AS 1081.1—1990
ISO 1680/1: 1986

Australian Standard®

Acoustics—Measurement of airborne noise emitted by rotating electrical machinery

Part 1: Engineering method for free–field conditions over a reflective plane

This Australian Standard was prepared by Committee AV/6, Acoustics — Machinery Noise. It was approved on behalf of the Council of Standards Australia on 2 February 1990 and published on 7 May 1990.

The following interests are represented on Committee AV/6:

Australian Coal Association

Australian Compressed Air and Mining Equipment Institute

Australian Federation of Construction Contractors

Australian and New Zealand Environmental Council

Confederation of Australian Industry

Construction Equipment Importers and Manufacturers of Australia

Council of the City of Sydney

Department of Industrial Relations and Employment, N.S.W.

Department of Labour, S.A.

Master Builders Construction and Housing Association Australia

Metal Trades Industry Association of Australia

Monash University

National Association of Australian State Road Authorities

National Farmers Federation

Outdoor Power Equipment Association

Royal Institute of Naval Architects

Tractor and Machinery Association of Australia

University of Melbourne

Australian Standard®

Acoustics—Measurement of airborne noise emitted by rotating electrical machinery

Part 1: Engineering method for free–field conditions over a reflective plane

First published in part as AS 1081—1975.
Revised and redesignated AS 1081.1—1990.

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 6186 4

PREFACE

This Standard was prepared by the Standards Australia Committee on Acoustics—Machinery Noise to supersede, in part, AS 1081—1975, *Measurement of airborne noise emitted by rotating electrical machinery*. It is identical with and has been reproduced from ISO 1680/1—1986, *Acoustics—Test code for the measurement of airborne noise emitted by rotating electrical machinery*—Part 1: *Engineering method for free–field conditions over a reflective plane*.

This Standard is one of the series which deals with rotating electrical machinery noise, the series being arranged as follows:

Part 1: Engineering method for free–field conditions over a reflective plane (this Standard).

Part 2: Survey method.

For the purpose of this Australian Standard, the ISO text should be modified as follows:

(a) *Clause 3*: The terms which have their equivalents in AS 1633, *Acoustics—Glossary of terms and related symbols* should follow the definitions of the Australian Standard. The terms which do not have equivalents in the AS 1633 should be as in this Standard.

(b) *References*: The reference to other publications should be modified as follows:

ISO		AS	
266	Acoustics—Preferred frequencies for measurements	2533	Acoustics—Preferred frequencies for measurements
354	Acoustics—Measurement of sound absorption in a reverberation room	1045	Acoustics—Measurement of sound absorption in a reverberation room
1680/2	Acoustics—Test code for the measurement of airborne noise emitted by rotating electrical machinery—Part 2: Survey method	1081.2	Acoustics—Measurement of airborne noise emitted by rotating electrical machinery Part 2: Survey method
3740	Acoustics—Determination of sound power levels of noise sources—Guidelines for the use of basic standards and for the preparation of noise test codes	1271.1	Determination of sound power levels of noise sources, Part 1: Guidelines for the use of basic standards for the preparation of noise test codes
3741	Acoustics—Determination of sound power levels of noise sources—Precision methods for broad–band sources in reverberation rooms	1217.2	Acoustics—Determination of sound power levels of noise sources, Part 2: Precision methods for broad–band sources in reverberation rooms
3742	Acoustics—Determination of sound power levels of noise sources—Precision methods for discrete–frequency and narrow–band sources in reverberation room	1217.3	Acoustics—Determination of sound power levels of noise sources, Part 3: Precision methods for discrete–frequency and narrow–band sources in reverberation room
3744	Acoustics—Determination of sound power levels of noise sources—Engineering methods for free–field conditions over a reflecting plane	1217.5	Acoustics—Determination of sound power levels of noise sources, Part 5: Engineering methods for free–field conditions over a reflecting plane
3745	Acoustics—Determination of sound power levels of noise sources—Precision methods for anechoic and semi–anechoic rooms	1217.6	Acoustics—Determination of sound power levels of noise sources, Part 6: Precision methods for anechoic and semi–anechoic rooms
IEC			
34/1	Rotating electrical machines Part 1: Rating and performance	1359	Rotating electrical machines — General requirements
225	Octave, half–octave and third–octave band filters intended for the analysis of sounds and vibrations	Z41	Octave, half–octave and one–third octave band pass filters intended for analysis of sound and vibrations
651	Sound level meters	1259	Sound level meters

CONTENTS

Acoustics—Measurement of airborne noise emitted by rotating electrical machinery—Part 1: Engineering method for free-field conditions over a reflecting plane

0 Introduction

This part of ISO 1680 is based on ISO 3744 and has been drafted in accordance with ISO 3740.

The main purpose of this part of ISO 1680 is to specify a clearly defined measurement method for rotating electrical machines operating under steady-state conditions, the results of which can be expressed in sound power levels so that all machines tested using this code can be directly compared. Other methods, such as the precision methods of ISO 3741, 3742 and 3745, may also be used for determining sound power levels if the installation and operating conditions of this part of ISO 1680 are used.

1 Scope and field of application

1.1 General

This part of ISO 1680 specifies, in accordance with ISO 2204, an engineering method (grade 2) for measuring the sound pressure levels on a rectangular parallelepiped surface enveloping the machine and for calculating the sound power level produced by the machine. It outlines the procedures which may be used to evaluate the test environment and specifies the characteristics of suitable measuring instruments. A method is given for determining the A-weighted sound power level and, if required, octave or one-third octave band sound power levels of the machine from the mean of the sound pressure levels measured on the rectangular parallelepiped surface.

This part of ISO 1680 applies to the measurement of airborne noise from rotating electrical machines, such as motors and generators (d.c. and a.c. machines) without any limitation on the output or voltage, when fitted with their normal auxiliaries. It applies to rotating electrical machines with any linear dimension (length, width or height) not exceeding 15 m.

This part of ISO 1680 applies to measurements carried out in environmental conditions that meet the criteria given in clause 4 and annex A (environmental correction $K \leq 2$ dB, correction for background noise ≤ 1 dB). If these criteria are not met, standard deviations of the test results may be greater than those given in table 1, i.e. the engineering grade of accuracy may not be achieved. The method given in ISO 1680/2 shall then be used, which will result in A-weighted sound power levels of lower accuracy. In this case, no reference shall be made to this part of ISO 1680.

1.2 Measurement uncertainty

Measurements carried out in conformity with this part of ISO 1680 usually result in standard deviations which are equal to or less than those given in table 1. The standard deviations given in table 1 reflect the cumulative effects of all causes of measurement uncertainty, excluding variations in the sound power level of the machine from test to test. For a machine which emits noise with a relatively ”flat” spectrum in the 100 to 10 000 Hz frequency range, the A-weighted sound power level is determined with a standard deviation of approximately 2 dB. For outdoor measurements, the standard deviation in the octave band centred on 63 Hz will be approximately 5 dB.

NOTE— The standard deviations in table 1 include the effects of allowable variations in the positioning of the measurement positions and in the selection of the stipulated measurement surface.

Table 1—Uncertainty in determining sound power levels for engineering measurements indoors or outdoors

Octave band centre frequencies Hz	One-third octave band centre frequencies Hz	Standard deviation of mean value dB
125	100 to 160	3,0
250 to 500	200 to 630	2,0
1 000 to 4 000	800 to 5 000	1,5
8 000	6 300 to 10 000	2,5

2 References

ISO 266, *Acoustics—Preferred frequencies for measurements*.

ISO 354, *Acoustics—Measurement of sound absorption in a reverberation room*.

ISO 1680/2, *Acoustics— Test code for the measurement of airborne norse emitted by rotating electrical machinery— Part 2: Survey method*.