

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Incandescent lamps – Safety specifications –
Part 2: Tungsten halogen lamps for domestic and similar general lighting
purposes**

**Lampes à incandescence – Prescriptions de sécurité –
Partie 2: Lampes tungstène-halogène pour usage domestique et éclairage
général similaire**



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Annex C (informative) Information for luminaire design

Annex D (informative) Bibliography.....

Table 1 – Maximum allowable cap temperature rise (Δt_g).....

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

Table C.1 – Maximum cap temperatures

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INCANDESCENT LAMPS – SAFETY SPECIFICATIONS –

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

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International Standard IEC 60432-2 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

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

This consolidated version of IEC 60432-2 consists of the second edition (1999) [documents 34A/884/FDIS and 34A/898/RVD], its amendment 1 (2005) [documents 34A/1119/FDIS and 34A/1128/RVD] and its amendment 2 (2012) [documents 34A/1533/FDIS and 34A/1560/RVD].

The technical content is therefore identical to the base edition and its amendments and has been prepared for user convenience.

It bears the edition number 2.2.

A vertical line in the margin shows where the base publication has been modified by amendments 1 and 2.

Annexes A and B form an integral part of this standard.

Annexes C and D are for information only.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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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, E26/50x39, E27 or E27/51x39.

Lamps complying with this standard are self-shielded, but need not be marked with a special symbol. As they are direct replacements for conventional tungsten filament lamps, there will be no corresponding luminaire marking.

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 used in North America and E26/25 caps used in Japan.

NOTE 3 Self-shielded lamps are lamps for which the luminaire needs no protective shield.

This part of IEC 60432 covers photobiological safety according to IEC 62471 and IEC/TR 62471-2. Lamps covered by this part of IEC 60432 do not reach risk levels that require risk group marking.

1.2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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*

IEC 62471:2006, *Photobiological safety of lamps and lamp systems*

IEC/TR 62471-2, *Photobiological safety of lamps and lamp systems – Part 2: Guidance on manufacturing requirements relating to non-laser optical radiation safety*

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/(m²·klx)

NOTE The effective power of the UV radiation is obtained by weighting the spectral power distribution of the lamp with the UV hazard function $S_{UV}(\lambda)$. Information about the relevant UV hazard function is given in CIE S 009:2002, *Photobiological safety of lamps and lamp systems*. It only relates to possible hazards regarding UV exposure of human beings. It does not deal with the possible influence of optical radiation on materials, such as mechanical damage or discoloration.

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.

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.

For PAR-shaped lamps with unskirted caps not intended to substitute for R-shaped lamps, the values of Table 1 apply.

For BT-shaped lamps that are intended as substitutes for A-shaped lamps, the values of group 1 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. | | | | | | | | |
|------------------|-------------------------|---|--------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | | | B15d | B22d | E12 | E14 | E17 | E26/24 | E26/25 | E27 | |
| 1 | 250 | T-shape and other shapes intended for use in same luminaire | | 165 | | | | - | - | - | - |
| 2 | 100 | T-shape and other shapes intended for use in same luminaire | 145 | | | 140 | | | - | - | - |
| 8 | 250 | PAR shapes ¹⁾ | - | - | - | - | - | - | 3) | - | - |
| 10 ²⁾ | 75 100 150 250 | T-shape without outer envelope | 145 150 165 165 | - - - - | - - - - | - - - - | - - - - | - - - - | - - - - | - - - - | - - - - |
| 11 ²⁾ | 100 | PAR shapes with unskirted caps not intended as substitutes for R shapes | - | - | - | - | - | - | 145 | - | - |

¹⁾ Lamps with skirted caps: E26/50x39, E27/51x39, etc.
²⁾ Groups 10 and 11 are new groups.
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.

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.

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2.11 Photobiological safety

The specific effective radiant UV power of a lamp shall not exceed:

- 2 mW/klm or, <https://standards.iteh.ai/catalog/standards/sist/c9aad28-bd68-4e1c-a778-e56554422667/iec-60432-2-1999amd1-2005amd2-2012-csv>
- for reflector lamps 2 mW/(m²·klx).

Compliance is checked by measurement of the spectral power distribution and subsequent calculation of the specific effective radiant UV power.

For blue light hazard and IR radiation, there are no requirements.

NOTE The lamps within the scope of this standard are general lighting service (GLS) lamps according to the definition in IEC 62471:2006, 3.11. Assessed as such, they will not reach risk levels for blue light hazard and infrared radiation hazards that require risk group marking.

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.

Sampling in line with H.2.3 of IEC 60432-1 is not applicable.

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 ⁵⁾ 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 b) All lamps with B22d caps | 5 or 10 at design change ⁶⁾ 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 |
| 2.10 | Operation-to-failure Interchangeability | Periodic Periodic | All lamps of all classes All classes with the same cap | 315 32 | 0,25 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.

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.