Australian Standard®

GUIDE TO THE USE OF SOUND-MEASURING EQUIPMENT

Part 1—PORTABLE SOUND LEVEL METERS

This Australian Standard was prepared by Committee AV/2, Acoustics, Instrumentation and Measurement Techniques. It was approved on behalf of the Council of the Standards Association of Australia on 5 December 1987 and published on 5 April 1988.

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Australian Acoustical Society
Australian Environment Council
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Department of Industrial Relations and Employment, N.S.W.
Department of Occupational Health, Safety and Welfare, W.A.
Department of Transport and Communications
CSIRO, Division of Building Research
National Acoustic Laboratories
National Association of Testing Authorities Australia
National Building Technology Centre
CSIRO, National Measurement Laboratory
Telecom Australia
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PREFACE

This Standard was prepared by the Association's Committee on Acoustics, Instrumentation and Measurement Techniques, to supersede SAA MP44.1, *Guide for the use of sound measuring equipment, Part 1: Portable sound level meters*.

Since 1979 considerable development has taken place in the design of sound measuring equipment and in techniques of measurement.

The purpose of this Standard is to provide background information and to define terminology applicable to the sound measurement field, but more importantly, to describe many of the more commonly encountered standard sound measurement procedures and techniques.

This Standard is restricted to the use of portable sound level meters, although some reference is made to complementary instrumentation. The use of more complex measurement and analysis systems will in general require a reasonably high level of formal technical training on the part of the user and the intention here is to provide a basic reference rather than an advanced text.

CONTENTS

FOREWORD

The community is becoming increasingly aware of the important psychological and physiological effects of noise. Hearing conservation programs are being introduced in industry and there is a growing demand for noise control measures in the community at large.

If informed decisions about noise control are to be made, it is necessary that there be an agreed system for objective sound measurements made according to standardized procedures.

This Standard is one of a series which aims at giving information on the methods by which such reliable measurements of sound may be made. It provides the basic information and procedures which will enable the reader to perform meaningful sound measurements after having acquired some experience. AS 2659.2 provides guidance on types of integrating sound level meters and other instruments such as microphones, extension cables, windscreens, and calibration equipment in general. Another Standard in the series will provide information on more complex equipment for analysis of sound signals, and intended for use by those readers who have already developed some expertise and wish to undertake more complex measurement tasks.

It is emphasized that compliance with the principles set out in this Standard will not alone allow the reader to become proficient in the field of sound measurements. However, if its contents are carefully studied and applied to the measurement of sound, and the information provided by the manufacturer of the microphone/sound level meter systems to be used is closely read and understood, a fair degree of competence in the taking of sound measurements with a sound level meter should result.

STANDARDS ASSOCIATION OF AUSTRALIA

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PART 1: PORTABLE SOUND LEVEL METERS

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard provides guidance on the use of sound level meters for the taking of objective sound measurements according to standardized procedures.

Guidance is given on types of sound level meters, types of sounds and their identification, measurement techniques, and the reporting of information obtained. Calibration of the equipment is also described.

This Standard does not cover the interpretation of any sound pressure levels obtained using the methods described.

1.2 APPLICATION. This Standard applies to the use of portable sound level meters. Some references are made to more complex instrumentation, but this Standard is not intended to cover such equipment. It also applies to microphones, extension cables, windscreens, and calibration equipment normally supplied with portable sound level meters.

The Standard describes the application of sound level meters under various environmental and physical conditions, in order that measurements will be reproducible and comparable. The Standard may be relevant when measurements are made in accordance with any of the Australian Standards listed in Appendix A.

1.3 REFERENCED DOCUMENTS. The documents below are referred to in this Standard.

AS

1055 Acoustics—Description and measurement of environmental noise
- Part 1: General procedures (AS 1055.1)
- Part 2: Application to specific situations (AS 1055.2)
- Part 3: Acquisition of data pertinent to land use (AS 1055.3)

1081 Methods of measurement of airborne noise emitted by rotating electrical machinery

1217 Acoustics—Determination of sound power levels of noise sources
- Part 1: Guidelines for the use of basic standards for the preparation of noise test codes (AS 1217.1)
- Part 2: Precision methods for broad-band sources in reverberation rooms (AS 1217.2)
- Part 3: Precision methods for discrete-frequency and narrow-band sources in reverberation rooms (AS 1217.3)
- Part 4: Engineering methods for special reverberation test rooms (AS 1217.4)
- Part 5: Engineering methods for free-field conditions over a reflecting plane (AS 1217.5)
- Part 6: Precision methods for anechoic and hemi-anechoic rooms (AS 1217.6)
- Part 7: Survey method (AS 1217.7)

1259 Sound level meters

1269 Hearing conservation

1633 Acoustics—Glossary of terms and related symbols

1948 Method for measurement of airborne noise on board vessels

1949 Method for measurement of airborne noise emitted by vessels on waterways and in ports and harbours

2659 Guide to the use of sound-measuring equipment
- Part 2: Portable equipment for integration of sound signals (AS 2659.2)

1.4 DEFINITIONS. For the purpose of this Standard, the definitions given in AS 1633 apply. For convenience, definitions of particular relevance to this Standard are reproduced below and further explanation can be found in the body of this Standard.

1.4.1 Ambient sound—the all-encompassing sound at a point, being a composite of sounds from near and far.

1.4.2 Background sound—the ambient sound in the absence of the sound under investigation.

1.4.3 Decibel—one-tenth of a bel.

Unit symbol: dB

NOTES:

1. Two powers P_1 and P_2 are said to be separated by an interval of n bels (or $10n$ decibels) when $n = \log_{10} (P_1/P_2)$.
2. Where the conditions are such that the ratios of sound particle velocities and ratios of sound pressures (or analogous quantities such as electric currents or voltages) are the square roots of the corresponding power ratios, the number of decibels by which the corresponding powers differ is expressed by the following equations:

$$n = 20 \log_{10} (u_1/u_2)$$

$$n = 20 \log_{10} (p_1/p_2)$$

where u_1/u_2 and p_1/p_2 are the given ratios of sound particle velocity and of sound pressure respectively.

1.4.4 Diffuse sound field—a sound field of uniform energy density in which, from point to point, all directions of propagation of waves are equally probable.

1.4.5 Free field—a sound field in a medium of such extent that the effects of the boundaries are negligible throughout the region of interest.