

Sound power levels of noise sources —

Part 7: Survey method for determination of sound power levels of noise sources using a reference sound source

[ISO title: Acoustics — Determination of sound power levels of
noise sources — Survey method using a reference sound source]

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Environment and Pollution Standards Committee (EPC/-) to Technical Committee EPC/1, upon which the following bodies were represented:

- Association of Consulting Engineers
- British Broadcasting Corporation
- British Occupational Hygiene Society
- British Telecommunications plc
- Department of Health and Social Security
- Department of the Environment (Building Research Establishment)
- Department of Trade and Industry (Air Division)
- Department of Trade and Industry (National Physical Laboratory)
- Engineering Equipment and Materials Users' Association
- Health and Safety Executive
- Incorporated Association of Architects and Surveyors
- Institute of Acoustics
- Institute of Occupational Hygienists
- Institute of Physics
- Institute of Sound and Vibration Research
- Institution of Civil Engineers
- Institution of Electronic and Radio Engineers
- Royal Institute of British Architects
- Transmission and Distribution Association (BEAMA Ltd.)

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- AFRC Institute of Engineering Research
- Advanced Manufacturing Technology Research Institute
- Agricultural Engineers Association
- British Cement Association
- British Compressed Air Society
- British Hydromechanics Research Association
- British Steel Corporation
- Business Equipment and Information Technology Association
- Construction Industry Research and Information Association
- Department of Trade and Industry (National Engineering Laboratory)
- Federation of Associations of Specialists and Sub-Contractors
- Federation of Manufacturers of Construction Equipment and Cranes
- Federation of Piling Specialists
- Hevac Association
- Institution of Mechanical Engineers
- Institution of Production Engineers
- Rotating Electrical Machines Association (BEAMA Ltd.)
- Society of Motor Manufacturers and Traders Ltd.

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National foreword

This Part of BS 4196 has been prepared under the direction of the Environment and Pollution Standards Committee and it is identical with ISO 3747:1987 “Acoustics — Determination of sound power levels of noise sources — Survey method using a reference sound source”, published by the International Organization for Standardization (ISO). ISO 3747 was prepared by ISO Technical Committee 43, Acoustics, with the active participation and approval of the UK.

- BS 4196 at present comprises the following Parts which have been published:
- Part 0: *Guide for the use of basic standards and for the preparation of noise test codes;*
 - Part 1: *Precision methods for determination of sound power levels for broad-band sources in reverberation rooms;*
 - Part 2: *Precision methods for determination of sound power levels for discrete-frequency and narrow-band sources in reverberation rooms;*
 - Part 3: *Engineering methods for determination of sound power levels for sources in special reverberation test rooms;*
 - Part 4: *Engineering methods for determination of sound power levels for sources in free-field conditions over a reflecting plane;*
 - Part 5: *Precision methods for determination of sound power levels for sources in anechoic and semi-anechoic rooms;*
 - Part 6: *Survey method for determination of sound power levels of noise sources;*
 - Part 7: *Survey method for determination of sound power levels of noise sources using a reference sound source.*

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following. The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker. Wherever the words “International Standard” or “ISO 3747” appear, referring to this standard, they should be read as “Part of BS 4196” or “this Part of BS 4196” respectively.

Cross references

International Standard	Corresponding British Standard
ISO 266:1975	BS 3593:1963 <i>Recommendation on preferred frequencies for acoustical measurements</i> (Technically equivalent)
ISO 354:1985	BS 3638:1987 <i>Method for measurement of sound absorption in a reverberation room</i> (Identical)
ISO 3740:1980	BS 4196 <i>Sound power levels of noise sources</i> Part 0:1981 <i>Guide for the use of basic standards and for the preparation of noise test codes</i> (Identical)
ISO 3741:1975	Part 1:1981 <i>Precision methods for determination of sound power levels for broad-band sources in reverberation rooms</i> (Identical)
ISO 3742:1975	Part 2:1981 <i>Precision methods for determination of sound power levels for discrete-frequency and narrow-band sources in reverberation rooms</i> (Identical)

International Standard	Corresponding British Standard
ISO 3743:1976	Part 3:1981 <i>Engineering methods for determination of sound power levels for sources in special reverberation test rooms</i> (Identical)
ISO 3744:1981	Part 4:1981 <i>Engineering methods for determination of sound power levels for sources in free-field conditions over a reflecting plane</i> (Identical)
ISO 3745:1977	Part 5:1981 <i>Precision methods for determination of sound power levels for sources in anechoic and semi-anechoic rooms</i> (Identical)
ISO 3746:1979	Part 6:1981 <i>Survey method for determination of sound power levels of noise sources</i> (Identical)
^a IEC 225:1966	BS 2475:1964 <i>Specification for octave and one-third octave band-pass filters</i> (Technically equivalent)
^a IEC 651:1979	BS 5969:1981 <i>Specification for sound level meters</i> (Identical)
^a IEC 804:1985	BS 6698:1986 <i>Specification for integrating-averaging sound level meters</i> (Identical)

^a IEC = International Electrotechnical Commission.

The Technical Committee has reviewed the provisions of ISO 2204 and the draft of ISO 6926, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard. ISO has decided not to publish ISO 3748 to which references are made in Table 1, clause **0.3**, paragraph 4, line 3 and in clause **2**. These references are for information only and do not affect the status of this standard.

IEC Publication 50 (08) is referred to in clause **2** for information only. IEC Publication 50 (08) has been superseded by IEC Publication 50 (801):1984, which is technically equivalent to BS 4727 “*Glossary of electrotechnical, power, telecommunication, electronics, lighting and colour terms*” Part 3 “*Terms particular to telecommunications and electronics*” Group 08:1985 “*Acoustics and electroacoustics terminology*”.

Additional information. It should be noted that in the last sentence of **6.1**, the list of operational conditions is not exhaustive and the sentence should therefore be regarded as being for information only.

NOTE In **7.3.1**, line 6, “parallelipiped” should read “parallelepiped”. In **7.4**, paragraph 3, line 1, “shape” should read “shapes”.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 18, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0.1 Related International Standards

This International Standard is one of a series specifying 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 1.

When applying 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 are given as general principles stated in each of the basic documents. Guidelines for making these decisions are provided in ISO 3740. If no noise test code is specified for a particular machine, the mounting and operating conditions shall be fully described in the test report. The method described in this International Standard supplements the method described in ISO 3746.

0.2 Synopsis of ISO 3747

0.2.1 Applicability

0.2.1.1 *Test environment*

Installation (indoors or outdoors) with no restrictions.

0.2.1.2 *Type of source*

Device, machine, component or sub-assembly not movable from its installed location for the purposes of acoustical measurements.

0.2.1.3 *Dimensions of the source*

No restrictions.

0.2.1.4 *Character of noise radiated by the source*

Steady, broad-band, discrete-frequency or narrow-band.

0.2.2 Accuracy

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

0.2.3 Quantities to be measured

Sound pressure levels with A-weighting and, if required, in octave bands at specified microphone positions for the noise source under test and for a reference sound source which is installed on top of or beside the source under test.

0.2.4 Quantities to be determined

Weighted sound power level (A-weighting is required; other weightings are optional).

0.3 Introduction

In the set of basic documents ISO 3741 to ISO 3746, various methods are described for determining the sound power levels of machines and equipment. These methods, which are of various accuracies, permit the evaluation of the effects produced by the test environment on the sound pressure levels at a given distance from the source. These methods also permit the reduction of the data to free-field conditions by means of environmental corrections which have to be determined.

It is, however, not always a simple matter to determine the magnitude of the environmental corrections. On the other hand, a reference sound source with known acoustical characteristics, stable in time and available for immediate use, can offer many advantages, particularly for taking account of environmental factors.

This International Standard describes the procedures to be used for determining the sound power levels of machines and equipment which cannot be moved from their installed locations for acoustical testing purposes. A reference sound source is used which fulfils the requirements of ISO 6926; the reference sound source is located in the immediate vicinity of the source under test.

Table 1 — International Standards specifying various methods for determining the sound power levels of machines and equipment

International Standard No. ^a	Classification of method ^b	Test environment	Volume of source	Character of noise	Sound power levels obtainable	Optional information available
3741	Precision (grade 1)	Reverberation room meeting specified requirements	Preferably less than 1 % of test room volume	Steady, broad-band	In one-third octave or octave bands	A-weighted sound power level
3742				Steady, discrete-frequency or narrow-band		
3743	Engineering (grade 2)	Special reverberation test room		Steady, broad-band, narrow-band, or discrete-frequency	A-weighted and in octave bands	Other weighted sound power levels
3744	Engineering (grade 2)	Outdoors or in large room	Greatest dimension less than 15 m	Any	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
3745	Precision (grade 1)	Anechoic or semi-anechoic room	Preferably less than 0,5 % of test room volume	Any		
3746	Survey (grade 3)	No special test environment	No restrictions: limited only by available test environment	Any	A-weighted	Sound pressure levels as a function of time; other weighted sound power levels
3747	Survey (grade 3)	No special test environment; source under test not movable	No restrictions	Steady, broad-band narrow-band, or discrete-frequency	A-weighted	Sound power levels in octave bands
3748	Engineering (grade 2)	Essentially free-field over a reflecting plane (indoors or outdoors)	Less than 1 m ³	Any	A-weighted and in one-third octave or octave bands	Sound pressure levels as a function of time; other weighted sound power levels
^a See clause 2.						
^b See ISO 2204.						