AS/NZS 61558.1:2008
(Incorporating Amendment No. 1)

AS/NZS 61558.1:2008

Australian/New Zealand Standard™

Safety of Power Transformers, Power Supplies, Reactors and Similar Products

Part 1: General requirements and tests (IEC 61558-1 Ed 2.1, MOD)

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 1 May 2008 and on behalf of the Council of Standards New Zealand on 11 April 2008.
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The following are represented on Committee EL-002:

Australian Industry Group
Australian Retailers Association
Australian Electrical and Electronic Manufacturers Association
Business New Zealand
Consumer Electronic Suppliers Association, Australia
Consumers' Federation of Australia
Electrical regulatory authorities, Australia
Electrical Compliance Testing Association
Electrical consultants
Ministry of Economic Development, New Zealand
New Zealand Electric Fence Energizer Manufacturers' Standards Group

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Australian/New Zealand Standard™

Safety of Power Transformers, Power Supplies, Reactors and Similar Products

Part 1: General requirements and tests (IEC 61558-1 Ed 2.1, MOD)

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AUSTRALIA/NEW ZEALAND STANDARD

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SAFETY OF POWER TRANSFORMERS, POWER SUPPLIES, REACTORS AND SIMILAR PRODUCTS –

Part 1: General requirements and tests

FOREWORD

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 first edition of AS/NZS 61558, *Safety of power transformers, power supplies and similar,* Part 1: *General requirements and tests*, three years from publication of the relevant Part 2. During this period it is anticipated that regulatory authorities will approve power transformers and power supplies to the relevant Part 2 using either edition of Part 1.

A1 This standard incorporates Amendment No. 1 (October 2009).The changes introduced by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected. Where an application date other than immediate is applicable to an amendment the date of application (DOA) is indicated by the marginal bar against the part affected

The objective of this Standard is to provide manufacturers and regulatory bodies with minimum safety requirements, designed to give user protection against hazards that might occur during normal operation and abnormal operation of power transformers, power supplies or similar and which may be used as the basis for approval for sale or for connection to supply in Australia and new Zealand.

This Standard forms the second edition of AS/NZS 61558, *Safety of power transformers, power supplies and similar,* Part 1: *General requirements and tests*. This Standard has been varied as indicated to take account of Australian and New Zealand conditions. This Standard, referred to as Part 1, is to be used in conjunction with the appropriate Part 2, which contains clauses that supplement or modify the corresponding clauses in Part 1, to provide the relevant requirements for each type of product.

A1 This Standard is an adoption with national modifications and contains the full text of IEC 61558-1, *Safety of power transformers, power supply units and similar* — Part 1: *General requirements and tests* Edition 2 including its corrigendum 1 (2008) and amendment 1 (2009). Where a particular subclause of part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. Where this Standard states "addition", "modification" or "replacement", the relevant text in part 1 is to be adapted accordingly.

NOTE 1 Subclauses, notes, tables and figures which are additional to those in part 1 are numbered starting from 101. Annexes, which are additional to those in part 1 are lettered AA, BB, etc.

NOTE 2 In this Standard the following print types are used:

– requirements: in arial type;

– *test specifications: in italic type;*

– notes: in small arial type;

Words **in bold** in the text are defined in clause 3.

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.

Annexes A, B, C, D, E, F, G, H, J, K, L, R, W and ZZ form an integral part of this standard. Annexes M, N, P, Q, U, V and ZZ are for information only.. Annexes I, O, S and T are intentionally void so as to align with the IEC version of the Standard.

NOTE Annex U contains the optional t_w system (marking, requirements and tests).

As this Standard is reproduced from an International Standard, the following applies:

a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.

b) In the source text 'this standard' should read 'this Australian/New Zealand Standard'.

c) A full point should be substituted for a comma when referring to a decimal marker.

d) French text on figures should be ignored.

A1 The numbering of clauses, subclauses, notes, tables, figures and annexes follows that of IEC 61558-1 Ed 2.1. To allow for the introduction of additional material by the IEC, the numbers 1 to 100 have been reserved. Clauses numbered from 101 are used by the IEC to add to the body of the Standard by annexes. To allow for additional material to be introduced by Australia and New Zealand, the numbers 201 to 300 are used to number further clauses, subclauses, notes, tables and figures in this Standard.

This scheme has been introduced to reduce the likelihood of the IEC and Australia or New Zealand using the same clause or figure number for differing requirements. The use of the word VOID indicates that the IEC requirement is not used in Australia or New Zealand. The word is also used where the deletion of a particular requirement such as a Table would lead to the consequential renumbering of references within the body of the Standard and succeeding tables. Where Australia and New Zealand have added a requirement or made a change to a particular clause of IEC 61558-1 that clause number remains unchanged. The normative references and bibliography are reformatted to indicate the Australia/New Zealand standard that is equivalent to the IEC standard or ISO standard to which reference is made.

A1 Variations to IEC 61558-1 Ed 2.1 are indicated at the appropriate places throughout this Standard. Strikethrough (~~example~~) identifies IEC tables, figures and passages of text which, for the purposes of this Standard, are deleted. Where tables, figures and passages of text are added, each is set in its proper place and identified by shading (example). Added figures are not themselves shaded but are identified by a shaded border. The variations are listed in Annex ZZ of this Standard for easy reference. The variations also form the Australian and New Zealand national variations for purposes of the IECEE scheme for recognition of results of testing to standards for safety of electrical equipment (the CB scheme).

This second edition of Part 1 is only to be used in conjunction with parts 2 based on this edition. The parts 2 contain clauses to supplement or modify the corresponding clauses of this Part 1 in order to provide the relevant requirements for each type of transformer.

This standard may be applied, as far as is reasonable to transformers not mentioned in the parts 2, and to transformers designed on new principles.

INTRODUCTION

This International Standard covers safety requirements for **transformers**. Where the term **transformer** is used, it covers **transformers**, **reactors** and **power supplies** where applicable.

During the development of this standard, to the extent possible, the requirements of AS/NZS 3000 were taken into consideration, so that a **transformer** may be installed in accordance with the wiring rules contained in that standard.

This standard recognizes the internationally accepted levels of protection against the possible electrical, mechanical, and fire hazards caused by **transformers** operating under normal conditions in accordance with the manufacturer's instructions. It, also, covers abnormal conditions which may occur in practice.

A **transformer** complying with this standard will not necessarily be judged to comply with the safety principles of this standard if when examined and tested, it is found to have other features that impair the level of safety covered by these requirements.

A **transformer** employing materials or having forms of construction differing from those detailed in this standard may be examined and tested according to the intent of the requirements, and if found to be substantially equivalent, may be judged to comply with the safety principles of this standard.

The standard dealing with non-safety aspects of electromagnetic compatibility (EMC) of **transformers** is IEC 62041: *Power transformers, power supply units, reactors and similar products – EMC requirements*. However, that standard also includes tests which may subject the **transformer** to conditions involving the safety aspects.

The objective of Part 1 of AS/NZS 61558 is to provide a set of requirements and tests considered to be generally applicable to most types of **transformers**, and which can be called up as required by the relevant part 2 of AS/NZS 61558 or IEC 61558. Part 1 is thus not to be regarded as a specification by itself for any type of **transformer**, and its provisions apply only to particular types of **transformers** to the extent determined by the appropriate part 2. Part 1 of IEC 61558 also contains normative routine tests.

Each part 2 in conjunction with Part 1 contains all the necessary requirements for the **transformer** being covered and does not contain references to other parts 2. For **transformers** with a protection index IP00 and associated **transformers**, it is possible to have circuits corresponding to different parts 2 within the same construction (e.g. SELV output circuit according to Part 2-6 and 230 V output circuit according to Part 2-4). However, if the **transformer** is covered by different parts 2 of AS/NZS 61558 or IEC 61558, to the extent reasonable, the relevant part 2 is applied to each function/application separately. If applicable, the effect of one function on the other is taken into consideration.

If, an appropriate part 2 for a particular **transformer** or group of **transformer**s does not exist, the nearest applicable part 2 may be used as a guide to the requirements and tests.

Where the requirements of any of the clauses of a part 2 refer to Part 1 by the phrase "This clause of Part 1 is applicable", this phrase means all the requirements of that clause of Part 1 are applicable, except those requirements that are, clearly, not applicable to the particular type of **transformer** covered by that part 2.

The principle for preparation of the different parts 2 is as follows:

Relevant clauses of this standard (e.g. clauses dealing with thermal endurance test for windings) apply also to **transformers** forming an integral part of an appliance and which cannot be tested separately.

As an option, the thermal characteristics of **transformers** can be specified by the rated maximum operating temperature of the winding (symbol t_w) which shall not be exceeded to ensure a minimum lifetime as specified in Annex U. In addition, for **transformers** subjected to abnormal conditions as specified in Clause 15, the specified temperature limit shall not be exceeded when the **transformer** is built into an appliance or used as an independent **transformer**.

SAFETY OF POWER TRANSFORMERS, POWER SUPPLIES, REACTORS AND SIMILAR PRODUCTS –

Part 1: General requirements and tests

1 Scope

This International Standard deals with safety aspects of power **transformers**, power supplies, reactors and similar products such as electrical, thermal and mechanical safety.

This standard covers the following types of **dry-type transformers**, **power supplies**, including **switch mode power supplies**, and **reactors,** the windings of which may be encapsulated or non-encapsulated :

NOTE 1 The distinction between **transformers**, **power supplies** and **switch mode power supplies** is as follows:

– for **transformers**, there is no change in frequency .However, **transformers** (e.g. constant voltage **transformers**) may have an internal resonance frequency not exceeding 30 kHz;

– for **power supplies**, the **internal operational frequency** and waveform are different from the **supply frequency** and waveform, and the **internal operational frequency** does not exceed 500 Hz (see definition 3.1.19);

– for **switch mode power supplies**, the **internal operational frequency** and waveform are different from the **supply frequency** and waveform and the **internal operational frequency** exceeds 500 Hz and does not exceed 100 MHz.

The relevant parts 2 may be found in the introduction of this standard.

a) Stationary or portable, single-phase or poly-phase, air-cooled (natural or forced), **isolating** and **safety isolating transformers**, **independent** or **associated**, not forming a part of distribution networks and with the following characteristics:

   – **rated supply voltage** not exceeding 1 000 V a.c.;

   – **rated supply frequency** not exceeding 500 Hz;

   and complying with the following values, unless otherwise specified in the relevant part 2:

   - for **isolating transformers**:
     – rated output for single phase **transformers**, not exceeding 25 kVA, and for poly-phase **transformers** not exceeding 40 kVA.
     – **no-load output voltage** and the **rated output voltage** exceeding 50 V a.c., and not exceeding 500 V a.c, or 1 000 V a.c. to be in accordance with the National Wiring Rules or for a special application.
   - for **safety isolating transformers**:
     – **rated output** for single phase **transformers** not exceeding 10 kVA, and for poly-phase **transformers** not exceeding 16 kVA.
     – **no-load output voltage** and the **rated output voltage** not exceeding 50 V a.c. between conductors, or between any conductor and protective earth.

NOTE 1 **Isolating** and **safety isolating transformers** are used where **double** or **reinforced insulation** between circuits is required by the installation rules or by the appliance specification (for example toys, bells, portable **tools**, handlamps).

b) **Stationary** or **portable**, single-phase or polyphase, air-cooled (natural or forced) **separating transformers**, **auto-transformers**, **variable transformers** and small **reactors**, **independent** or **associated**, not forming a part of distribution networks and with the following characteristics:

   – **rated supply voltage** not exceeding 1 000 V a.c.;

   – **rated supply frequency** not exceeding 500 Hz;

   and complying with the following values, unless otherwise specified in the relevant part 2: