

# Australian/New Zealand Standard™

## Approval and test specification— General requirements for electrical equipment



## **AS/NZS 3100:2002**

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-002, Safety of Household and Similar Electrical Appliances and Small Power Transformers. It was approved on behalf of the Council of Standards Australia on 7 May 2002 and on behalf of the Council of Standards New Zealand on 21 March 2002.

This Standard was published on 13 May 2002.

---

The following are represented on Committee EL-002:

Association of Certification Bodies  
Australian Chamber of Commerce and Industry  
Australian Electrical and Electronic Manufacturers Association  
Canterbury Manufacturers Association New Zealand  
Consumer Electronic Suppliers Association, Australia  
Electrical Regulatory Authorities, Australia  
Electrical Test Laboratories  
Electrical Consultants  
Electricity Supply Association of Australia  
Institution of Engineers Australia  
Metal trade Industries Association of Australia  
Ministry of Consumer Affairs, New Zealand

---

### **Keeping Standards up-to-date**

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about joint Australian/New Zealand Standards can be found by visiting the Standards Web Shop at [www.standards.com.au](http://www.standards.com.au) or Standards New Zealand web site at [www.standards.co.nz](http://www.standards.co.nz) and looking up the relevant Standard in the on-line catalogue.

Alternatively, both organizations publish an annual printed Catalogue with full details of all current Standards. For more frequent listings or notification of revisions, amendments and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national Standards organization.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to the Chief Executive of either Standards Australia or Standards New Zealand at the address shown on the back cover.

---

*This Standard was issued in draft form for comment as DR 01968.*

---

## Australian/New Zealand Standard™

# Approval and test specification— General requirements for electrical equipment

Originated in Australia as C 100—1937.  
Final Australian edition AS 3100—1994.  
Originated in New Zealand as NZSS 1300:1965.  
Final New Zealand edition NZS 6200:1988.  
Jointly revised and designated AS/NZS 3100:1997.  
Second edition AS/NZS 3100:2002.  
Reissued incorporating Amendment No. 1 (November 2003).  
Reissued incorporating Amendment No. 2 (July 2004).  
Reissued incorporating Amendment No. 3 (November 2005).

### COPYRIGHT

© Standards Australia/Standards New Zealand

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Jointly published by Standards Australia, GPO Box 476, Sydney, NSW 2001 and Standards New Zealand, Private Bag 2439, Wellington 6020

ISBN 0 7337 4630 6

## CONTENTS

	Page
PREFACE .....	5
SECTION 1: SCOPE, APPLICATION AND REFERENCED DOCUMENTS .....	6
1.1 Scope.....	6
1.2 Application .....	6
1.3 Referenced documents .....	6
SECTION 2: DEFINITIONS .....	8
2.1 General.....	8
SECTION 3: DESIGN AND CONSTRUCTION .....	16
3.1 General.....	16
3.2 Equipment to be suitable for conditions of use.....	17
3.3 Selection of materials and parts .....	17
3.4 Selection of components.....	17
3.5 Workmanship .....	17
3.6 Fuses.....	17
3.7 Identification of wiring.....	18
3.8 Regulating devices and switches.....	18
3.9 Socket-outlets .....	20
3.10 Equipment intended to be supported by contacts of socket-outlets.....	20
3.11 Static charge in equipment.....	20
3.12 Control methods .....	20
3.13 Stability.....	21
3.14 Equipment connected to supply by a plug.....	21
SECTION 4: PROTECTION AGAINST MECHANICAL AND ELECTRICAL FAILURE.....	21
4.1 Prevention of short-circuit and arcing .....	21
4.2 Mechanical protection of conductors and cables .....	26
4.3 Terminals and connecting facilities for supply conductors .....	26
4.4 Flexible cord and connecting plug .....	30
4.5 Supply connection and external flexible cables and cords.....	32
4.6 Joints and connections .....	34
4.7 Strength of screw threads and fixings.....	35
4.8 Space-threaded and thread-cutting screws.....	35
4.9 Direct connection to fixed wiring .....	36
4.10 Mechanical strength.....	36
4.11 Degree of protection (IP classification).....	36
SECTION 5: PROTECTION AGAINST RISK OF ELECTRIC SHOCK.....	36
5.1 Guarding of live parts .....	36
5.2 Insulation of live parts.....	37
5.3 Earthing facilities.....	39
5.4 Equipment with double insulation .....	40
5.5 Extra-low voltage equipment .....	42
5.6 Switches in portable heating appliances .....	43
5.7 Temperature rises for components and insulating material.....	43

5.8	Fault-indicating devices .....	47
5.9	Fixing of handles, knobs, or the like .....	47
SECTION 6: RESISTANCE TO HEAT, FIRE AND TRACKING .....		47
6.1	General .....	47
6.2	Resistance to heat .....	47
6.3	Resistance to fire .....	48
6.4	Resistance to tracking .....	48
SECTION 7: MARKING .....		48
7.1	Information to be marked .....	48
7.2	Method of marking .....	49
7.3	Double marking .....	50
7.4	Marking of earth connections .....	50
7.5	Marking of class II equipment .....	50
7.6	Marking of live supply connections .....	51
7.7	Additional marking of multi-rated equipment .....	51
7.8	Equipment with type X, type Y and type Z attachments .....	51
7.9	Legibility of marking .....	51
7.10	Instructions for installation and use .....	51
SECTION 8: TESTS .....		51
8.1	General .....	51
8.2	Void .....	53
8.3	Insulation resistance and leakage current .....	53
8.4	High voltage (electric strength) test .....	54
8.5	Test of earthing connection .....	60
8.6	Cord anchorage .....	60
8.7	Test for screw threads and fixings (See Clause 4.7) .....	61
8.8	Mechanical strength test .....	63
8.9	Standard electrodes for electric strength tests .....	65
8.10	Standard test finger and protective impedance .....	65
8.11	Temperature measurements .....	68
8.12	Temperature and fire risk test .....	69
8.13	Test of marking .....	71
8.14	Stability test .....	71
8.15	Abnormal operation .....	72
Annex A (Normative) Requirements from the 1994 edition .....		77
Annex B (Normative) Tests of resistance to heat, fire and tracking .....		82
Annex C (Normative) Measurement of creepage distances and clearances .....		88
Annex D (Informative) Information on the safety principles of the design and testing of electrical equipment including insulation- encased and metal-encased class II construction .....		93
Annex E (Informative) Circuit for measuring leakage currents .....		101
Annex F (Normative) Heat behaviour test .....		103

Figure 8.3.2.1 – Circuit diagram for leakage current measurement at operating temperature for single-phase connection of Class II appliances .....	56
Figure 8.3.2.2 – Circuit diagram for leakage current measurement at operating temperature for single-phase connection of appliances, other than those of Class II.....	57
Figure 8.3.2.3 – Circuit diagram for leakage current measurement at operating temperature for three-phase connection of Class II appliances.....	58
Figure 8.3.2.4 – Circuit diagram for leakage current measurement at operating temperature for three-phase connection of appliances other than those of Class II .....	59
Figure 8.8.2 - Impact-test apparatus.....	64
Figure 8.10 - Standard test finger.....	67
Figure A1 - Guidance for the selection and sequence of tests .....	80
Figure B2 - Typical ball pressure test apparatus .....	83
Figure B3 - Guidance on the application of glow-wire and needle-flame tests .....	85
Figure D1 - Types of double insulation .....	100
Figure E1 - Typical circuit arrangement .....	102
Table 4.1 - Creepage distances and clearances .....	25
Table 4.4 - Minimum nominal cross-sectional area of power supply cables and cords.....	32
Table 5.7 - Maximum temperature rise .....	44
Table 8.4 - Testing voltages.....	55
Table 8.6 - Test values for cord pull test.....	61
Table 8.7 - Test values for screw torque test .....	63
Table 8.12 - Standard cross-sections of copper conductors corresponding to the rated thermal current .....	71
Table 8.15.3 - Maximum winding temperatures.....	74
Table 8.15.9 - Maximum temperature rises during abnormal operation tests.....	76

A2 |

## PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-002 - Safety of Household and Similar Electrical Appliances and Small Power Transformers to supersede AS/NZS 3100:1997 from the date of publication.

A3

This Standard incorporates Amendment No. 1 (November 2003), Amendment No. 2 (July 2004) and Amendment No. 3 (November 2005). The changes required by the Amendments are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

This Standard is one of a series of Approval and Test Specifications issued by Standards Australia and Standards New Zealand. These Standards are to be read in conjunction with This Standard is one of a series of Approval and test specifications issued by Standards Australia and Standards New Zealand, whose objective is to provide manufacturers and regulatory bodies with safety requirements for equipment not covered by AS/NZS 3350.1 or AS/NZS 60335.1, and that is designed to give the user protection against hazards that might occur during normal operation and abnormal operation of the equipment, and which may be used as the basis for approval for sale or for connection to supply in Australia and New Zealand.

This Standard contains general requirements for electrical equipment and can be applied to equipment for which no particular Approval and test specification exists. It also forms the basis of general requirements where an Approval and test specification exists for a piece of equipment. Only safety matters and related conditions are covered.

This Standard was revised to incorporate Amendments No's 1, 2, 3, 4, 5 and 6 and to effect changes to clause B3.3 that were issued in draft form for comment as document DR 01968. Editorial changes have also been incorporated.

For appliances, where conflict or uncertainty arises between the requirements detailed in this Standard and those detailed in AS/NZS 3350.1, those in AS/NZS 3350.1 shall take precedence. Where an interpretation of the requirements in AS/NZS 3100 is needed, the interpretation made shall be based upon the requirements detailed in AS/NZS 3350.1.

Annex A of this Standard contains fire hazard test requirements for equipment that is not designated as 'attended' or 'unattended'.

The terms 'normative' and 'informative' have been used in this Standard to define the application of the Annex to which they apply. A 'normative' Annex is an integral part of a Standard, whereas an 'informative' Annex is only for information and guidance

## Standards Australia/Standards New Zealand

---

### Approval and test specification – General requirements for electrical equipment

#### SECTION 1: SCOPE, APPLICATION AND REFERENCED DOCUMENTS

##### 1.1 Scope

This Standard specifies the general safety requirements for, or with respect to, equipment (including fittings, accessories, appliances and apparatus) of classes and types that are used in, or intended for use in, or in connection with, electrical installations in buildings, structures, and premises. It is not applicable to an appliance within the scope of either AS/NZS 3350.1 or AS/NZS 60335.1 or a part 2 of either of these two standards, except where an approval and test specification makes reference to this standard.

Guidelines covering design and testing of electrical equipment to ensure safety and protection against electric shock, including the principles and application of double insulation, are contained in Annex D. Users of this Standard may find it helpful to study Annex D before reading the main body of this Standard.

##### 1.2 Application

As and when an individual Standard dealing with specific features of the design and construction, and the testing, of any particular class or type of equipment is issued, it shall supersede those general requirements of this Standard that are specifically dealt with in those individual Standards.

Any material, fitting, cable, accessory, appliance or apparatus used in, or in connection with, an electrical installation shall comply with the appropriate individual Standard. In the absence of any such Standard, the appropriate provisions of this Standard shall apply.

NOTE Where an individual Standard makes reference to the appropriate clauses of this Standard, it is taken to mean that Clauses 3, 4, 5, 6.1, 6.2, 6.3, 7 and 8.15.8 of this Standard are applicable to the individual Standard. The remaining tests of Clause 8 are only applicable if referred to by Clauses 3, 4, 5, 6.1, 6.2, 6.3 or 7 of this Standard or if directly referred to in the individual Standard.

Should any requirement of an individual Standard differ from any of the general requirements of this Standard, the requirement of the individual standard shall prevail.

Where the words 'National Wiring Rules' have been used throughout the text of this Standard, it shall be taken to mean AS/NZS 3000.

##### 1.3 Referenced documents

The following documents are referred to in this Standard:

NOTE Where no relevant joint Australia/New Zealand Standard is listed, the referenced Australian Standard is deemed to be appropriate for the purpose of this Standard.

##### Standards

AS

1834.1      Material for soldering – Solder alloys





SAI GLOBAL

This is a free 8 page sample. Access the full version online.

The remainder of this document  
is available for purchase online at

[www.saiglobal.com/shop](http://www.saiglobal.com/shop)

SAI Global also carries a wide range of publications from a wide variety of Standards Publishers:



SAI GLOBAL



Click on the logos to search the database online.