

BRITISH STANDARD

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*Incorporating
Amendment No. 1, and
implementing
Amendment No. 2, not
published separately*

Safety specification for incandescent lamps

Part 2. Tungsten halogen lamps for domestic and similar general lighting purposes

ICS 29.140.20

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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
- Department of Trade and Industry (Consumer Safety Unit, CA Division)
- Electrical Installation Equipment Manufacturers' Association

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The following table identifies the current issue of each page. Issue 1 indicates that a page has been introduced for the first time by amendment. Subsequent issue numbers indicate an updated page. Double vertical sidelining on replacement pages indicates the most recent changes (amendment, addition, deletion).

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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 60432-2 : 1994 *Safety specifications for incandescent lamps Part 2: Tungsten halogen 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 432-2 : 1994 including Amendments 1 : 1996 and 2 : 1997, published by the International Electrotechnical Commission (IEC).

The foreword of amendment A1 to the EN makes reference to the 'date of withdrawal (dow) of conflicting national standards' as 1997-07-01. In this case, the relevant national standard is BS EN 60432-2 : 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 2002-07-01.

Analogous provisions apply in respect of amendment A2, for which the dow is 1998-04-01, and the expiry date for current approvals is 2003-04-01.

This British Standard should be read in conjunction with Part 1 which is published as BS EN 60432-1 : 1995.

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

requirement proper	in roman type
test specifications	in italic type
explanatory matter	in smaller roman type

Cross-references

Publication referred to	Corresponding British Standard
EN 60432-1 : 1994 (IEC 432-1 : 1993)	BS EN 60432 <i>Safety specification for incandescent lamps Part 1 : 1995 Tungsten filament lamps for domestic and similar general lighting purposes</i>
IEC 887 : 1988	BS 7132 : 1989 <i>Nomenclature for glass bulb designation system for lamps</i>
ISO 9001 : 1994 ¹⁾	BS EN ISO 9000 <i>Quality Management and quality assurance standards</i> BS EN ISO 9001 : 1994 <i>Quality systems. Model for quality assurance in design, development, production, installation and servicing</i>
ISO 9002 : 1994 ¹⁾	BS EN ISO 9002 : 1994 <i>Quality systems. Model for quality assurance in production, installation and servicing</i>
ISO 9003 : 1994 ¹⁾	BS EN ISO 9003 : 1994 <i>Quality systems. Model for quality assurance in final inspection and test</i>

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

¹⁾ The 1987 edition of this standard has been superseded.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60432-2

December 1994

+ A1

October 1996

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ICS 29.140.20

Descriptors: Lighting equipment, incandescent lamp, tungsten filament lamp, safety, interchangeability, definition, protection against electric shocks, heating, resistance to torque, quality control, marking

English version

Safety specifications for incandescent lamps Part 2: Tungsten halogen lamps for domestic and similar general lighting purposes

(includes amendment A1 : 1996 + A2 : 1997)
(IEC 432-2 : 1994 + A1 : 1996 + A2 : 1997, modified)

Prescriptions de sécurité pour lampes à
incandescence
Partie 2: Lampes tungstène-halogène pour usage
domestique et éclairage général similaire
(inclut l'amendement A1 : 1996 + A2 : 1997)
(CEI 432-2 : 1994 + A1 : 1996 + A2 : 1997,
modifiée)

Sicherheitsanforderungen an Glühlampen
Teil 2: Halogen-Glühlampen für den Hausgebrauch
und ähnliche allgemeine Beleuchtungszwecke
(enthält Änderung A1 : 1996 + A2 : 1997)
(IEC 432-2 : 1994 + A1 : 1996 + A2 : 1997,
modifiziert)

This European Standard was approved by CENELEC on 1994-10-04. 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.

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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

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Ref. No. EN 60432-2 : 1994 + A1 : 1996 + A2 : 1997 E

Foreword

The text of document 34A(CO)698, future edition 1 of IEC 432-2, 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 together with common modifications prepared by CENELEC Reporting Secretariat SR 34A as EN 60432-2 on 1994-10-04.

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) 1995-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1995-10-01

For products which have complied with the relevant national standard before 1995-10-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2000-10-01.

This part 2 is to be used in conjunction with EN 60432-1.

Annexes designated 'normative' are part of the body of the standard. Annexes designated 'informative' are given for information only. In this standard, annexes A and ZA are normative and annex B 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 document 34A/652/FDIS, future amendment 1 to IEC 432-2 : 1994, 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 A1 to EN 60432-2 : 1994 on 1996-10-01.

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) 1997-07-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1997-07-01

For products which have complied with EN 60432-2 : 1994 before 1997-07-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2002-07-01.

Foreword to amendment A2

The text of document 34A/704/FDIS, future amendment 2 to IEC 60432-2 : 1994, 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 60432-2 : 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) 1998-04-01
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 1998-04-01

For products which have complied with EN 60432-2 : 1994, with its corrigendum March 1995 and its amendment A1 : 1996 before 1998-04-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 2003-04-01.

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INTRODUCTION

There are increasing numbers of cases where tungsten halogen technology is being utilized in general lighting applications. For example, PAR-shaped lamps with tungsten halogen inner bulbs are available for use as substitutes for similar lamps with regular tungsten filaments. The primary concern is that the existing standard for general lighting incandescent lamps, IEC 432, does not adequately list safety requirements for tungsten halogen lamps. Neither does the scope of the existing standard for tungsten halogen lamps, IEC 357: 1982, Tungsten halogen lamps (non-vehicle), encompass such applications.

This part 2 of IEC 432 adds to and modifies IEC 432-1.

SAFETY SPECIFICATIONS FOR INCANDESCENT LAMPS –

Part 2: Tungsten halogen lamps for domestic and similar general lighting purposes

Section 1: General

1.1 Scope

This part of IEC 432 specifies the safety and the related interchangeability requirements of tungsten halogen lamps for general lighting service. It covers those tungsten halogen lamps that are used as direct replacements for conventional tungsten filament lamps as well as new tungsten halogen lamps which have no correspondence in IEC 432-1, but for which the safety and interchangeability requirements are treated by this standard in conjunction with IEC 432-1. These tungsten halogen lamps have the following characteristics:

- rated wattage up to and including 250 W;
- rated voltage of 50 V to 250 V inclusive;
- outer envelopes with various finishes and bulb shapes as designated in IEC 887;
- caps B15d, B22d, E14, E26, E27, or E27/51x39;
- B15d capped lamps, without outer envelope.

NOTES

- 1 There is no implication that a tungsten halogen lamp used as a substitute for an incandescent tungsten filament lamp would use the same bulb shape as the original incandescent lamp.

This standard is intended to be read in conjunction with those sections of IEC 432-1 to which reference is made.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 432. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 432 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 410: 1973, *Sampling plans and procedures for inspection by attributes*

IEC 432-1: 1993, *Safety specifications for incandescent lamps – Part 1: Tungsten filament lamps for domestic and similar general lighting purposes*

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

ISO 9001: 1987, *Quality systems – Model for quality assurance in design/development, production, installation and servicing*

ISO 9002: 1987, *Quality systems – Model for quality assurance in production and installation*

ISO 9003: 1987, *Quality systems – Model for quality assurance in final inspection and test*

1.3 Definitions

For the purpose of this part of IEC 432 the definitions of IEC 432-1 apply. In addition, the following definitions apply.

1.3.1 specific effective radiant UV power: Effective power of the UV radiation of a lamp related to its luminous flux. Units: mW/klm.

For a reflector lamp, this is the effective irradiance of the UV radiation related to the illuminance. Units: $\text{mW/m}^2 \cdot (\text{klx})^{-1}$.

NOTE – The effective power (or irradiance) of the UV radiation is obtained by weighting the spectral power distribution of the lamp with the action spectrum published by the American Conference of Governmental Industrial Hygienists (ACGIH), which is endorsed by the World Health Organization (WHO) and recommended by the International Radiation Protection Association (IRPA). For references, see annex B of this standard.

1.3.2 outer envelope: Transparent or translucent enclosure containing an inner tungsten halogen light source.

1.3.3 general lighting tungsten halogen lamp: Tungsten halogen lamp for which the safety and interchangeability are covered by this standard in conjunction with IEC 432-1.

1.3.4 tungsten halogen lamp: Gas-filled lamp containing halogens or halogen compounds, the filament being of tungsten. [IEV 845-07-10]

Section 2: Requirements

2.1 General

The requirements of IEC 432-1 apply.

2.2 Marking

The requirements of IEC 432-1 apply.

The lamp manufacturer shall provide a cautionary notice, or suitable graphical symbol (an example is shown in annex B), if safety hazards exist when an outer envelope is broken.

2.3 Protection against accidental contact in screw lampholders

The requirements of IEC 432-1 apply.

2.4 Lamp cap temperature rise (Δt_s)

The requirements of IEC 432-1 apply. In order to maintain thermal interchangeability in existing luminaires, the Δt_s value of a general lighting tungsten halogen lamp shall not exceed the value, specified in table 2 of IEC 432-1, of the lamp for which it is substituted.

Table 1 below, contains additional requirements for lamps not having a corresponding type in table 2 of IEC 432-1.

For PAR-shaped lamps with unskirted caps, intended to be substitutes for R-shaped lamps, the values of group 7 in table 2 of IEC 432-1 apply.

**Table 1 – Maximum allowable cap temperature rise (Δt_s)
Additions to IEC 432-1, table 2, for general lighting
tungsten halogen lamps**

Group Number	Wattage	Bulb shape	Δt_s max K							
			B15d	B22d	E12	E14	E17	E26/24	E26/25	E27
1	250 W	T-shape and other shapes intended for use in same luminaire	-	165	-	-	-	-	-	165
2	100 W	T-shape and other shapes intended for use in the same luminaire	145	--	--	140	--	--	--	--
8	250 W	PAR shapes ¹⁾	-	-	-	-	-	-	-	-
10 ²⁾	75 W 100 W 150 W 250 W	T-shape without outer envelope	145 150 165 165	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -	- - - -
¹⁾ Lamps with skirted caps: E27/51x39, etc. ²⁾ Group 10 is a new group.										

2.5 Resistance to torque

The requirements of IEC 432-1 apply. The heating test shall be conducted at the relevant values of IEC 432-1, table K1 or table 2 of this standard.

2.6 Insulation resistance of B15d, B22d and E27/51x39 capped lamps and other lamps having insulated skirts

The requirements of IEC 432-1 apply.

2.7 Accidentally live parts

The requirements of IEC 432-1 apply.

2.8 Creepage distance for B15d and B22d capped lamps

The requirements of IEC 432-1 apply.

2.9 Safety at end of life

The requirements of IEC 432-1 apply, except that the induced failure test shall be replaced by an alternative induced failure test in accordance with annex A of this standard.

NOTE - The alternative induced failure test is also suitable for lamps with rated voltages below 100 V.

2.10 Interchangeability

The requirements of IEC 432-1 apply.

2.11 UV radiation

|| The specific effective radiant UV power of a lamp shall not exceed $0,35 \text{ mW/klm}^{(1)}$ and for a reflector lamp: $0,35 \text{ mW}/(\text{m}^2 \cdot \text{klx})$.

2.12 Information for luminaire design

The information given in IEC 432-1 applies. Table 2 contains additional information for lamps not having a corresponding type in table K1 of IEC 432-1.

Table 2 - Maximum cap temperature

Cap type	Wattage W	Temperature °C
B15d	75, 100 150, 250	210 250
B22d	250	250
E14	100	210
E26/50x39	250	250
E27	250	250

Section 3: Assessment

The requirements of IEC 432-1 apply, modified as follows:

Table 3 replaces table 6 of IEC 432-1.

In presenting the test results, the manufacturer may combine results for different lamp classes according to column 4 of table 6 of IEC 432-1 and table 3 of IEC 432-2, provided that the requirements are common.

NOTE - The whole production assessment in IEC 432-1 requires that the quality control procedures of a manufacturer shall satisfy recognized quality system requirements for final inspection and test (e.g. ISO 9003).

Within the framework of a quality assurance system based also on in-process inspection and testing (e.g. ISO 9001 and 9002) the manufacturer may show compliance with some of the requirements of this standard by means of in-process inspection instead of finished product testing.

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Table 3 – Grouping of test records, sampling and acceptable quality levels (AQL) for general lighting tungsten halogen lamps

1 Clause number of this standard	2 Tests per IEC 432-1 ¹⁾	3 Type of test	4 Grouping of test records between lamp classes	5 Minimum annual sample per grouping	6 AQL ²⁾ %
2.2 i)	Marking legibility	Running	All classes with same method of marking	200	2.5
ii)	Marking durability	Running	All classes with same method of marking	32	2.5
2.2	Presence of required symbol	Running	All classes with same method of marking	32	2.5
2.3	Accidental contact	Running	All lamps tested with their appropriate gauge	32	1.5
2.4	Cap temperature rise	Design ³⁾ or periodic	Lamps by class	5 at any design change 20	
2.5	Resistance to torque Unused lamps a) test by attributes according to C.1.4 a)	Running	All lamps with the same cement and the same cap (e.g. B15d, B22d, E14...)	80	0.65
	b) test by variables ⁴⁾ according to C.1.4 b)	Running	All lamps with the same cement and the same cap (e.g. B15d, B22d, E14...)	25	0.65
2.5	After heating a) test by attributes according to C.2.3 a)	Periodic ⁵⁾	All lamps with the same cement and the same cap (e.g. B15d, B22d, E14...)	80	0.65
	b) test by variables ⁴⁾ according to C.2.3 b)	Periodic ⁵⁾	All lamps with the same cement and the same cap (e.g. B15d, B22d, E14...)	20	0.65
2.6	Insulation resistance	Running	All classes with B15d, B22d and E27/51x39 cap	315	0.25 or 0.65 ⁶⁾
2.7	Accidently live parts	100 % Inspection	-	-	-
2.8	Creepage distance	Design	a) All lamps with B15d caps b) All lamps with B22d caps	5 or 10 at design change ⁷⁾ 5 or 10 at design change ⁷⁾	
2.9	End-of-life alternative induced failure	Design	See clause H.1	Clause H.2	According to compliance conditions of clause H.4
	Operation-to-failure	Periodic	All lamps of all classes	315	0.25
2.10	Interchangeability	Periodic	All classes with the same cap	32	2.50
2.11	UV radiation	Design	All lamps having the same outer envelope or bulb	5	-

1) The clause and annex numbers in columns 2, 4, 5 and 6 are related to IEC 432-1.
 2) Use of this term is indicated in IEC 410, where operating characteristics can be found.
 3) See 3.3.2 of IEC 432-1.
 4) Assessed in accordance with annex G, IEC 432-1.
 5) For lamps with uncemented caps, this shall be a design test.
 6) See 3.3.4 and 1.3.3 of IEC 432-1.
 7) See 3.3.3 of IEC 432-1.

Annex A (normative)

Alternative induced failure test

A.1 Test circuit and equipment

The requirements of clauses D.1 and D.2 of IEC 432-1 apply, except that instead of a pulse generator a laser of adequate power shall be used to induce burn-out of the filament.

NOTE – An example of a suitable laser is a neodymium-glass laser.

A.2 Test procedure

The lamp to be tested shall be inserted in the lampholder and the safety cover put in place. Through a small hole in the cover, the laser beam shall be aligned and focused on the lamp filament.

The lamp shall be switched on, applying rated voltage only. After complete warm-up of the lamp, a laser pulse shall be applied.

If the lamp remains alight, the output power of the laser shall be increased and the laser pulse shall be applied again. This procedure shall be repeated until burn-out of the filament is achieved.

NOTE – If the focusing of the laser beam is disturbed by the finish of the lamp or the structure of the outer envelope, specially prepared samples will have to be used.

A.3 Inspection and assessment

After the test, each test lamp is examined. If:

- a) the bulb is no longer intact,
- b) or the bulb is detached from the cap,
- c) or, for bayonet caps only, there is a short circuit between either contact and the shell,

then the lamp is deemed to have failed the test and is counted as a non-conformity.



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Annex B
(normative))

Symbols

The height of graphical symbols shall be not less than 5 mm, and for letters, not less than 2 mm.

B.1 Cautionary notice regarding broken outer envelope



NOTES

- 1 The cap and bulb may be varied to show the shape of the lamp.
- 2 The above cross may be varied if this improves the readability of the information.

||

Annex C
(informative)**Bibliography**

- [1] ACGIH: "Threshold limit values and biological exposure indices", American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, USA (1990-1991).
- [2] IRPA/INIRC: Guidelines on limits of exposure to ultraviolet radiation of wavelengths between 180 nm and 400 nm. *Health Physics*, Vol. 49, pp 331-340, (1985).
- [3] IRPA/INIRC: Proposed changes to the IRPA 1985 guidelines on limits of exposure to ultraviolet radiation, *Health Physics*, Vol. 56, pp 971-972, (1989).

NOTE - INIRC: International Non-ionizing Radiation Committee.

IRPA: International Radiation Protection Association.

Annex ZA (normative)**Other international publications quoted in this standard with the references of the relevant European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

NOTE. When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

IEC publication	Date	Title	EN/HD	Date
410	1973	<i>Sampling plans and procedures for inspection by attributes</i>	—	—
432-1	1993	<i>Safety specifications for incandescent lamps — Part 1: Tungsten filament lamps for domestic and similar general lighting purposes</i>	EN 60432-1	1994
887	1988	<i>Glass bulb designation system for lamps</i>	—	—

Other publications

ISO 9001:1987	<i>Quality systems — Model for quality assurance in design/development, production, installation and servicing</i>
ISO 9002:1987	<i>Model for quality assurance in production and installation</i>
ISO 9003:1987	<i>Model for quality assurance in final inspection and test</i>

List of references

See national foreword.



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