AS 1469—1983

Australian Standard®

ACOUSTICS—METHODS FOR THE DETERMINATION OF NOISE RATING NUMBERS

This Australian standard was prepared by Committee AK/4, Architectural Acoustics. It was approved on behalf of the Council of the Standards Association of Australia on 22 February 1983 and published on 9 May 1983.

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First published 1973
Second edition 1983

This standard was issued in draft form for comment as DR 81247.

ISBN 0 7262 2943 1

PREFACE

This edition of this standard was prepared by the Association's Committee on Architectural Acoustics, to supersede AS 1469—1973.

The underlying procedure for ascribing a noise rating (NR) number to a given set of octave band sound pressure levels in this edition remains the same as in the earlier edition and has not been changed technically. However, this edition provides for additional methods for the calculation of NR value from the given set of octave band sound pressure levels by the use of a formula which can be used in computer calculations and by the use of a table, while retaining the method of estimation of NR value by the use of a graph.

Another widely used single-number measure of the noise in a given situation is the A-weighted sound pressure level L_A which is simpler to measure as it does not involve explicit frequency analysis of the noise. Both NR and L_A are to be found in use in current Australian standards. Ease of determination, and likely accuracy of prediction of subjective reaction, are both taken into account in choosing which rating scheme will be applied in a particular Australian standard.

This standard was based on the International Organization for Standardization Recommendation ISO/R 1996—1971, Acoustics—Assessment of Noise with Respect to Community Response, which contains in an appendix the above NR curves and the tabulations on which they are based. Acknowledgment of this source is made.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard for ACOUSTICS—METHODS FOR THE DETERMINATION OF NOISE RATING NUMBERS

1 SCOPE. This standard sets out two methods for determining a unique number called the noise rating (NR) number from the measured set of nine octave band sound pressure levels (31.5 Hz to 8 kHz centre frequencies in accordance with AS Z41) pertaining to the noise in a given environment. A numerical method and a graphical method for determining the NR number are described.

2 APPLICATION. This standard is intended to establish a single number measure of a given acoustic environment. This measure may be used both in setting permissible sound levels, and in assessing compliance with permissible sound levels in various types of space as in buildings, ships, etc.

NOTES:

1. AS 1948, AS 2107 and AS 2254 specify the measurement/assessment of an acoustic environment in occupied spaces using the NR values in accordance with this standard.
2. NR values are also used by some authorities to specify the performance of plant and equipment in terms of the noise rating caused by plant or equipment operating when installed in a particular environment.

3 REFERENCED DOCUMENTS. The following standards are referred to in this standard:

AS 1633 Glossary of Acoustic Terms

AS 1948 Method for Measurement of Airborne Noise on Board Vessels

AS 2107 Code of Practice for Ambient Sound Levels for Areas of Occupancy Within Buildings

AS 2254 Recommended Noise Ratings for Various Areas of Occupancy in Vessels

AS Z41 Octave, Half Octave, and One-third Octave Band Pass Filters Intended for the Analysis of Sound and Vibrations

4 DEFINITIONS. For the purpose of this standard, the following definitions apply:

NOTE: For definitions of other acoustic terms, see AS 1633.

4.1 Noise rating (NR) number of the sound—a number equal to the highest octave band noise rating number (NR_f) calculated for the octave bands with centre frequencies from 31.5 Hz to 8 kHz inclusive.

4.2 Octave band noise rating number (NR_f) of the sound—a number obtained from an octave band sound pressure level by the use of the following equation:

$$NR_f = \frac{(L_{pf} - A_f)}{B_f} \quad \ldots\ldots\ldots\ldots\ldots (1)$$

where

NR_f = octave band noise rating number

L_{pf} = octave band sound pressure level, in decibels re 20 μPa

A_f and B_f = functions of the octave band centre frequency f having the values shown in Table 1, in decibels

TABLE 1

VALUES OF A_f AND B_f FOR DIFFERENT OCTAVE BAND CENTRE FREQUENCIES

Octave band centre frequency f Hz	A_f dB	B_f dB
31.5	55.4	0.681
63	35.5	0.790
125	22.0	0.870
250	12.0	0.930
500	4.8	0.974
1000	0	1.000
2000	–3.5	1.015
4000	–6.1	1.025
8000	–8.0	1.030

4.3 Noise rating (NR) curves—curves obtained by joining octave band sound pressure levels of equal octave band noise rating on a graph of sound pressure level versus octave band centre frequency.

5 DETERMINATION OF NOISE RATING.

5.1 Numerical Method. For each of the nine octave band sound pressure levels L_{pf} at 31.5 Hz to 8 kHz centre frequencies, calculate the octave band noise rating number (NR_f) by equation (1) and Table 1 or by the use of Table 2. The highest of the eight calculated NR_f values shall, after rounding to the nearest integer, be the noise rating ascribed to the sound concerned.

NOTE: An example of the numerical method is given in Appendix A.

5.2 Graphical Method. An approximate noise rating number may also be determined by the use of the selected family of noise rating curves provided in Fig. 1. The octave band sound pressure levels may be plotted as points on the grid of octave band sound pressure levels (dB) versus centre frequency f(Hz). The corresponding octave band noise rating numbers NR_f may be estimated by interpolation between the curves of NR provided at intervals of 5 NR.

NOTES:

1. An example of the use of the graphical method is given in Appendix A.
2. Caution should be exercised, as the interpolation required is non-linear and varies in scale from place to place on Fig. 1. However, the graphical method in most cases will enable quick identification of the band or bands most likely to attract the highest NR_f. It is advisable to check the true NR_f of the band or bands so identified, using equation 1 or Table 2. Then decide which band has the highest NR_f value and thus determine the NR.

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