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METHODS FOR MEASUREMENT OF AIRBORNE SOUND EMITTED BY COMPRESSOR UNITS INCLUDING PRIMEMOVERS AND BY PNEUMATIC TOOLS AND MACHINES

PART 2: ENGINEERING METHOD FOR MEASUREMENT OF AIRBORNE SOUND EMITTED BY PNEUMATIC TOOLS AND MACHINES

The following scientific, industrial and governmental organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

Australian Acoustical Society
Australian Compressed Air Institute
Confederation of Australian Industry
CSIRO, Division of Building Research
Department of Environment, South Australia
Environment Protection Authority, Victoria
Institution of Engineers, Australia
National Association of Australian State Road Authorities
Society of Automotive Engineers - Australasia
Sydney City Council

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PREFACE

This standard was prepared by the Association's Committee on Noise from Pneumatic Tools and Machines.

The standard is the second Part of a series of standard methods for measurement of airborne sound emitted by compressor units, including primemovers, and by pneumatic tools and machines. It describes methods for determining the mean sound level and mean band pressure level of airborne sound emitted by different pneumatic tools and machines, and is based on the CAGI-PNEUROP Test Code for the Measurement of Sound from Pneumatic Equipment, published by the Compressed Air and Gas Institute, New York, 1969. It also takes into account ISO/DIS 3481, Acoustics - Measurement of Airborne Noise Emitted by Pneumatic Tools and Machines - Engineering Method for the Determination of Sound Power Levels. Acknowledgment is made of the assistance obtained from these documents.

Other Parts in this series will deal with similar determinations for compressor/primemover units and with determination of sound power level of compressors and pneumatic tools and machines.

This standard is intended to show how information on the acoustic properties of pneumatic tools and machines should be measured and presented. This information is obtained from measurements made over a reflecting plane and in an area where free-field conditions usually exist. A form of test report for presentation of results is given in an appendix.

This standard requires reference to the following Australian standards:

AS 1055	Code of Practice for Noise Assessment in Residential Areas
AS 1259	Sound Level Meters Part 2 — Type 2, Precision
AS 1269	SAA Hearing Conservation Code
AS 1270	Hearing Protection Devices
AS 1633	Glossary of Acoustic Terms
AS A79	Glossary of Names for Earthmoving and Constructional Plant
AS Z33	Preferred Frequencies and Band Centres for Acoustical Measurements
AS Z41	Octave, Half Octave and One-third Octave Band Pass Filters Intended for the Analysis of Sound and Vibrations

CONTENTS

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1 SCOPE. This standard describes a method for determining the mean sound level and mean band pressure level of airborne sound emitted by pneumatic tools and machines. These include both percussive machines (such as crawler drills, rock drills, paving breakers, picks and spaders, chippers, riveters, scalers, spike and pin drivers, rammers and tampers) and non-percussive machines (such as rotary air machines, screw drivers and nut setters, impact wrenches and hoists). This is an engineering method in which care is required to establish a controlled environment in order to achieve repeatable results.

2 APPLICATION. This standard is intended to apply to —

(a) a comparison of the acoustic properties of different makes of tools and machines tested according to the procedures described in this standard, and the subsequent rating of these machines;

(b) a prediction of noise annoyance in adjoining areas from tools and machines operating outdoors, for example on a construction site (see AS 1055 for assessment of noise annoyance in residential areas); and

(c) an assessment of the noise exposure of persons who are occupationally exposed to noise from such tools and machines (see AS 1269 and AS 1270).

3 DEFINITIONS. For the purpose of this standard, the definitions in AS 1633 and AS A79 apply.

4 INSTRUMENTATION.

4.1 Sound Level Meter. The sound level meter shall comply with AS 1259, Part 2. Care shall also be taken to avoid the influence of wind gusts on meter readings. A microphone windscreen shall be used and the appropriate correction shall be applied.

4.2 Alternative Systems. Alternative measuring systems may be used provided that their overall electro-acoustic performance complies with the relevant requirements of AS 1259, Part 2. All parts of such a system, including cables, shall be subjected to calibration.

4.3 Spectrum analysis. Where measurements of the sound frequency spectrum are required, a frequency analyser fitted with filters complying with AS Z41 shall be used, and the selected band shall be in accordance with AS Z33.

4.4 Calibration. All equipment shall be calibrated at intervals of not more than 2 years. In addition, the measuring system shall be checked at least before and after each measuring session against an acoustic calibrator appropriate to the sound level meter. Multi-frequency calibrating devices are recommended for this purpose.

If lengthy measurement procedures are undertaken, instrument performance shall be checked at least every 2 h. If the system registers a discrepancy greater than ±1 dB from the level of the calibrator between consecutive checks, any measurements in the interval between the two checks shall be considered invalid.

5 OPERATING CONDITIONS.

5.5.1 General.

5.1.1 *Condition of machine*. Prior to measurement, the machine under test shall be operating in a stable condition as for continuous service.

The machine shall be operated at its rated working pressure. During testing, air pressure shall be measured at the machine with the machine in operation. The machine shall operate normally; restriction of the exhaust by freezing shall be avoided. The type, quality and quantity of lubricant shall be as recommended by the manufacturer.

NOTES:

1. An air receiver of adequate capacity may need to be provided to avoid effects of pulsations and fluctuations in air supply.
2. Care should be taken to ensure that the airborne sound from compressors and similar auxiliary equipment which may be used does not affect the results.

The geometric centre of the machine or tool on test shall be located above the reflecting plane, as shown in Figs 1 to 15, as applicable.

NOTE: Direct discharge of exhaust air onto the loading device, onto the reflecting plane, or directly towards the microphone position should, as far as possible, be avoided.

5.1.2 *Loading of equipment*. The arrangement of equipment, its operation and loading shall be in accordance with Figs 1 to 15. Care shall be taken to avoid erroneous sound levels caused by induced vibration in the supporting structures as in Figs 7, 10, 11, 12 and 13.