AS/NZS 60076.1:2014

Australian/New Zealand Standard™

Power transformers

Part 1: General (IEC 60076-1, Ed. 3.0 (2011) MOD)

STANDARDS Australia

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This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-008, Power Transformers. It was approved on behalf of the Council of Standards Australia on 9 May 2014 and on behalf of the Council of Standards New Zealand on 7 February 2014.
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The following are represented on Committee EL-008:

Australasian Railway Association
Australian Chamber of Commerce and Industry
Australian Industry Group
Department of Industry
Electricity Engineers Association, New Zealand
Energy Efficiency and Conservation Authority of New Zealand
Energy Networks Association
Engineers Australia
Industry Training Body

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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 AS/NZS 60076.1.

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Part 1: General (IEC 60076-1, Ed. 3.0 (2011) MOD)

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-008, Power Transformers, to supersede AS 60076.1—2005, *Power transformers*, Part 1: *General (IEC 60076-1, Ed. 2.1 (2000) MOD)*.

The objective of this Standard is to provide manufacturers, suppliers, test laboratories, purchasers and users of power transformers with general requirements for three-phase and single-phase transformers. The exceptions are some small and special purpose transformers.

This Standard is an adoption with national modifications. It has been reproduced from IEC 60076-1, Ed. 3.0 (2011), *Power transformers*, Part 1: *General*, and has been varied as indicated to take account of Australian/New Zealand conditions.

This edition includes the following significant technical changes with respect to the previous edition:

(a) Addition of a definition of harmonic content.

(b) Addition of a subclause on transport.

(c) Addition of functional method of specification.

(d) Addition of connection symbols for single-phase transformers.

(e) Addition of safety and environmental requirements.

(f) Addition of requirements for liquid preservation systems.

(g) Addition of a clause on DC currents.

(h) Addition of vacuum, pressure and leak tests on tanks.

(i) The requirements formerly in Annex A are now incorporated in the text and Annex A is now an informative checklist.

(j) Informative annexes have been added on facilities for condition monitoring and environmental and safety considerations.

This Standard is structured as follows:

(i) Preface.

(ii) IEC 60076-1, Ed. 3.0 (2011) (unedited from the contents page to the final clause of the source document).

(iii) Appendix ZZ—(Australian/New Zealand) variations to the source document.

(iv) Appendices ZA and ZB—for Australia/New Zealand.

This Standard is Part 1 of the AS/NZS 60076 series which is progressively replacing the AS 2374 series. This series will consist of adoptions, with national modifications when necessary, of the IEC 60076 series of power transformers.

The variations listed in Appendix ZZ address issues, including the following:

(A) Definition and details of T-T connected transformers.

(B) Clarification to the type testing scope for Australian/New Zealand conditions.

(C) Clarification of the scope and limitations for sound level to ensure consistency with AS/NZS 60076.10, which includes the required maximum sound levels.

(D) Additional items to appear on the rating plate to suit Australian/New Zealand conditions and practices.

(E) Additional safety considerations to suit Australian/New Zealand conditions and practices.

(F) Additional special information items for order/enquiry to suit Australian/New Zealand conditions and practices.

The variations described in Appendix ZZ form the Australian/New Zealand variations for the purposes of the IECEE CB Scheme for recognition of testing to standards for safety of electrical equipment.

Table 6.1 of AS 2067 (minimum values for separating outdoor transformers) was consulted during the preparation of this Standard, with respect to liquid volumes contained in outdoor transformers.

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

(1) In the source text 'this part of IEC 60076' should read 'this Australian/New Zealand Standard'.

(2) A full point substitutes for a comma when referring to a decimal marker.

References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

Reference to International Standard		*Australian/New Zealand Standard*	
IEC		AS/NZS	
60076	Power transformers	60076	Power transformers
60076-2	Part 2: Temperature rise for liquid-immersed transformers	60076.2	Part 2: Temperature rise for liquid-immersed transformers
60076-3	Part 3: Insulation levels, dielectric tests and external clearances in air	60076.3	Part 3: Insulation levels, dielectric tests and external clearances in air (IEC 60076-3, Ed. 2 (2000) MOD)
60076-5	Part 5: Ability to withstand short circuit	60076.5	Part 5: Ability to withstand short circuit (IEC 60076-5, Ed. 3.0 (2006) MOD)
60076-6	Part 6: Reactors	60076.6	Part 6: Reactors
60076-7	Part 7: Loading guide for oil-immersed power transformers	60076.7	Part 7: Loading guide for oil-immersed power transformers
		AS	
60076-8	Part 8: Application guide	2374.8	Part 8: Application guide
		AS/NZS	
60076-10	Part 10: Determination of sound levels	60076.10	Part 10: Determination of sound levels
		AS	
60076-11	Part 11: Dry-type transformers	60076.11	Part 11: Dry-type transformers
		AS/NZS	
60137	Insulated bushings for alternating voltages above 1000 V	60137	Insulated bushings for alternating voltages above 1000 V (IEC 60137, Ed. 5.0 (2003) MOD)
		AS	
60214	Tap-changers	60214	Tap-changers
60214-1	Part 1: Performance requirements and test methods	60214.1	Part 1: Performance requirements and test methods
		1767	Insulating liquids
60296	Fluids for electrotechnical applications—Unused mineral insulating oils for transformers and switchgear	1767.1	Part 1: Specification for unused mineral insulating oils for transformers and switchgear

Only normative references that have been adopted as Australian or Australian/New Zealand Standards have been listed.

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

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AUSTRALIAN/NEW ZEALAND STANDARD

Power transformers

Part 1:
General (IEC 60076-1, Ed. 3.0 (2011) MOD)

1 Scope

This part of IEC 60076 applies to three-phase and single-phase power transformers (including auto-transformers) with the exception of certain categories of small and special transformers such as:

– single-phase transformers with rated power less than 1 kVA and three-phase transformers less than 5 kVA;
– transformers, which have no windings with rated voltage higher than 1 000 V;
– instrument transformers;
– traction transformers mounted on rolling stock;
– starting transformers;
– testing transformers;
– welding transformers;
– explosion-proof and mining transformers;
– transformers for deep water (submerged) applications.

When IEC standards do not exist for such categories of transformers (in particular transformer having no winding exceeding 1000 V for industrial applications), this part of IEC 60076 may still be applicable either as a whole or in part.

This standard does not address the requirements that would make a transformer suitable for mounting in a position accessible to the general public.

For those categories of power transformers and reactors which have their own IEC standards, this part is applicable only to the extent in which it is specifically called up by cross-reference in the other standard. Such standards exist for:

– reactors in general (IEC 60076-6);
– dry-type transformers (IEC 60076-11);
– self-protected transformers (IEC 60076-13);
– gas-filled power transformers (IEC 60076-15);
– transformers for wind turbine applications (IEC 60076-16);
– traction transformers and traction reactors (IEC 60310);
– converter transformers for industrial applications (IEC 61378-1);
– converter transformers for HVDC applications (IEC 61378-2).

At several places in this part it is specified or recommended that an 'agreement' should be reached concerning alternative or additional technical solutions or procedures. Such agreement is made between the manufacturer and the purchaser. The matters should preferably be raised at an early stage and the agreements included in the contract specification.