

Australian Standard™

**Acoustics—Rating of sound  
absorption—Materials and systems**

[ISO title: Acoustics—Sound absorbers for use in buildings—  
Rating of sound absorption]

This Australian Standard was prepared by Committee AV-004, Acoustics, Architectural. It was approved on behalf of the Council of Standards Australia on 31 May 2002 and published on 10 July 2002.

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The following are represented on Committee AV-004:

Association of Australian Acoustical Consultants  
Australian Acoustical Society  
Australian Building Codes Board  
Australian Chamber of Commerce and Industry  
Australian Defence Force Academy  
Australian Hearing  
Building Industry Authority New Zealand  
CSIRO Building, Construction and Engineering  
Department of Public Works and Services, N.S.W.  
New Zealand Acoustical Society  
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## PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee AV-004, Acoustics, Architectural. After consultation with Stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to provide a method by which the frequency-dependent values of the sound absorption coefficient can be converted into a single number. This single number rating can be used to formulate requirements and to describe acoustical properties of sound-absorbing products to be used for routine applications in normal offices, corridors, classrooms, hospitals, etc. For such general applications, the acoustic absorption at the median frequencies of 500 Hz, 1000 Hz and 2000 Hz is considered more important than the acoustic absorption at lower and higher frequencies. The single number rating obtained by the method of this Standard is not appropriate when products are to be used in environments requiring specialist acoustical design. In such cases, complete sound absorption data as a function of frequency are needed.

This Standard is identical with and has been reproduced from ISO 11654:1997, *Acoustics—Sound absorbers for use in buildings—Rating of sound absorption*.

This Standard uses the term ‘weighted sound absorption coefficient ( $\alpha_w$ )’ to replace the term ‘Noise Reduction Coefficient (NRC)’, which is commonly used in Australia and New Zealand to specify the acoustic absorption characteristics of building materials. The NRC rating of a test sample is a single number determined as the arithmetic average of the acoustic absorption coefficients measured by one-third octave bands of noise centred on 250 Hz, 500 Hz, 1000 Hz and 2000 Hz. The calculated NRC is rounded to the nearest 0.05.

The above definition of NRC rating is found in older Standards from the American Society for Testing and Materials (ASTM), but the use of NRC in ASTM Standards has now been largely superseded. NRC rating is not defined in Australian Standards or in most of the textbooks available in Australia. As a consequence, there has been some confusion over the range of frequency measurements used to calculate the NRC rating of a product. In some cases, the 4000 Hz acoustical absorption coefficient has been included in the calculations and the result reported as the NRC value for the product. This practice tends to result in a higher absorption rating than the true NRC rating. The use of weighted sound absorption coefficient as a standardized single number rating is intended to overcome the confusion associated with the use of NRC rating.

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

- (a) Its number appears on the cover and title page while the International Standard number appears only on the cover.
- (b) In the source text, ‘this International Standard’ should read ‘this Australian/New Zealand Standard’.
- (c) In Clause 5.4 *add* a new third paragraph as follows:  
For each sound absorption ranking include details of the materials, mounting and depth of construction.
- (d) In Annex A *add* a new second paragraph as follows:  
An unfavourable deviation occurs when the practical sound absorption coefficient,  $\alpha_p$ , is less than the corresponding reference curve value.
- (e) A full point substitutes for a comma when referring to a decimal marker.

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

<i>Reference to International Standard or other publication</i>	<i>Australian/New Zealand Standard</i>
ISO	AS
354 Acoustics—Measurement of sound in a reverberation room	1045 Acoustics—Measurement of sound absorption in a reverberation room

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

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## AUSTRALIAN STANDARD

**Acoustics—Rating of sound absorption—Materials and systems****1 Scope**

**1.1** This International Standard specifies a method by which the frequency-dependent values of the sound absorption coefficient can be converted into a single number. Before this is done, the one-third-octave band values of the sound absorption coefficient measured in accordance with ISO 354 are converted into octave bands.

In annex B a classification method, based on these single numbers, is given for information.

**1.2** The single-number rating specified in this International Standard can be used to formulate requirements and to describe acoustical properties of sound-absorbing products to be used for routine applications in normal offices, corridors, class rooms, hospitals, etc. The rating is not appropriate when the products are to be used in qualified environments requiring careful acoustical design by expertise. In such cases, complete sound absorption data as a function of frequency are satisfactory.

This International Standard is not applicable unless the application covers the whole frequency range of the reference curve. If only a part of this range is of interest, it may be more appropriate to look for products with a good sound absorption within this range only. The shape indicators described in this International Standard give some guidance in identifying such products which may have a relatively low single number but a much higher potential if a more restricted frequency range is considered. Such products should be judged from the complete sound absorption curve.

As the rating curve in this International Standard has as a lower limit the 250 Hz octave band, the rating is not appropriate below this frequency. If such low frequencies are of interest, reference must be made to the complete sound absorption curve.

This International Standard is, in principle, applicable to all building products for which the sound absorption coefficient has been determined in accordance with ISO 354. It is, however, often not suitable for application to single items, such as chairs, baffles, etc., nor is it applicable to road barriers and road surfaces.

**2 Normative references**

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 354:1983, *Acoustics — Measurement of sound absorption in a reverberation room*.

ISO 354:1985/Amd. 1:—1), *Annex D: Test specimen mountings for sound absorption tests*.

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1) To be published.