

Australian Standard[®]

**ACOUSTICS—METHODS FOR
THE MEASUREMENT OF ROAD
TRAFFIC NOISE**

This Australian standard was prepared by Committee AK/5, Community Noise. It was approved on behalf of the Council of the Standards Association of Australia on 7 February 1984 and published on 6 April 1984.

The following interests are represented on Committee AK/5:

Australian Acoustical Society
Australian and New Zealand Pulp and Paper Industry Technical Association
Australian Institute of Health Surveyors
Australian Institute of Petroleum Limited
Australian Road Research Board
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THE MEASUREMENT OF ROAD
TRAFFIC NOISE**

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PREFACE

This standard was prepared by the Association's Committee on Community Noise.

As road traffic noise is the chief community noise source at the majority of urban sites, it is necessary to standardize methods for measurement of this noise and for the collection of associated data.

At the time of preparation of this standard, a number of descriptors of traffic noise are in use throughout the world. One of these is the descriptor L_{10} (18 hours) which is used in the United Kingdom and has been widely used in Australia. For details of a measurement and prediction method, see Calculation of Road Traffic Noise, Department of Environment, Welsh Office, HMSO, London, July, 1975. The International Organization for Standardization Technical Committee (ISO/TC 43), however, recommends the use of the descriptor $L_{Aeq,T}$. Both the above descriptors are used in this draft standard. It is recommended that further consideration be given to the use in Australia of the descriptor $L_{Aeq,T}$ as additional experience is gained. Thus wherever possible it is recommended that $L_{Aeq,T}$ be measured together with any other traffic noise descriptor.

Prior knowledge of acoustics is required in order to use this standard.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

ACOUSTICS—METHODS FOR THE MEASUREMENT OF ROAD TRAFFIC NOISE

1 SCOPE. This standard sets out methods for the measurement of the noise emitted by road traffic. The sound pressure levels are expressed in decibels, generally using the A-weighting network.

This standard describes minimum instrument requirements, preferred scales of measurement, and the location of measurement sites and non-acoustic data which are to be recorded in conjunction with the acoustic measurements.

NOTE: While the A-weighting network is usually sufficient for traffic noise studies, it may also be necessary to use frequency analysis or other weighting networks, for specific situations. See AS Z41 for details of octave, half octave and one-third octave band filters used for analysis of sound and AS 1259 for details of other networks.

Some of the methods described and the data to be acquired in this standard are only necessary if the measurements are for research purposes.

This standard does not include methods of prediction of road traffic noise levels nor of assessment of the effect of traffic noise on people.

2 REFERENCED DOCUMENTS. The following documents are referred to in this standard:

- AS 1259 Sound Level Meters
 AS 1633 Glossary of Acoustic Terms
 AS 2659 Guide for the Use of Sound Measurement Equipment Part 3—Equipment for Integration of Sound Signals*
 AS 2880 Tape Recording Equipment for Use in Acoustical Measurement in Systems
 SAA MP44 Guide for the Use of Sound Measuring Equipment Part 1—Portable Sound Level Meters†
 AS Z41 Octave, Half Octave and One-third Octave Band Pass Filters Intended for the Analysis of Sound and Vibrations

Guide Policy for Traffic Noise Measurement Procedures, National Association of Australian State Road Authorities, Sydney, 1980

Calculation of Road Traffic Noise, Department of Environment, Welsh Office, HMSO, London, July 1975.

3 APPLICATION. This standard applies to the measurement of sound emitted by road traffic in most situations, when received both inside and outside buildings and for both urban and rural situations.

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

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

4.1 Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (in decibels)—is the value of the sound pressure level of a continuous steady sound that, within a specified time interval, T , has the same mean square sound pressure as a sound whose level varies with time, and is defined as—

$$L_{Aeq,T} = 10 \log_{10} \left[\frac{1}{t_2 - t_1} \int_{t_1}^{t_2} \frac{p_A^2(t)}{p_0^2} dt \right] \text{ dB(A)}$$

where

$L_{Aeq,T}$ = equivalent continuous A-weighted sound pressure level, determined over a time interval T starting at t_1 and ending at t_2 , in decibels (A)

p_0 = reference sound pressure
 = 20 μ Pa

$p_A(t)$ = instantaneous A-weighted sound pressure of the sound signal.

Where discrete sampling methods are used, the value of $L_{Aeq,T}$ may be approximated as follows:

$$L_{Aeq,T} \cong 10 \log_{10} \left[\frac{\sum L_{Ai} \cdot 10^{0.1L_{Ai}}}{10} \right]$$

where

L_{Ai} = sound level corresponding to the class midpoint of the class i , in decibels (A)

Δt_i = time interval for which the sound level is within the limits of class i , in percentage of relevant time periods

Σ = the summation of all the components for the range of classes of sound level involved.

NOTE: Commonly the class interval is 5 dB.

4.2 Percentile level $L_{AN,T}$ (in decibels)—the A-weighted sound pressure level exceeded for N percent of the total time period of interest T in hours, e.g. $L_{AN,1h}$, $L_{AN,T}$ may be determined by sampling over shorter periods, t , where L_{AN} is the sound pressure level exceeded for N percent of the time ' t '.

NOTES:

1. Commonly used values of N are 1, 5, 10, 50, 90, 95 and 99.
2. Commonly used values of T are 1 h and 24 h.
3. Where one representative sample only is taken in time period T , $L_{AN,T} = L_{AN}$; where more than one sample is taken, the separate samples must be combined into one composite sample to determine $L_{AN,T}$.

4.3 Derived descriptor L_{A10} (18 hour)—the arithmetic average of the 18 individual $L_{A10,1h}$ values between the hours of 6.00 a.m. and midnight.

NOTE: This derived descriptor is found in the 'Calculation of Road Traffic Noise, Department of Environment, Welsh Office, HMSO, London, July 1975'.

4.4 Vehicle type—the classification of the vehicles based on shapes given in Fig. 1.

NOTE: The classification of vehicles has been based on potential noise output. For ease of field identification the body shapes and the number of tyres are used in Fig. 1. For additional guidance the typical tare mass ranges are also given for the various body shape/number of tyre classifications.

* In course of preparation