AS/NZS 60076.10.1:2009
IEC 60076-10-1, Ed.1 (2005)

AS/NZS 60076.10.1:2009

Australian/New Zealand Standard™

Power transformers

Part 10.1: Determination of sound levels—Application guide

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 16 March 2009 and on behalf of the Council of Standards New Zealand on 20 March 2009.
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The following are represented on Committee EL-008:

Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Institute of Petroleum
Department of Environment, Water, Heritage and the Arts
Electricity Engineers Association, New Zealand
Energy Efficiency & Conservation Authority of New Zealand
Energy Networks Association
Engineers Australia
Testing Interests (Australia)

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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 09006.

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Part 10.1: Determination of sound levels—Application guide

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-008, Power Transformers.

The objective of this Standard is to provide manufacturers, test laboratories and purchasers with supporting information to assist in using AS/NZS 60076.10:2009.

This Standard is identical with, and has been reproduced from IEC 60076-10-1, Ed.1 (2005), *Power Transformers—Part 10-1: Determination of sound levels—Application guide*.

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 part of IEC 60076' should read 'this Australian/New Zealand Standard'.

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

The term 'informative' is used to define the application of the annex to which they apply. An informative annex is only for information and guidance.

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1 Scope

This part of IEC 60076 provides supporting information to help both manufacturers and purchasers apply the measurement techniques described in IEC 60076-10. The sources and characteristics of transformer and reactor sound are described. Practical guidance on making measurements is given, and factors that may influence the accuracy of the methods are discussed. This application guide also clarifies those factors which should be agreed between manufacturer and purchaser when specifying a transformer or reactor, and indicates why values measured in the factory may differ from those measured on site.

This application guide is applicable to transformers and reactors together with their associated cooling auxiliaries.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

References to international standards that are struck through in this clause are replaced references to Australian or Australian/New Zealand Standards that are listed immediately thereafter and identified by shading. Any Australian or Australian/New Zealand Standard that is identical to the International Standard it replaces is identified as such.

~~IEC 60076-10:2005, *Power transformers – Part 10: Determination of sound levels*~~

AS/NZS 60076.10:2009 Power transformers Part 10: Determination of sounds levels

3 Basic physics of sound

3.1 Sound pressure, p

Sound may be defined as any pressure variation (in air, water or other elastic media) that the human ear can detect. The pressure variations travel through the medium (for the purposes of this document, air) from the source of the sound to the listener's ears. The number of cyclic pressure variations per second is called the 'frequency' of the sound, and is measured in hertz (Hz). The frequency of a sound produces its own distinctive tone or pitch. A transformer 'hum' is low frequency, fundamentally 100 Hz or 120 Hz, while a whistle is high frequency, typically above 3 kHz. The normal range of hearing for a healthy young person extends from approximately 20 Hz to 20 kHz.

A further characteristic used to describe a sound is the amplitude of the pressure fluctuations which is measured in pascals (Pa). The weakest sound that a healthy human ear can detect is strongly dependent on frequency; at 1 kHz it has an amplitude of 20 μPa. The threshold of pain corresponds to a sound pressure of more than a million times higher. Therefore, to avoid the use of large numbers, the decibel scale (dB) is used.