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FOREWORD

This standard (part 1) specifies the general and safety requirements for d.c. or a.c. supplied electronic control gear for LED modules for supply voltages up to and including 250 V d.c. and a.c. supplies up to and including 1 000 V at 50 Hz.

The performance requirements have been covered in a separate standard (under preparation)

- a) IS xxxxx (Doc: ET 23(5717) consists of the following parts, under the general title 'Lamp control gear' :
- b) IS xxxxx (Doc: ET 23(5717) Part 1: General and safety requirements
- c) IS xxxxx (Doc: ET 23(5718) Part 2 Particular requirements, Sec 1 Starting devices (other than glow starters)
- d) IS xxxxx (Doc: ET 23(5719) Part 2 Particular requirements, Sec 3 a.c. supplied electronic ballasts for fluorescent lamps
- e) IS xxxxx (Doc: ET 23(5720) Part 2 Particular requirements, Sec 8 Ballasts for fluorescent lamps
- f) IS xxxxx (Doc: ET 23(5721) Part 2 Particular requirements, Sec 9 Ballasts for discharge lamps (excluding fluorescent lamps)

This standard, and the parts which make up IS xxxxx (Part 2), in referring to any of the clauses of IS xxxxx (Part 1) specify the extent to which such a clause is applicable and the order in which the tests are to be performed; they also include additional requirements as necessary. All parts which make up IS xxxxx (Part 2) are self-contained and therefore do not include references to each other.

Where the requirements of any of the clauses of IS xxxxx (Part 1) are referred to in this standard by the phrase "The requirements of Clause 'x' of IS xxxxx (Part 1) apply", this phrase is interpreted as meaning that all requirements of the clause in question of Part 1 apply, except any which are clearly inapplicable to the specific type of lamp control gear covered by this particular part of IS xxxxx (Part 2).

This standard is based on IEC 61347-2-13, Ed 1 2006-05 and Document IEC 34C/901A/DC 'd.c. or a.c. supplied electronic control gear for LED modules' issued by the International Electrotechnical Commission (IEC).

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated expressing the result of a test, shall be rounded off in accordance with IS 2: 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

LAMP CONTROL GEAR

Part 2 Particular Requirements

Section 13 d.c. or a.c. supplied electronic control gear for LED modules

1 SCOPE

This standard (Part 2/Sec 13) of IS xxxxx (Part 1) specifies particular safety requirements for electronic control gear for use on d.c. supplies up to and including 250 V and a.c. supplies up to and including 1 000 V at 50 Hz and at an output frequency which can deviate from the supply frequency, associated with LED modules.

Control gear for LED modules specified in this standard are designed to provide constant voltage or current at SELV or higher voltages. Deviations from the pure voltage and current types do not exclude the gear from this standard.

The Annexes of Doc: ET 23 (5717) which are applicable according to this part and section and using the word “lamp” are understood to also comprise LED modules.

Particular requirements for SELV control gears are given in Annex I.

Performance requirements will be covered by a separate standard (under preparation).

Plug-in control gear, being part of the luminaire, are covered as for built-in control gear by the additional requirements of the luminaire standard.

2 REFERENCES

The following Indian standards are necessary adjunct to this standard.

<i>IS No.</i>	<i>Title</i>
2500 (Part 1): 2000	Sampling procedures for inspection by attributes: Part 1 Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
Doc: ET 23 (5717) (under print)	Safety of lamp controlgear: Part 1 General requirements
Doc: ET 16 (5802) (under print)	Safety of power transformers, power supply units and similar: Part 1: General requirements and tests
IS 61558(Part 2/Sec 6) :1997	Safety of power Transformers, power

supply units and similar: Part 2 particular requirements, Section 6 Safety Isolating transformers for general use

3 TERMINOLOGY

For the purpose of this standard, the definitions of **3** of Part 1 of this standard shall apply, together with the following.

3.1 Electronic Controlgear for LED Modules

Unit inserted between the supply and one or more LED modules which serves to supply the LED module(s) with its (their) rated voltage or rated current. The unit may consist of one or more separate components and may include means for dimming, correcting the power factor and suppressing radio interference.

3.2 d.c. or a.c. Supplied Controlgear

Controlgear that includes stabilizing elements for operating one or more LED module(s).

3.3 SELV Controlgear

Controlgear providing a SELV output isolated from the supply mains by means such as a safety isolating transformer, as specified in IS 16558 (Part 2/Sec 6).

3.4 Associated Controlgear

Controlgear designed to supply specific appliance(s) or equipment, incorporated or not incorporated.

NOTE- An example of an associated control gear is an electronic control gear within an emergency unit where it is assigned in a one-to-one relation to battery driven ballast.

3.5 Plug-In Controlgear

Controlgear incorporated in an enclosure provided with an integral plug as the means of connection of the electrical supply

3.6 Rated Output Voltage for Constant Voltage Controlgear

Output voltage, at rated supply voltage, rated frequency and at rated output power, assigned to the control gear.

3.7 Rated Output Current for Constant Current Controlgear

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Output current, at rated supply voltage, rated frequency and at rated output power, assigned to the control gear.

3.8 Light Emitting Diode (LED)

Solid state device embodying a p-n junction, emitting optical radiation when excited by an electric current.

NOTE- This definition is independent from the existence of enclosure(s) and of terminals.

3.9 LED Module

Unit supplied as a light source. In addition to one or more LEDs it may contain further components, e.g. optical, electrical, mechanical and/or electronic.

3.10 Maximum Output Voltage

Maximum voltage which can occur between the output terminals for constant current controlgear in any load condition.

3.11 Acceptance Test

Tests carried out on samples taken from a lot for the acceptance of the lot.

4 GENERAL REQUIREMENTS

The requirements of **4** of Doc: ET 23 (5717) shall apply, together with the following additional requirements.

Controlgears providing SELV shall comply with the requirements of Annex I. This includes insulation resistance, electric strength, creepage distances and clearance between primary and secondary circuits.

Controlgear which are not of the pure voltage and current types are tested according to the requirements of either a voltage source or a current source, whichever comes closer to the electrical behaviour of the controlgear.

5 GENERAL NOTES ON TESTS

The requirements of **5** of Doc: ET 23 (5717) shall apply, with the following additional requirement.

The following number of specimens shall be submitted for testing:

- a) one unit for the tests of **6 to 12** and **15 to 21**;

- b) one unit for the tests of **14** (additional units or components, where necessary, may be required in consultation with the manufacturer).

6 CLASSIFICATION

Control gears are classified according to the method of installation given in **6** of Doc: ET 23 (5717) and according to:

- a) protection against electric shock;
- b) auto-wound control gear;
- c) separating control gears
- d) isolating control gears
- e) SELV control gears

7 MARKING

7.1 Mandatory Marking

Control gears, other than integral control gear, shall be clearly and durably marked, in accordance with the requirements of **7.2** of Doc: ET 23 (5717), with the following mandatory markings:

- a) items a), b), c), d), e), f), k), l), m) and t) of **7.1** of Doc: ET 23 (5717) together with
- b) for constant voltage types: rated output voltage;
- c) for constant current types: rated output current ;
- d) if applicable: an indication that the control gear is suitable for operation with LED modules only.

7.2 Information to be provided if applicable

In addition to the above mandatory markings, the following information, if applicable, shall be given either on the control gear, or be made available in the manufacturer's catalogue or similar.

- a) items h), i), and j) and s) of **7.1** of Doc: ET 23 (5717) together with
- b) mention whether the control gear has mains-connected windings,

7.3 BIS Certification Marking

The controlgear may also be marked with the Standard Mark.

7.3.1 The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made there under. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

8 PROTECTION AGAINST ACCIDENTAL CONTACT WITH LIVE PARTS

The requirements of **10** of Doc: ET 23 (5717) shall apply.

9 TERMINALS

The requirements of **8** of Doc: ET 23 (5717) shall apply.

10 PROVISIONS FOR PROTECTIVE EARTHING

The requirements of **9** of Doc: ET 23 (5717) shall apply.

11 MOISTURE RESISTANCE AND INSULATION

The requirements of **11** of Doc: ET 23 (5717) shall apply.

12 ELECTRIC STRENGTH

The requirements of **12** of Doc: ET 23 (5717) shall apply.

13 THERMAL ENDURANCE TEST FOR WINDINGS OF BALLASTS

The requirements of **13** of Doc: ET 23 (5717) is not applicable.

14 FAULT CONDITIONS

The requirements of **14** of Doc: ET 23 (5717) shall apply, together with the following additional requirements.

In the case of control gear provided with the marking, the requirements specified in Annex C shall be fulfilled.

15 TRANSFORMER HEATING

SELV, isolating and separating control gears shall be tested according to **L.6** and **L.7** of Doc: ET 23 (5717), where the requirements for control gears providing SELV are valid also for separating and isolating control gears.

For SELV control gears, the output voltage shall not exceed the limits given in clause **10.4** of Doc: ET 23 (5717), during the tests of **15.1** and **15.2** of this standard.

15.1 Normal Operation

The requirements of **L.6** of Doc: ET 23 (5717) shall apply, together with the following additional requirement.

For built-in and integral control gears tests shall be made under conditions such that the convertors is brought to t_c , as reached under normal operation at rated supply voltage.

15.2 Abnormal Operation

The requirements of **L.7** of Doc: ET 23 (5717) shall apply. In addition the following test at any voltage between 90 percent and 110 percent of the rated supply voltage shall be performed if relevant, with the control gear operating according to the manufacturer's instructions (including heatsinks, if specified) for 1 h.

Connect double the LED modules or equivalent load for which the control gear is designed.

- a) in parallel to the output terminals, for constant voltage output types
- b) in series to the output terminals, for the constant current output types

During and at the end of the tests specified above, the control gear shall show no defect impairing safety, nor shall any smoke or flammable gases be produced.

16 CONSTRUCTION

The requirements of **15** of Doc: ET 23 (5717) shall apply.

17 CREEPAGE DISTANCES AND CLEARANCES

Unless otherwise specified in **14** the requirements of **16** of Doc: ET 23 (5717) shall apply.

18 SCREWS, CURRENT-CARRYING PARTS AND CONNECTIONS

The requirements of **17** of Doc: ET 23 (5717) shall apply.

19 RESISTANCE TO HEAT, FIRE AND TRACKING

The requirements of **18** of Doc: ET 23 (5717) shall apply.

20 RESISTANCE TO CORROSION

The requirements of **19** of Doc: ET 23 (5717) shall apply.

17 TESTS

17.1 Classification of Tests

17.1.1 Type Tests

The following shall constitute the type tests to be carried out on selected sample of controlgear, sample being drawn preferably from regular production lot:

- a) Marking (*see 7*),
- b) Protection against accidental contact with live parts (*see 8*),
- c) Terminals (*see 9*),
- d) Provisions for protective earthing (*see 10*),
- e) Moisture resistance (*see 11*)
- f) electric strength (*see 12*),
- g) Thermal endurance test for windings of ballasts (*see 13*),
- h) Fault conditions (*see 14*),
- i) Transformer heating (*see 15*),
- j) Construction (*see 16*),
- k) Creepage distances and clearances (*see 17*),
- l) Screws, current-carrying parts and connections (*see 18*),
- m) Resistance to heat, fire and tracking (*see 19*),
- n) Resistance to corrosion (*see 20*)

17.2 Acceptance Test

The sampling plan for acceptance tests shall be as specified in IS 2500 (Part 1). The following shall constitute as acceptance tests:

- a) Marking (*see 7*),
- b) Protection against accidental contact with live parts (*see 8*),
- c) Terminals (*see 9*),
- d) Provisions for protective earthing (*see 10*),
- e) Moisture resistance (*see 11*)
- f) electric strength (*see 12*),
- g) Fault conditions (*see 14*),
- h) Transformer heating (*see 15*),

ANNEX A

Test to establish whether a conductive part is a live part which may cause an electric shock

The requirements of Annex A of Doc: ET 23 (5717) shall apply.

ANNEX B

Particular requirements for thermally protected lamp control gear

The requirements of Annex B of Doc: ET 23 (5717) is not applicable.

ANNEX C

Particular requirements for electronic lamp control gear with means of protection against overheating

The requirements of Annex C of Doc: ET 23 (5717) shall apply.

ANNEX D

Requirements for carrying out the heating tests of thermally protected lamp control gear

The requirements of Annex D of Doc: ET 23 (5717) shall apply.

ANNEX E

Use of constant S other than 4 500 in t_w tests

The requirements of Annex E of Doc: ET 23 (5717) shall apply.

ANNEX F

DRAUGHT-PROOF ENCLOSURE

The requirements of Annex F of ET 23 (5717) shall apply.

ANNEX G

EXPLANATION OF THE DERIVATION OF THE VALUES OF PULSE VOLTAGES

The requirements of Annex G of ET 23 (5717) are not applicable.

ANNEX H

TESTS

The requirements of Annex H of ET 23 (5717) shall apply.

ANNEX I
PARTICULAR ADDITIONAL REQUIREMENTS FOR SELV D.C. OR A.C.
SUPPLIED ELECTRONIC CONTROL GEARS FOR LED MODULES

Delete completely current Annex I and substitute with the following:

The requirements of Annex L in Doc: ET 23 (5717) shall apply.
