Australian Standard®

ACOUSTICS—DETERMINATION OF SOUND POWER LEVELS OF NOISE SOURCES

Part 7—SURVEY METHOD

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Part 7—SURVEY METHOD

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PREFACE

This standard was prepared by the Association's Committee on Techniques for Measurement. It supersedes AS 1217—1972, Methods of Measurement of Airborne Sound Emitted by Machines.

This standard is based on ISO 3746—1979, Acoustics—Determination of Sound Power Levels of Noise Sources—Survey Method.

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for
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FOREWORD

This standard is one of a series setting out various methods for determining the sound power levels of machines and equipment. These basic documents specify only the acoustical requirements for measurements appropriate for different test environments as shown in Table A.

In the application of these basic documents, it is necessary to decide which one is most appropriate for the conditions and purposes of the test. The operating and mounting conditions of the machine or equipment to be tested must be in accordance with the general principles stated in the basic documents.

Guidelines for making these decisions are provided in AS 1217.1. If no sound test method is specified for a particular machine, the mounting and operating conditions shall be fully described in the test report.

TABLE A.
BASIC STANDARDS SPECIFYING VARIOUS METHODS FOR DETERMINING THE SOUND POWER LEVELS OF MACHINES AND EQUIPMENT

AS number	Classification of method	Test environment	Volume of source	Character of noise	Sound power levels obtainable	Optional information available
AS 1217.2	Precision	Reverberation room complying with specified requirements	Preferably less than 1 percent of test room volume	Steady, broad-band	In one-third octave or octave bands	A-weighted sound power level
AS 1217.3				Steady, discrete-frequency, or narrow-band		
AS 1217.4	Engineering	Special reverberation test room		Steady, broad-band, narrow-band, or discrete-frequency	A-weighted and in octave bands	Other weighted sound power levels
AS 1217.5	Engineering	Outdoors or in large room	Greatest dimension less than 15 m	Most	A-weighted and in one-third octave or octave bands	Directivity information and sound pressure levels as a function of time; other weighted sound power levels
1217.6	Precision	Anechoic or hemi-anechoic room	Preferably less than 0.5 percent of test room volume	Most		
AS 1217.7	Survey	No special test environment	No restrictions; limited only by available test environment	Most	A-weighted	Sound pressure levels as a function of time; other weighted sound power levels

SYNOPSIS

Test environment. Installation (indoors or outdoors) complying with prescribed volume requirements.

Type of source. Device, machine, component, subassembly.

Size of noise source. No restrictions.

Character of noise radiated by the source. Most types. For exceptions, see Clause 1.2.2.

Accuracy. Survey (standard deviation for determining A-weighted sound power levels is about 5 dB for discrete tone sources and 4 dB for sources which radiate steady, broad-band noise).

Quantities to be measured. Weighted sound pressure levels at prescribed microphone positions.

Quantities to be determined. Weighted sound power level: A-weighting is required; other weightings are optional.

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard sets out a survey method for determining the weighted sound power level of a device or machine. The sound power level of the source is calculated from the measured values of the weighted sound pressure levels at prescribed microphone positions. The method is particularly useful for rating the sound output of a source that produces steady noise (as defined in AS 1633) and cannot be moved from its position to a special test environment.

The method requires measurement of the A-weighted sound pressure level at four or more microphone positions on a hypothetical measurement surface which envelops the source. One of two alternative measurement surfaces may be selected, either a hemisphere or a rectangular parallelepiped. The hemispherical surface is best suited for measurement of the noise emitted by small sources as well as that emitted by larger sources which are approximately cubical in shape. The rectangular parallelepiped is best suited for long or tall sound sources as well as for those situations in which measurement must be carried out close to the source. This may occur when use of the hemispherical surface leads to microphone positions that are not sufficiently far away from reflecting surfaces, when measured levels with the source in operation are close to the background noise levels, or when other unfavourable environmental conditions are present. In general, the hemispherical surface is preferred when the measuring distance is large compared with the dimensions of the source and the rectangular parallelepiped is preferred for close-in measurements.

The method yields physical data that may be useful for—

(a) comparing machines which are similar in size and kind; or

(b) rating apparatus in terms of its overall weighted sound power output.

This method should not be used when it is feasible to use a more precise method, e.g. when a laboratory hemi-anechoic room is available for the measurements.

The method requires that the background noise be at least 3 dB lower than the noise produced by the source.

Appendix A gives a procedure for qualifying the acoustic environment for the purposes of measurements made according to the requirements of this standard. If the test environment does not comply with the requirements of Appendix A, the method is not to be used for determining the sound power level of a source.

The method permits the determination of the A-weighted sound power level of a noise source. If additional information is required, e.g. the sound power levels in frequency bands (see AS 1217.4) should be used.

1.2 FIELD OF APPLICATION.

1.2.1 General. This standard sets out a survey method for measuring the weighted sound pressure levels at prescribed microphone positions around a noise source. The A-weighted sound power level of the source is calculated from the measured values. This method may be applied in situ to sources which cannot be moved to a special test environment and to which the methods set out in AS 1217.2 to AS 1217.6 inclusive cannot be applied or should not be applied because they require too much effort.

1.2.2 Types of noise. This standard applies to sources which radiate broad-band noise, narrow-band noise, discrete tones and combinations thereof. The procedures specified in this standard are primarily applicable to sources that radiate steady noise. These procedures may also be applied to sources that radiate non-steady noise as defined in AS 1633, with the exception of an isolated burst of sound energy or a train of bursts with a repetition rate less than 5 per second.

1.2.3 Size of source. The method does not restrict the volume of the noise source. However, if the measurements are made indoors, the volume of the test room must be sufficiently larger than the volume of the source to permit the microphones to be located as specified in Section 5.

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

AS 1217	Acoustics—Determination of Sound Power Levels of Noise Sources, Part 1—Guidelines for the Use of Basic Standards and for the Preparation of Noise Test Codes Acoustics—Determination of Sound Power Levels of Noise Sources, Part 2—Precision Methods for Broad-band Sources in Reverberation Rooms Acoustics—Determination of Sound Power Levels of Noise Sources, Part 3—Precision Methods for Discrete-frequency and Narrow-band Sources in Reverberation Rooms Acoustics—Determination of Sound Power Levels of Noise Sources, Part 4—Engineering Methods for Special Reverberation Test Rooms Acoustics—Determination of Sound Power Levels of Noise Sources, Part 5—Engineering Methods for Free-field Conditions over a Reflecting Plane Acoustics—Determination of Sound Power Levels of Noise Sources, Part 6—Precision Methods for Anechoic and Hemi-anechoic Rooms
AS 1259	Sound Level Meters
SAA MP44	Guide for the Use of Sound Measuring Equipment Part 1—Portable Sound Level Meters*
AS 1633	Glossary of Acoustic Terms

* SAA MP44, Part 1 is in course of revision and is to be issued as AS 2659 Part 1.