUIRED FOR LIGHT DISTRIBUTION IN SPACE OF THESE LAMPS [1]

In all cases, the minimum vertical angles of light distribution in space are 15° above and 15° below the horizontal for all categories of devices included in this Regulation, except:

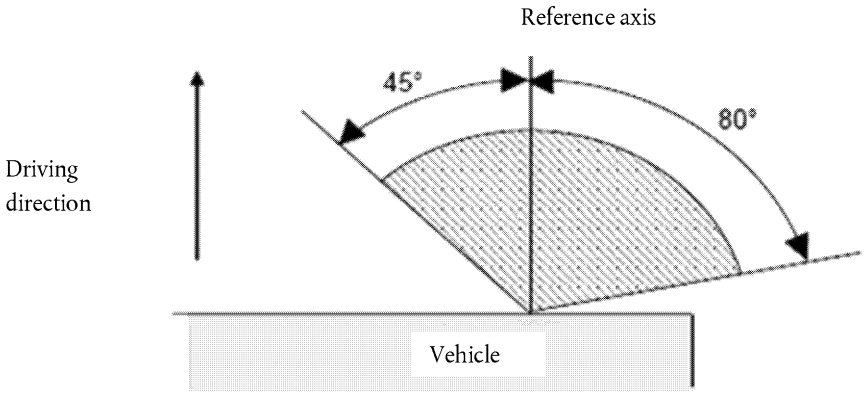
(a) For lamps intended to be installed with their H plane at a mounting height less than 750 mm above the ground, for which they are 15° above and 5° below the horizontal;

(b) Optional lamps intended to be installed with their H plane at a mounting height more than 2 100 mm above the ground, for which they are 5° above and 15° below the horizontal;

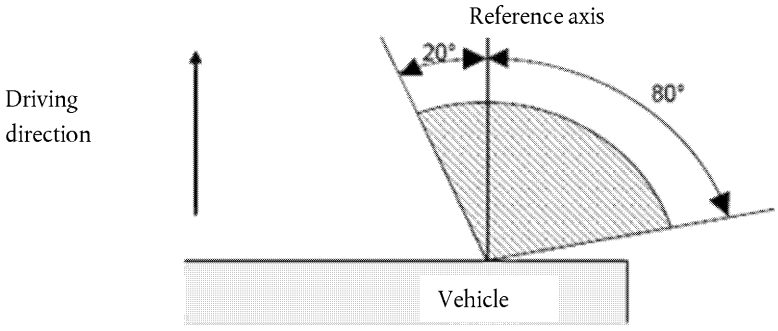
(c) For category S3 or S4 stop lamp for which they are 10° above and 5° below the horizontal.

Minimum horizontal angles of light distribution in space

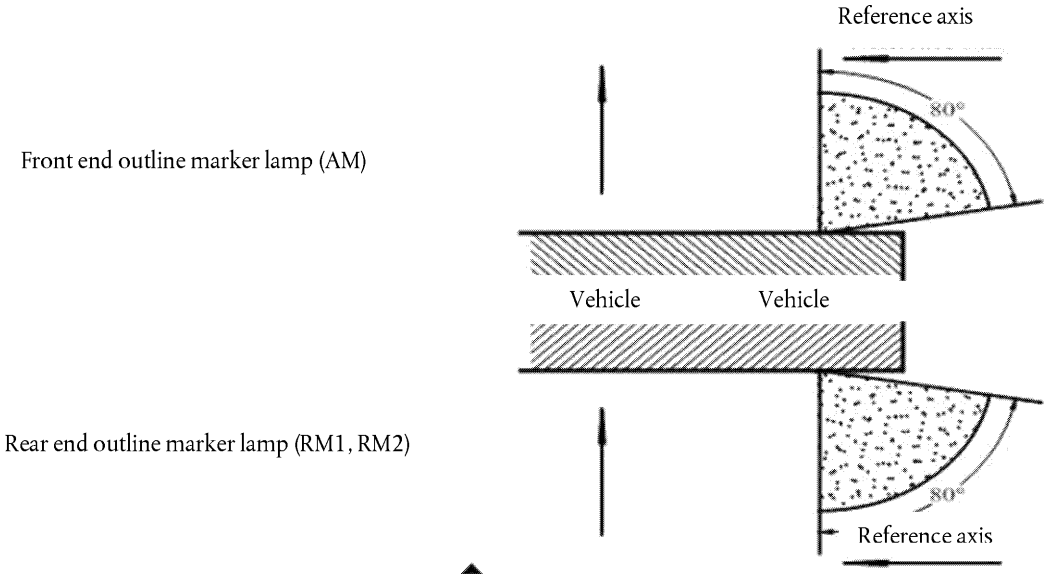
Front position lamps



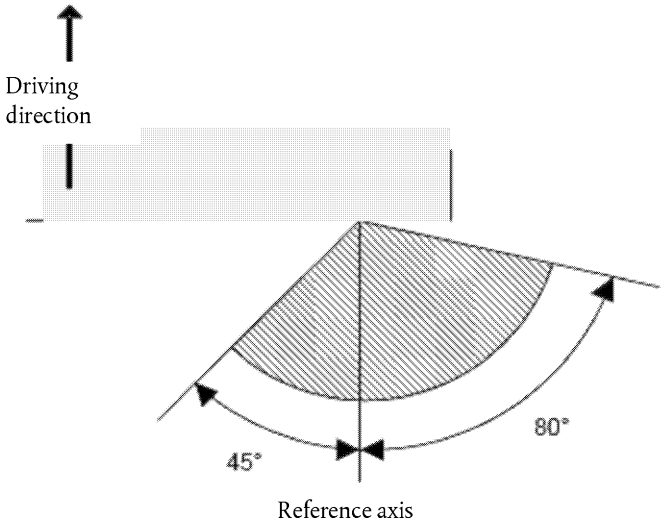
Under the H plane for front position lamps intended to be installed with this plane at a mounting height less than 750 mm above ground.



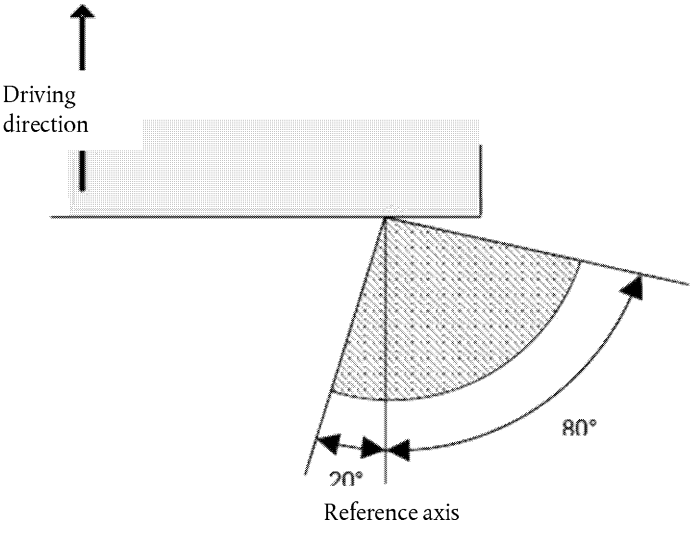
[1] The angles shown in these diagrams are correct for devices to be mounted on the right side of the vehicle. The arrows point to the front of the vehicle.



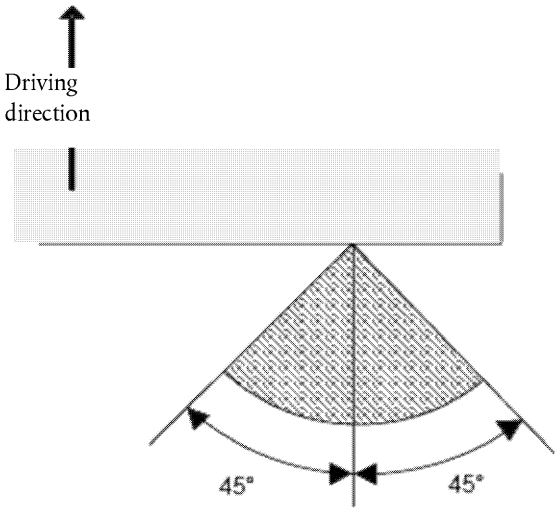
Rear position lamps



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

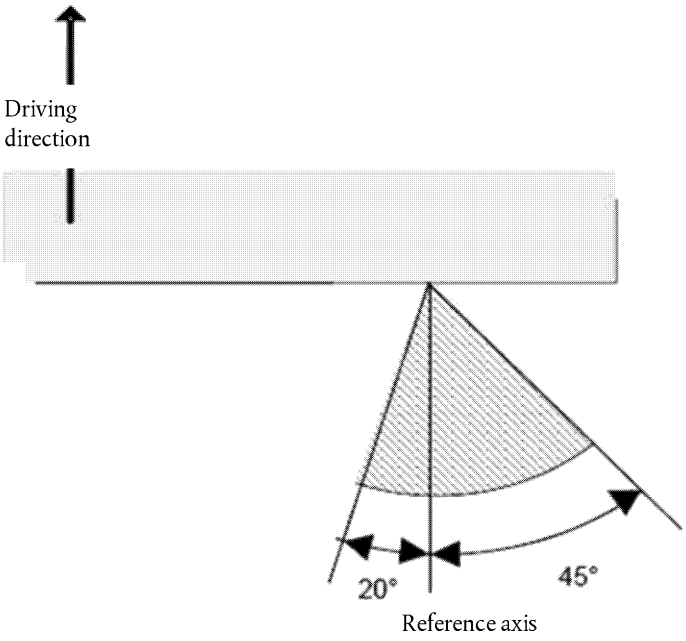


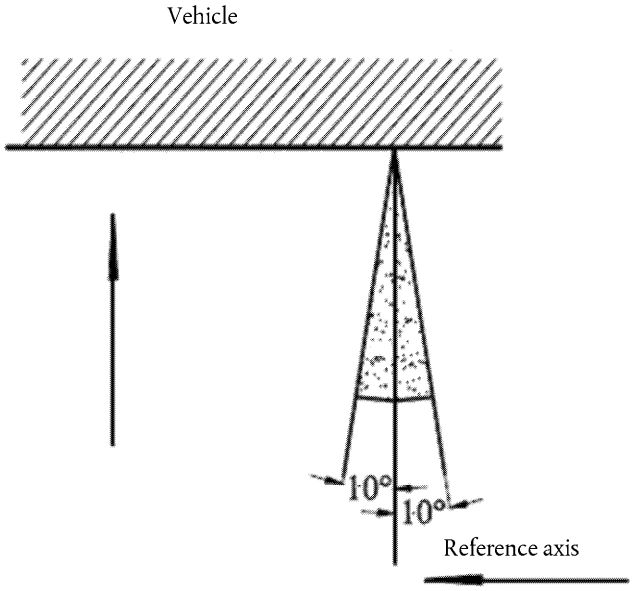
Stop lamps (S1 and S2)



Stop-lamps (S3 and S4)

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

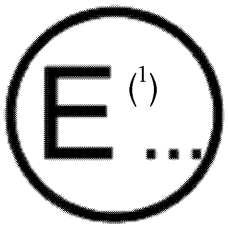



Vehicle
10°
10°
Reference axis

ANNEX 2

COMMUNICATION

(Maximum format: A4 (210 × 297 mm))



issued by: Name of administration

.....

.....

.....

Concerning (2): Approval granted

Approval extended

Approval refused

Approval withdrawn

Production definitively discontinued

of a type of device pursuant to Regulation No 7

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

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

9.1. By category of lamp:

For mounting either outside or inside or both (2)

Colour of light emitted: red/white (2)

Number, category and kind of light source(s): .....

Voltage and wattage: .....

Light source module specific identification code: .....

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

Geometrical conditions of installation and relating variations, if any: .....

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

(a) Being part of the lamp: yes/no (2)

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

Input voltage(s) supplied by an electronic light source control gear/variable intensity control: .....

Electronic light source control gear/variable intensity control manufacturer and identification number (when the light source control gear is part of the lamp but is not included into the lamp body): .....

Variable luminous intensity: yes/no (2)

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

Front position lamp	yes/no (2)
R1 Rear position lamp	yes/no (2)
R2 Rear position lamp	yes/no (2)
S1 Stop lamp	yes/no (2)
S2 Stop lamp	yes/no (2)
S3 Stop lamp	yes/no (2)
S4 Stop lamp	yes/no (2)
End-outline marker lamp	yes/no (2)

10. Position of the approval mark: .....

11. Reason(s) for extension (if applicable): .....

12. Approval granted/extended/refused/withdrawn (2): .....

13. Place: .....

14. Date: .....

15. Signature: .....

16. The list of documents deposited with the type-approval authority which has granted approval is annexed to this communication and may be obtained on request.

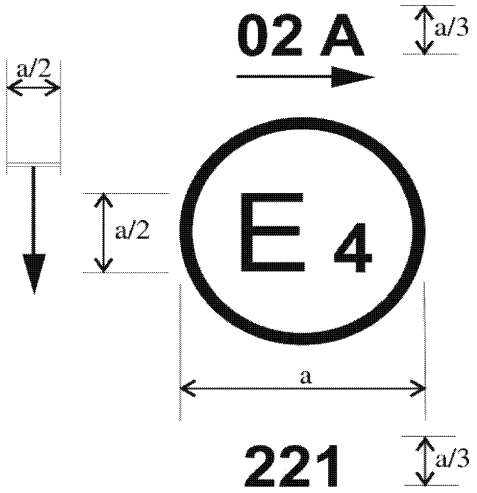
(1) Distinguishing number of the country which has granted/extended/refused/withdrawn an approval (see approval provisions in the Regulation).

(2) Delete what does not apply.

ANNEX 3

EXAMPLES OF ARRANGEMENTS OF THE APPROVAL MARKS

1. FRONT POSITION LAMP

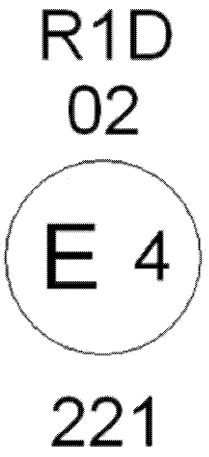


a = 5 mm min.

The device bearing the approval mark shown above is a front position lamp approved in the Netherlands (E4), under approval number 221 pursuant to Regulation No 7.

The number mentioned close to the symbol 'A' indicates that approval was granted in accordance with the requirements of Regulation No 7 as amended by the 02 series of amendments. The horizontal arrow indicates the side on which the required photometric specifications are met up to an angle of 80° H. The vertical arrow starting from a horizontal segment and directed downwards indicates a permissible mounting height of equal to or less than 750 mm from the ground for this device.

2. REAR POSITION LAMP

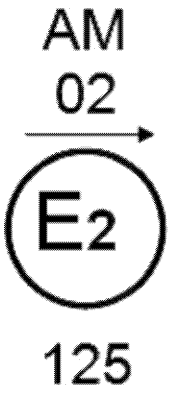


The device bearing the approval mark shown above is a rear position lamp approved in the Netherlands (E4) under approval number 221 pursuant to Regulation No 7, which may also be used in an assembly of two rear position lamps.

The number mentioned below the symbol 'R1D' indicates that approval was granted in conformity with the requirements of Regulation No 7 as amended by the 02 series of amendments.

The absence of an arrow means that, both right and left, the required photometric specifications are met up to an angle of 80° H.

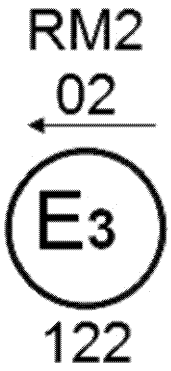
3. FRONT END-OUTLINE MARKER LAMP



The device bearing the approval mark shown above is a front end-outline marker lamp approved in France (E2) under approval number 125 pursuant to Regulation No 7.

The number mentioned below the symbol 'AM' indicates that approval was granted in conformity with the requirements of Regulation No 7 as amended by the 02 series of amendments. The horizontal arrow indicates the side on which the required photometric specifications are met up to an angle of 80° H.

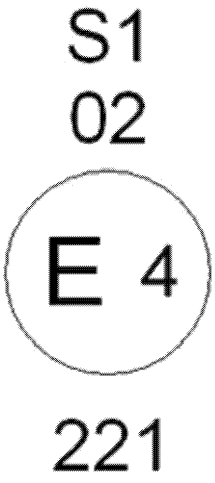
4. REAR END-OUTLINE MARKER LAMP



The device bearing the approval mark shown above is a rear end-outline marker lamp with variable luminous intensity approved in Italy (E3) under approval number 122 pursuant to Regulation No 7.

The number mentioned below the symbol 'RM' indicates that approval was granted in conformity with the requirements of Regulation No 7 as amended by the 02 series of amendments. The horizontal arrow indicates the side on which the required photometric specifications are met up to an angle of 80° H.

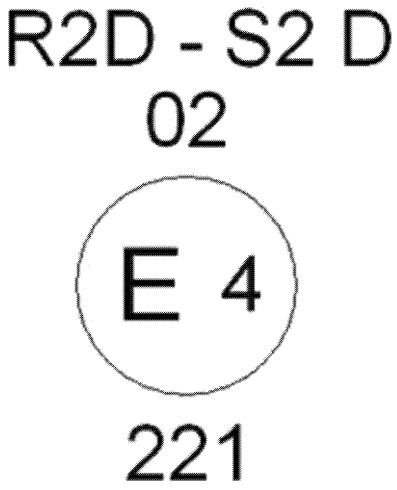
5. STOP-LAMP



The device bearing the approval mark shown above is a stop-lamp with one level of illumination approved in the Netherlands (E4) under approval number 221 pursuant to Regulation No 7.

The number mentioned below the symbol 'S1' indicates that the approval was granted in conformity with the requirements of Regulation No 7 as amended by the 02 series of amendments.

6. DEVICE COMPRISING BOTH A REAR POSITION LAMP AND A STOP-LAMP



The device bearing the approval mark shown above is a device comprising both a rear position lamp and a stop-lamp with variable luminous intensity, approved in the Netherlands (E4) under approval number 221 pursuant to Regulation No 7.

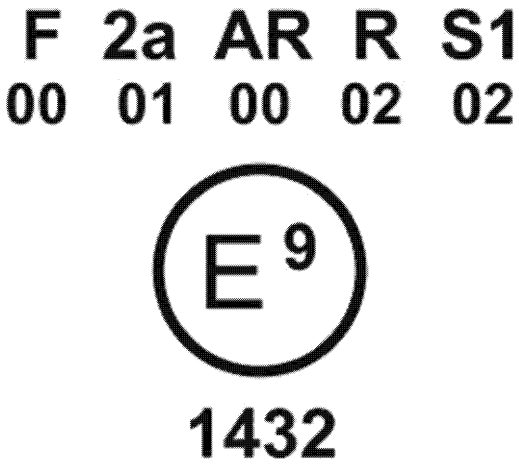
The number mentioned below the symbol 'R2D-S2D' indicates that approval was granted in conformity with the requirements of Regulation No 7 as amended by the 02 series of amendments. The rear position lamp is incorporated into a stop-lamp, both with variable luminous intensity, which may also be used in an assembly of two lamps.

The absence of an arrow means that, both right and left, the required photometric specifications are met up to an angle of 80° H.

Note: The approval number and the additional symbols shall be placed close to the circle and either above or below the letter 'E' or to the right or to the left of that letter. The digits of the approval number shall be on the same side of the letter 'E' and face the same direction. The approval number and the additional symbol including the number of the series of amendments to the Regulation in question, where applicable, shall be placed diametrically opposite to each other.

The use of Roman numerals as approval numbers should be avoided so as to prevent any confusion with other symbols.

7. MARKING OF INDEPENDENT LAMPS



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

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

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

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

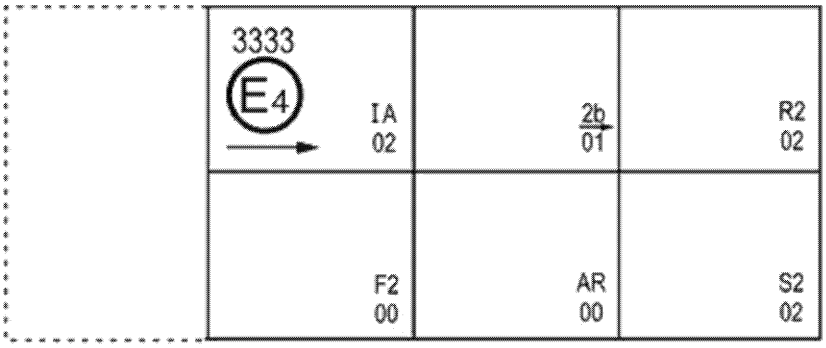
A red rear position lamp (R) approved in accordance with the 02 series of amendments to Regulation No 7,

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

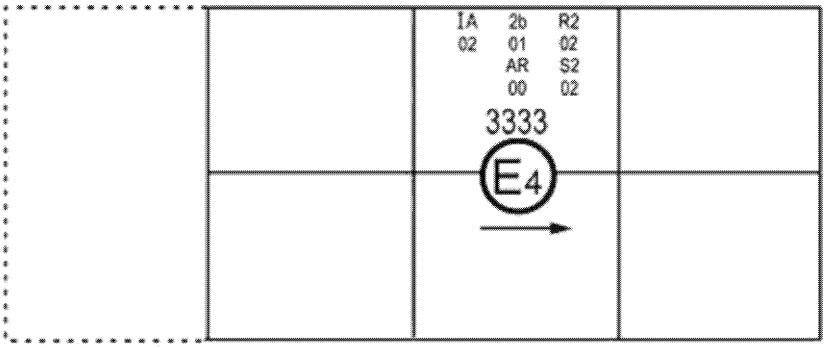
8. SIMPLIFIED MARKING OF GROUPED, COMBINED OR RECIPROCALLY INCORPORATED LAMPS WHEN TWO OR MORE LAMPS ARE PART OF THE SAME ASSEMBLY

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

Model A



Model B



Model C

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

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

A reflex-reflector of class IA approved in accordance with the 02 series of amendments to Regulation No 3,

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

A red rear position lamp with variable luminous intensity (R2) approved in accordance with the 02 series of amendments to Regulation No 7,

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

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

A stop-lamp with variable luminous intensity (S2) approved in accordance with the 02 series of amendments to Regulation No 7.

Note: The three examples of approval marks (models D, E and F) below correspond to a lighting device bearing an approval mark comprising:

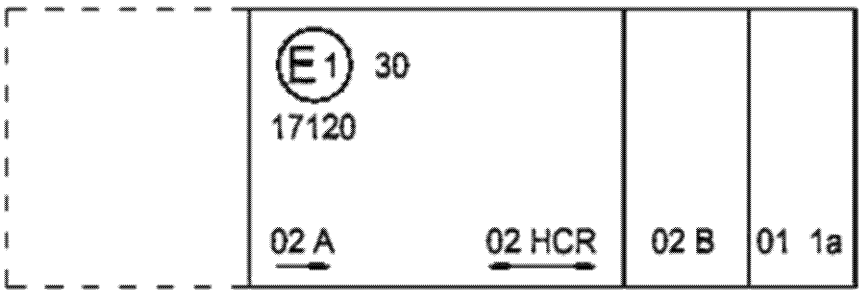
A front position lamp approved in accordance with the 02 series of amendments to Regulation No 7,

A headlamp with a passing beam designed for right- and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 111 250 candelas (indicated by the number '30'), approved in accordance with the 02 series of amendments to Regulation No 20,

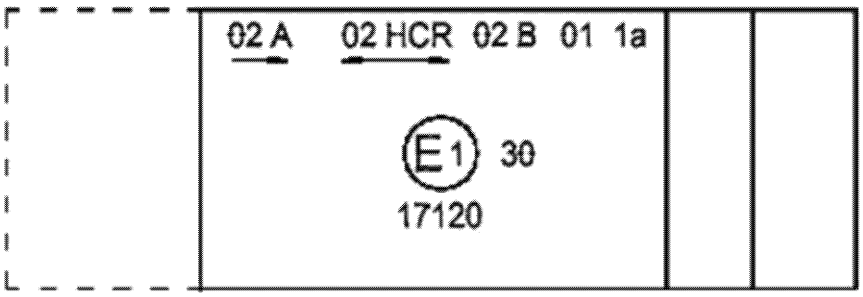
A front fog lamp approved in accordance with the 02 series of amendments to Regulation No 19,

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

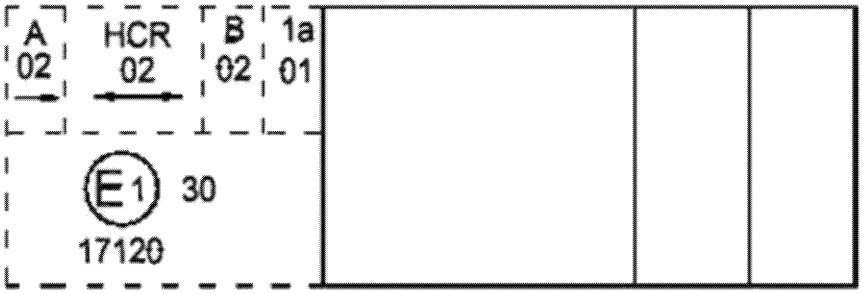
Model D



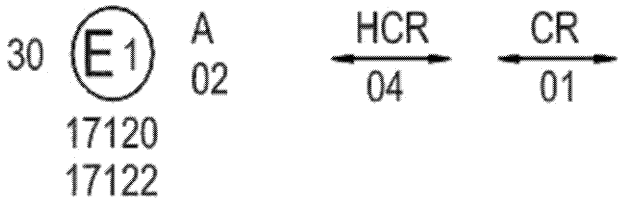
Model E



Model F



9. LAMP RECIPROCALLY INCORPORATED WITH A HEADLAMP



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

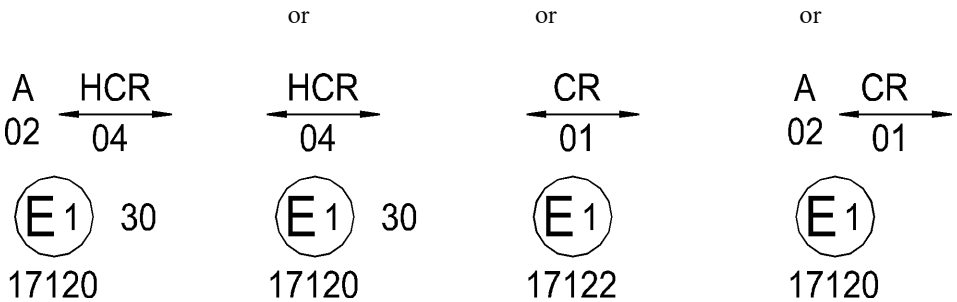
Either a headlamp with a passing beam designed for right- and left-hand traffic and a driving beam with a maximum intensity comprised between 86 250 and 111 250 candelas (indicated by the number '30') approved in Germany (E1) in accordance with the requirements of Regulation No 8 as amended by the 04 series of amendments, which is reciprocally incorporated with

a front position lamp approved in accordance with the 02 series of amendments to Regulation No 7;

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

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

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

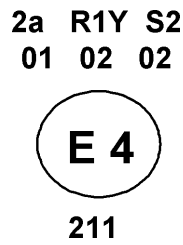


10. LIGHT SOURCE MODULES

MD E3 17325

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

11. INTERDEPENDENT LAMPS

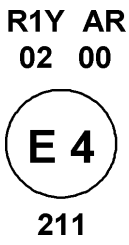


Marking of an interdependent lamp comprising part of an interdependent lamp system providing:

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

a red rear position (side) lamp (R1) approved in accordance with the 02 series of amendments to Regulation No 7. This is also marked Y as it is an interdependent lamp forming part of an interdependent lamp system,

A stop-lamp with variable luminous intensity (S2) approved in accordance with the 02 series of amendments to Regulation No 7.



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

a red rear position (side) lamp (R1) approved in accordance with the 02 series of amendments to Regulation No 7. This is also marked Y as it is an interdependent lamp forming part of an interdependent lamp system,

a reversing lamp (AR) approved in accordance with Regulation No 23 in its original version.

ANNEX 4

PHOTOMETRIC MEASUREMENTS

1. MEASUREMENT METHODS

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

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

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

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

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

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

2. **Table of standard light distribution**

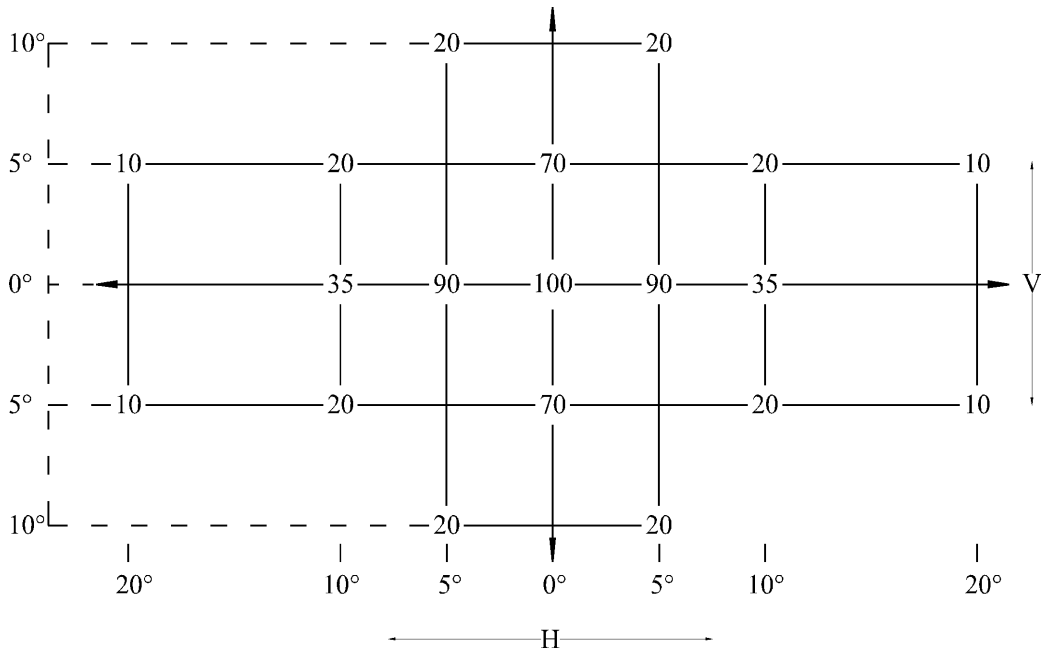


Table of light distribution for category S3 stop-lamp

10°	32	—	64	—	32
5°	64	100	100	100	64
0°	64	100	100	100	64
5°	64	100	100	100	64
	10°	5°	0°	5°	10°

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

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

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

3. PHOTOMETRIC MEASUREMENT OF LAMPS

The photometric performance shall be checked:

3.1. For non-replaceable light sources (filament lamps and other): with the light sources present in the lamp, in accordance with the relevant subparagraph of paragraph 7.1 of this Regulation.

3.2. For replaceable light source(s):

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

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

The actual luminous fluxes of each light source used shall not deviate more than 5 % from the mean value.

Alternatively and in case of filament lamps only, a standard filament lamp may be used in turn, in each of the individual positions, operated at its reference flux, the individual measurements in each position being added together.

3.3. For any signalling lamp except those equipped with filament lamp(s), the luminous intensities, measured after one minute and after 30 minutes of operation, shall comply with the minimum and maximum requirements. The luminous intensity distribution after one minute of operation can be calculated from the luminous intensity distribution after 30 minutes of operation by applying at each test point the ratio of luminous intensities measured at HV after one minute and after 30 minutes of operation.

ANNEX 5

MINIMUM REQUIREMENTS FOR CONFORMITY OF PRODUCTION CONTROL PROCEDURES

1. GENERAL

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

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

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

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

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

2. MINIMUM REQUIREMENTS FOR VERIFICATION OF CONFORMITY BY THE MANUFACTURER

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

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

2.1. Nature of tests

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

2.2. Methods used in tests

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

2.2.2. In any test of conformity carried out by the manufacturer, equivalent methods may be used with the consent of the competent authority responsible for approval tests. The manufacturer is responsible for proving that the applied methods are equivalent to those laid down in this Regulation.

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

2.2.4. In all cases the reference methods shall be those of this Regulation, particularly for the purpose of administrative verification and sampling.

2.3. Nature of sampling

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

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

2.4. Measured and recorded photometric characteristics

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

2.5. Criteria governing acceptability

The manufacturer is responsible for carrying out a statistical study of the test results and for defining, in agreement with the competent authority, criteria governing the acceptability of his products in order to meet the specifications laid down for verification of conformity of products in paragraph 9.1 of this Regulation.

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

ANNEX 6

MINIMUM REQUIREMENTS FOR SAMPLING BY AN INSPECTOR

1. GENERAL

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

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

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

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

1.2.3. Lamps with apparent defects are disregarded.

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

2. FIRST SAMPLING

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

2.1. The conformity is not contested

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

2.1.1.1. Sample A

A1:	one lamp	0 %
	one lamp not more than	20 %
A2:	both lamps more than	0 %
	but not more than	20 %

Go to sample B

2.1.1.2. Sample B

B1:	both lamps	0 %

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

2.2. The conformity is contested

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

2.2.1.1. Sample A

A3:	one lamp not more than	20 %
	one lamp more than	20 %
	but not more than	30 %

2.2.1.2. Sample B

B2:	in the case of A2	
	one lamp more than	0 %
	but not more than	20 %
	one lamp not more than	20 %
B3:	in the case of A2	
	one lamp	0 %
	one lamp more than	20 %
	but not more than	30 %

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

2.3. Approval withdrawn

Conformity shall be contested and paragraph 10 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the lamps are:

2.3.1. Sample A

A4:	one lamp not more than	20 %
	one lamp more than	30 %
A5:	both lamps more than	20 %

2.3.2. Sample B

B4:	in the case of A2	
	one lamp more than	0 %
	but not more than	20 %
	one lamp more than	20 %
B5:	in the case of A2	
	both lamps more than	20 %
B6:	in the case of A2	
	one lamp	0 %
	one lamp more than	30 %

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

3. REPEATED SAMPLING

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

3.1. The conformity is not contested

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

3.1.1.1. Sample C

C1:	one lamp	0 %
	one lamp not more than	20 %

	C2:	both lamps more than	0 %
		but not more than	20 %

Go to sample D

3.1.1.2. Sample D

	D1:	in the case of C2	
		both lamps	0 %

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

3.2. The conformity is contested

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

3.2.1.1. Sample D

	D2:	in the case of C2	
		one lamp more than	0 %
		but not more than	20 %
		one lamp not more than	20 %

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

3.3. Approval withdrawn

Conformity shall be contested and paragraph 10 applied if, following the sampling procedure in Figure 1 of this annex, the deviations of the measured values of the lamps are:

3.3.1. Sample C

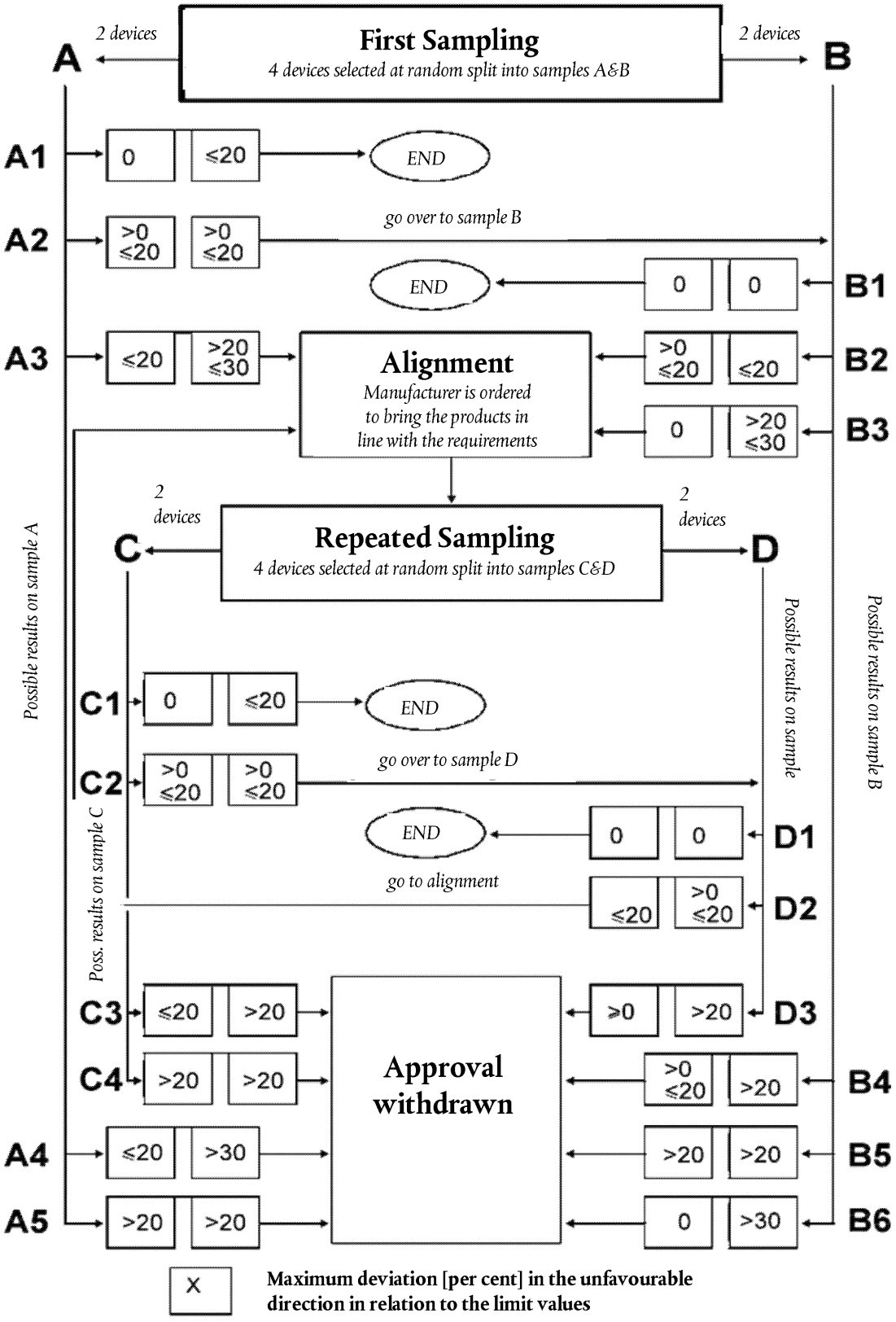
	C3:	one lamp not more than	20 %
		one lamp more than	20 %
	C4:	both lamps more than	20 %

3.3.2. Sample D

	D3:	in the case of C2	
		one lamp 0 % or more than	0 %
		one lamp more than	20 %

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

Figure 1


First Sampling
4 devices selected at random split into samples A&B
2 devices
2 devices
A
B
A1
0
≤20
END
A2
>0 ≤20
>0 ≤20
go over to sample B
END
0
0
B1
A3
≤20
>20 ≤30
Alignment
Manufacturer is ordered to bring the products in line with the requirements
>0 ≤20
≤20
B2
0
>20 ≤30
B3
2 devices
2 devices
C
Repeated Sampling
4 devices selected at random split into samples C&D
D
Possible results on sample A
Possible results on sample
Possible results on sample B
C1
0
≤20
END
C2
>0 ≤20
>0 ≤20
go over to sample D
END
0
0
D1
go to alignment
≤20
>0 ≤20
D2
Poss. results on sample C
C3
≤20
>20
Approval withdrawn
≥0
>20
D3
C4
>20
>20
>0 ≤20
>20
B4
A4
≤20
>30
>20
>20
B5
A5
>20
>20
0
>30
B6
X
Maximum deviation [per cent] in the unfavourable direction in relation to the limit values

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

CONTENTS

REGULATION

ANNEXES

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

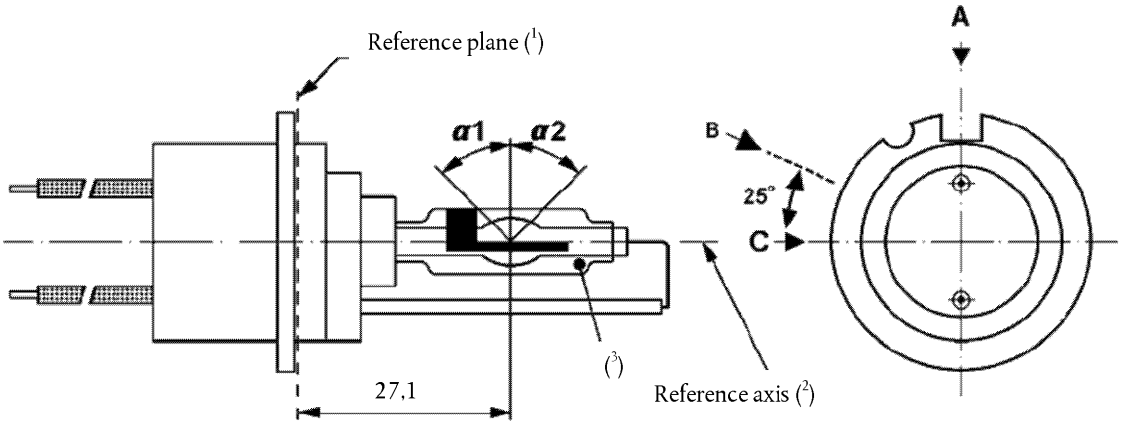
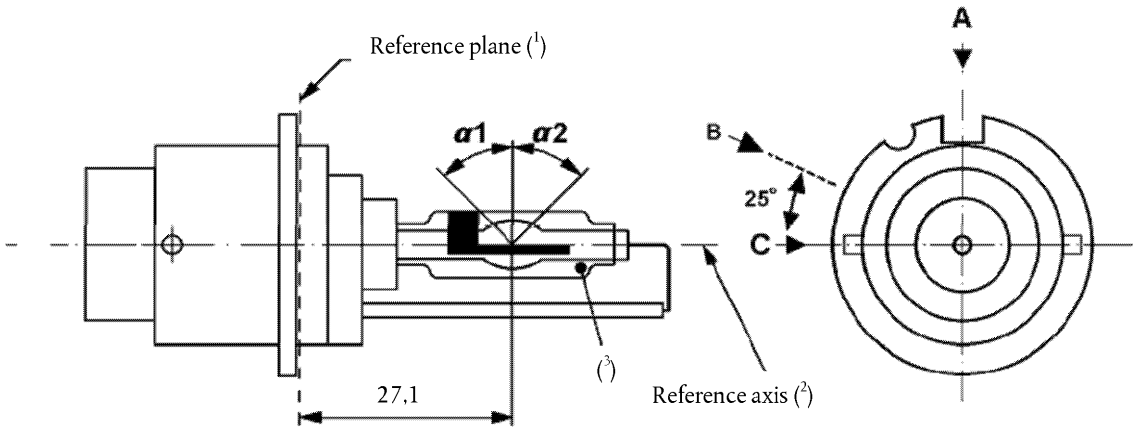


Figure 2

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

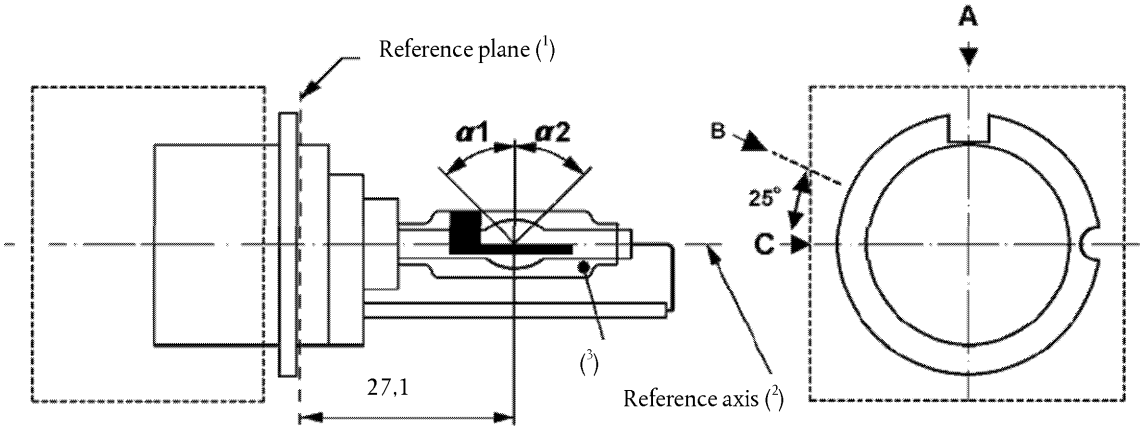
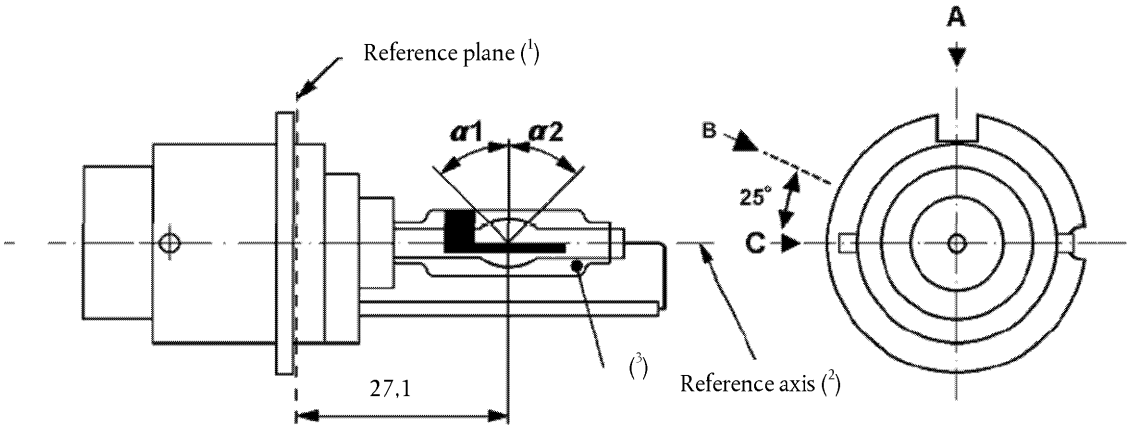


Figure 4

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)

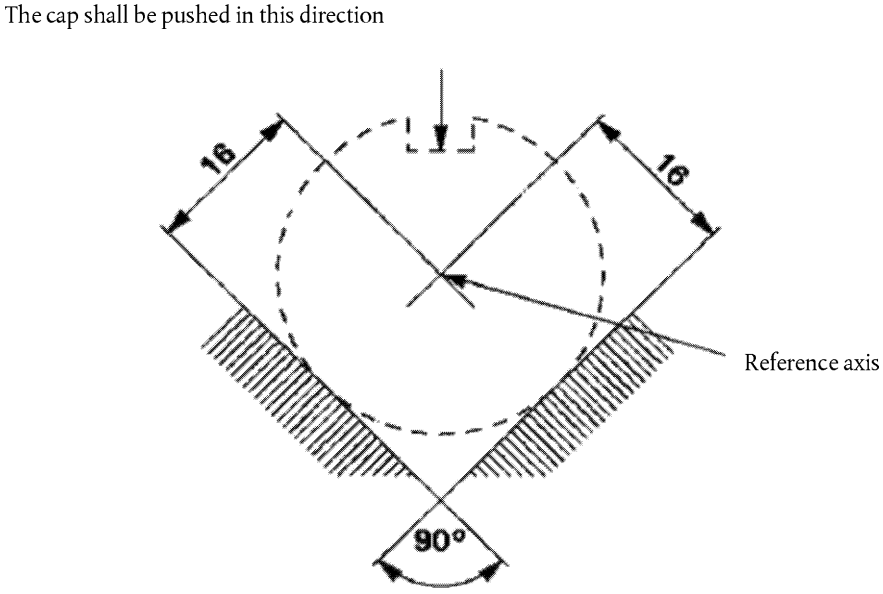
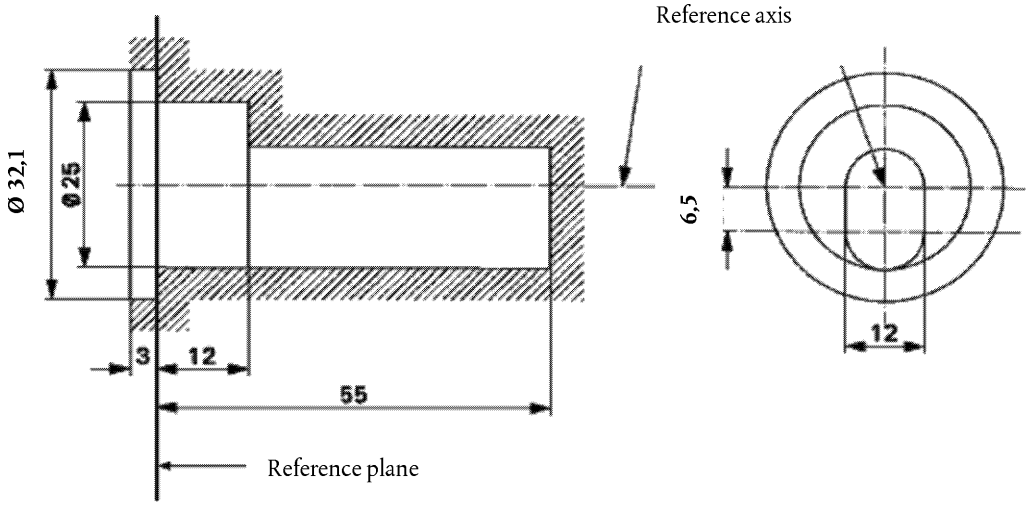


Figure 6

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	

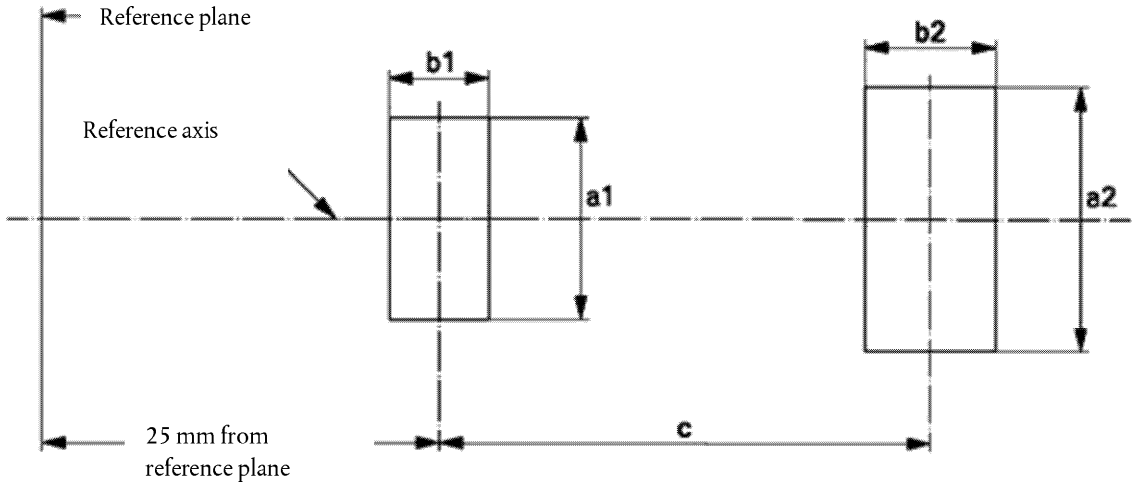
Dimensions			Production light sources		Standard light sources	
			D1R/D2R	D3R/D4R	D1R/D2R	D3R/D4R
Lamp voltage	Objective	V	85	42	85	42
	Tolerance		± 17	± 9	± 8	± 4
Lamp wattage	Objective	W	35		35	
	Tolerance		± 3		± 0,5	
Luminous flux	Objective	lm	2 800		2 800	
	Tolerance		± 450		± 150	
Chromaticity 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

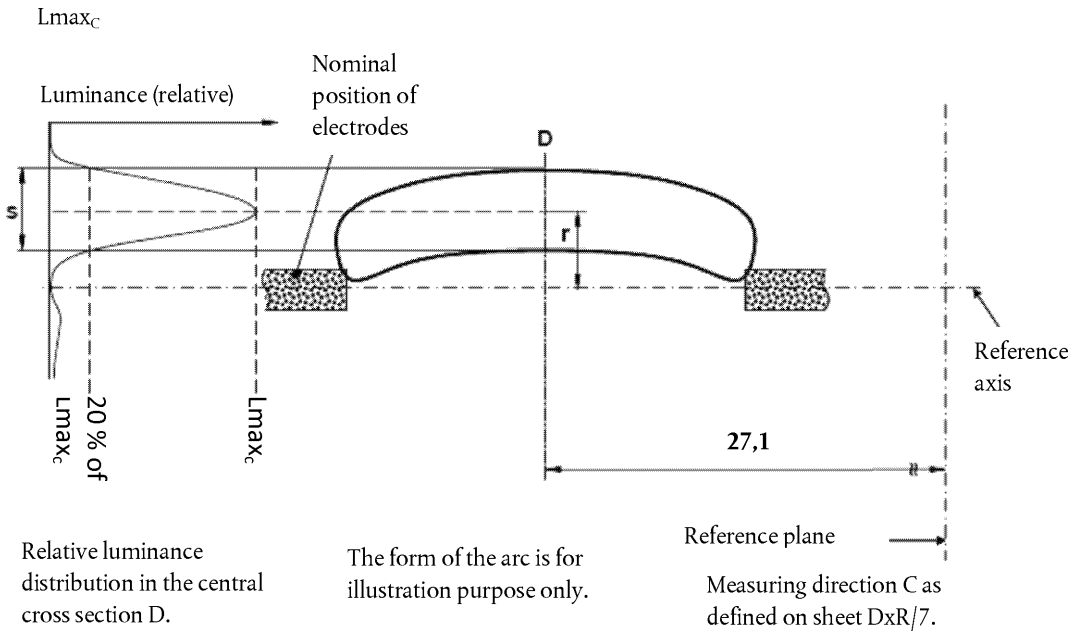
d = diameter of the electrode:
d < 0,3 for D1R and D2R
d < 0,4 for D3R and D4R.

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.



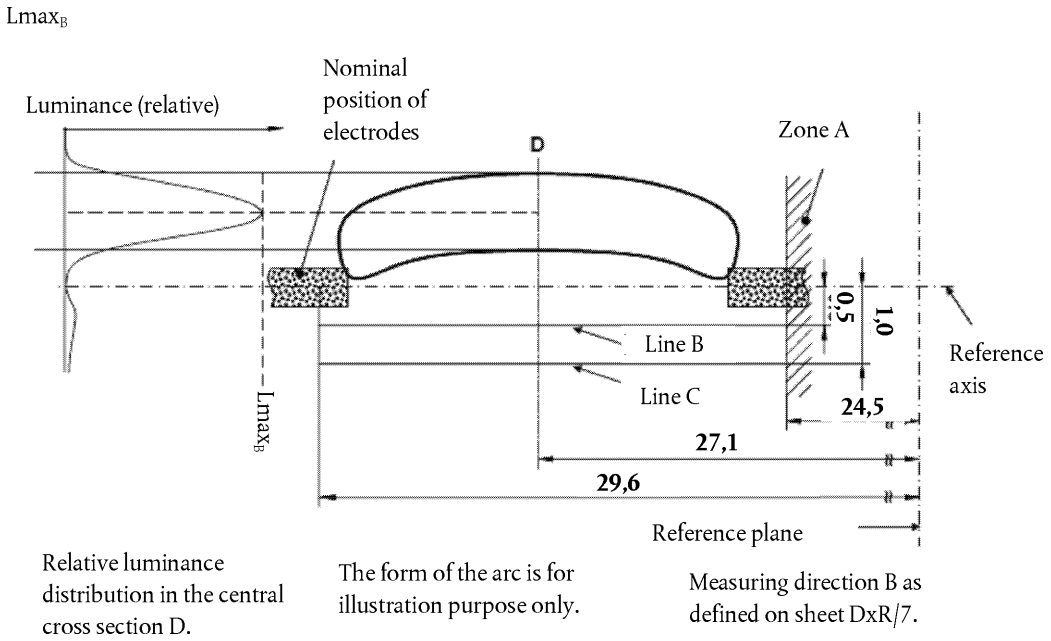
When measuring the relative luminance distribution in the central cross section D as indicated in the drawing above, the maximum value $Lmax_C$ has the distance r from the reference axis. The points of 20 % of $Lmax_C$ have the distance s, as shown in the drawing above.

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:

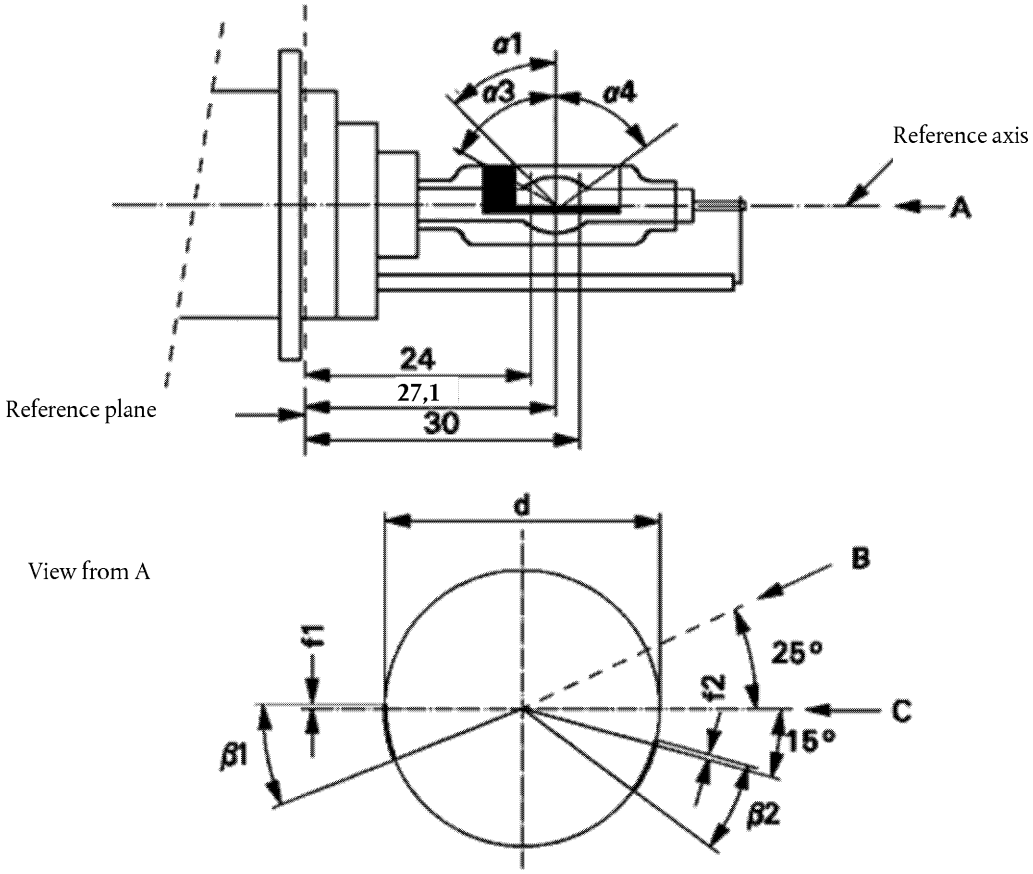
Zone A	≤ 4,5 %
Line B	≤ 15 %
Line C	≤ 5,0 %

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

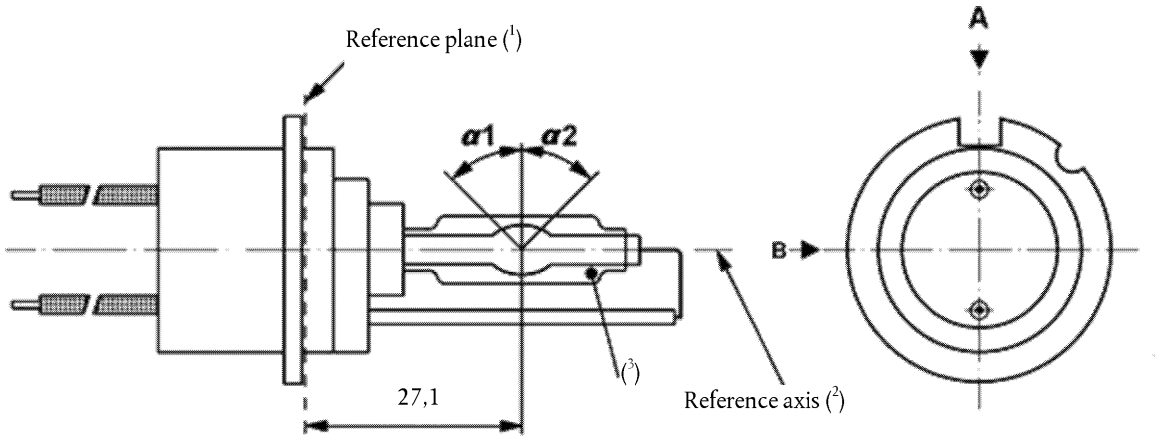
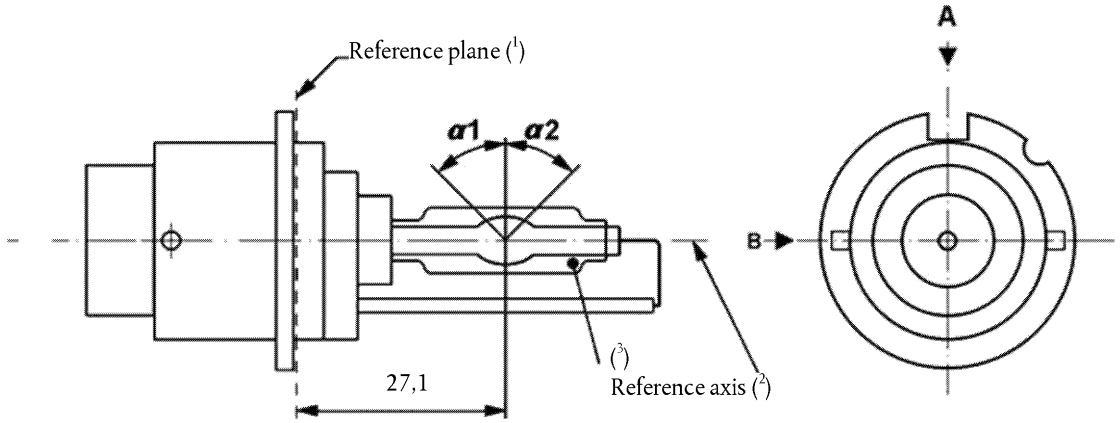


Figure 2

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

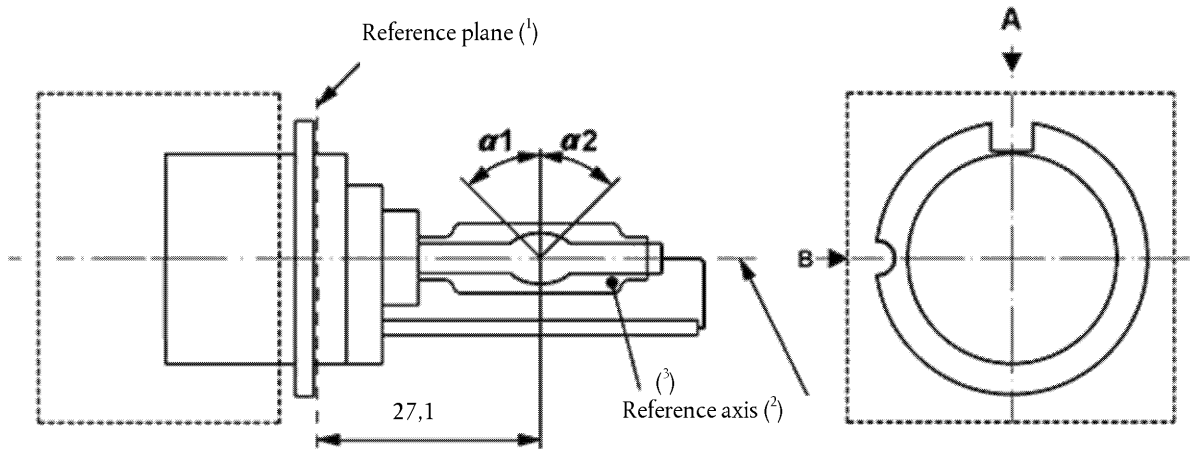
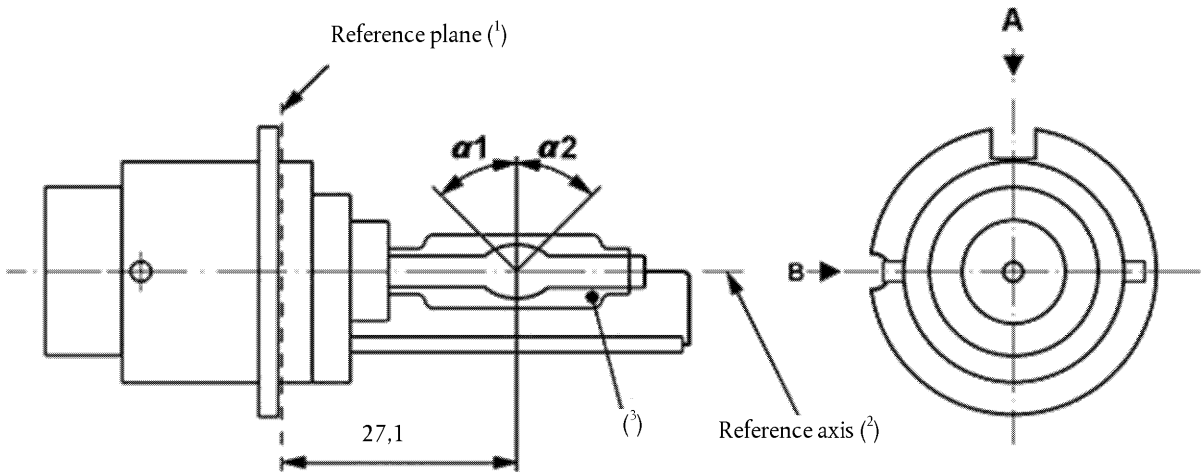


Figure 4

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])

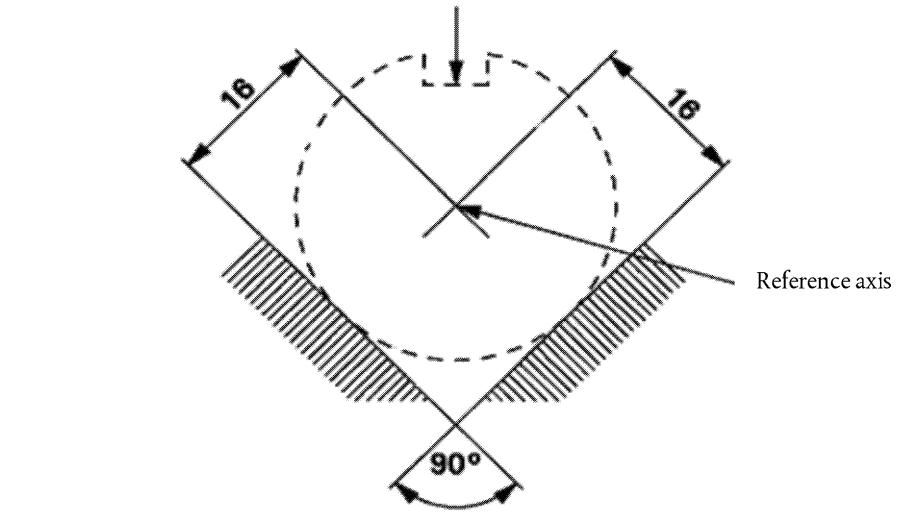
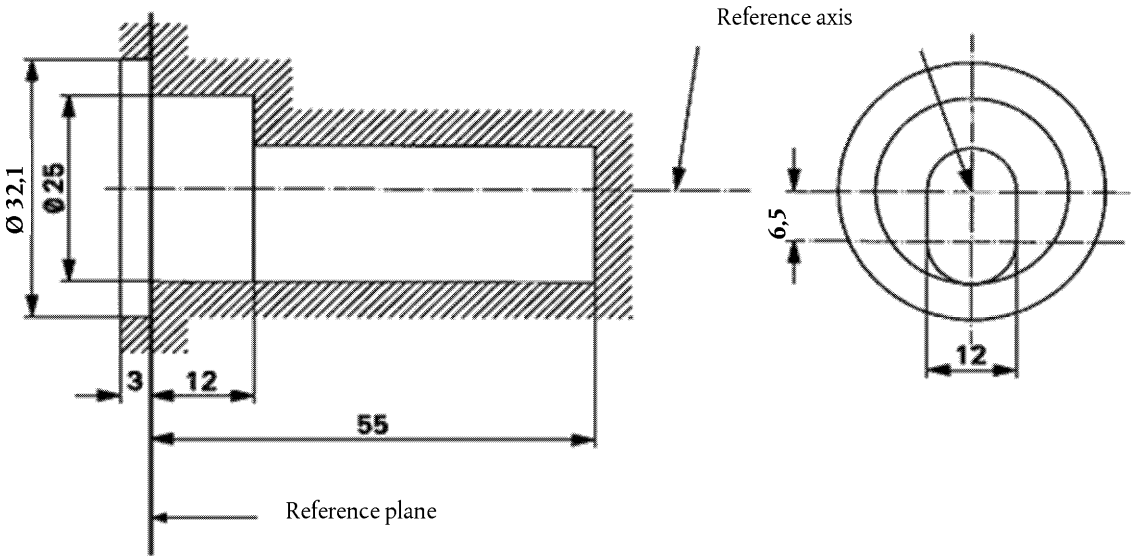


Figure 6

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

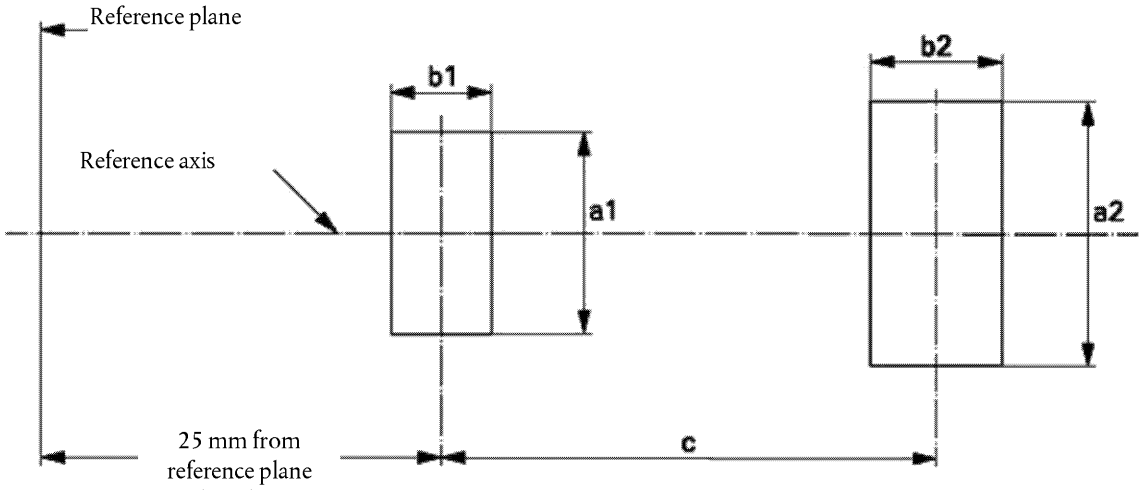
			D1S/D2S	D3S/D4S	D1S/D2S	D3S/D4S
Rated voltage of the ballast		V	12 (2)		12	
Rated wattage		W	35		35	
Test voltage		V	13,5		13,5	
Lamp voltage	Objective	V	85	42	85	42
	Tolerance		± 17	± 9	± 8	± 4
Lamp wattage	Objective	W	35		35	
	Tolerance		± 3		± 0,5	
Luminous flux	Objective	lm	3 200		3 200	
	Tolerance		± 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

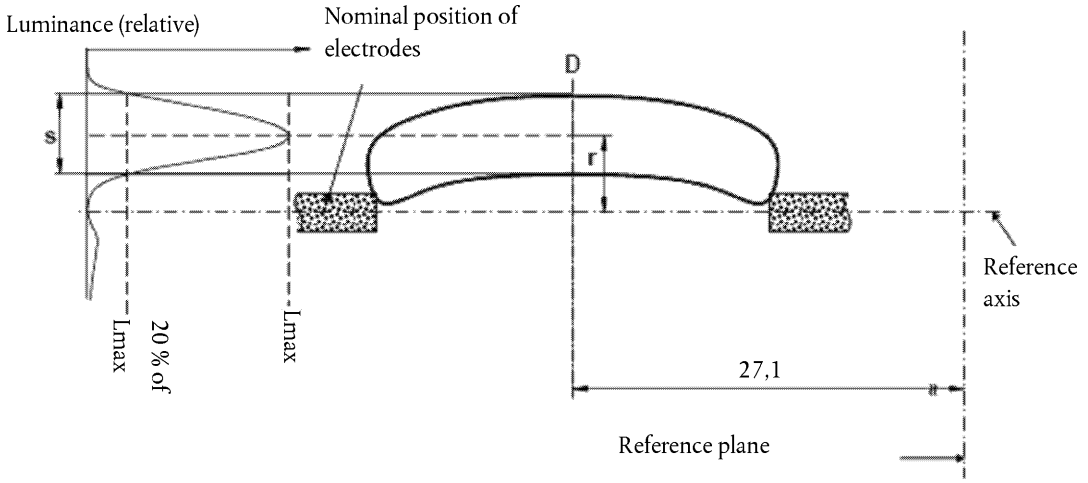
d = diameter of the electrode:
d < 0,3 for D1S and D2S
d < 0,4 for D3S and D4S.

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:

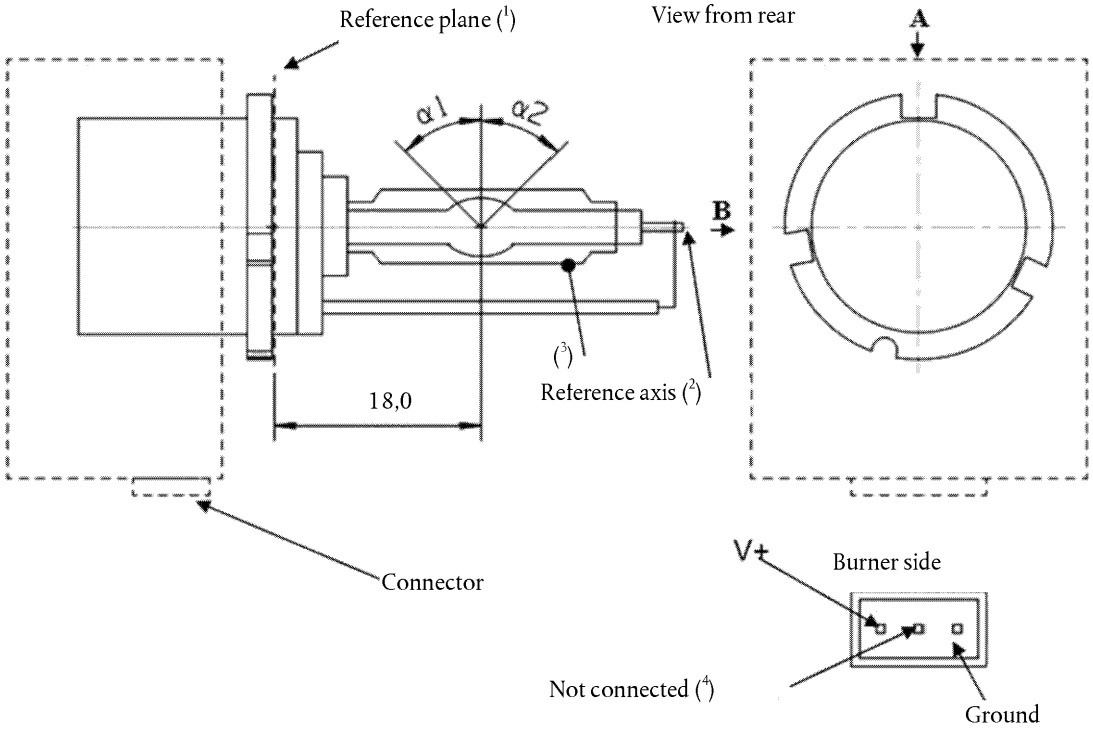
Dimension in mm	Production light sources	Standard light sources
r (arc bending)	0,50 ± 0,40	0,50 ± 0,20
s (arc diffusion)	1,10 ± 0,40	1,10 ± 0,25

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

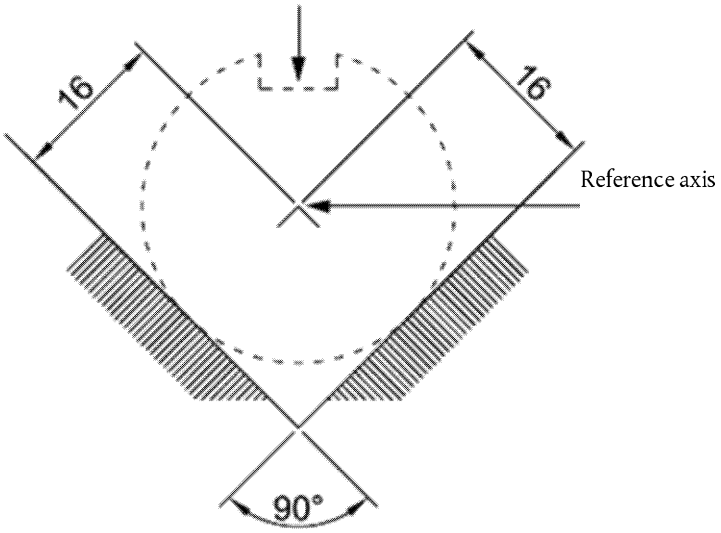
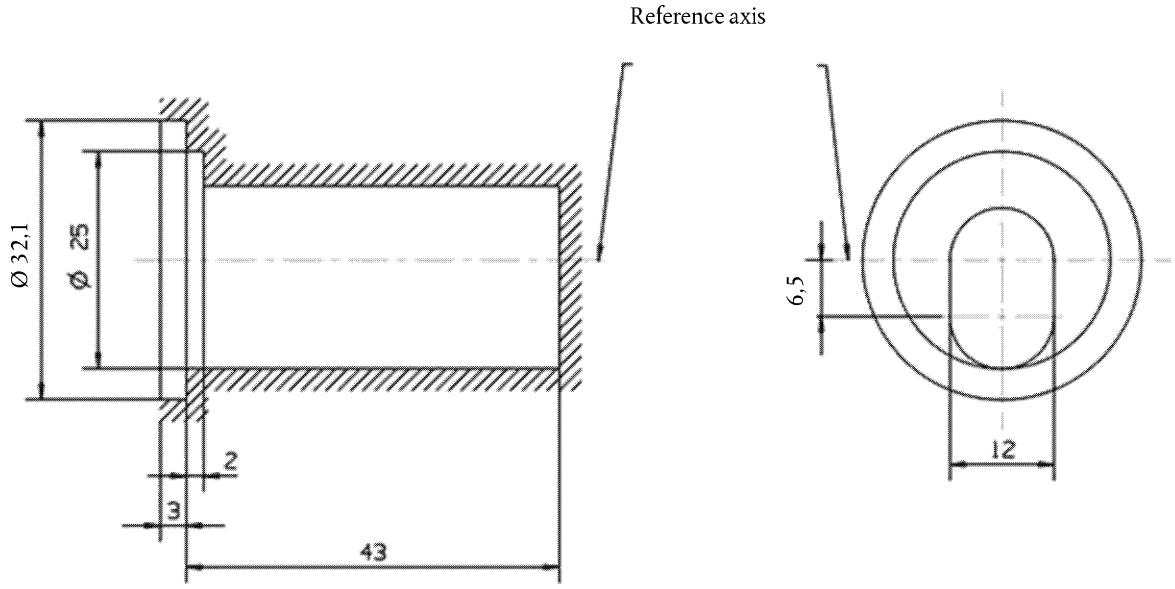


Figure 3

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

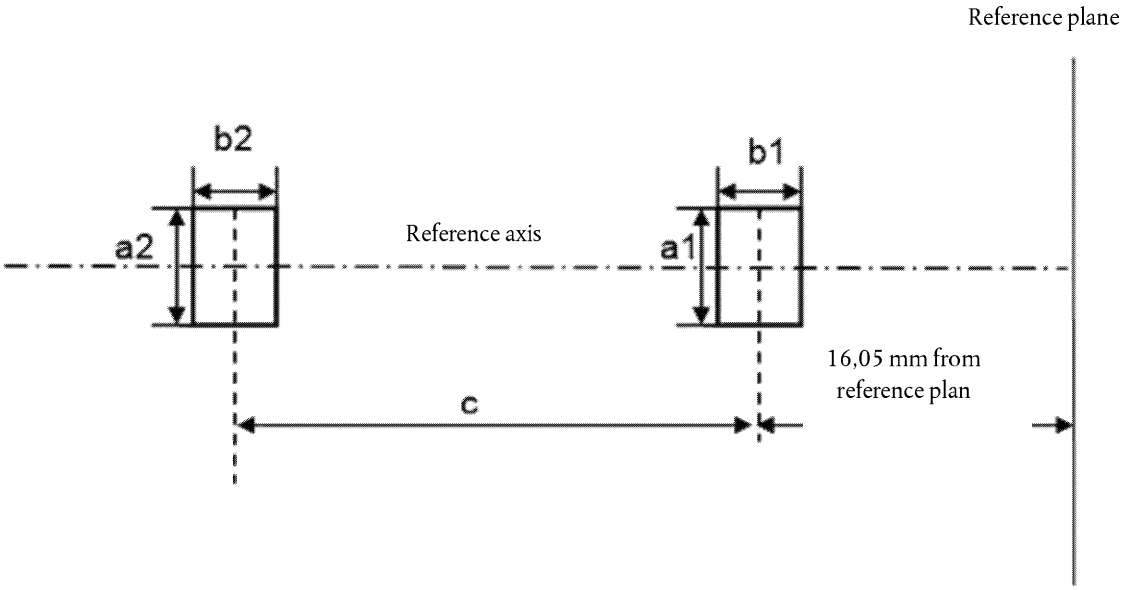
(1) The part of the bulb within the angles α1 and α2 shall be the light-emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles α1 and α2.
(2) Wattage of lamp with ballast integrated.
(3)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

Category D5S — Sheet D5S/4

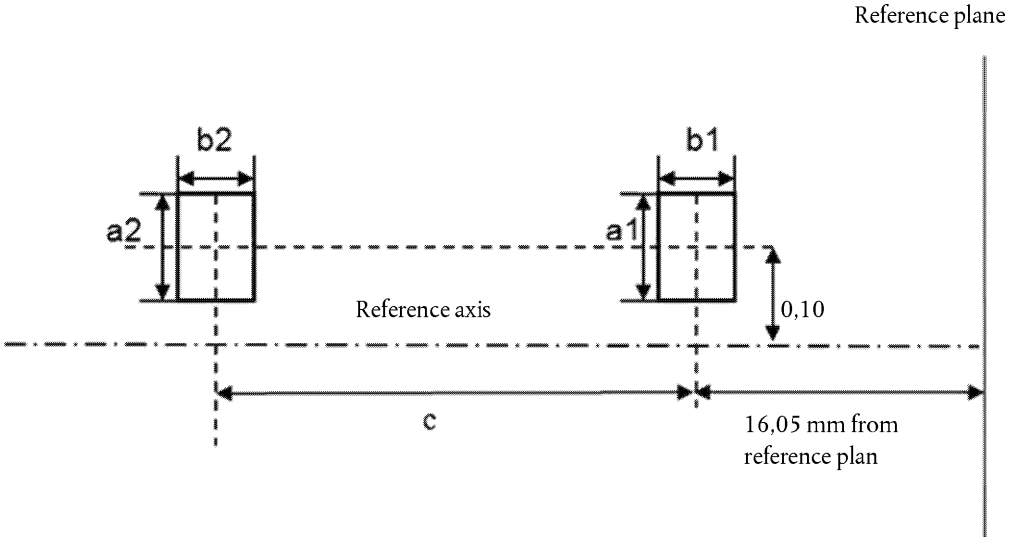
Position of the electrodes

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

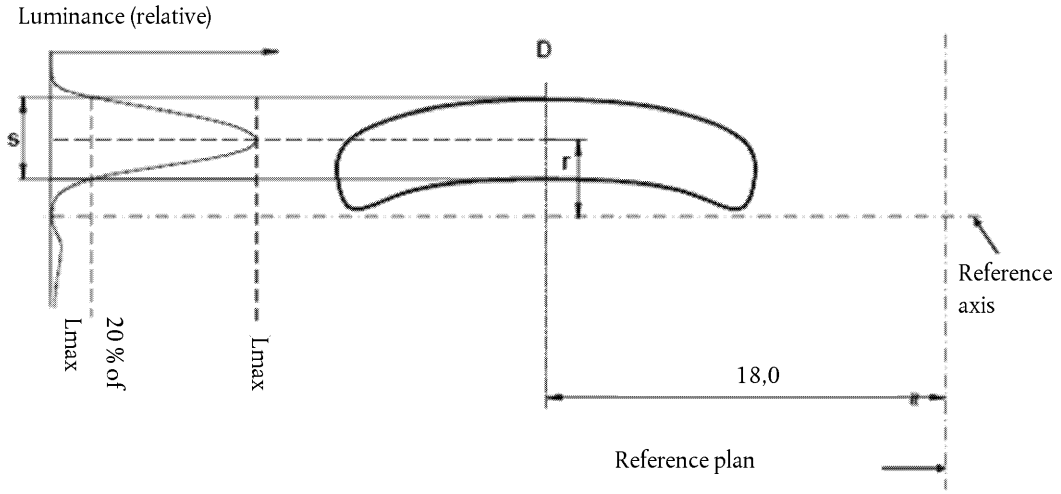
Dimension in mm	Production light sources	Standard light sources
b2	0,60	0,30
c	3,90	3,90

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.

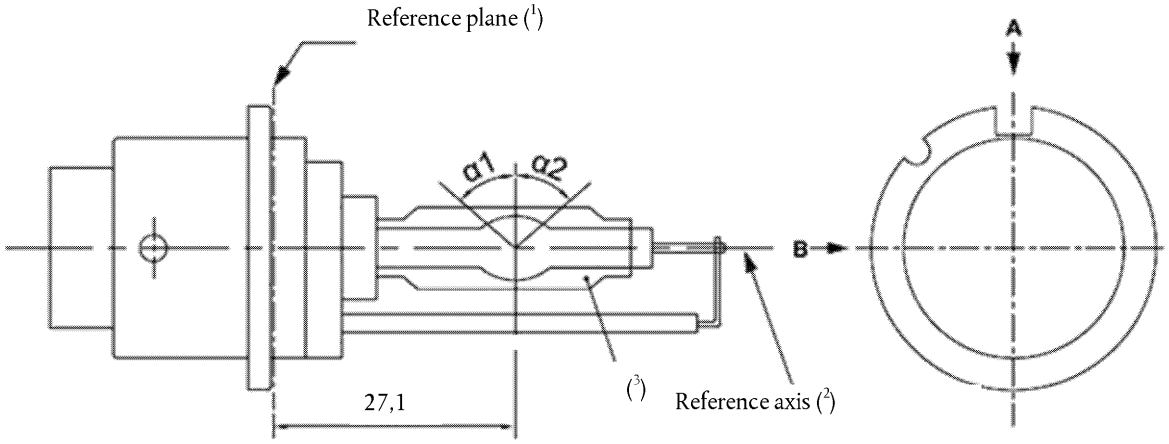
Dimension in mm	Production light sources	Standard light sources
r (arc bending)	0,50 +/- 0,25	0,50 +/- 0,15
s (arc diffusion)	0,70 +/- 0,25	0,70 +/- 0,15

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

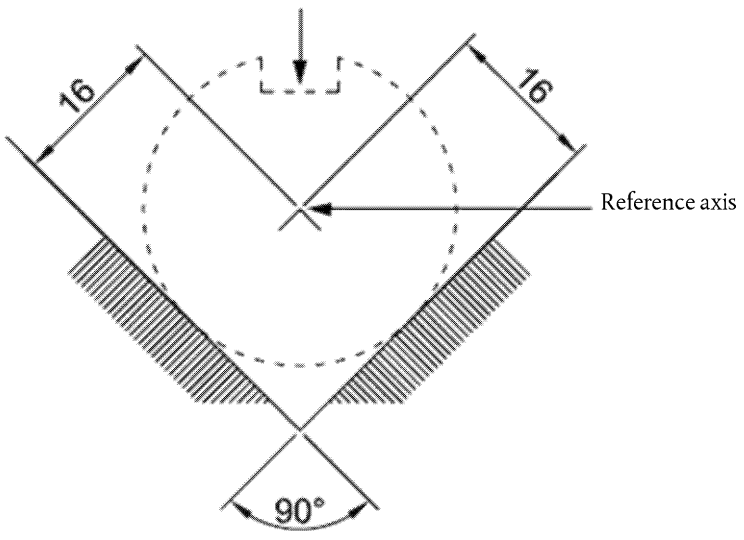
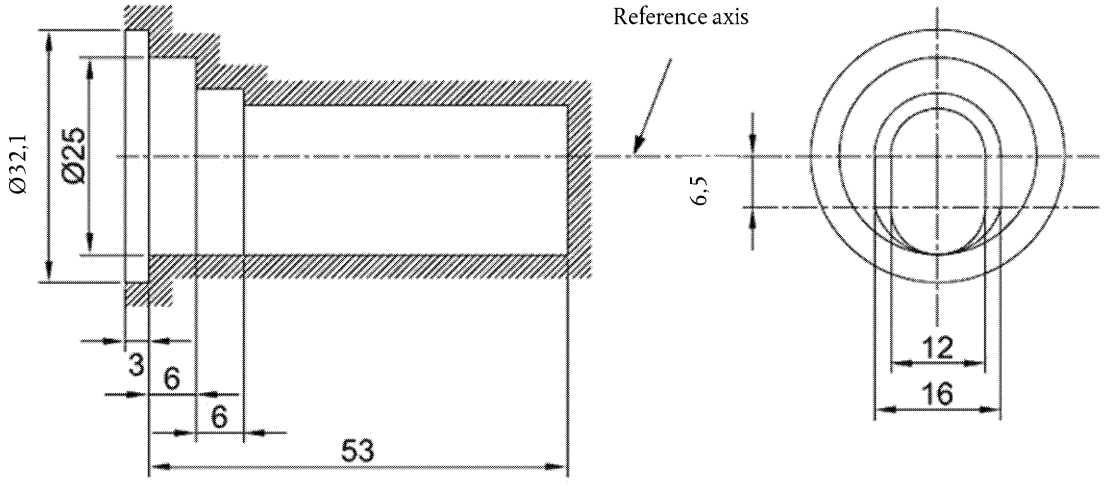


Figure 3

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

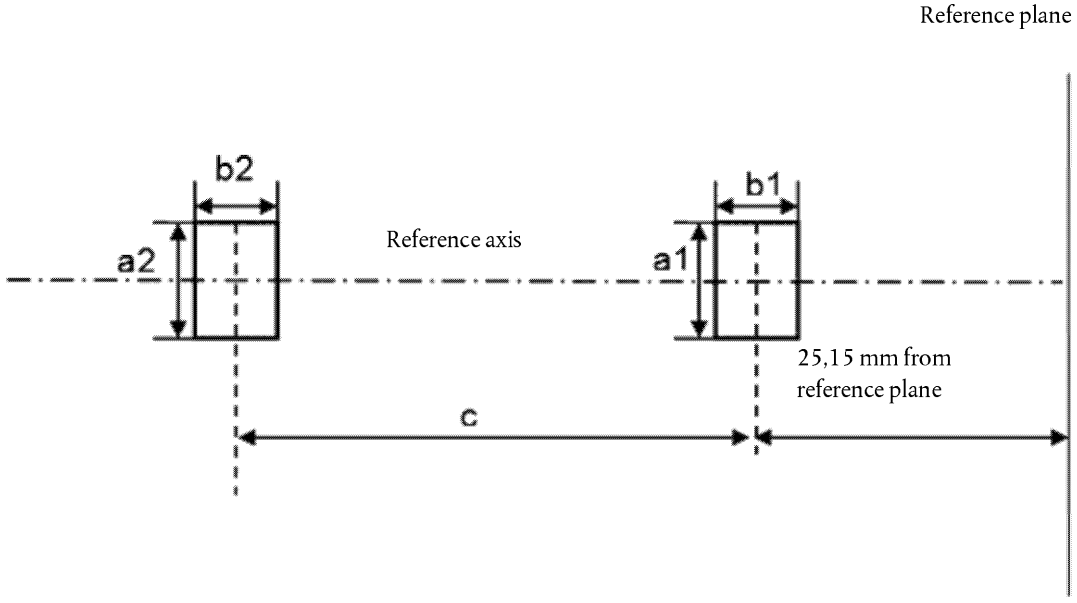
([1]) The part of the bulb within the angles α1 and α2 shall be the light-emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles α1 and α2.
([2]) Application voltages of ballasts may differ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

Category D6S — Sheet D6S/4

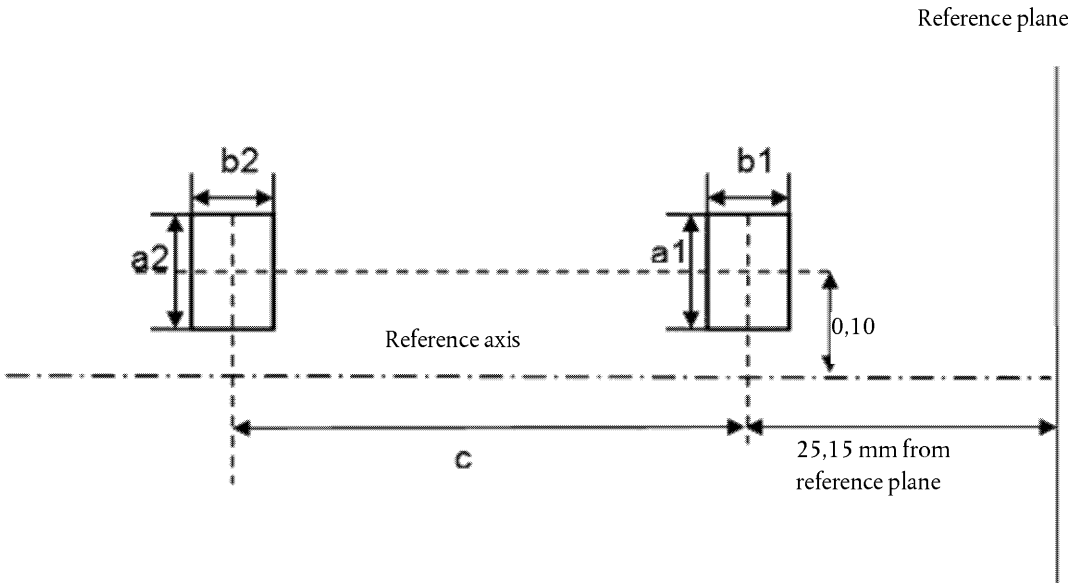
Position of the electrodes

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

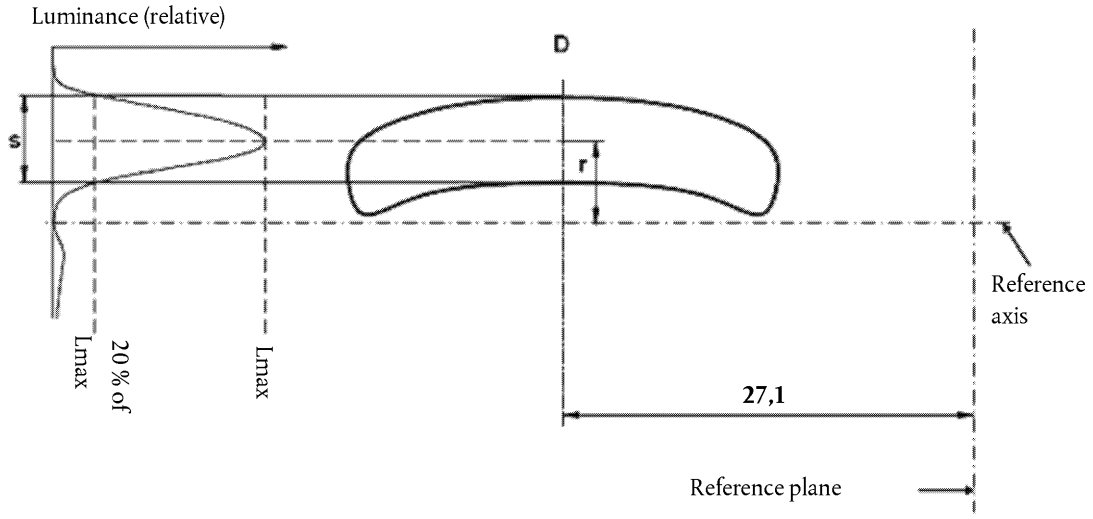
Dimension in mm	Production light sources	Standard light sources
a1	0,30	0,20
a2	0,50	0,25
b1	0,30	0,15
b2	0,60	0,30
c	3,90	3,90

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.

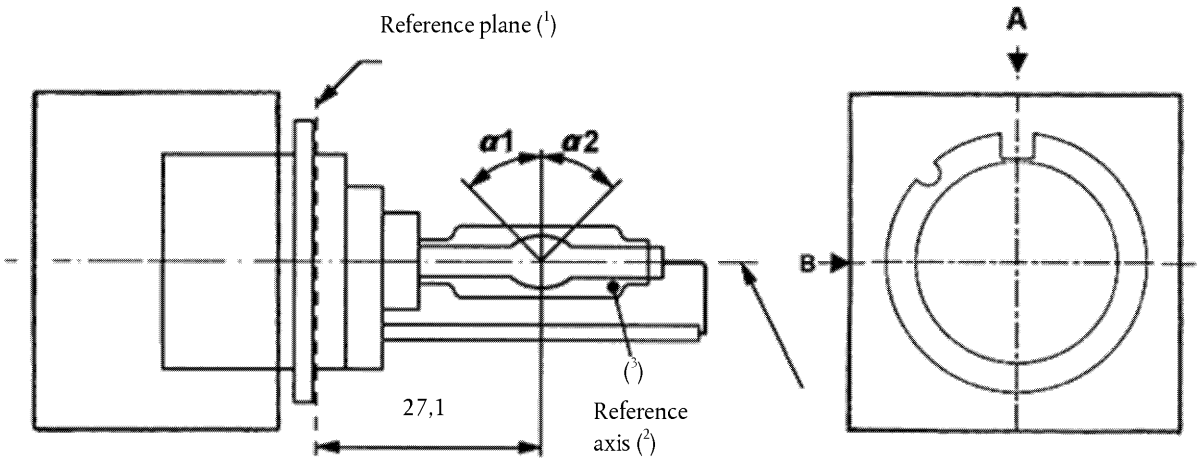
Dimension in mm	Production light sources	Standard light sources
r (arc bending)	0,50 +/- 0,25	0,50 +/- 0,15
s (arc diffusion)	0,70 +/- 0,25	0,70 +/- 0,15

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)

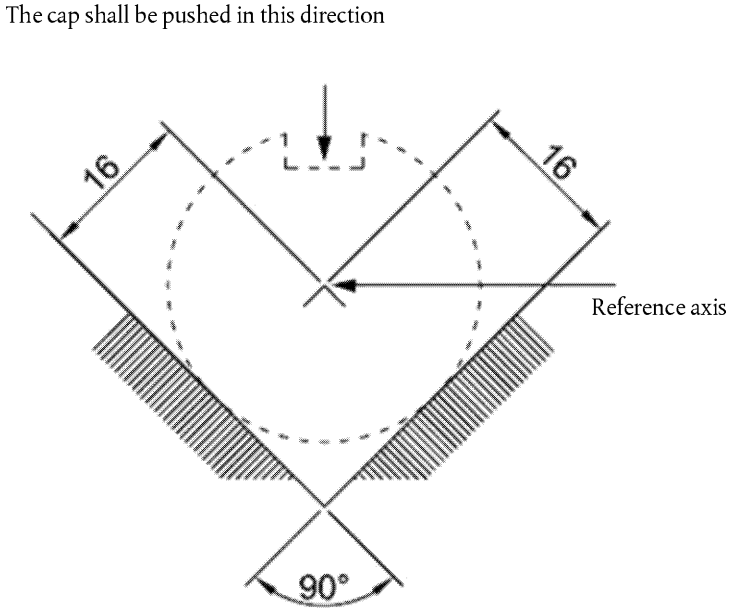
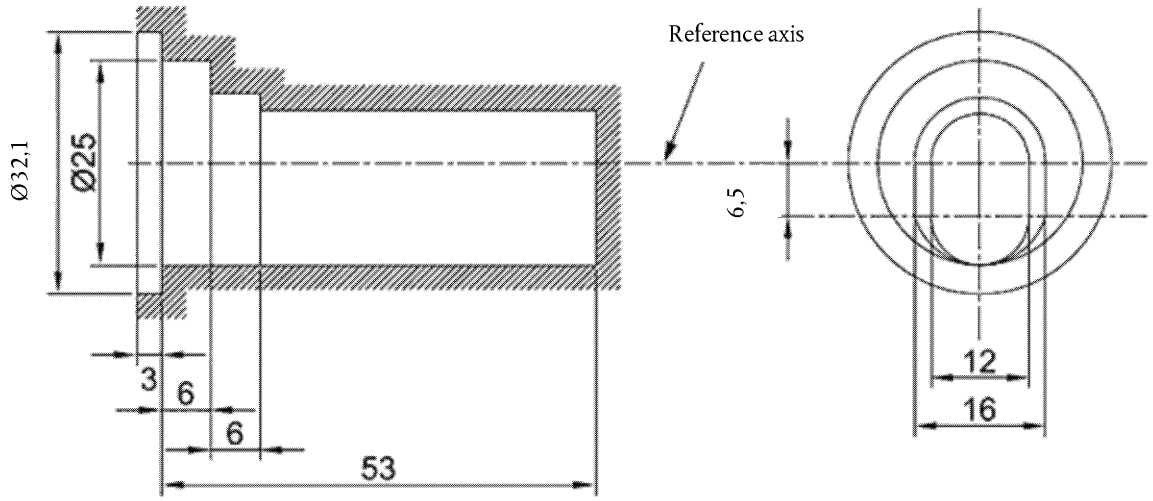


Figure 3

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

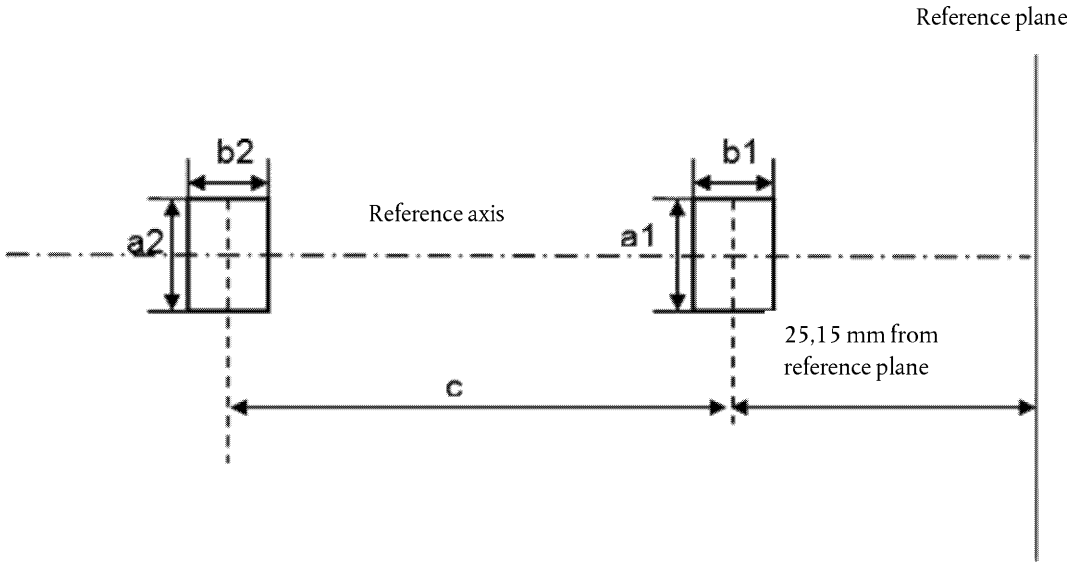
(1) The part of the bulb within the angles α1 and α2 shall be the light-emitting part. This part shall be as homogeneous in form as possible and shall be optically distortion free. This applies to the whole bulb circumference within the angles α1 and α2.
(2) Application voltages of ballasts may differ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

Category D8S — Sheet D8S/4

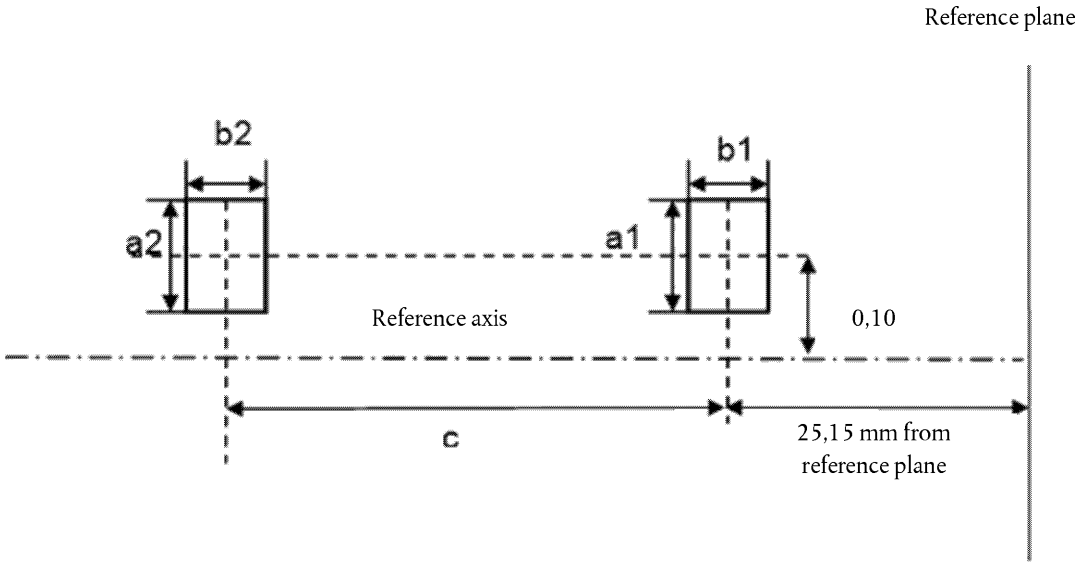
Position of the electrodes

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

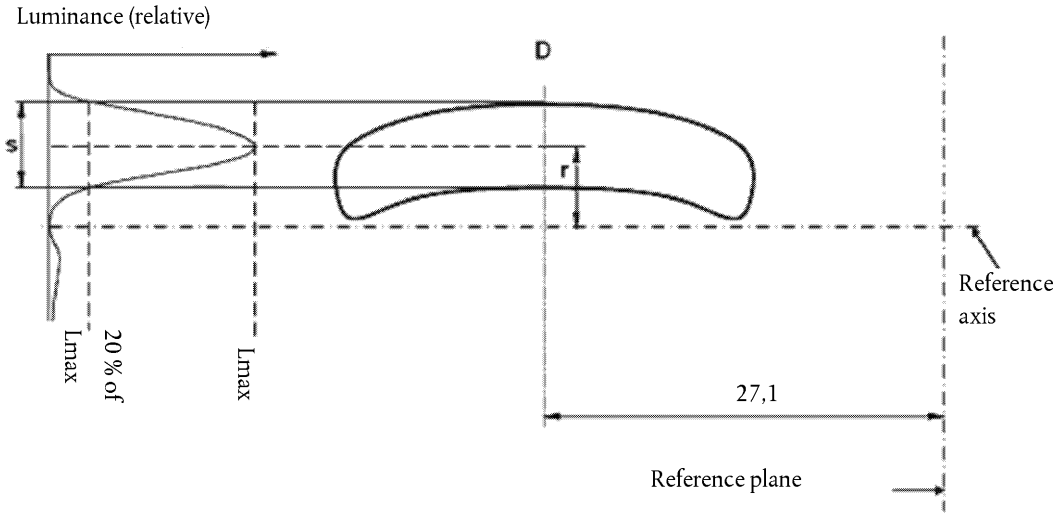
Dimension in mm	Production light sources	Standard light sources
a1	0,30	0,20
a2	0,50	0,25
b1	0,30	0,15
b2	0,60	0,30
c	3,90	3,90

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

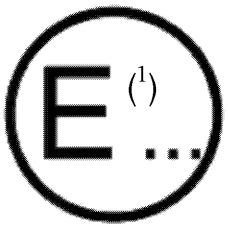
When measuring the relative luminance distribution in the central cross section as indicated in the drawing above, the maximum value shall be located within the distance r from the reference axis. The point of 20 % of the maximum value shall be within s.

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.

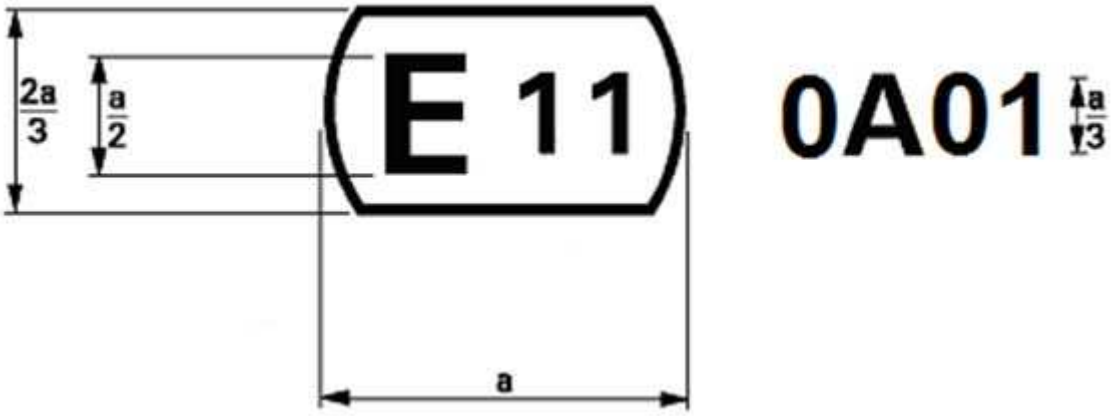
(1) Distinguishing number of the country which has granted/extended/refused/ withdrawn approval (see approval provisions in the Regulation).

(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

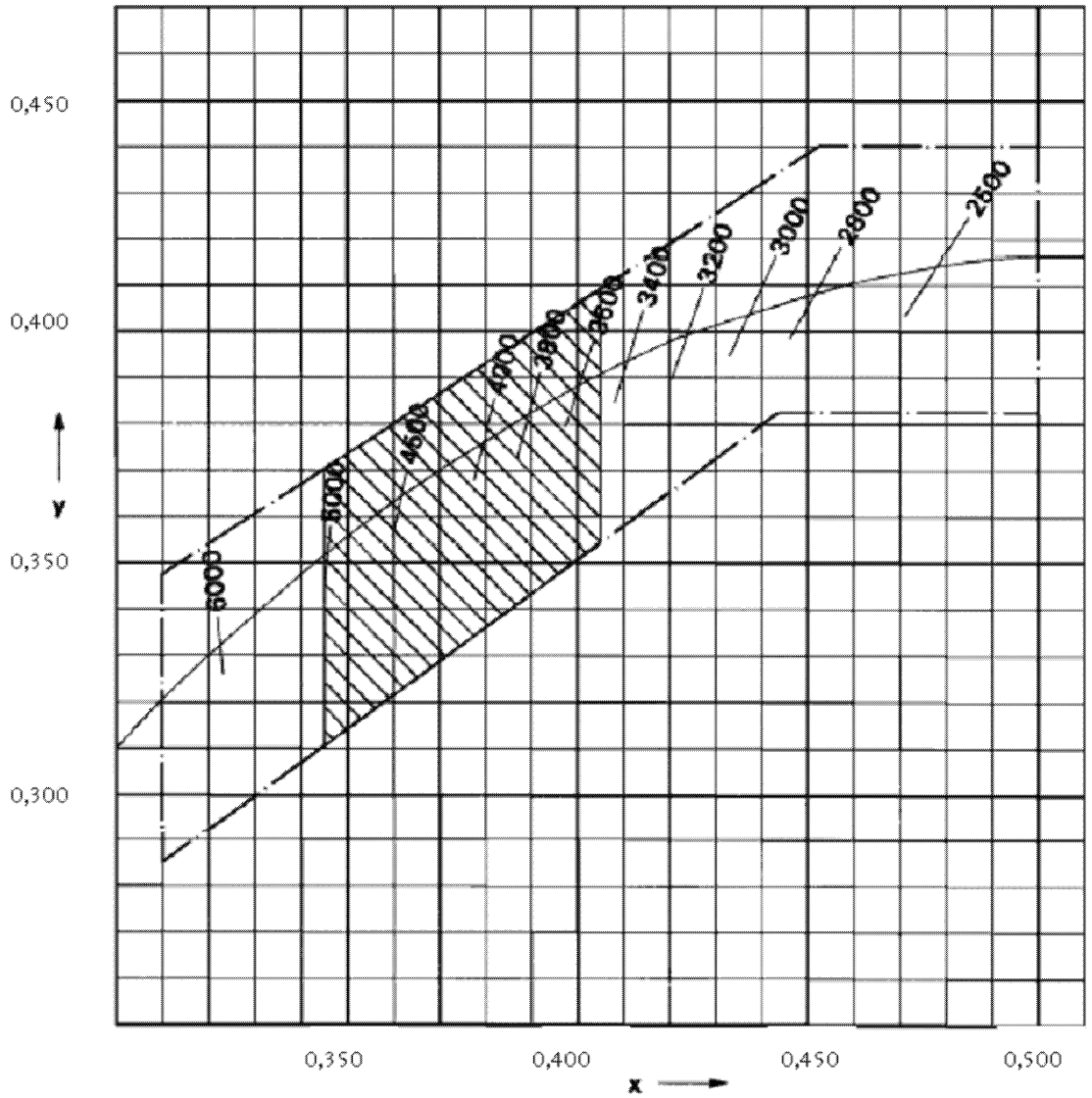
The light source shall be started and be operated with the ballast (possibly integrated) at test voltage for a period of 15 minutes. Then the supply voltage to the ballast or the light source with the ballast integrated shall be switched off for a switch-off period as indicated on the relevant data sheet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

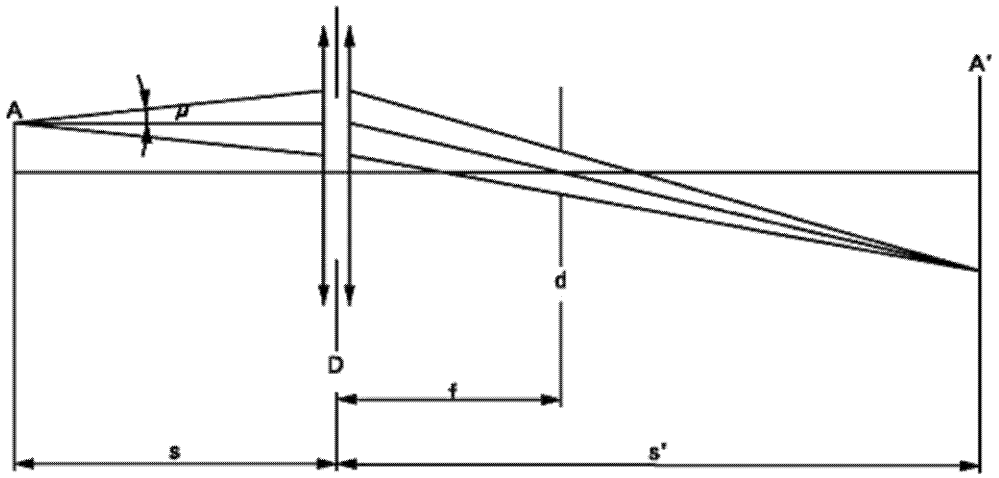
ANNEX 5

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.

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