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Specification for

Indicator lamps for use in telecommunication apparatus and for allied purposes

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Electrical Illumination Standards Committee (LGL/-) to Technical Committee LGL/6 upon which the following bodies were represented:

- Association of Manufacturers Allied to the Electrical and Electronic Industry (BEAMA Ltd)
- Bus and Coach Council
- Chartered Institution of Building Services
- Consumer Standards Advisory Committee of BSI
- Electrical Contractors' Association
- Electricity Supply Industry in England and Wales
- Engineering Equipment and Materials Users' Association
- Institution of Public Lighting Engineers
- Lighting Industry Federation Ltd.
- London Transport Executive
- Ministry of Defence
- National Illumination Committee of Great Britain
- Society of Glass Technology
- Society of Motor Manufacturers and Traders Limited

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Department of Trade and Industry (Consumer Safety Unit, CCS Division)
- Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd)
- National Coal Board

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Foreword

This revision of this British Standard has been prepared under the direction of the Electrical Illumination Standards Committee and it supersedes BS 1050:1953 which is withdrawn. The opportunity has been taken to widen the scope to include the majority of low voltage indicator lamps used in telecommunication apparatus and for allied purposes. The presentation of the information has been changed by specifying general requirements for these lamps in section 1 with section 2 consisting of individual standard sheets giving details pertinent to each type of lamp. Previous editions of this standard covered only the range of tungsten filament visual indicator lamps then in use.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1 Scope

This British Standard specifies requirements for low voltage electric lamps operating up to and including 60 V used as visual indicators in telecommunication apparatus and allied purposes.

Section 1 specifies general requirements. Section 2 consists of standard lamp data sheets giving particular requirements for individual types of lamp.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard the following definitions apply:

2.1 type

lamps which have the same nominal dimensions, rated voltage and photometric and electrical characteristics

2.2 batch

all the lamps of one type put forward at one time for test for compliance with this standard

2.3 inspection test quantity (ITQ)

the number of lamps to be tested to decide whether a batch satisfies the visual, mechanical and physical requirements of this standard

2.4 rating test quantity (RTQ)

the number of lamps to be tested to decide whether a batch satisfies the requirements for initial readings

2.5 life test quantity (LTQ)

the number of lamps to be tested to decide whether a batch satisfies the requirements for life and for lumen maintenance

2.6 rated voltage

the voltage for which the lamp is designed

2.7 initial readings

the photometric and electrical measurements made at the end of the ageing period

2.8 lumen

the unit of luminous flux. It is equal to the flux emitted within a solid angle of one steradian by a uniform point source of one candela

2.9 ageing

the operation of a new lamp for a specified period in order to stabilize its photometric and electrical characteristics

2.10 life

the number of hours the lamp operates to failure, or the number of hours assigned to the lamp under the test conditions of this standard

2.11 rated life

the life for which the lamp is designed when operated under the test conditions of this standard

2.12 average life

the arithmetic mean of the lives of the lamps in the LTQ

2.13 life test voltage

the voltage at which the life test is made

NOTE This is the rated voltage unless otherwise stated on the appropriate standard sheet.

2.14 lumen maintenance (of an individual lamp)

the lumen output of a lamp at a specified time in its life, expressed as a percentage of its initial lumen output

2.15 average lumen maintenance (of a test quantity)

the arithmetic mean of the values of lumen maintenance for the individual lamps

2.16 standard deviation (of a group of measurements)

the square root of the number obtained by adding the squares of the differences between the individual measurements and the average of the group and then dividing the sum by the number of measurements

2.17 coefficient of variation (of a group of measurements)

the standard deviation expressed as a percentage of the average of the group of measurements

2.18 light centre length (LCL)

the distance from the centre of the rectangle which encloses the luminous section of the filament to a fixed reference point on the cap

NOTE The reference point is indicated on the appropriate standard sheet.

2.19
design test

a test made on a sample for the purpose of checking compliance of the design of a type

3 Marking

Each lamp shall be distinctly and durably marked with the following information except where specified on the appropriate standard sheet:

- a) the rated voltage;
- b) the manufacturer’s identifying code or mark;
- c) the lamp’s rated wattage or manufacturer’s part number;

NOTE Any other information agreed between customer and supplier may also be marked on the lamp.

4 Requirements and tests for inspection, rating and life

4.1 Test quantities

4.1.1 An ITQ of 35 lamps shall be selected, at random, from at least 10 containers, or from all the containers if there are less than 10.

4.1.2 From the lamps which have passed the inspection test, there shall be selected, at random, an RTQ of 25 lamps.

4.1.3 From the lamps which have passed the rating test, there shall be selected, at random an LTQ of 20 lamps.

4.1.4 Lamps which are accidentally broken during a test shall, when necessary, be replaced to ensure that the required number of lamps complete the test. The results obtained with replacement lamps shall be substituted for those of the broken lamps.

NOTE In order to avoid unnecessary delay, it is recommended that spare lamps be tested with each test quantity.

4.2 Inspection

4.2.1 *Dimensions.* The lamps shall comply with the dimensions shown on the appropriate standard sheet.

4.2.2 *Bulb.* The bulb shall be clear except where specified on the appropriate standard sheet and free from defects detrimental to service. Where a bulb is coloured, the colouring agent or lacquer shall give an even distribution of light over the entire coloured area and shall not be affected during the life test given in 4.4. With the rated voltage applied to the lamp, the colour shall comply with BS 381C, where specified on the appropriate standard sheet.

4.2.3 Terminations

4.2.3.1 *Cap.* The caps shall be as specified on the appropriate standard sheet and shall be fixed firmly to the bulbs such that they withstand the initial torque specified in Table 1, without visible relative movement between cap and bulb. The cap shall be held firmly without distortion and the appropriate torque gradually applied to the bulb in a clockwise direction and held for 5 ± 2 s.

Table 1 — Initial torque values

Cap type (see BS 5101-1)	Initial torque
E5	N m
BA9s	0.06
E10	} 0.23
B15d, BA15d	
S3s	1.15
Bi-pin	No requirement
	No requirement

4.2.3.2 *Connection plates.* The connection plates shall be of the size and shape specified on the appropriate standard sheet. The sideplates shall be nickel plated brass, or any other material approved by the customer prior to testing. It shall not be possible to short circuit the two connection plates by means of a 6 mm square section bar not less than 50 mm in length. The connection plates shall be fixed firmly to the bulb such that they will withstand a pull of 13.5 N. The pull shall be applied perpendicularly to and within 6 mm of the free end of the plate. Attachment to the plate shall be by adhesive; physical deformation by heat shall not occur.

4.2.3.3 *Lead-out wires.* For wire-ended lamps the wires shall be of the length shown on the appropriate standard sheet. The wires shall meet the bend test requirements of method 2 of test Ub of BS 2011-2.1U:1984, for the size of wire used.

4.2.4 *Filament.* The filament shall be of the shape and type stated on the appropriate standard sheet. It shall be supported on all the supports provided. Where not influenced by contact with the supports or lead-out wires, the filament shall be of uniform colour at rated and half of the rated voltage. The filament shall be nominally central about the longitudinal axis of the bulb and in no case shall the filament touch the side of the bulb.

4.2.5 *Solder.* Where the lead-out wires are soldered to the cap, the solder shall be applied evenly and in such quantity as to allow proper engagement of the cap in the appropriate standard lamp holder and to ensure satisfactory electrical contact. The wire shall not project more than 1 mm beyond the surface of the solder.

4.3 Rating

4.3.1 Ageing. Before initial readings are taken, the lamps shall be aged at the life test voltage for 1 ± 0.25 h.

4.3.2 Initial readings. The lamps shall be measured for initial current and lumens at rated voltage, unless otherwise specified on the appropriate standard sheet.

4.3.3 Coloured bulbs. In the case of lamps having coloured bulbs, the rating tests shall be carried out on similar lamps having clear bulbs selected in accordance with 4.1.

4.4 Life

4.4.1 Operating position. If not specified on the appropriate standard sheet, the lamps under test shall be mounted either in a vertical or a horizontal burning position. They shall be mounted with their centres not less than 25 mm apart, and shall have a free circulation of air in a room temperature not exceeding 30 °C. The lamps shall maintain their respective burning positions for the entire test. In addition, for lamps from standard sheets 1, 2 and 3 the average loading of the test rack shall not exceed 0.16 W/cm² of face area.

4.4.2 Test voltage. The test voltage shall be the rated voltage unless otherwise specified on the appropriate standard sheet. The supply shall be alternating current at a frequency between 40 Hz and 60 Hz. Short fluctuations from the test voltage shall not exceed ± 1.0 %.

Where used (see note), an accelerated test voltage shall not exceed 110 % of the rated voltage. The following relationship shall be used to calculate the equivalent life under accelerated test conditions:

$$\begin{aligned} \text{Life at test voltage} &= \\ &= \text{life at rated voltage} \times \left(\frac{\text{rated voltage}}{\text{test voltage}} \right)^{13.5} \end{aligned}$$

NOTE For lamps with rated lives greater than 1 000 h accelerated life testing may be agreed between customer and supplier.

4.4.3 Test procedure. A record shall be kept of the total burning hours for each lamp. The ageing period referred to in 4.3.1 shall not be included as part of the life. The lamps shall be switched off twice daily during the life test for periods of not less than 15 min, such periods not being included as part of the life. The life test of individual lamps shall be deemed to have terminated if the total burning hours reach 160 % of the rated life, or its equivalent if accelerated testing is used and any lamp still operating shall be deemed to have a life equal to the total burning hours at termination.

4.4.4 Measurement during test. Where a lumen maintenance requirement is specified on the appropriate standard sheet, the lamps shall be measured for lumens at rated voltage when the total burning hours reach 75 ± 5 % of the rated life, or its equivalent if accelerated testing is used. Any lamp with a lumen maintenance less than the minimum average value specified on the appropriate standard sheet (excluding the case of zero lumen maintenance due to early failure) shall be deemed to have a life equal to 69 % of the rated life, or its equivalent if accelerated testing is used.

5 Conditions of compliance

5.1 General

A batch of lamps shall be deemed to comply with this standard only if the requirements specified in each of 5.2, 5.3 and 5.4 are satisfied.

5.2 Inspection tests

5.2.1 The number of lamps failing to comply with any one of 4.2.1 to 4.2.5 inclusive or with clause 3 shall not exceed two.

5.2.2 The cumulative number of lamps failing to comply with all of 4.2.1 to 4.2.5 inclusive and clause 3 shall not exceed four.

5.3 Rating tests

5.3.1 The average initial current of the test quantity shall not fall outside the tolerance shown on the appropriate standard sheet.

5.3.2 The average initial lumens of the test quantity shall not fall outside the tolerance shown on the appropriate standard sheet.

5.3.3 The coefficient of variation of lumens of the test quantity shall not exceed the maximum shown on the appropriate standard sheet (where required).

5.4 Life tests

5.4.1 The average life of the test quantity shall not be less than 90 % of the rated life shown on the appropriate standard sheet, or its equivalent if accelerated testing is used.

5.4.2 The average lumen maintenance of the test quantity, excluding any lamp which has zero lumen maintenance due to early failure, shall not be less than the minimum shown on the appropriate standard sheet.

5.4.3 The number of lamps having lives less than 70 % of the rated life shown on the appropriate standard sheet, or its equivalent if accelerated testing is used, including any lamp not complying with the lumen maintenance requirement referred to in 4.4.4, shall not exceed four.

Section 2. Standard lamp data sheets

Sheet No.	Title
1	Slide base lamps
2	Slide base lamps (special)
3	Slide base lamps (special)
4	38 mm round lamp
5	28 mm pigmy lamp
6	11 mm round lamp
7	5 mm tubular lamp
8	5 mm tubular lamp (special)
9	5 mm wire ended lamp
10	8 mm tubular lamp
11	10 mm tubular lamp
12	3 mm lamp
13	3 mm bi-pin lamp
14	6 mm bi-pin lamp
15	7 mm tubular special lamp