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Australian Standard 3168—1983

APPROVAL AND TEST SPECIFICATION FOR FLUORESCENT LAMP BALLASTS

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The following interests are represented on Committee LG/3:

Australian Electrical and Electronic Manufacturers Association
Association of Consulting Engineers Australia
Confederation of Australian Industry
Department of Public Works, N.S.W.
Department of Transport and Construction
Electrical Apparatus Approvals Authorities
Electronic Importers Association
Electricity Supply Association of Australia
Illuminating Engineering Societies of Australia
Public Works Department, Vic.
Railways of Australia Committee
Telecom Australia

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PREFACE

This standard was prepared by the Association's Committee on Auxiliaries for Discharge Lamps.

It is one of a series of approval and test specifications issued by the Association. These specifications are accompanied by a general specification AS 3100, containing definitions and general requirements for electrical materials and equipment. The purpose of these specifications is to outline conditions which must be met to secure approval for the sale and use of electrical equipment in Australia. Only safety matters and related conditions are covered.

It prescribes safety requirements for ballasts designed for use with tubular fluorescent lamps having characteristics specified in AS 1201. Complete ballasts and their component parts such as reactors, transformers and capacitors (having a nominal capacitance of not more than 0.1 μF) essential to the functioning of ballasts in fluorescent lamp circuits are within the scope of this standard.

Requirements for the characteristics of ballasts essential to proper lamp operation and satisfactory operation of ballasts in fluorescent lamp circuits are not included herein, but are covered by AS 2643, Fluorescent Lamp Ballasts—Performance Requirements.

This standard, other than in editorial presentation, closely follows the fourth edition of IEC 82, Ballasts for Tubular Fluorescent Lamps; however, some of the requirements of that publication have been modified to take account of local conditions. These modifications include the addition of a test to determine the ignitability and combustion propagation of solid insulating materials and non-metallic enclosures, the mandatory marking of the rated maximum operating temperature of a ballast winding (t_w), and the requirement that capacitors in excess of 0.1 μF must comply with the relevant requirements of AS 2644, Capacitors for Use in Discharge Lamp Circuits.

This standard introduces two concepts relative to the thermal characteristics of windings. It refers firstly to the rated maximum operating temperature of the winding (symbol t_w) which cannot be exceeded to ensure a sufficient length of life for the ballast, and secondly, to the rated temperature rise of a winding (symbol Δt) which cannot be exceeded during a test made under specified conditions. These two concepts allow a better appreciation of the possibilities of using a ballast in the thermal environment in which it may be exposed, in particular when the ballast is incorporated in a luminaire.

For checking the maximum rated operating temperature t_w, an endurance test period of 30 days as the standard method and, at the manufacturer's choice, an optional endurance test period of 60 days, are specified. Values for theoretical test temperatures, as well as the limiting temperatures under abnormal conditions, are also given.

With reference to the equation of Appendix D concerning the endurance tests, this standard introduces the use of constants S other than 4500 in t_w tests. If a claim is not made to the contrary, the endurance testing of ballasts is based on the constant S given in the equation, having a value of 4500; however a manufacturer may claim the use of other values if this can be justified by either of the tests specified. A limited number of standardized values for S have been adopted, because it is necessary to list the values for theoretical test temperatures, as well as the limiting temperatures under abnormal conditions, for each value of S.

It should be noted that the fourth edition of IEC 82 did not distinguish between performance and safety requirements. However, this standard includes only those requirements of IEC 82 which were considered to be 'safety criteria'.

This standard supersedes AS C168—1970, two years after the date of publication.

During the two-year period before withdrawal of AS C168, while the two standards are concurrent for the same ballast, it is expected that regulatory authorities will approve ballasts to either standard, and that the tests of Clauses 20.17 and 20.18 of this standard will also be conducted on a ballast submitted for testing to AS C168—1970.

The Association desires to call attention to the fact that this standard does not purport to include all the necessary provisions of a contract.

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STANDARDS ASSOCIATION OF AUSTRALIA
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AMENDMENT No 1
to
AS 3168—1983
Approval and Test Specification for
FLUORESCENT LAMP BALLASTS

REVISED TEXT

The 1983 edition of AS 3168 is amended as follows; the amendments should be inserted in the appropriate place.

SUMMARY: The following sections of this standard are covered by this amendment: Clauses 11.1, 11.2, 13, 19, 20.5, 20.9, 20.9.2, 20.13, 20.16 and 20.17, Figs. 1 and 4 and Table 2.

Published on 10 May 1985.

Page 8. Clause 11.1.

Add 'safety' prior to 'requirements' in the third line.

This amendment forms part of the specification on publication.

Page 8. Clause 11.2.

Delete the Note.

This amendment forms part of the specification on publication.

Page 8. Clause 13.

Delete this Clause.

This amendment forms part of the specification on publication.

Page 8. Clause 19.

Delete 'is operated with a reference lamp' and *insert* 'is tested in accordance with Clause 20.9.2'.

This amendment forms part of the specification on publication.

Page 9. Table 2.

Delete the existing title of the Description of Test for: Test No. 4 and *insert* 'Capacitive Current'; Test No. 9 and *insert* 'Supply Current and Waveform'; *Delete* Test No. 13.

This amendment forms part of the specification on publication.

Page 10. Clause 20.5.

Delete the existing clause and insert the following:

20.5 Capacitive Current. Where a capacitor is connected between live parts and exposed metal parts of the ballast, the measurement of the insulation resistance between these parts shall be replaced by a measurement of the current in accordance with Fig. 1. The ballast shall be connected to a voltage equal to 110 percent of the rated supply voltage at nominal frequency.

The current shall be measured between each pole of the supply source and the exposed metal parts, with and without lamps. The resistance of the measuring circuit shall be $2000 \pm 50\ \Omega$.

The current so measured shall not exceed 0.5 mA.

This amendment forms part of the specification on publication.

Page 10. Fig. 1.

Delete 'Leakage' in title and insert 'Capacitive'.

This amendment forms part of the specification on publication.

Page 10. Clause 20.9.

Delete existing title and insert 'Supply Current and Waveform'.

This amendment forms part of the specification on publication.

Page 11. Clause 20.9.2. AMDT No 1 MAY 1985

Delete the existing clause and add the following new clause:

20.9.2 *Supply current.* The ballast shall be operated at rated voltage with a reference lamp. The supply current so measured, shall comply with Clause 19.

This amendment forms part of the specification on publication.

Page 13. Clause 20.13 AMDT No 1 MAY 1985

Delete the clause and associated Fig. 4.

This amendment forms part of the specification on publication.

Page 17. Clause 20.16. AMDT No 1 MAY 1985

Add the following new Note immediately after the title:

NOTE: As the thermal endurance test confirms the t_w rating of an insulation system, it should not be necessary to repeat this test on ballasts of the same manufacturer with similar construction and identical insulants.

This amendment forms part of the specification on publication.

Page 17 Clause 20.17. AMDT No 1 MAY 1985

Replace with attached:

Delete all existing text, and insert the following:

20.17 Determination of ignitability and combustion propagation.

20.17.1 *General.* The tests are made on one specimen. If a failure occurs, the test is repeated on two further specimens, both of which shall pass the test.

20.17.2 *Resistance to heat of insulating material retaining live parts in position.* Parts of insulating material retaining live parts in position shall be subjected to the glow wire test at a temperature of 650 °C for 30 s as specified in AS 2420 and the results determined in accordance with the provisions of Clause 2.2.3 thereof.

In addition, parts of insulating material retaining terminals for external conductors shall be subjected to the glow wire test at a temperature of 850 °C for 30 s as specified in AS 2420 and the results determined in accordance with the provisions of Clause 2.2.3 thereof.

NOTE: The bad connection test of AS 2420 is under consideration as an alternative to this requirement.

20.17.3 *Resistance to heat of external parts of insulating material.* External accessible parts of insulating material shall be subjected to the glow wire test at a temperature of 650 °C for 30 s as specified in AS 2420 and the results determined in accordance with the provisions of Clause 2.2.3 thereof.

This amendment forms part of the specification on publication.

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
APPROVAL AND TEST SPECIFICATION
FOR
FLUORESCENT LAMP BALLASTS

This specification shall be read in conjunction with AS 3100. (See also Clause 3, below.)

1 SCOPE AND REFERENCED DOCUMENTS.

1.1 Scope. This specification prescribes safety requirements for ballasts designed for use on a.c. supplies at 50 Hz, associated with tubular fluorescent lamps operated with or without a starter switch and having rated wattages, dimensions and characteristics as specified in AS 1201. It applies to complete ballasts and to their component parts such as reactors, transformers and capacitors having a capacitance of not more than 0.1 μF, which are incorporated in the ballasts or supplied as separate elements essential to the functioning of ballasts in fluorescent lamp circuits.

It does not apply to the following:

(a) Ballasts designed for use with cold-cathode fluorescent lamps, requirements for which are specified in AS 3143.

(b) Capacitors which are incorporated in starters.

(c) Ballasts of the resistance type.

NOTES:

1. It is emphasized that only safety matters and conditions closely allied thereto are specified herein. Attention is drawn to AS 2643 which contains requirements intended to ensure the satisfactory performance of ballasts in fluorescent lamp circuits.
2. Attention is drawn to Clause 11, which specifies requirements for capacitors having a capacitance greater than 0.1 μF, and used in tubular fluorescent lamp circuits.

1.2 Referenced Documents. The following standards are referred to in this specification:

AS 1201	Tubular Fluorescent Lamps for General Lighting Service Part 1—Test and Compliance Requirements Part 2—Lamp Data Sheet
AS 1931	High Voltage Testing Techniques Part 1—General Definitions, Test Requirements, Test Procedures and Measuring Devices
AS 3100	Approval and Test Specification for Definitions and General Requirements for Electrical Materials and Equipment
AS 3143	Approval and Test Specification for Transformers for Cold-cathode Electrical Discharge Lamps and Lighting Systems
AS 3145	Approval and Test Specification for Radio Interference Suppression Devices
AS 3191	Approval and Test Specification for Electric Flexible Cords
AS 2643	Fluorescent Lamp Ballasts—Performance Requirements
AS 2644	Capacitors for Use in Discharge Lamp Circuits
IEC 216	Guide for the Determination of Thermal Endurance Properties of Electrical Insulating Materials
✓IEEE 101 (1972)	Report on Guide for Statistical Analysis of Test Data

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2 DEFINITIONS.

For the purpose of this specification, the following definitions, in addition to those listed in AS 1201, apply:

2.1 Ballast—a unit inserted between the supply and one or more discharge lamps, which by means of inductance, capacitance or a combination of inductance and capacitance serves mainly to limit the current of the lamp(s) to the required value.

It may also include means for transforming from the supply voltage and arrangements which help to provide starting voltage and preheating current, prevent cold starting, reduce stroboscopic effect, correct the power-factor and/or suppress radio interference.

2.2 Independent ballast—a ballast, which can be mounted separately outside a luminaire, without any additional enclosure.

2.3 Built-in ballast—a ballast, consisting of one or more separate units, exclusively designed to be built into a luminaire, a box, an enclosure or the like.

2.4 Reference ballast—a special inductive-type ballast designed for the purpose of providing comparison standards for use in testing ballasts, and for the selection of reference lamps. It is essentially characterized by a stable voltage-to-current ratio, which is relatively uninfluenced by variations in current, temperature and the magnetic surroundings, as outlined in Appendix B of AS 2643.

2.5 Reference lamp—a lamp selected for testing ballasts which, when associated with a reference ballast under the conditions specified in Appendices B and C of AS 2643, has electrical characteristics which are close to the values given in AS 1201 within the limits defined in Appendix C of AS 2643.

2.6 Thermal test lamp—a lamp selected primarily for testing the thermal characteristics of ballasts. This lamp, when operated under specified conditions in association with a reference ballast of appropriate rating, has a running current not deviating by more than 2.5 percent from the current a reference lamp would pass.