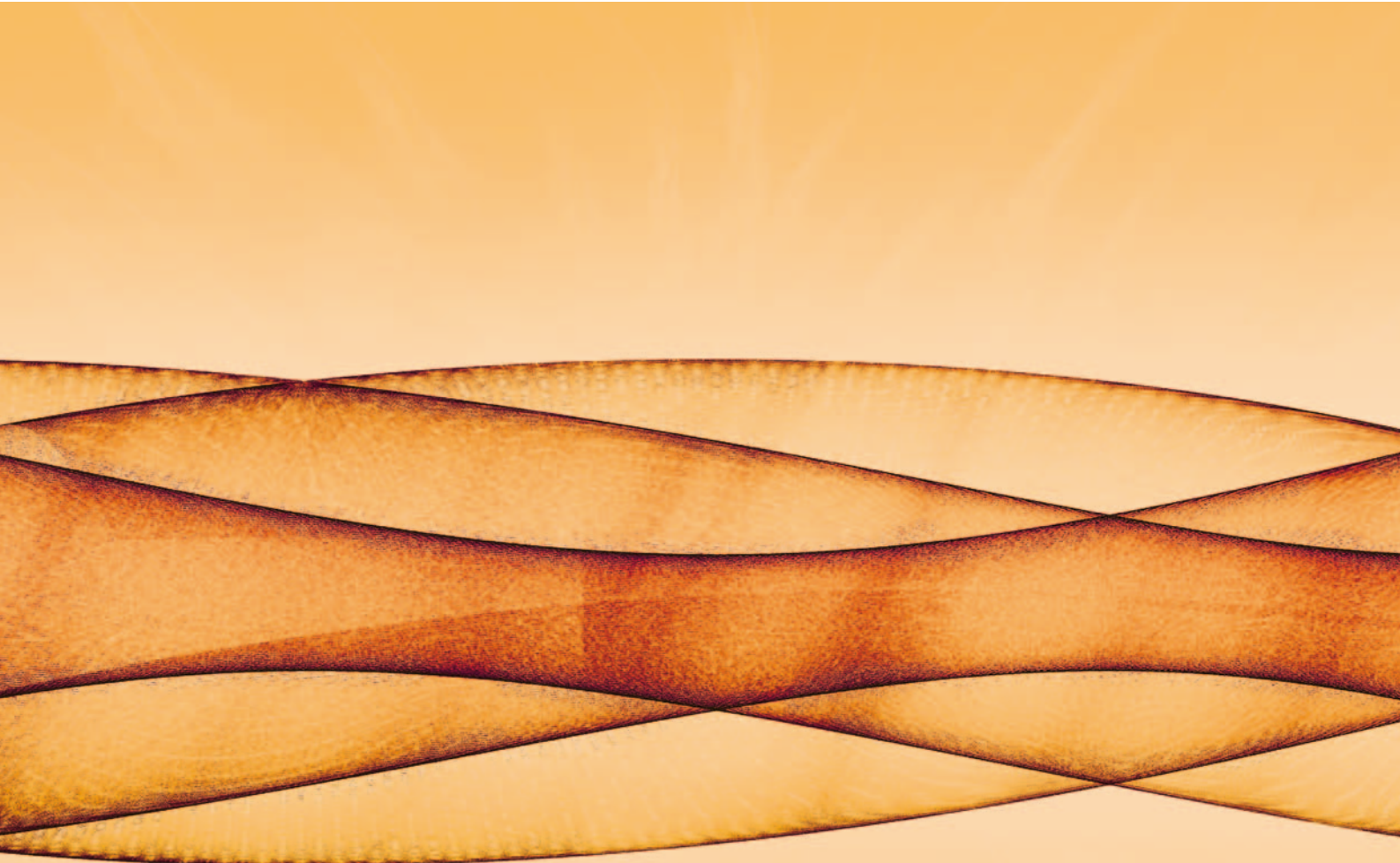




AS/NZS 3000:2007
Wiring Rules



STANDARD

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Wiring Rules

AS/NZS 3000:2007

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Australian Building Codes Board
Australian Electrical and Electronic Manufacturers Association
Canterbury Manufacturers Association New Zealand
Communications, Electrical and Plumbing Union
Consumers' Federation of Australia
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Australian/New Zealand Standard™

Electrical installations (known as the Australian/New Zealand Wiring Rules)

Originated as part of AS CC1—1931.
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-001, Wiring Rules, to supersede, in Australia/New Zealand, AS/NZS 3000:2000, Electrical installations—Buildings, structures and premises (known as the Wiring Rules).

The development of this Standard has been based on the following considerations:

- (a) Results of a survey of the electrical industry indicated that the industry wanted a document better suited to the present electrical regulatory structure, which flows more logically, is easier to understand, reinstates much of the guidance information removed from the 2000 edition and contains an increased level of diagrammatic representation of concepts, and more selected examples.
- (b) Experience gained in the application of the eleventh (2000) edition as expressed to Standards Australia and Standards New Zealand.

During preparation of this Standard, reference was made to IEC 60364, *Electrical installations of buildings* (all parts) and acknowledgment is made of the assistance received from this source.

The presentation of this edition differs from previous editions of AS/NZS 3000 in that the Standard comprises two parts but with both parts bound as one document.

Part 1 provides uniform essential elements that constitute the minimum regulatory requirements for a safe electrical installation.

It also provides an alternative regulatory vehicle for Australian and New Zealand regulators seeking to move from the present prescription of AS/NZS 3000 in electrical installation safety and licensing legislation.

Part 1 satisfies the following objectives:

- It is generally complete in itself to avoid cross-referencing to Part 2.
- It may be called up in regulation as a separate Part or together with Part 2.
- It provides 'high level' safety performance outcomes/conditions without prescriptive work methods that demonstrate means of compliance.
- It establishes an enforcement link to Part 2. Failure to comply with a work method provision in Part 2 would breach high level safety conditions of Part 1 unless an alternative mechanism is satisfied.
- It establishes the 'deemed to comply' status of Part 2, confirming that installations that comply with Part 2 comply with high level safety conditions of Part 1.
- It establishes 'deemed to comply' status of AS/NZS 3018, relating to simple domestic applications, and parts of other standards, confirming compliance with 'high level' safety conditions of Part 1.

- It maintains alignment with IEC 60364 developments at the level of essential safety.
- It provides a mechanism for acceptance of alternative design and installation practices that are not addressed, or are inconsistent with, those given in the 'deemed to comply' Part 2. This mechanism is intended to apply where departures from the methods in Part 2 are significant rather than minor aspects that remain within the flexibility of Part 2.
- It details responsibilities, documentation and verification criteria for designers or installers that seek to apply an alternative method to the 'deemed to comply' methods contained in Part 2.

Part 2 provides installation practices that achieve certainty of compliance with the essential safety requirements of Part 1.

It is primarily a revision of the 2000 edition to provide work methods and installation practices that are 'deemed to comply' with the associated performance outcomes/safety conditions.

Part 2 satisfies the following objectives:

- It may be called up in regulation in addition to Part 1 to reflect a range of regulatory adoption options.
- It incorporates and elaborates on all 'high level' performance outcomes of Part 1 with the addition of requirements and recommendations to clarify and support compliance.
- It establishes the 'deemed to comply' status of AS/NZS 3018 relating to simple domestic applications, and parts of other standards, confirming compliance with the work methods of Part 2 and the 'high level' safety conditions of Part 1.
- It generally retains the structure of AS/NZS 3000:2000, except that Verification (inspection and testing) has been moved to the final section of substantive text as it would be the last function performed in the formation of an electrical installation, and damp situations have been separated from other special electrical installations as they are the more commonly occurring of special electrical installations.
- New introductory selection and installation clauses have been included in Sections 2, 3, 4, 5, 6 and 7.
- It restores information from AS 3000—1991 as requirements, recommendations and examples of typical, effective compliant solutions.
- Emphasis has been placed on common, practicable and cost-effective methods that achieve safety compliance, fitness for purpose and a level of good practice rather than overly conservative or obscure measures.

- Greater use has been made of illustrations and examples to promote understanding of common or difficult aspects, e.g. line diagrams, alternative overcurrent device locations, International Protection (IP) rating summary, switchboard access.
- Testing and inspection provisions have been updated in alignment with AS/NZS 3017, including provisions for periodic inspection in accordance with AS/NZS 3019.

Other major changes to the content of AS/NZS 3000:2000 include the following:

- (i) Revised or new definitions for—
 - electrical installation;
 - circuit;
 - basic protection (protection against direct contact);
 - fault protection (protection against indirect contact);
 - outbuilding;
 - isolation; and
 - competent person.
- (ii) Requirements for alterations, additions and repairs have been expanded and clarified through the integration of information contained in a number of frequently asked questions.
- (iii) Illustration of normal and alternative location, and omission of, overcurrent devices.
- (iv) Discrimination/selectivity of protective devices.
- (v) A single main switch (per tariff) for a single domestic installation.
- (vi) Illustration of basic clearances for switchboard access.
- (vii) Expansion of the use of residual current devices (RCDs) to all socket-outlet and lighting circuits rated up to 20 A.
- (viii) Limiting the number of circuits connected to any one RCD to three.
- (ix) Requiring the division of lighting circuits between RCDs where the number of both RCDs and lighting circuits exceeds one.
- (x) Arc fault protection must be provided for all switchboards with a nominal supply rated above 800 A and should be considered for all other switchboards.
- (xi) Full-size neutral conductors are required on consumers mains, multiphase submain and final subcircuits subject to some conditions, for example overcurrent detection is fitted.
- (xii) Allowance for a voltage drop of up to 7% where a substation is located on the premises.
- (xiii) Installation couplers are recognised as a suitable method of connecting cables.

- (xiv) The colour identification of conductors has been clarified, particularly for European alternatives for single-phase and three-phase applications.
- (xv) Restrictions on cable supports in suspended ceilings.
- (xvi) Additional illustrations of the protection of wiring systems near building surfaces have been included.
- (xvii) Segregation from telecommunications, gas and water services has been clarified and a summary table of separation distances given.
- (xviii) The location of underground cable must be marked at entry to a structure or recorded on a map.
- (xix) Aerial cable clearances have been updated to distribution industry standards.
- (xx) Requirements have been added for the prevention of the spread of fire.
- (xxi) Requirements for clearances of recessed luminaires to combustible building material and thermal insulation have been critically revised.
- (xxii) Electricity generating systems, such as engine-driven generator sets, stand-alone power systems, grid-connected inverter systems and batteries, have been moved to Section 7.
- (xxiii) Illustrations of the multiple earthed neutral (MEN) system and clarification of its relationship to IEC systems have been added.
- (xxiv) Earthing electrode types and installation conditions have been specified.
- (xxv) Main earthing conductors to be labelled at the connection to the earth electrode.
- (xxvi) Requirements for MEN switchboards in outbuildings have been clarified.
- (xxvii) Illustration of equipotential bonding of conductive water piping has been included.
- (xxviii) Reinforced concrete slabs in a shower or bathroom must be equipotentially bonded.
- (xxix) Information on earth fault-loop impedance, previously included in Section 1, has been moved to Section 5.
- (xxx) Bath and shower figures have been corrected to fix the Zone 2 discrepancy in the 2000 edition and now appear with corresponding plan and elevation views on facing pages.
- (xxxi) The Zone 1 horizontal dimension for spa pools and tubs with water capacity less than 5 000 L has been increased to 1.25 m, instead of 1.0 m. This dimension has been changed from AS/NZS 3000:2000 to align with the limit of arm's reach defined in Clause 1.4.12 and Figure 1.1.

- (xxxii) In locations containing sauna heaters (Clause 6.5), Zone 4 (the 300 mm below the ceiling) has been removed to align with IEC 60364-7-703. Zones 1 and 3 have been extended to incorporate this area.
- (xxxiii) Sanitization operations have been added to hosing-down operations to clearly cover food-handling and produce areas, such as chicken farms, where corrosive chemicals are used in the cleaning and hosing-down process.
- (xxxiv) Hosing-down zones have been modified.
- (xxxv) 'Emergency systems' have been renamed 'Safety services' in line with IEC 60364.
- (xxxvi) Generating systems are dealt with in greater detail, particularly in the areas of the suitability of RCDs with respect to waveforms of the supply and to the connection to an electrical installation. Illustration is provided for generator supply interconnection.
- (xxxvii) Electrical separation is dealt with in greater detail with a new requirement for double pole switching, the provision of testing requirements in addition to those of Section 8 and the inclusion of illustrations.
- (xxxviii) Separation of extra-low voltage (ELV) circuits from live parts of other circuits [both separated extra-low voltage (SELV) and protected extra-low voltage (PELV)] and earth (SELV only) must be verified by insulation resistance testing.
- (xxxix) The requirements for high voltage installations (Clause 7.6) have been substantially reduced and provide a pointer to the detailed requirements of, initially Appendix K, and then to AS 2067 when it is published.
- (xl) Reference to other Standards and documents has been clarified to highlight their status. Specific electrical installation Standards are now grouped as—
 - (A) providing additional requirements that shall be complied with;
 - (B) deemed to comply Standards; and
 - (C) Standards providing guidance for specific electrical installations.
- (xli) AS/NZS 3012 *Electrical installations—Construction and demolition sites* and AS/NZS 3003 *Electrical installations—Patient areas of hospitals and medical, dental practices and dialyzing locations* have been elevated from the status of guidance Standards to that of Standards providing additional requirements that shall be complied with.
- (xlii) Verification of operation of RCDs where supply is connected is now mandatory in Australia.
- (xliii) Verification of earth fault-loop impedance for socket-outlet circuits not protected by an RCD (at a socket-outlet) is now a mandatory test for both Australia and New Zealand.

- (xliv) The date of initial energization of an installation should be available on-site.
- (xlv) Appendix B has been renamed 'Circuit protection guide' to reflect its content more accurately. It has been expanded to provide illustration of circuit arrangements of an installation, guidance information on automatic disconnection of supply as an introduction to the treatment of earth fault-loop impedance and a better illustration of an MEN system with earth fault-loop. Table B4.1 of the 2000 edition, Maximum values of earth fault-loop impedance (Z_s) at 230 V a.c., has been relocated to Section 8 Verification.
- (xlvi) Appendix C has been expanded to cover more than the calculation of maximum demand and the information provided on maximum demand has been clarified and updated. The Appendix has been renamed 'Circuit arrangements' and includes guidance information on simplified cable current ratings, simplified voltage drop calculations, the number of points connected to circuits and the number of cables that can be installed in conduits similar to that in the 1991 edition of AS 3000, but not included in AS/NZS 3000:2000.
- (xlvii) Appendix D has been updated to provide more comprehensive guidance information for the construction of private aerial lines.
- (xlviii) Appendix E has been added to provide some information on the electrical requirements contained in National Building Codes (the Building Code of Australia (BCA) and the New Zealand Building Code (NZBC)).
- (xlix) Appendix F has been added to provide information and guidance on the installation of surge protective devices (SPDs).
- (l) Appendix G has been added to provide information and guidance on the degree of protection of enclosed equipment (International Protection or IP rating).
- (li) Appendix H has been added to provide information and guidance on the classification of wiring systems (WS classification).
- (lii) Appendix I has been added to provide information and guidance on the ratings of overload protective devices where alterations, additions or repairs involve the use of existing conductors of an imperial size.
- (liii) Appendix J has been added to provide a full listing of electrical symbols used in this Standard.
- (liv) Appendix K has been added to provide detailed high voltage installation requirements for Australia only. This Appendix will be deleted by amendment when AS 2067 dealing with high voltage installations has been published.
- (lv) An improved index has been provided to make using the document more intuitive.

- (lvi) The electric shock survival (resuscitation) guide has been updated to incorporate current practice. It is, however, only provided for guidance. Persons associated with the installation and repair of electrical installations and electrical equipment should obtain training in resuscitation methods.

This Standard may be applied through legislative requirements, as indicated in Clause 1.2. As this Standard supersedes AS/NZS 3000:2000, it would usually apply to electrical installations from its date of publication, but it is recommended that it not be applied on a mandatory basis before a date at least six months after publication. However, if work on an installation was commenced before publication of this edition, the relevant regulatory authority or electricity distributor may grant permission for the installation to be completed in accordance with AS/NZS 3000:2000.

Statements expressed in mandatory terms in notes to tables and figures are deemed to be requirements of this Standard.

The term, 'informative' has been used in this Standard to define the application of the appendix to which it applies. An 'informative' appendix is only for information and guidance.

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FOREWORD

Application of different typefaces. There are four different typefaces used in this Standard and each of these has a specific purpose. The typefaces and their application are as follows:

- (a) **Bold print** These are opening statements defining the fundamental principle and are generally positioned at the beginning of a clause or major part of a section.
- (b) Normal print These are mandatory requirements that form the substance of a clause in that they indicate certain methods that satisfy the essential requirements.
- (c) *Italic print* These are exceptions or variations to mandatory requirements. These generally give specific examples where the essential requirements do not apply or where they are varied for certain applications. Italic print also represents examples or clarifications given.
- (d) Reduced normal print These are explanatory notes that may give advice. They are preceded by 'NOTE' in the manner used in previous editions.

It is important not to read any single typeface by itself as the preceding or following paragraphs may contain additional or modifying requirements.

Cross-references Throughout this Standard, where reference to another clause or portion of a clause has been made to avoid repetition, such reference, unless otherwise stated, shall include all appropriate subclauses and paragraphs of the clause or portion thereof referred to.

Frequently asked questions (FAQs) Clarifications to requirements of the Wiring Rules that were covered by rulings and interpretations in earlier editions will be included in FAQs as the need arises. These FAQs will be applicable throughout Australia and New Zealand and will be developed by the Joint Standards Australian/Standards New Zealand Committee EL-001, Wiring Rules. These FAQs can be found online at www.wiringrules.com.au.

Provision for revision This Standard necessarily deals with existing conditions, but it is not intended to discourage invention or to exclude materials, equipment and methods that may be developed. Revisions will be made from time to time in view of such developments and amendments to this edition will be made only where essential.

Special national requirements Certain provisions of the Standard have a different application in Australia and New Zealand. The following symbols appearing in the outer margin indicate that the identified Section or Clause is:

- 1 Applicable in Australia only.
- 2 Applicable in New Zealand only.

A

NZ

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard

Electrical installations (known as the Australian/New Zealand Wiring Rules)

Part 1: Scope, application and fundamental principles

SECTION 1 SCOPE, APPLICATION AND FUNDAMENTAL PRINCIPLES

1.1 SCOPE

This Standard sets out requirements for the design, construction and verification of electrical installations, including the selection and installation of electrical equipment forming part of such electrical installations.

These requirements are intended to protect persons, livestock, and property from electric shock, fire and physical injury hazards that may arise from an electrical installation that is used with reasonable care and with due regard to the intended purpose of the electrical installation.

In addition, guidance is provided so that the electrical installation will function correctly for the purpose intended.

1.2 APPLICATION

This Standard may be applied through legislative requirements, made in each State and Territory of Australia and in New Zealand, concerned with the safety of electrical installations. The Standard may also be applied in conjunction with any additional requirements, exemptions or restrictions in such legislation.

The principal application of this Standard is to electrical installations in all types of premises and land used by electricity consumers. However, the Standard may also be referenced or applied through legislative or other requirements relating to the effect of electrical installations in matters such as the following:

- (a) Safety of workplaces.
NOTE: For example, Occupational Health & Safety legislation and associated codes.
- (b) Safe design and construction of buildings.
NOTE: For example, National Building Codes [such as the Building Code of Australia (BCA), New Zealand Building Code (NZBC)] and the associated referenced Standards.
- (c) Electricity generation, transmission and distribution systems.
- (d) Safe connection to electricity distribution systems.
NOTE: For example, service rules and conditions provided by local electricity distributors.
- (e) Qualifications of electricity workers.



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