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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Cycles — Lighting and retro-reflective devices — Photometric and physical requirements —

Part 1 :

Lighting equipment

Cycles — Éclairage et dispositifs rétroréfléchissants — Exigences photométriques et physiques —

Partie 1 : Dispositifs d'éclairage

Reference number
ISO 6742-1 : 1987 (E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6742-1 was prepared by Technical Committee ISO/TC 149, *Cycles.*

This second edition cancels and replaces the first edition (ISO 6742-1 : 1985), of which it constitutes a technical revision incorporating draft Amendment ISO 6742-1/DAM 1 : 1986 which, in addition to a revision of clauses 8.1.2 and 8.1.3, includes new definition 4.12 and new clauses 8.2.2, 8.2.3, 11.3 and 12.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Cycles — Lighting and retro-reflective devices — Photometric and physical requirements —

Part 1 : Lighting equipment

0 Introduction

This part of ISO 6742 has been prepared in order to specify photometric and physical requirements for lighting and retro-reflective devices for cycles intended for use on public roads.

The provision of such equipment is intended to make other road users aware of the presence of cyclists, especially under conditions of poor visibility or at night. In addition, headlamps made in conformity with the requirements of this part of ISO 6742 will provide sufficient lighting to enable cyclists at night to detect road conditions immediately ahead and, if necessary, to take action to avoid potential hazards.

ISO 6742-2 gives requirements for retro-reflective devices.

Annex A is included to give characteristics of typical filament lamps that are suitable for headlamps and rear lamps (for production and test purposes). However, cycle filament lamps will form the subject of a future IEC Standard, on publication of which annex A will be withdrawn and reference made to that standard.

Annex B describes a suitable vibration test machine.

1 Scope

This part of ISO 6742 specifies photometric and physical requirements, test methods, and marking requirements for lighting equipment for cycles.

2 Field of application

This part of ISO 6742 applies to lighting equipment for use on cycles intended to be used on public roads and, in particular, for use on bicycles complying with ISO 4210.

3 References

ISO 3768, *Metallic coatings — Neutral salt spray test (NSS test).*

ISO 4210, *Cycles — Safety requirements of bicycles.*

CIE Publication No. 15, *Colorimetry, Official CIE (International Commission on Illumination) recommendations.*

IEC Publication 61, *Lamp caps and holders together with gauges for the control of interchangeability and safety.*

IEC Publication 86, *Primary batteries.*

IEC Publication 285, *Sealed nickel-cadmium cylindrical rechargeable single cells.*

4 Definitions

For the purposes of this part of ISO 6742, the following definitions apply.

4.1 cycle: Any vehicle that has at least two wheels and is propelled solely by the muscular energy of the person on that vehicle, in particular by means of pedals.

4.2 bicycle: Two-wheeled cycle.

4.3 headlamp: Lamp that shows a white or selective yellow light to the front of the cycle to indicate its presence on the road and also to provide additional illumination of the road ahead.

4.4 rear lamp: Lamp that shows a red light to the rear of a cycle and serves to indicate its presence.

4.5 filament lamp: Lamp in which light is produced by means of an element heated to incandescence by the passage of an electric current.

4.6 axis of reference: Characteristic horizontal axis of the lamp, as determined by the manufacturer, to serve as a direction of reference during use in service and during test measurements. (See figure 1.)

4.7 centre of reference: Intersection of the axis of reference with the light output surface of the lamp. (See figure 1.)

4.8 beam centre: As viewed on the test screen, that area at the centre of the light pattern the intensity of which is not less than 80 % of the maximum intensity, I_{max}, of the beam.

4.9 rated voltage: Voltage marked on the filament lamp.

4.10 unit for test: Complete unit, including the requisite electrical supply.

4.11 reference luminous flux: Specified luminous flux of a filament lamp to which the photometric characteristics of a headlamp or rear lamp shall be referred.

4.12 system: Group comprising a headlamp, rear lamp, battery pack and/or generator and interconnecting cable.

5 Photometric requirements for headlamps

5.1 Luminous intensity

5.1.1 Values of luminous intensity

The luminous intensity values A, B and C of the beam at the test points A and B and in zone C shown in figure 2 shall be as follows:

$400 \text{ cd} \leqslant A \geqslant 0{,}8\ I_{max}$

$B \geqslant 0{,}5\ I_{max}$

$C \leqslant 120 \text{ cd}$

The luminous intensity shall be not less than $0{,}5\ I_{max}$ at any position within the area bounded by points B on plane V, and points B on 3,5°D.

The luminous intensity shall be not less than 0,05 cd at any position within the area between 15°U and 15°D, and 80°L and 80°R.

The luminous intensity shall not exceed 120 cd at any position above plane H.

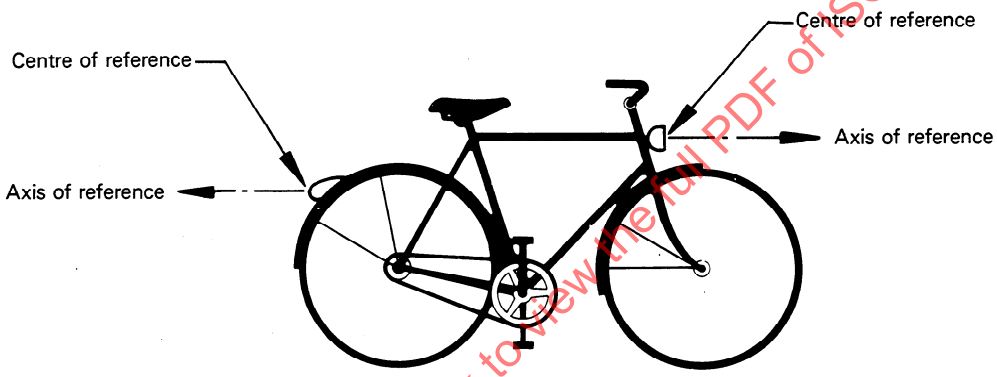
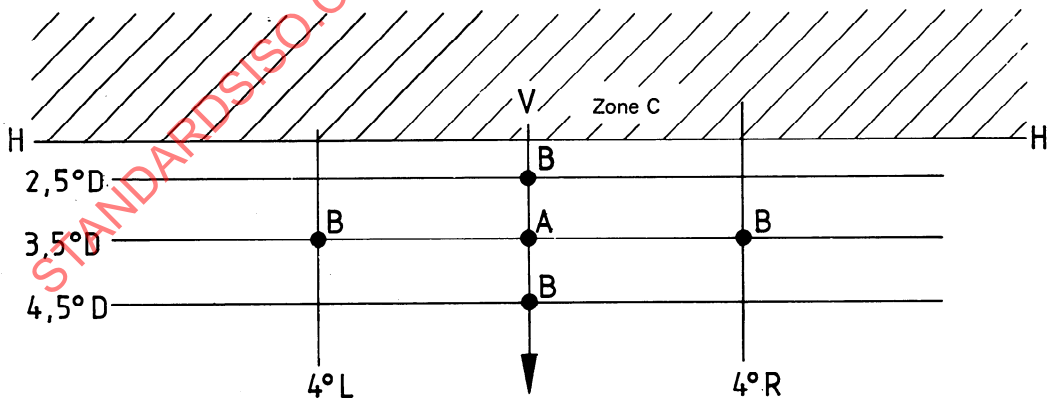


Figure 1 — Axis and centre of reference



H represents the horizontal plane through the axis of reference;

V represents the vertical plane through the axis of reference;

U and D represent the degrees of arc, respectively, above and below the horizontal plane;

L and R represent the degrees of arc, respectively, to the left and right of the vertical plane.

Figure 2 — Location of test points for headlamps

5.1.2 Unit for test

The headlamp shall be fitted with the filament lamp specified by the manufacturer and operated at its reference luminous flux for the rated voltage, as specified by the manufacturer.

NOTE — Details of suitable filament lamps are given in annex A. However, cycle filament lamps will form the subject of a future IEC Standard, on publication of which annex A will be withdrawn and reference made to that standard.

5.1.3 Test measurements

Measurements of luminous intensity shall be made using a test distance big enough for the inverse square law to be effective.

The lamp centre of reference shall be taken as the light source.

The receptor shall subtend an angle of not less than 10′ and of not more than 1° at the lamp centre of reference.

For test measurements, the point A (3,5°D on V) shall lie within the beam centre. At all points other than the beam centre, a geometric tolerance of 15′ is permissible.

5.2 Colour of light from headlamp

5.2.1 White light

The colour of the light shall be located within the area on the chromaticity diagram defined by the CIE chromaticity co-ordinates given in table 1.

Table 1 — CIE chromaticity coordinates defining white light

x	0,285	0,453	0,500	0,500	0,440	0,285
y	0,332	0,440	0,440	0,382	0,382	0,264

5.2.2 Selective yellow light

The colour of the light shall be located within the area on the chromaticity diagram defined by the CIE chromaticity co-ordinates given in table 2.

Table 2 — CIE chromaticity coordinates defining selective yellow light

x	0,466	0,477	0,541	0,524
y	0,500	0,515	0,451	0,442

5.2.3 Visual comparison

To check visually the colorimetric characteristics of the light emitted, a source of light approximating to illuminant A, as defined by CIE Publication No. 15, in combination with appropriate filters, shall be used for the comparison field of the colorimeter.

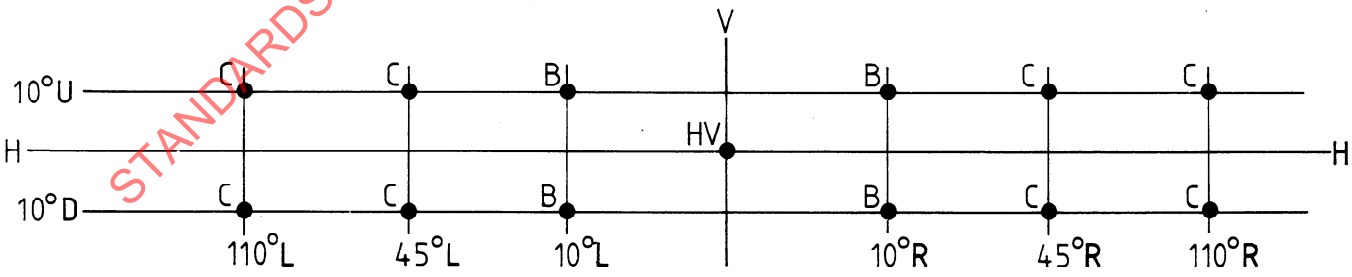
6 Photometric requirements for rear lamps

6.1 Luminous intensity

6.1.1 Values of luminous intensity

6.1.1.1 The luminous intensity values of the beam at the test points HV, B and C shown in figure 3 shall be as follows :

— at point HV 0,75 cd min.
— at points B 0,10 cd min.
— at points C 0,02 cd min.



H represents the horizontal plane through the axis of reference;

V represents the vertical plane through the axis of reference;

HV is the point of intersection of planes H and V on the screen;

U and D represent the degrees of arc, respectively, above and below the horizontal plane;

L and R represent the degrees of arc, respectively, to the left and right of the vertical plane.

Figure 3 — Location of test points for rear lamps

6.1.1.2 The lamp shall also emit upwards red light of an intensity not less than 0,02 cd within a cone with a vertical axis and having a half angle of 45° (see figure 4).

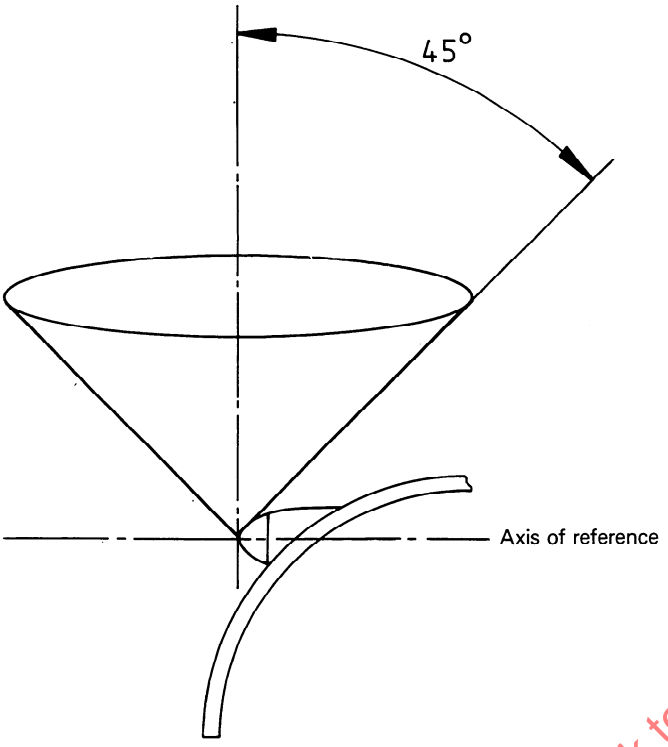


Figure 4 — Vertical cone of light from rear lamp

6.1.2 Unit for test

The rear lamp shall be fitted with the filament lamp specified by the manufacturer and operated at its reference luminous flux for the rated voltage, as specified by the manufacturer.

NOTE — Details of suitable filament lamps are given in annex A. However, cycle filament lamps will form the subject of a future IEC Standard, on publication of which annex A will be withdrawn and reference made to that standard.

6.1.3 Test measurements

Measurements of luminous intensity shall be made using a test distance big enough for the inverse square law to be effective.

The lamp centre of reference shall be taken as the light source.

The receptor shall subtend an angle of not less than 10′ and of not more than 1° at the lamp centre of reference.

For test measurements, the point HV shall lie within the beam centre. At all points other than the beam centre a geometric tolerance of 15′ is permissible.

6.2 Colour of light from rear lamp

6.2.1 Red light

The colour of the light shall be located within the area on the chromaticity diagram defined by the CIE chromaticity co-ordinates given in table 3.

Table 3 — CIE chromaticity coordinates defining red light

x	0,645	0,665	0,735	0,721
y	0,335	0,335	0,265	0,259

6.2.2 Visual comparison

To check visually the colorimetric characteristics of the light emitted, a source of light approximating to illuminant A, as defined by CIE Publication No. 15, in combination with appropriate filters, shall be used for the comparison field of the colorimeter.

7 Generators

7.1 Output characteristics

The voltage output shall be in accordance with the values specified in table 4 when the generator is tested against a fixed non-inductive resistive load calculated from the manufacturer's recommended nominal filament lamp rating.

A low consumption voltmeter giving the true r.m.s. value shall be used. The resistance of the voltmeter shall be included in the fixed resistive load.

Table 4 — Output characteristics

Road speed	Voltage output as a percentage of rated voltage	
	Minimum	Maximum
km/h	%	%
5	50	117
15	85	117
30	95	117

7.2 Maintenance of generator output

When operated continuously for 1 h at a speed equivalent to 15 km/h and against the fixed resistive load as calculated, the voltage shall not drop below 85 % of the rated voltage.

8 Batteries

8.1 Primary batteries

8.1.1 Specification

Batteries shall comply with the requirements of IEC Publication 86.

8.1.2 Maintenance of luminous intensity

8.1.2.1 Headlamp

After having been subjected to the test in 8.1.3, the luminous intensity at test point A shall be not less than 100 cd when the measured voltage is applied to the lamp.

8.1.2.2 Rear lamp

After having been subjected to the test in 8.1.3, the luminous intensity at test point HV shall be not less than 0,25 cd when the measured voltage is applied to the lamp.

8.1.3 Test method

Fit the unit to be tested with the filament lamp specified by the manufacturer, and with fresh batteries (i.e. within 4 weeks of their date of manufacture).

Carry out the test at a temperature of 20 ± 2 °C and a relative humidity of (60 ± 15) %.

Operate the lamp on full load (i.e. including any additional light units, where appropriate) for 30 min continuously, once per day for 5 consecutive days per week, for 4 weeks (i.e. a total of 10 h operation).

Measure the voltage on full load at the end of this period and verify the luminous intensity using this voltage.

8.2 Secondary batteries

8.2.1 Specification

Nickel-cadmium batteries shall comply with the requirements of IEC Publication 285.

NOTE — There is as yet no international standard for other types of suitable secondary batteries.

8.2.2 Maintenance of luminous intensity

8.2.2.1 Headlamp

After having been subjected to the test in 8.2.3, the luminous intensities shall be not less than that required under 5.1.1 when the final measured voltage is applied to the lamp or, if the headlamp is part of a system, to the system.

8.2.2.2 Rear lamp

After having been subjected to the test in 8.2.3, the luminous intensities shall be not less than that required under 6.1.1 when the final measured voltage is applied to the lamp or, if the rear lamp is part of a system, to the system.

8.2.3 Test method

NOTE — Where the unit is part of a system, for "unit" read "system".

Charge the battery in accordance with the instructions supplied with the unit.

Measure the voltage on full load. Operate the unit until this voltage falls to 75 % of the initial voltage.

Recharge the battery in accordance with the instructions. Leave the unit for 24 to 30 h in a temperature of 20 ± 2 °C.

Operate the unit for the maximum duration period claimed by the manufacturer as marked on the unit (see 11.3) in an ambient temperature of 20 ± 2 °C.

Measure the voltage on full load at the end of this period, and verify the luminous intensity using this voltage.

9 Switch performance (where applicable)

9.1 The action of the switch shall be positive. The on and off positions shall be definite. Operation of this switch shall not cause battery movement. The lamp shall show no visible evidence of flickering when switched to either the on or off position, or, in the case of a screw type, when the switch is fully in or out.

9.2 The switch shall be tested by making and breaking the circuit 5 000 times under rated voltage conditions. If the battery should fail (for example by breakage of the contact strip) it shall be replaced and the test continued. The switch shall still comply with the requirements of 9.1 after the test.

10 Environmental tests

10.1 General

Units shall be tested complete with fittings as recommended by the manufacturer to enable them to be secured appropriately to a cycle.

Battery lamps shall be tested with the battery in position.

Unless otherwise specified all tests shall be carried out at an ambient temperature of 23 ± 5 °C.

10.2 Vibration resistance test for head and rear lamps

10.2.1 Requirements

When tested by the method in 10.2.2, the lamp shall not become loose or detached from its mounting during the test.

After the test the unit shall function correctly and shall not show evidence of material weakness or displacement of parts. To check the performance after the test, the filament lamp shall be replaced if the filament in the lamp is broken and, if necessary, the battery shall also be replaced. Loosening, or other failure of the filament lamp shall constitute failure of the unit.

10.2.2 Test method

10.2.2.1 Principle

Mounting of a unit to simulate its intended mounting on a cycle and subjection to repetitive vibration to simulate, on an accelerated time-scale, the use of a cycle on the road.

10.2.2.2 Apparatus

Vibration test machine, as shown in annex B, and with the following characteristics.

The table of the vibration test machine shall be spring-mounted at one end and fitted with steel caulks on the underside of the other end. The caulks shall make contact with a steel anvil once during each cycle, at the completion of the fall of the table. The load at the point of contact shall be not less than 265 N and not more than 310 N and shall be provided by means of adjustable tension springs positioned between the cam and the spring-mounted end of the table.

10.2.2.3 Method

Mount the unit in the manner in which it is designed to be fitted to a cycle. Fasten the assembly to a vibration test machine in a position similar to its normal operating position. Vibrate the assembly for 1 h at 750 ± 50 cycles per minute through a distance of 3 mm.

10.3 Temperature test for head and rear lamps

10.3.1 Requirements

When tested by the method in 10.3.2, each headlamp and rear lamp shall function correctly and shall comply with the appropriate requirements of clauses 5 and 6.

10.3.2 Test method

Place the headlamp or rear lamp in a pre-heated oven at $50\ ^{+5}_{0}$ °C for 2 h.

Remove the headlamp or rear lamp into ambient conditions.

Remove the filament lamp and clean it by wiping (to remove any deposits arising from exposure to an elevated temperature).

Operate the filament lamp outside the headlamp or rear lamp for 5 min at rated voltage to dry it; then, without touching the filament lamp envelope, reassemble into the headlamp or rear lamp.

Operate the headlamp or rear lamp at 117 % of the rated voltage in its normal operating position for 1 h.

10.4 Temperature test for generator

10.4.1 Requirements

When tested by the method in 10.4.2, the generator shall function correctly and, when operated at a speed equivalent to 15 km/h, shall comply with the requirements in 7.1 and table 4.

10.4.2 Test method

Place the generator in a pre-heated oven at $50\ ^{+5}_{0}$ °C for 2 h.

Remove the generator from the oven into ambient conditions until equilibrium is reached.

10.5 Moisture resistance test for lamps and generator

10.5.1 Requirements

After being subjected to the test in 10.5.2, the unit shall function correctly, and there shall be no deleterious retention of moisture.

10.5.2 Test method

10.5.2.1 Apparatus

Water spray cabinet, containing a revolving mount for the unit, meeting the following requirements.

The revolving mount for the unit under test shall revolve about a vertical axis at a rate of 4 r/min.

Water at 20 ± 10 °C shall be sprayed on to the mounted unit at an angle of 45°, directed downwards, at a precipitation rate of 2,5 mm/min.

10.5.2.2 Method

Mount the unit in its normal operating position on the revolving mount, and ensure that all drain holes (if any) are open.

Spray and revolve the unit for 6 h continuously.

At the end of this period allow the unit to drain for 1 h.

10.6 Corrosion resistance test for lamps and generator

10.6.1 Requirement and test method

After being tested by the method specified in ISO 3768, the unit shall function correctly and be free from corrosion detrimental to its use.

10.6.2 Duration of test

The duration of the test shall be 50 h comprising two periods of exposure of 24 h each, separated by an interval of 2 h during which time the unit is allowed to dry.

10.7 Fuel resistance test for head and rear lamps

10.7.1 Requirements

After being subjected to the test in 10.7.2, the lens surface shall not show any visible signs of deterioration other than slight local surface crazing.

10.7.2 Test method

Prepare a mixture comprising 70 % (V/V) of *n*-heptane and 30 % (V/V) of toluene.

Soak a cotton cloth in the mixture.

Lightly wipe the outer surface of the lens with the cotton cloth and allow the lens to dry naturally for 5 min.

Inspect visually.

11 Marking

Units shall be durably marked with the following information.

11.1 Headlamps and rear lamps

a) The filament lamp and battery or generator with which the lamp is designed to be used.

b) The name or other means of identification of the manufacturer.

c) The number of this part of ISO 6742, i.e. ISO 6742-1, marked in such a position as to be visible when fitted to a cycle.

11.2 Generators

a) Rated output, i.e. voltage(s) and wattage(s).

b) The name or other means of identification of the manufacturer.

c) The number of this part of ISO 6742, i.e. ISO 6742-1, marked in such a position as to be visible when fitted to a cycle.

11.3 Secondary battery systems

The battery pack, or the lamp unit if it is self-contained, shall be durably and visibly marked with the following, in lettering at least 3 mm in height:

Maximum use before recharging: ... hours

NOTE — The duration (...) represents a claim by the manufacturer of the continuous period of time that the battery, when new and fully charged, will provide the voltage necessary to produce luminous intensities not less than those specified in 5.1.1 and 6.1.1.

12 Instructions

NOTE — This clause applies only to a lamp or system powered by a secondary battery.

Instructions shall be supplied with each lamp or system giving information on:

a) fitting the unit to the cycle;

b) operation;

c) type of battery charger to be used;

d) recommended periods for charge;

e) warnings against overcharging or other foreseeable types of abuse that could damage the battery, if relevant;

f) replacement parts, including reference numbers of the filament lamp and battery, and instructions for replacement;

NOTE — The reference numbers of the filament lamp and battery are additionally to be marked on the lamp unit.

g) the expected life of the battery, and a recommended annual check for deterioration;

h) loss of charge during extended periods of non-use.

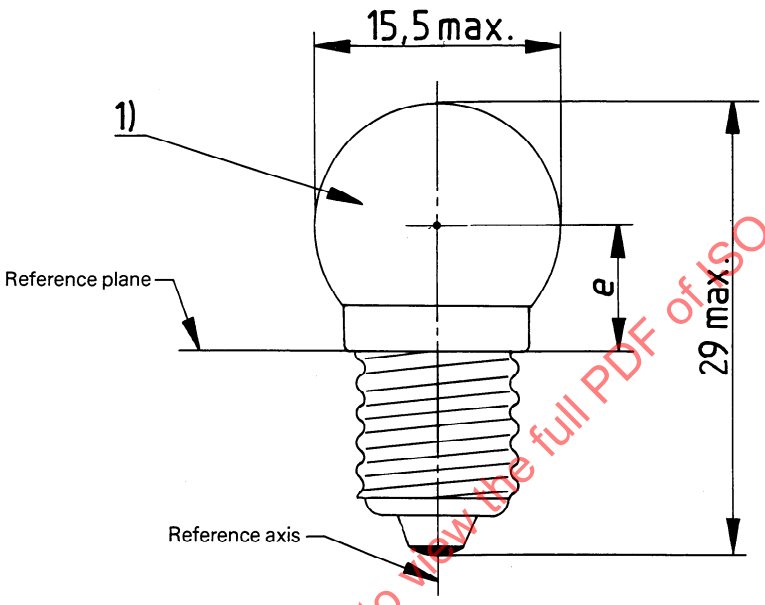
Additional information may be provided at the discretion of the manufacturer.

Annex A

Typical filament lamps

Characteristics of six filament lamps are given in figures 5 to 10.

Dimensions in millimetres



C1	Lamps of normal production			Standard lamps
Dimensions (mm)	minimum	nominal	maximum	
e	8,25	8,75	9,25	8,75 ± 0,15
Lateral deviation[2]			1,0	0,2 max.
Cap	EP10[3]			
Electrical and photometric characteristics				
Rated volts (V)	6			6
Rated watts (W)	2,4			2,4
Test voltage (V)	6,0			
Objective watts (W)	2,4			2,4 at 6 V
Tolerance (%)	±6			±6
Objective luminous flux (lm)	22,5			
Tolerance (%)	±20			
Reference luminous flux : 21 lm at approx. 6 V				

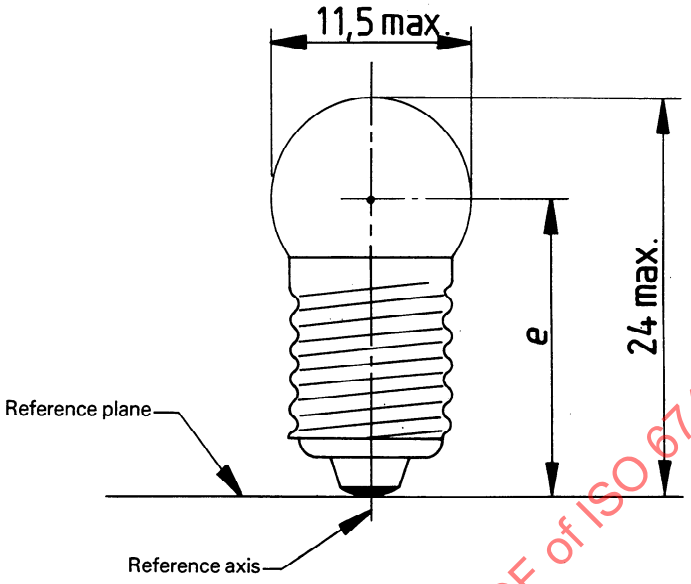
1) Colourless or selective yellow bulb; the photometric specifications of the table refer to colourless bulbs.

2) Lateral deviation of the filament luminous centre with respect to two mutually perpendicular planes, both containing the reference axis and one of them containing the filament axis.

3) Cap in accordance with IEC Publication 61 (sheet 7004-30-1).

Figure 5 — Filament lamp, category C1

Dimensions in millimetres



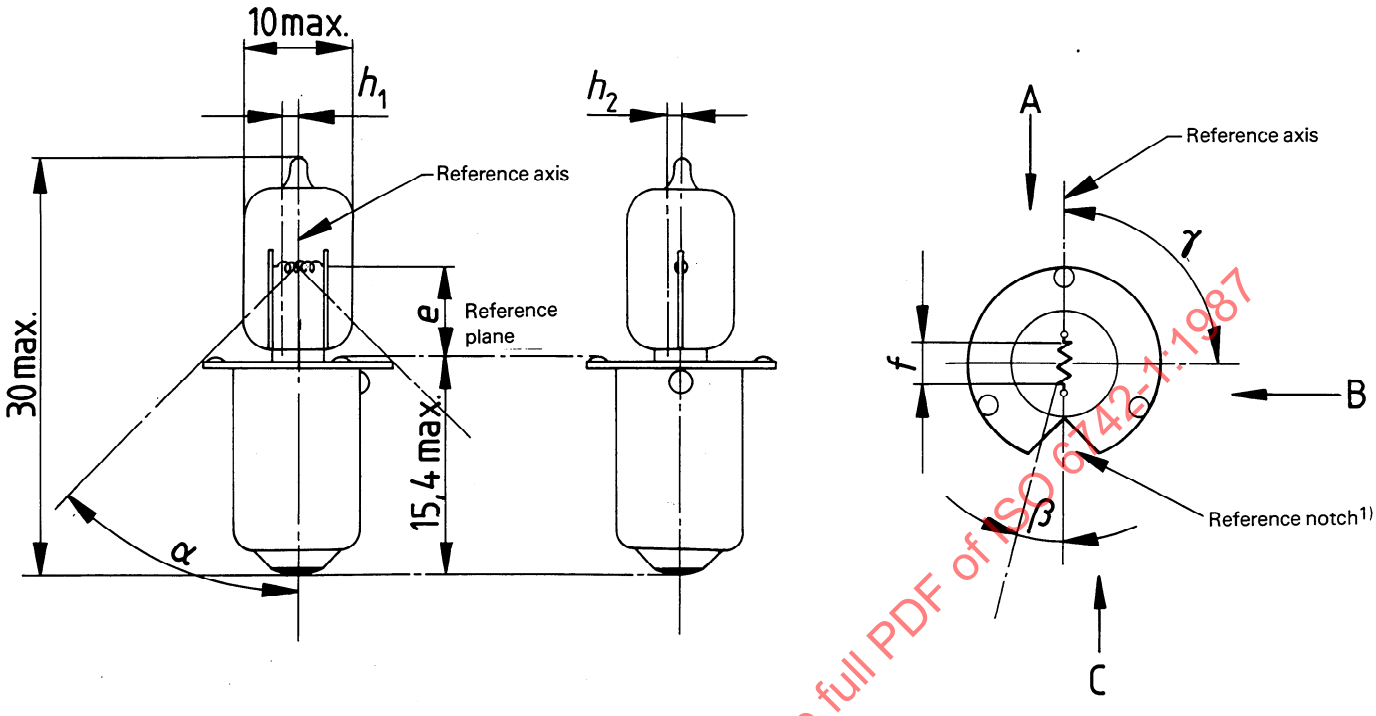
C2	Lamps of normal production			Standard lamps
Dimensions (mm)	minimum	nominal	maximum	
e	17	18	19	18 ± 0,15
Lateral deviation[1]			1,0	0,2 max.
Cap	E10[2]			
Electrical and photometric characteristics				
Rated volts (V)	6			6
Rated watts (W)	0,6			0,6
Test voltage (V)	6,0			
Objective watts (W)	0,6			0,6 at 6 V
Tolerance (%)	± 10			± 10
Objective luminous flux (lm)	2			
Tolerance (%)	± 20			
Reference luminous flux : 2 lm at approx. 6 V				

1) Lateral deviation of the filament luminous centre with respect to two mutually perpendicular planes, both containing the reference axis and one of them containing the filament axis.

2) Cap in accordance with IEC Publication 61 (sheet 7004-22-5).

Figure 6 — Filament lamp, category C2

Dimensions in millimetres



C3	Lamps of normal production			Standard lamps
Dimensions (mm)	minimum	nominal	maximum	
e		6,55[2]		6,55 ± 0,15
f	1,00	1,25	1,5	
h_1		– [2]		0 ± 0,15
h_2		– [2]		0 ± 0,15
α			60°	
β	−15°	0°	+15°	0° ± 5°
γ		90°		
Cap	PX 13.5s[3]			
Electrical and photometric characteristics				
Rated volts (V)	6			6
Rated watts (W)	2,4			2,4
Test voltage (V)	6,0			
Objective watts (W)	2,4			2,4 at 6,0 V
Tolerance (%)	±8			±8
Objective luminous flux (lm)	36			
Tolerance (%)	±15			
Reference luminous flux : 36 lm at approx. 6 V				

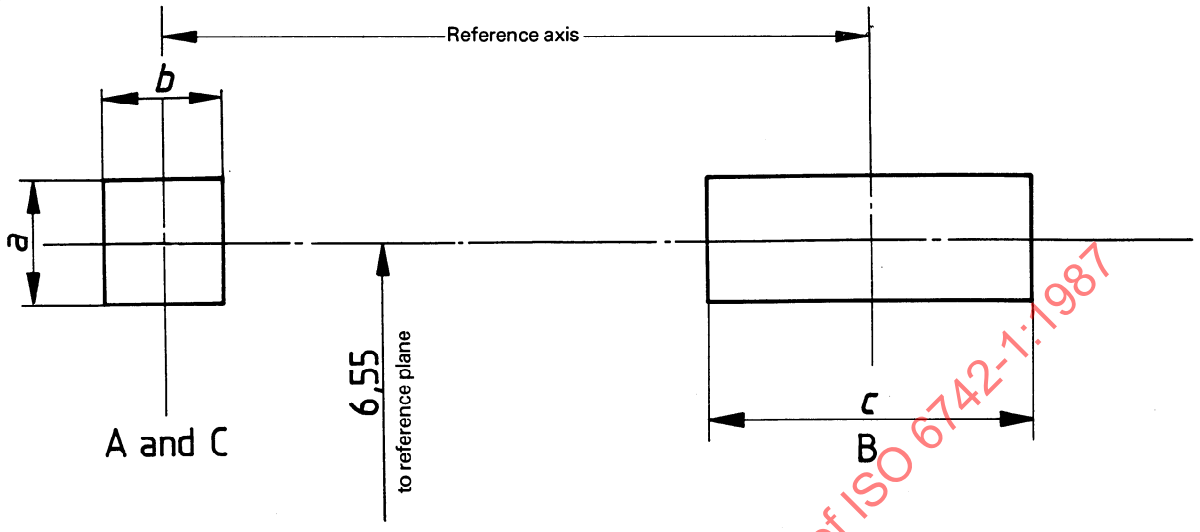
1) The position of the notch with respect to the filament mounting leads is under consideration.

2) To be checked by means of a box system [see figure 7b)].

3) Cap in accordance with IEC Publication 61 (sheet 7004-40-1).

Figure 7a) — Filament lamp, halogen, category C3

Dimensions in millimetres



Reference	*a*	*b*	*c*
Dimension[1)]	*d* +0,5	*d* +0,5	2,0

1) *d* is the filament diameter.

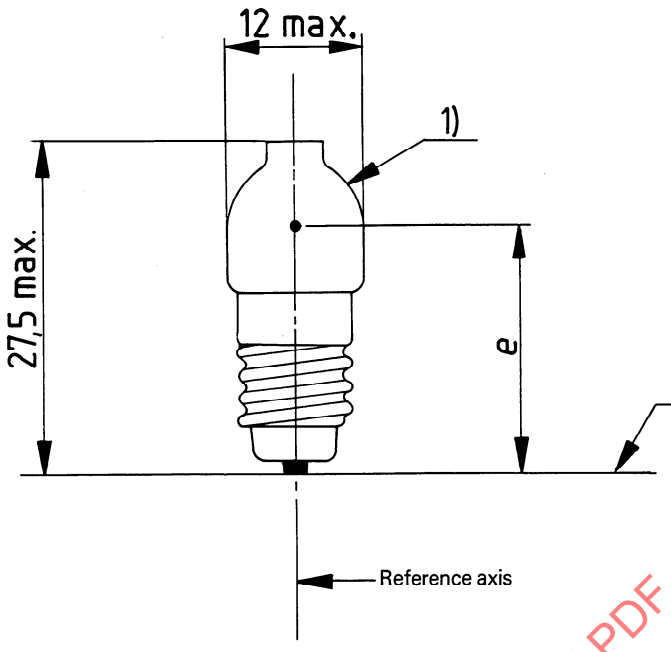
This test is used to determine whether a lamp complies with the requirements, by checking whether the filament is correctly positioned in relation to the reference axis and the reference plane.

The filament shall lie entirely within the limits shown.

NOTE — Because the filaments of halogen lamps operate at higher temperatures than those of conventional lamps, it is necessary to ensure that the lamps in this specification are not subjected to generator voltages in excess of 8,0 (under consideration) in order to avoid rapid failure.

Figure 7b) — Screen projection requirements

Dimensions in millimetres



C4	Lamps of normal production			Standard lamps
Dimensions (mm)	minimum	nominal	maximum	
e	17,5	19,0	20,5	19 ± 0,15
Lateral deviation[2]			1,5	0,2 max.
Cap			E10[3]	
Electrical and photometric characteristics				
Rated volts (V)		2,5		2,5
Rated watts (W)		0,75		0,75
Test voltage (V)		2,5		
Objective watts (W)		0,75		0,75 at 2,5 V
Tolerance (%)		±10		±10
Objective luminous flux (lm)		7,0		
Tolerance (%)		±20		
Reference luminous flux : 7 lm at approx. 2,5 V				

1) The shape of the glass envelope is optional.

2) Lateral deviation of the filament luminous centre with respect to two mutually perpendicular planes, both containing the reference axis and one of them containing the filament axis.

3) Cap in accordance with IEC Publication 61 (sheet 7004-22-5).

Figure 8 — Filament lamp, category C4