Nationally Acknowledged International Standard

Approved: June 6, 2002 Secretariat: ANSLG-- National Electrical Manufacturers Association

for Electric Lamps

Incandescent Lamps- Safety Specifications-

Tungsten Halogen Lamps for Domestic and Similar General Lighting Purposes- Part 2

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FOREWORD (This Foreword is not part of ANS/IEC C78.60432:2-2002)

Suggestions for improvement of this standard will be welcome. They should be sent to the Secretariat, C78 Committee, ANSLG, 1300 1300 North 17th Street, Arlington, VA 22209 This standard was processed and approved for submittal to ANSI by ASC C78.

Chapter I of this standard presents deviations for the the United States of America to IEC 60432-2: 1999. Additionally, the base temperature rise limits for E26/24 based lamps are under reiew and chjanges are expected.

In chapter II of this standard, the English text and the order of that text is exactly the same as that found in IEC 60432-2:1999. The reader should note, however, that the page numbers have been changed and French text is not included. Information concerning the approval of this standard is based on the documents listed in the table below:

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At the time of publications the C78 committee consisted of the following members:

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CHAPTER 1

United States of America's

Deviations to
IEC 60432-2:1999

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1 General notes

In North America the word “cap” is commonly known as base.

The following bases (caps) are not used in the United States:
B22d, E14, E26/25, E27, and E27/51x39

2 Deviations affecting Annex B - Symbols

The symbols in this annex are not required in the United States

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CHAPTER 2

IEC 60432-2:1999

Incandescent Lamps –
Safety Specifications –

Tungsten halogen lamps for domestic and similar general lighting purposes –

Part 2

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INCANDESCENT LAMPS – SAFETY SPECIFICATIONS –

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

1 General

This standard shall be used in conjunction with IEC 60432-1.

1.1 Scope

This part of IEC 60432 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 60432-1, but for which the safety and interchangeability requirements are treated by this standard in conjunction with IEC 60432-1. 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;

– caps B15d, B22d, E12, E14, E17, E26, E26d, E26/50×39, E27 or E27/51×39.

This standard also covers single-ended lamps, within the above ratings, which are not direct replacements for conventional tungsten filament lamps, but serve the same purpose.

NOTE 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.

NOTE 2 There are two variations of E26 caps which are not fully compatible. E26/24 caps are used in North America and E26/25 caps are used in Japan.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60432. For dated references, subsequent amendments to, or revisions of, these publications do not apply. However, parties to agreements based on this part of IEC 60432 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050(845), *International Electrotechnical Vocabulary (IEV) – Chapter 845: Lighting*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

IEC 60432-1, *Incandescent lamps – Safety specifications – Part 1: Tungsten filament lamps for domestic and similar general lighting purposes*

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1.3 Definitions

For the purpose of this part of IEC 60432, the definitions of IEC 60432-1 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

Unit: mW/klm

For a reflector lamp, this is the effective irradiance of the UV radiation related to the illuminance

Unit: mW/($m^2 \times$ klx)

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 Organisation (WHO) and recommended by the International Radiation Protection Association (IRPA). For references, see annex D 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 60432-1

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

2 Requirements

2.1 General

The requirements of IEC 60432-1 apply.

2.2 Marking

The requirements of IEC 60432-1 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 60432-1 apply.

2.4 Lamp cap temperature rise (Δt_s)

The requirements of IEC 60432-1 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 60432-1, of the lamp for which it is substituted.

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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 60432-1 apply.

Table 1 below, contains additional requirements for lamps not having a corresponding type in table 2 of IEC 60432-1.

Table 1 – Maximum allowable cap temperature rise (Δt_s)

Additions to IEC 60432-1, table 2, for general lighting tungsten halogen lamps

Group number	Wattage W	Bulb shape	Δt_s max. K							
			B15d	B22d	E12	E14	E17	E26/24	E26/25	E27
1	250	T-shape and other shapes intended for use in same luminaire	–	165	–	–	–	–	–	165
2	100	T-shape and other shapes intended for use in same luminaire	145	–	–	140	–	–	–	–
8	250	PAR shapes[1)]	–	–	–	–	–	[3)]	–	–
10 [2)]	75	T-shape without outer envelope	145	–	–	–	–	–	–	–
	100		150	–	–	–	–	–	–	–
	150		165	–	–	–	–	–	–	–
	250		165	–	–	–	–	–	–	–

[1)] Lamps with skirted caps: E26/50×39, E27/51×39, etc.

[2)] Group 10 is a new group.

[3)] Under consideration.

2.5 Resistance to torque

The requirements of IEC 60432-1 apply. The heating test shall be conducted at the relevant values of IEC 60432-1, table K.1, or table C.1 of this standard.

2.6 Insulation resistance of B15d, B22d, E26/50×39 and E27/51×39 capped lamps and other lamps having insulated skirts

The requirements of IEC 60432-1 apply.

2.7 Accidentally live parts

The requirements of IEC 60432-1 apply.

2.8 Creepage distance for B15d and B22d capped lamps

The requirements of IEC 60432-1 apply.

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2.9 Safety at end of life

The requirements of IEC 60432-1 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 60432-1 apply.

Caps originally developed for single-ended extra low voltage (ELV) lamps (voltage designation: A) shall not be used for mains voltage lamps (voltage designation: B and C). Examples of such caps are: G4, GU4, GU5.3, GX5.3, GU7, G6.35 and GY6.35.

2.11 UV radiation

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

2.12 Information for luminaire design

See annex C.

3 Assessment

The requirements of IEC 60432-1 apply, modified as follows:

Table 2 replaces table 6 of IEC 60432-1.

In presenting the test results, the manufacturer may combine results for different lamp classes according to column 4 of table 6 of IEC 60432-1 and table 2 of the present standard, provided that the requirements are common.

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Table 2 – Grouping of test records, sampling and acceptable quality levels (AQL) for general lighting tungsten halogen lamps

1 Subclause number of this standard	2 Tests per IEC 60432-1[1)]	3 Type of test	4 Grouping of test records between lamp classes	5 Minimum annual sample per grouping	6 AQL[2)] %
2.2	Marking legibility	Running	All classes with same method of marking	200	2,5
	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.1.4a)	Running	All lamps with the same cement and the same cap	80	0,65
	b) test by variables[4)] according to C.1.4b)	Running	All lamps with the same cement and the same cap	25	0,65
2.5	After heating				
	a) test by attributes according to C.2.3a)	Periodic[5)]	All lamps with the same cement and the same cap	80	0,65
	b) test by variables[4)] according to C.2.3b)	Periodic[5)]	All lamps with the same cement and the same cap	20	0,65
2.6	Insulation resistance	Running	All classes with B15d, B22d, E26/50x39 and E27/51x39 cap	315	0,4
2.7	Accidentally live parts	100 % inspection	–	–	–
2.8	Creepage distance	Design	a) All lamps with B15d caps	5 or 10 at design change[6)]	
			b) All lamps with B22d caps	5 or 10 at design change[6)]	
2.9	Safety at 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	2,5
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 refer to IEC 60432-1.
2) Use of this term is indicated in IEC 60410, where operating characteristics can be found.
3) See 3.3.3 of IEC 60432-1.
4) Assessed in accordance with annex G of IEC 60432-1.
5) For lamps with uncemented caps, this shall be a design test.
6) See 3.3.4 of IEC 60432-1.

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Annex A
(normative)

Alternative induced failure test

A.1 Test circuit and equipment

The requirements of clauses D.1 and D.2 of IEC 60432-1 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 should 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.

The cautionary notice regarding broken outer enveloppe is the following:



IEC 1472/99

NOTE 1 The cap and bulb may be varied to show the shape of the lamp.

NOTE 2 The above cross may be varied if this improves the readability of the information.

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Annex C
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Information for luminaire design

C.1 General

The information given in IEC 60432-1 applies.

C.2 Maximum cap temperature

Table C.1 contains additional information for lamps not having a corresponding type in table K.1 of IEC 60432-1.

Table C.1 – Maximum cap temperatures

Cap type	Wattage W	Temperature °C
B15d	75, 100	210
	150, 250	250
B22d	250	250
E14	100	210
E26/50×39	250	250
E27	250	250

C.3 Cap/holder fits

Cap/holder fits originally developed for single-ended extra low voltage (ELV) lamps should not be used in luminaires designed for mains voltage lamps. Examples of such fits are: G4, GU4, GU5.3, GX5.3, GU7, G6.35 and GY6.35.

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Annex D
(informative)

Bibliography

[1] ACGIH: “Threshold limit values and biological exposure indices”, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, USA.

[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.

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