

Safety specification for incandescent lamps

Part 1. Tungsten filament lamps for domestic and similar general lighting purposes

The European Standard EN 60432-1 : 1994 has the status of a
British Standard

ICS 29.140.20

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee CPL/34/1, Lamps, upon which the following bodies were represented:

- British Lighting Association for the Preparation of Standards (BRITLAPS)
- Chartered Institution of Building Services Engineers
- Electricity Association
- Engineering Equipment and Materials Users' Association
- Institution of Lighting Engineers
- Lighting Industry Federation Ltd.
- London Regional Transport
- National Illumination Committee of Great Britain
- Society of Motor Manufacturers and Traders Limited

The following bodies were also represented through the participation of subcommittees

- Consumer Policy Committee of BSI
- Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
- Department of Trade and Industry (Consumer Safety Unit, CA Division)

This British Standard, having been prepared under the direction of the Electrotechnical Sector Board, was published under the authority of the Standards Board and comes into effect on 15 June 1995

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Amendments issued since publication

Amd. No.	Date	Text affected
9775	January 1998	Indicated by a double vertical line in the margin

The following BSI references relate to the work on this standard:
Committee reference CPL/34/1
Draft for comment 91/28808 DC

ISBN 0 580 24316 8

Summary of pages

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National foreword

|| This British Standard has been prepared by Technical Committee CPL/34/1 and is the English language version of EN 60432-1 : 1994 *Safety specification for incandescent lamps Part 1: Tungsten filament lamps for domestic and similar general lighting purposes*, including amendments A1 and A2, published by the European Committee for Electrotechnical Standardization (CENELEC). It was derived by CENELEC from || IEC 432-1 : 1993, including Amendments 1 and 2 published by the International Electrotechnical Commission (IEC).

Part 2 of this British Standard is published as BS EN 60432-2 : 1995.

The foreword of the EN makes reference to the 'date of withdrawal', dow, of the relevant national standard. In this case the relevant standard is BS 5971 : 1988 which will be withdrawn on 1995-12-01. Certificates or marks will not be awarded after this date with respect to the withdrawn British Standard. However such certificates and marks, already awarded, may apply to production until 2000-12-01.

|| The foreword to amendments A1 and A2 to the EN makes reference to the 'date of withdrawal (dow) of conflicting national standards' as 1998-06-01. In this case, the relevant national standard is BS EN 60432-1 : 1995, but the date of withdrawal relates only to those parts of the British Standard subject to Amendment No. 1. Certificates and marks will not be awarded after this date with respect to the British Standard not incorporating Amendment No. 1. They will be awarded only to the amended British Standard. However, such certificates and marks already awarded with respect to the British Standard not incorporating Amendment No. 1 may continue to apply for production until 2003-06-01.

In accordance with the CENELEC common modifications, all references to lamps with E12, E17 and E26 caps have been deleted at the appropriate places in the text. They are indicated by a side line in the margin.

The following print types are used in this standard:

requirements proper	in roman type
<i>test specifications</i>	<i>in italic type</i>
explanatory matter	in smaller roman type

Cross-references

International Standard	Corresponding British Standard
	BS EN 60061 <i>Specification for lamp caps and holders together with gauges for the control of interchangeability and safety</i>
EN 60061-1 : 1993 (IEC 61-1 : 1969)	BS EN 60061-1 : 1993 <i>Lamp caps</i>
EN 60061-3 : 1993 (IEC 61-3 : 1969)	BS EN 60061-3 : 1993 <i>Gauges</i>
EN 60064 : 1989	BS 161 : 1990 <i>Specification for tungsten filament lamps for domestic and similar general lighting purposes. Performance requirements</i>
EN 60360 : 1989 (IEC 360 : 1987)	BS 5371 : 1990 <i>Standard method of measurement of lamp cap temperature rise</i>
EN 60598-1 : 1993	BS EN 60598 <i>Luminaires</i> BS EN 60598-1 : 1993 <i>General requirements and tests</i>
IEC 887 : 1988	BS 7132 : 1989 <i>Nomenclature for glass bulb designation system for lamps</i>
ISO 3951 : 1989	BS 6002 <i>Sampling procedures for inspection by variables Part 1 : 1993 Specification for single sampling plans indexed by acceptable quality level (AQL) for lot-by-lot inspection</i>

Compliance with a British Standard does not of itself confer immunity from legal obligations.

ICS 29.140.20

Descriptors: Lighting equipment, incandescent lamp, tungsten filament lamp, safety, interchangeability, specification, protection against live parts, quality control, marking

English version

Safety specifications for incandescent lamps Part 1: Tungsten filament lamps for domestic and similar general lighting purposes

(includes amendments A1 : 1997 + A2 : 1997)
(IEC 432-1 : 1993, modified + A1 : 1995 + A2 : 1997)

Prescriptions de sécurité pour lampes à
incandescence

Partie 1: Lampes à filament de tungstène pour
usage domestique et éclairage général similaire
(inclut les amendements A1 : 1997 + A2 : 1997)
(CEI 432-1 : 1993, modifiée + A1 : 1995
+ A2 : 1997)

Sicherheitsanforderungen an Glühlampen
Teil 1: Glühlampen für den Hausgebrauch und
ähnliche allgemeine Beleuchtungszwecke
(enthält Änderungen A1 : 1997 + A2 : 1997)
(IEC 432-1 : 1993, modifiziert + A1 : 1995
+ A2 : 1997)

This European Standard was approved by CENELEC on 1994-12-06. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

The text of the International Standard IEC 432-1 : 1993, prepared by SC 34A, Lamps, of IEC TC 34, Lamps and related equipment, together with common modifications prepared by CENELEC Reporting Secretariat SR 34A, was submitted to the formal vote and was approved by CENELEC as EN 60432-1 on 1994-12-06.

The following dates were fixed :

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1995-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1995-12-01

For products which have complied with EN 60432 : 1988 and its amendments A1 : 1989 and A2 : 1993 before 1995-12-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2000-12-01.

Annexes designated 'normative' are part of the body of the standard. Annexes designated 'informative' are given for information only. In this standard, annexes A through J and ZA are normative and annex K is informative. Annex ZA has been added by CENELEC.

Common modifications

Lamps with the following caps are excluded from this European Standard as they do not comply with European safety requirements.

E12
E17
E26

Foreword to amendment A1

The text of amendment 1 : 1995 to the International Standard IEC 60432-1 : 1993, prepared by SC 34A, Lamps, of IEC TC 34, Lamps and related equipment, was submitted to the formal vote and was approved by CENELEC as amendment A1 to EN 60432-1 : 1994 on 1997-07-01 without any modification.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-06-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1998-06-01

For products which have complied with EN 60432-1 1994 and its corrigendum April 1995 before 1998-06-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2003-06-01.

Foreword to amendment A2

The text of document 34A/712/FDIS, future amendment 2 to IEC 60432-1 : 1993, prepared by SC 34A, Lamps, of IEC TC 34, Lamps and related equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A2 to EN 60432-1 : 1994 on 1997-07-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1998-06-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1998-06-01

For products which have complied with EN 60432-1 1994 and its corrigendum April 1995 before 1998-06-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2003-06-01.

Annexes designated 'normative' are part of the body of the standard. In this standard, annex ZA is normative. Annex ZA has been added by CENELEC.

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SAFETY SPECIFICATIONS FOR INCANDESCENT LAMPS

Part 1: Tungsten filament lamps for domestic and similar general lighting purposes

Section 1: General

1.1 Scope

International Standard IEC 432-1 specifies the safety and interchangeability requirements of tungsten filament incandescent lamps for general lighting service having:

- rated wattage up to and including 200 W;
- rated voltage of 50 V to 250 V inclusive;
- bulbs of the A, B, C, G, M, P, PS, PAR or R shapes*, or other bulb shapes where the lamps are intended to serve the same purpose as lamps with the foregoing bulb shapes;
- bulbs with all kinds of finishes;
- caps B15d, B22d, E14, E27, or E27/51x39.

This standard specifies the method a manufacturer should use to show that his product conforms to this standard on the basis of whole production appraisal in association with his test records on finished products. This method can also be applied for certification purposes. Details of a batch test procedure which can be used to make limited assessment of batches are also given.

Requirements for batch testing are included in order to enable the assessment of batches presumed to contain unsafe lamps. As some safety requirements cannot be checked by batch testing and as there may be no previous knowledge of the manufacturer's quality, batch testing cannot be used for certification purposes nor in any way for an approval of the batch. Where a batch is found to be acceptable, a testing agency may only conclude that there is no reason to reject the batch on safety grounds.

This standard is concerned with safety criteria only and does not take into account the performance of tungsten filament lamps with respect to luminous flux, life or power consumption characteristics. Readers should refer to IEC 64 for such characteristics with respect to types normally used for general lighting service.

* See IEC 887 for description of the letter symbols. Associated traditional names are:

- | | |
|-----------------------|---------------------------|
| – Pear shape | = A, PS |
| – Mushroom | = M |
| – Candle | = B, C (in North America) |
| – Round bulb | = P |
| – Globular | = G |
| – Reflector | = R |
| – Parabolic reflector | = PAR |

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 61-1: 1969, *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 1: Lamp caps*

IEC 61-3: *Lamp caps and holders together with gauges for the control of interchangeability and safety – Part 3: Gauges*

IEC 64: 1987, *Tungsten filament lamps for domestic and similar general lighting purposes. Performance requirements. Amendment No.1, 1988*

IEC 360: 1987, *Standard method of measurement of lamp cap temperature rise*

IEC 410: 1973, *Sampling plans and procedures for inspection by attributes*

IEC 598-1: 1992, *Luminaires – Part 1: General requirements and tests*

IEC 887: 1988, *Glass bulb designation system for lamps*

IEC 60432-2 : 1994, *Safety specifications for incandescent lamps – Part 2: Tungsten halogen lamps for domestic and similar general lighting purposes.*

ISO 468: 1982, *Surface roughness – Parameters, their values and general rules for specifying requirements*

ISO 3951: 1989, *Sampling procedures and charts for inspection by variables for percent nonconforming*

1.3 Definitions

For the purposes of this International Standard, the following definitions apply.

1.3.1 category: All lamps of one manufacturer having the same general construction (bulb shape, external dimensions, cap type, filament type), rated voltage, wattage rating and finish.

For the purposes of this standard:

- a) clear, frosted and coatings equivalent to a frosted finish are considered to be the same;
- b) various coloured and white finishes are not considered to be the same.

NOTE - Lamps differing only by their caps (e.g. E27 and B22d) are of different "categories", but of the same "type" as defined in IEC 64.

1.3.2 **type:** Lamps which, independent of the type of cap, are identical in photometric and electrical ratings.

1.3.3 **class:** All lamps of one manufacturer having the same general construction (bulb shape, external dimensions, cap type, filament type), wattage rating and finish and differing only by their rated voltages, when these voltages fall within the same voltage range (e.g. 100 V to 150 V, 200 V to 250 V).

1.3.4 **rated voltage:** Voltage or voltage range specified in the relevant lamp standard or assigned by the manufacturer or responsible vendor.

(If lamps are marked with a voltage range, it shall be interpreted that they are appropriate for use on any supply voltage within that range.)

1.3.5 **test voltage:** Rated voltage unless otherwise specified.

(If lamps are marked with a voltage range, the test voltage shall be taken as the mean of the voltage range unless otherwise specified.)

1.3.6 **rated wattage:** Wattage specified in the relevant lamp standard or assigned by the manufacturer or responsible vendor.

1.3.7 **end of life:** Instant when the energized lamp ceases to emit light.

1.3.8 **cap temperature rise (Δt_s):** Surface temperature rise, above ambient temperature, of a standard test lampholder fitted to the lamp's cap, when measured in accordance with the standard method described in IEC 360.

1.3.9 **design test:** Test, made on a sample, for the purpose of checking compliance of the design of a category, class or group of categories with the requirements of the relevant clause.

1.3.10 **periodic test:** Test repeated at intervals in order to check that the product does not deviate in certain respects from the given design.

1.3.11 **running test:** Test applied at frequent intervals to provide data for assessment.

1.3.12 **batch:** All the lamps of one category, identified as such, and put forward at one time for checking compliance.

1.3.13 **whole production:** Production of all types of lamps within the scope of this standard manufactured during a period of 12 months and nominated by the manufacturer in a list for inclusion in the control, this list being incorporated in the certificate when certification is in operation.

1.3.14 **bowl mirror lamp:** Lamp with part of its bulb coated with reflecting material so as to reflect a substantial part of the light in the general direction of the lamp cap.

1.3.15 **maximum cap temperature:** Maximum temperature for which the components in the cap area of a lamp are designed to withstand over the expected life of the lamp.

1.3.16 **lamp neck reference diameter:** That diameter of a lamp which is of influence on the protection against accidental contact and which is measured at a defined distance from the solder contact plate. For example:

- for E14 capped lamps, this distance is 30 mm.

Section 2: Requirements

2.1 General

Lamps shall be so designed and constructed that in normal use they present no danger to the user or surroundings.

Lamps shall satisfy the requirements of section 2.

2.2 Marking

2.2.1 The following information shall be marked on the lamps and shall be legible and durable when subjected to the test procedure in clause A.1:

- a) mark of origin (this may take the form of a trademark, the manufacturer's name or the name of the responsible vendor);
- b) the rated voltage or the rated voltage range, marked as "V" or "volts";
- c) the rated wattage marked as "W" or "watts".

For lamps with 40 mm diameter bulbs or larger and with a realized wattage of 14 W or less, the wattage need not be marked.

The rated voltage marking for lamps intended for use on United Kingdom supply voltages may be 240 volts or 240 V.

NOTE – The United Kingdom implementation of 230 V European harmonization process allows supply voltages to remain at 240 V.

2.2.2 *Dichroic reflectorized (cool beam) lamps and bowl mirror lamps*

The immediate lamp wrapping or container shall be marked with the relevant symbol as shown in annex B.

2.2.3 *Lamps with operating position limitations*

For lamps requiring operating position limitations, such as some 60 W candle and round bulbs capped with B22d or E27 caps which can comply with the requirement of the lamp cap temperature rise only by excluding the cap-up position, the immediate lamp wrapping or container shall be marked with the appropriate symbol. An example is shown in annex B.

NOTE – The requirements in 2.2.2 and 2.2.3 are intended as information for the end user of the lamp.

2.3 Protection against accidental contact in screw lampholders

Dimensions of screw capped lamps shall be such that safety against accidental contact is ensured according to IEC 61.

The lamps shall satisfy the gauges, defined in IEC 61-3 in accordance with table 1.

Table 1 – Gauges for protection against accidental contact
for checking lamps

Lamp cap	Gauge sheet No.	Lamp cap	Gauge sheet No.
E14	– See 2.3.1 – – – –	E27/25 and E27/27 E27/51x39	7006-51A 7006-51

2.3.1 E14-capped lamps shall satisfy the following requirements:

- Candle lamps shall be fitted with caps E14/25x17 and tested with gauge 7006-55.
- Round bulb, pigmy, tubular and reflector lamps having lamp neck reference diameters of 21 mm and greater shall be fitted with caps E14/25x17 and tested with gauge 7006-55.
- Round bulb, pigmy, tubular and reflector lamps having lamp neck reference diameters between 16 mm and 21 mm shall be fitted with caps E14/23x15 or E14/20.
- Round bulb, pigmy, tubular and reflector lamps having lamp neck reference diameters between 14 mm and 16 mm shall be fitted with caps E14/20.

In cases c) and d) a gauge is not required, because the choice of caps guarantees the same degree of safety as in cases a) and b).

NOTE -- The dash marking in the Gauge sheet No. column means that at the moment no such test system has been developed.

2.4 Lamp cap temperature rise (Δt_s)

2.4.1 The average cap temperature rise per class of lamp manufactured in a period of 12 months shall not exceed the following:

- a) the appropriate value as specified in table 2; or
- b) 45 K lower than the relevant values in table 2 where advantage is taken of the lower maximum cap temperature of subclause 2.5.3.1 b).

Compliance shall be checked by measurements of lamp cap temperature rise on lamps in the same class in accordance with the test procedure specified in IEC 360.

If the lamp is marked with a voltage range, the cap temperature rise shall be measured at the mean voltage provided the limits of the voltage range do not differ by more than 2,5 % from the mean voltage. For lamps with a wider voltage range, the measurement shall be at the highest marked voltage.

NOTE - Table 2 shows upper limits for average cap temperature rise which apply to all lamps listed by wattage, bulb and cap. In practice, several design features such as light centre length, mount shape and bulb finish affect cap temperature rise, but such factors are encompassed in each limit.

2.4.2 For the testing of batches when the 20 lamp sample size is needed, the average shall not exceed the appropriate value in accordance with 2.4.1, with an allowance of + 9 K.

Table 2 – Maximum allowable cap temperature rise (Δt_s) for various lamp wattages and classes over a 12-month period average

Group number	Wattage ¹⁾ W	Bulb shape	Δt_s max. K							
			B15d	B22d		E14				E27
1	25 and 30	A, PS, M and other shapes intended for use in the same luminaire	–	–	–	–	–			–
	40		–	–	–	–	–			–
	60		–	125	–	–	–			120
	100		–	135	–	–	–			130
	150 and 200		–	135	–	–	–			130
2	40	B, G (equal to or less than 45 mm diameter), P and other shapes intended for use in the same luminaire	135	140	–	130	–		–	140
	60		145	125 ⁴⁾	–	140	–		–	120 ⁴⁾
3	15	C and other shapes intended for use in the same luminaire	–	–		–				–
	25		–	–		–				–
	40		–	–		–				–
	60		–	–		–				–
4	25 and 40	G (greater than 45 mm diameter)	–	–	–	–	–	–		–
	60 and 100		–	–	–	–	–	–		–
5	25	P and G (equal to or less than 45 mm diameter), with bowl mirror	–	–	–	–	–	–		–
	40		135	135	–	135	–	–		135
	60		135	–	–	135	–	–		–
6	60	A and PS with bowl mirror	–	130	–	–	–	–		130
	100		–	135	–	–	–	–		135
	150 and 200		–	135	–	–	–	–	–	135
7	25	R shapes	–	–	–	–		–	–	–
	40		120	120	–	120				120
	60		–	130	–	–				130
	100, 150 and 200		–	135	–	–	–			135
8	75	PAR shapes ⁵⁾	–	–	–	–	–	–		150
	100		–	–	–	–	–	–		150
	150		–	–	–	–	–	–		150
9	150	PAR shapes with dichroic reflector ⁵⁾	–	–	–	–	–	–		175

NOTES

1 For lamps with intermediate wattage values, the requirement of the next higher value shown applies.

4 This may require a limitation on operating position.

5 Lamps with skirted caps: E27/51x39, etc.

7 Some lamp classes may be limited to operation in the cap-down-position by the manufacturer.