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Specification for Electric luminaires

Part 2. Detail requirements
Section 2.6 Electrical supply track systems
for luminaires

Spécification des luminaires électriques
Partie 2. Règles particulières
Section 2.6 Systèmes d'alimentation électriques par rail pour luminaires

Spezifikation für elektrische Leuchtkörper
Teil 2. Einzelschriften
Abschnitt 2.6 Leuchtengleitschienen mit Stromversorgung

National foreword

This British Standard has been prepared under the direction of the Electrical Illumination Standards Committee. It is identical with Publication 570 'Electrical supply track systems for luminaires' published by the International Electrotechnical Commission (IEC). In addition, a national appendix has been included which illustrates diagrammatically some of the definitions used in clause 2.

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This British Standard also implements Amendments Nos. 1 and 2 to IEC Publication 570 which were published in 1978 and 1982 respectively.

This standard supersedes BS 4533 'Electric luminaires (lighting fittings)' Part 2 'Detail requirements' Section 2.6 : 1972 'Luminaire track systems', which is therefore now withdrawn.

Terminology and conventions. The text of the international standard has been approved as suitable for publication, without deviation, as a British Standard. Some terminology and certain conventions are not identical with those used in British Standards; attention is especially drawn to the following.

The comma has been used in some figures as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

In tables I, II and VII the symbol 'Nm' has been used rather than the correct 'N m'.

References to 'local wiring rules' should be interpreted as being to the IEE Wiring Regulations.

Cross-references

International standard	Corresponding British Standard
IEC 162 : 1972, appendix F	BS 4533 Electric luminaires (lighting fittings) Part 1 General requirements and tests Section 1.15 : 1972 Screwless terminals (Related)
IEC 227 : 1967 (Code designation 227 IEC 53)	BS 6500 : 1975 Insulated flexible cords (table 16)*
IEC 245 : 1967 (Code designation 245 IEC 51)	BS 6500 : 1975 (table 4)*
IEC 245 : 1967 (Code designation 245 IEC 53)	BS 6500 : 1975 (table 6)*

*The colours of the cores of non-detachable flexible cables and cords are specified in the appropriate table of BS 6500 : 1975.

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British Standard Specification for

Electric luminaires

Part 2. Detail requirements

Section 2.6 Electrical supply track systems for luminaires

1. Scope

This standard applies to track systems with two or more poles and with provision for earthing (Class I), with a rated voltage not exceeding 440 V between poles (live conductors), rated frequency not exceeding 60 Hz and a rated current not exceeding 16 A per conductor for the connection of luminaires to the electrical supply.

It applies to track systems designed for ordinary interior use for mounting on, or flush with, or suspended from, walls and ceilings. These track systems are not intended for locations where special conditions prevail as in ships, vehicles and the like and in hazardous locations, for example, where explosions are liable to occur.

It is the responsibility of the user to ensure electrical, mechanical and thermal compatibility between the track system and luminaires attached to it.

Note. — Requirements for track systems other than Class I are under consideration.

2. Definitions

For the purpose of this standard the following definitions shall apply:

2.1 Luminaire track system

A system, including a track with conductors, by which luminaires may be easily connected to an electrical supply in a range of different positions determined only by the length and location of the track and comprising some or all of the components defined in Sub-clauses 2.2 to 2.6 below.

2.2 Track

A generally linear assembly of conductors within a housing, providing for the mechanical support and electrical connection of luminaires. Luminaires may be positioned or re-positioned along the length in a simple manner (e.g. without the use of tools).

2.3 Coupler

A component enabling electrical and/or mechanical connection to be made between tracks.

2.4 Connector

A component permitting the connection of a mains supply to the track and/or to luminaires from the track.

Note. — The functions of a coupler and a connector may be combined.

2.5 Adaptor

A component by which a luminaire may be electrically and mechanically connected to the track. This may incorporate a switch and/or a fuse.

2.6 *Suspension device*

2.6.1 *Track suspension device*

A component by which the track system may be mechanically connected to the supporting surface.

2.6.2 *Luminaire suspension device*

A component by which a luminaire may be mechanically connected to the track.

2.7 *Rated voltage*

The voltage assigned to the track or the component by the manufacturer.

Note. — Where the term voltage is used it implies the r.m.s. value unless otherwise specified.

2.8 *Rated current*

The current assigned to the track or the component by the manufacturer.

Note. — Where the term current is used, it implies the r.m.s. value unless otherwise specified.

2.9 *Live part*

A part through which current passes in normal use or any conducting part connected to such a current-carrying part, including a neutral conductor.

Note. — A test to determine whether or not a component is a live part which may cause an electric shock is given in Appendix A.

2.10 *Functional insulation (basic insulation)*

The insulation necessary for the proper functioning of the track or component and for basic protection against electric shock.

2.11 *Supplementary insulation (protective insulation)*

An independent insulation provided in addition to the functional insulation, in order to ensure protection against electric shock in the event of a failure of the functional insulation.

2.12 *Double insulation*

Insulation comprising both functional insulation and supplementary insulation.

2.13 *Reinforced insulation*

An improved functional insulation with such mechanical and electrical qualities that it provides the same degree of protection against electric shock as double insulation.

Note. — Definitions in Sub-clauses 2.9 to 2.13 are in line with those in IEC Publication 162, Luminaires for Tubular Fluorescent Lamps.

2.14 *Normal arm's reach*

2.5 m upwards and 1.25 m sideways and downwards from the floor.

Notes 1. — National wiring rules may require different values, and may allow exceptions for special locations.

2. — A stair well is an example of a situation where the downwards arm's reach may be applicable.



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2.15 *By hand*

Denotes that the operation does not require the use of a tool, coin or any other object.

3. **Classification**

Luminaire track systems shall be of Class I construction.

Note. — Requirements for track systems other than Class I are under consideration.

Luminaire track systems shall be classified according to their intended accessibility after mounting as:

- a) track systems intended for mounting within normal arm's reach;
- b) track systems not intended for mounting within normal arm's reach.

4. **General test requirements**

4.1 The requirements and tests of this standard shall not be applied to equipment already subject to its own separate specification(s).

4.2 Tests according to this specification are type tests.

One test sample as detailed in Sub-clause 4.3 shall be subjected to all relevant tests.

4.3 Unless otherwise specified, the sample is tested as delivered and under normal conditions of use, at an ambient temperature of between 10 °C and 30 °C.

The test sample shall include the following items:

- at least three sections of track, comprising a total length when assembled together of not less than 2.4 m;
- 1 mains supply connector;
- 1 end cover (if required);
- 1 coupler per length of track supplied (minimum of 3);
- 1 adaptor per length of track supplied (minimum of 3).

The necessary suspension devices as specified by the manufacturer in his installation instructions.

4.4 Unless otherwise specified, the tests are carried out in the order of the clauses.

5. **Marking**

Luminaire track systems shall be durably and legibly marked in accordance with the requirements of Sub-clauses 5.1 to 5.6.

5.1 The track shall be marked with the following:

- a) rated current (A);
- b) rated voltage (V);

- c) mark of origin (this may take the form of a trade mark, manufacturer's identification mark, or the name of the responsible vendor);
- d) type reference or catalogue number;
- e) maximum ambient temperature (t_a) if different from 25°C;
- f) where appropriate, a warning that the track is *not* intended for use within normal arm's reach.

- 5.2 Adaptors shall be marked with their rated current, rated voltage and the manufacturer's name or trade mark and type reference.

This does not apply to adaptors incorporated in luminaires.

If the adaptor has a fuse incorporated, the rated current and type of fuse shall be marked, either on the body of the adaptor or in the accompanying instructions for use.

- 5.3 Couplers and connectors need only be marked with the manufacturer's name or trade mark and type reference. This marking may be either on the body of the component, or on its package in the case of small items.
- 5.4 Marking of the rated current and the rated voltage of the track system shall be easily discernible when the track system is installed and ready for use.
- 5.5 Where necessary for safety or to ensure satisfactory operation, the neutral terminal shall be marked with the symbol N and the live terminal(s) clearly identified. The earthing terminal(s) shall be clearly indicated by the symbol $\perp$.
- 5.6 In addition to the above markings the following details, if they are necessary to ensure proper use and maintenance, shall be given either on the luminaire track system or in the manufacturer's instructions supplied with it.
- a) Rated frequency (Hz);
 - b) details of the maximum mechanical loading for which the track and luminaire suspension devices are suitable;
 - c) a warning if the components are unsuitable for the connection of inductive loads.
 - d) the maximum permissible track temperature under normal operating conditions if different from 70°C.

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5.7 Test of marking

The durability of the marking shall be checked by trying to remove it, by rubbing lightly for 15 s with a piece of cloth soaked with water and for a further 15 s with another piece of cloth soaked with petroleum spirit, and by inspection after the test detailed in Clause 15 has been completed. The marking shall be legible after the test.

- 5.8 Instructions for mounting the track shall be supplied with the track.

6. General requirements

The current rating for a track system shall be either 10 A or 16 A and current ratings for components shall be selected from the following values: 6 A, 10 A, 16 A.

Track systems shall be so designed and constructed that in normal use their performance is reliable and without danger to the user or surroundings.

In general, compliance is checked by carrying out all the tests specified.

7. Construction

7.1 Components shall be so designed that there is no risk of accidental contact between the earthing contact of the component and the current-carrying parts of the track during insertion and removal.

7.2 Adaptors shall incorporate provision for mechanical connection to the track so that the weight of the adaptor and/or luminaire is not supported by the electrical connections of the adaptor and track.

The requirements of Sub-clause 11.8 shall also apply.

7.2.1 Local wiring rules may require that adaptors shall not have a lower maximum current rating than the track system.

7.2.2 Local wiring rules may require fuses in adaptors. Where fitted, such fuses shall be of the high-breaking capacity type.

7.2.3 Adaptors for building into luminaires may be without provision for mechanical connection to the track. In such cases the luminaire shall have such a provision.

7.3 Contacts of adaptors shall not be removable without dismantling the adaptor. Also, it shall not be possible to replace the earthing pins or contacts in an incorrect position and this provision shall also apply to neutral pins or contacts where this is a safety requirement of the method of construction of the system.

7.4 Electrical connections shall be so designed that contact pressure is not transmitted through insulating material other than ceramic, pure mica or other material with characteristics no less suitable unless there is sufficient resiliency in the assembly to compensate for any possible shrinkage of the insulating material.

7.5 Couplers and connectors shall be capable of being mechanically locked to the track and shall ensure reliable electrical connection.

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7.6 Adjacent lengths of track shall be mechanically locked together in one of the following ways:

- with the aid of couplers;
- by other separate means using the couplers only to align the tracks;
- by rigidly fixing the lengths of track directly to the supporting surface, in which case the electrical contact shall be reliable when the ends of the track sections are separated longitudinally by 1 mm and when they are separated by 1 mm at right angles to the supporting surface.

Note. — A spacing at right angles to the supporting surface is specified in order to take account of unevenness of the surface.

Compliance shall be checked by carrying out the tests with the track in this position.

7.7 Insulating linings placed inside the metal end covers of the track in order to guarantee the insulation between the ends of the current conductors and accessible metal parts shall be rigidly fixed in such a manner that they will not become loose from the end covers during installation.

Compliance with the requirements of Sub-clauses 7.1 to 7.7 shall be checked by inspection.

- 7.8 Screwed connections, electrical or otherwise, the failure of which might cause the track system to become unsafe, shall withstand the mechanical stresses occurring in normal use. Screws in engagement with a thread of insulating material shall have a length of engagement of at least 3 mm plus one-third of the nominal screw diameter, except that this length need not exceed 8 mm. Correct insertion of the screw into the screw hole or nut shall be ensured.

Screws and nuts transmitting electrical contact pressure shall be of metal and shall engage with a metal thread.

Test

Compliance shall be checked by inspection and the connections shall be tightened and loosened five times. During the test, no damage impairing the further use of the screwed connections shall occur.

When testing terminal screws and nuts, a solid conductor of the largest cross-sectional area specified in Clause 12 is placed in the terminal. The conductor is moved each time the screw or nut is loosened. The test is made by means of a suitable test screwdriver, torque wrench or spanner, applying a torque as shown in Table II.

- 7.9 Current-carrying parts shall be of copper, an alloy containing at least 50% copper, or other metal no less resistant to corrosion than copper and having mechanical properties no less suitable.

This requirement does not apply to screws which do not essentially carry current such as terminal screws.

Test

Compliance shall be checked by inspection and, if necessary, by test.

8. Mechanical strength

- 8.1 Track and components including suspension devices shall have adequate mechanical strength and shall be so constructed as to withstand such rough handling as may be expected in normal use.

Compliance shall be checked by the tests of Sub-clauses 8.2 to 8.4 as appropriate.

- 8.2 Blows shall be applied to the sample by means of the spring-operated impact-test apparatus shown in Figure 1, page 48, or by other suitable means giving equivalent results.

Note. — Equivalent impact energies obtained by different methods do not necessarily give the same test result.

The apparatus consists of three main parts, the body, the striking element and the spring-loaded release cone.

The body comprises the housing, the striking element guide, the release mechanism and all parts rigidly fixed thereto. The mass of this assembly shall be 1.25 kg.

The striking element comprises the hammer head, the hammer shaft and the cocking knob. The mass of this assembly shall be 0.25 kg.

The hammer head shall have a hemispherical face of polyamide having a Rockwell hardness of R 100, with a radius of 10 mm; it shall be fixed to the hammer shaft in such a way that the distance from its tip to the plane of the front of the cone when the striking element is on the point of release, is equal to the value shown for the compression in Table I.

The cone shall have a mass of 0.06 kg and the cone spring shall be such that it exerts a force of 20 N when the release jaws are on the point of releasing the striking element.

The hammer spring shall be such that the product of the compression, in millimetres, and the force exerted, in newtons, equals 1000, the compression being approximately 20 mm. The spring shall be adjustable so as to cause the hammer to strike with an impact energy and spring compression as shown in Table I.

TABLE I
Impact energy and spring compression

Part to be tested	Impact energy (Nm)	Compression (mm)
Track systems designed for use outside normal arm's reach	0.35	17
Track systems designed for use within normal arm's reach	0.50	20

The release mechanism springs shall be adjusted so that they exert just sufficient pressure to keep the release jaws in the engaged position.

The apparatus is cocked by pulling the cocking knob back until the release jaws engage with the groove in the hammer shaft.

The blows shall be applied by pushing the release cone against the sample in a direction perpendicular to the surface at the point to be tested.

The pressure shall be slowly increased so that the cone moves back until it is in contact with the release bars, which then move to operate the release mechanism and allow the hammer to strike.

The sample is mounted or supported as in normal use on a rigid wooden board, cable entries being left open, knockouts opened, and cover-fixing and similar screws tightened with a torque equal to two thirds of that specified in Table II.

Three blows are applied to every point that is likely to be weak, paying special regard to insulating material enclosing live parts and to bushings of insulating material, if any.

After the test, the sample shall show no damage within the meaning of this specification.

In particular, cracks shall not have become visible to the naked eye, and the effectiveness of insulating linings and barriers shall not have been impaired. It shall be possible to remove and to replace external covers without these covers or their insulating lining breaking. Breakage of an enclosure is, however, allowed if it is backed by an inner cover which will withstand the test after removal of the enclosure.

Damage to the finish, small dents which do not reduce creepage distances or clearances below the values specified in Clause 10 and small chips which do not adversely affect the protection against electric shock are neglected.

TABLE II
Torque tests on screws

Nominal diameter of screw (mm)	Torque (Nm)	
	I	II
Up to and including 2.8	0.2	0.4
Over 2.8 up to and including 3.0	0.25	0.5
Over 3.0 up to and including 3.2	0.3	0.6
Over 3.2 up to and including 3.6	0.4	0.8
Over 3.6 up to and including 4.1	0.7	1.2
Over 4.1 up to and including 4.7	0.8	1.8
Over 4.7 up to and including 5.3	0.8	2.0
Over 5.3 up to and including 6.0	—	2.5

Column I of the table applies to screws without heads if the screws when tightened do not protrude from the hole.

Column II applies to other screws and nuts.

- 8.3 A force of 30 N is applied to metal parts enclosing live parts by means of a test finger having a tip as shown in Figure 2, page 48. During the test, the clearance distance between metal parts and live parts shall be not less than the values in Clause 10.

- 8.4 Compliance for track, suspension devices and adaptors is checked by the following test:

To test the suspension of both track and luminaires, suspension devices for luminaires, including adaptors, are mounted on the track as in normal use and are subjected for 1 h to a load equal to five times the specified load as claimed by the manufacturer, with a minimum value of 50 N. This test shall be made at a temperature of $(t_a + 15) ^\circ\text{C}$.

After the test, the components, the track and its fixing devices shall not be deformed to such an extent as would impair safety and the components shall not have become detached from the track.

For the purpose of the following bending test, which is an additional test of luminaire suspension devices, the track is mounted on a horizontal surface.

A bending moment of 2.5 Nm is then applied to the luminaire suspension device, the force being exerted for 1 min in a direction parallel to the track axis and for 1 min in a direction perpendicular to this axis.

After the test, the luminaire suspension device and other parts of the track system shall not be deformed to such an extent as would impair safety and the suspension device shall not have become loose.

Note. — Additional tests may be required for track systems designed for use in low temperature areas.

9. Polarity

Where necessary for the correct operation of the system, means shall be provided throughout to ensure that the correct polarity is maintained.

Compliance is checked by inspection.

10. Creepage distances and clearances

Creepage distances and clearances shall not be less than the values specified in Table III.