

INTERNATIONAL STANDARD

IEC
60268-4

Third edition
2004-02

Sound system equipment –

Part 4: Microphones

© IEC 2004 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: inmail@iec.ch Web: www.iec.ch



Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE

X

For price, see current catalogue

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references.....	7
3 General conditions.....	8
3.1 General.....	8
3.2 Measurement conditions.....	8
4 Particular conditions.....	9
4.1 Pre-conditioning.....	9
4.2 Sound source.....	10
4.3 Measurement of sound pressure.....	10
4.4 Voltage measuring system.....	10
4.5 Acoustical environment.....	10
4.6 Methods of measuring frequency response.....	13
4.7 Overall accuracy.....	14
4.8 Graphical presentation of results.....	14
5 Type description (acoustical behaviour).....	14
5.1 Principle of the transducer.....	14
5.2 Type of microphone.....	14
5.3 Type of directional response characteristics.....	14
6 Terminals and controls.....	15
6.1 Marking.....	15
6.2 Connectors and electrical interface values.....	15
7 Reference point and axis.....	15
7.1 Reference point.....	15
7.2 Reference axis.....	15
8 Rated power supply.....	15
8.1 Characteristic to be specified.....	15
8.2 Method of measurement.....	16
9 Electrical impedance.....	16
9.1 Internal impedance.....	16
9.2 Rated impedance.....	17
9.3 Minimum permitted load impedance.....	17
10 Sensitivity.....	17
10.1 General.....	17
10.2 Sensitivities with respect to acoustical environment.....	18
10.3 Sensitivities with respect to nature of signal.....	20
11 Response.....	21
11.1 Frequency response.....	21
11.2 Effective frequency range.....	21
12 Directional characteristics.....	22
12.1 Directional pattern.....	22
12.2 Directivity index.....	23
12.3 Front-to-rear sensitivity index (0° – 180°).....	23
12.4 Noise-cancelling index.....	24
12.5 Special characteristics for stereo microphones.....	24

13	Amplitude non-linearity	25
13.1	General	25
13.2	Total harmonic distortion	26
13.3	Harmonic distortion of the n^{th} order ($n = 2, 3, \dots$)	26
13.4	Difference frequency distortion of second order	27
14	Limiting characteristics	28
14.1	Rated maximum permissible peak sound pressure	28
14.2	Overload sound pressure	28
15	Balance	28
15.1	Balance of the microphone output	28
15.2	Balance under working conditions	28
16	Equivalent sound pressure level due to inherent noise	29
16.1	Characteristic to be specified	29
16.2	Method of measurement	29
17	Ambient conditions	29
17.1	General	29
17.2	Pressure range	29
17.3	Temperature range	29
17.4	Relative humidity range	29
18	External influences	30
18.1	General	30
18.2	Equivalent sound pressure due to external magnetic fields	30
18.3	Equivalent sound pressure due to mechanical vibration	31
18.4	Equivalent sound pressure due to wind	32
18.5	Transient equivalent sound pressure due to "pop" effect	33
18.6	Equivalent sound pressure due to electromagnetic interference	34
18.7	Electrostatic discharge	34
19	Magnetic stray field	34
19.1	Characteristic to be specified	34
19.2	Method of measurement	35
20	Physical characteristics	35
20.1	Dimensions	35
20.2	Weight	35
20.3	Cables and connectors	35
21	Classification of the characteristics to be specified	35
21.1	General	35
21.2	Classification	36
	Annex A (normative) Sound insulation device	41
	Annex B (informative) Simplified procedure for "pop" measurements	42
	Bibliography	45
	Figure 1a – Balance of the output	37
	Figure 1b – Balance under working conditions	37
	Figure 2 – Measurement set-up for wind influence	37
	Figure 3a – Wind generator with radial fan (front and side view)	38

Figure 3b – Wind generator with axial fan	38
Figure 4 – Electrical and mechanical set-up for the measuring of the "pop" effect	39
Figure 5 – Reference signal and characteristics.....	40
Figure A.1 – Sound insulation device	41
Figure B.1 – Measurement set-up.....	43
Figure B.2 – Test fixture for the sound field sensitivity	44
Table 1 – Reverberation time of the empty room.....	12
Table 2 – Speech power weighting factor at octave-band centre frequencies	20
Table 3 – Classification of characteristics	36

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SOUND SYSTEM EQUIPMENT –**Part 4: Microphones****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60268-4 has been prepared by IEC Technical Committee 100: Audio, video and multimedia systems and equipment.

This third edition cancels and replaces the second edition published in 1997, and constitutes a technical revision.

The text of this standard is based on the following documents:

FDIS	Report on voting
100/721/FDIS	100/750/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until 2008. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

SOUND SYSTEM EQUIPMENT –

Part 4: Microphones

1 Scope

This part of IEC 60268 specifies methods of measurement for the electrical impedance, sensitivity, directional response pattern, dynamic range and external influences of sound system microphones, and also gives recommendations as to characteristics to be specified.

It applies to sound system microphones for all applications for speech and music. It does not apply to measurement microphones, but it does apply to each audio channel of microphones having more than one channel, for example for stereo or similar use. It is also applicable to flush-mounted microphones and to the analogue characteristics of microphones with digital audio output.

For the purposes of this International Standard, a microphone includes all such devices as transformers, pre-amplifiers, or other elements that form an integral part of the microphone, up to the output terminals specified by the manufacturer.

NOTE The characteristics specified in this standard do not completely describe the subjective response of the microphone. Further work is necessary to find new definitions and measurement procedures for a later replacement by objective characteristics of at least some of the subjective descriptions use to describe microphone performance.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60065:2001, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60268-1:1985, *Sound system equipment – Part 1: General*

IEC 60268-2:1987, *Sound system equipment – Part 2: Explanation of general terms and calculation methods*

IEC 60268-3:2000, *Sound system equipment – Part 3: Amplifiers*

IEC 60268-5:2003, *Sound system equipment – Part 5: Loudspeakers*

IEC 60268-11:1987, *Sound system equipment – Part 11: Application of connectors for the interconnection of sound system components*

IEC 60268-12:1987, *Sound system equipment – Part 12: Application of connectors for broadcast and similar use*

IEC 60574-3:1983, *Audiovisual, video and television equipment and systems – Part 3: Connectors for the interconnection of equipment in audiovisual systems*

IEC 60914:1988, *Conference systems – Electrical and audio requirements*

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) – Part 4-2: Testing and measurement techniques – Electrostatic discharge immunity test*

IEC 61000-4-3:2002, *Electromagnetic compatibility (EMC) – Part 4: Testing and measurement techniques – Section 3: Radiated, radio-frequency, electromagnetic field immunity test*

IEC 61265:1995, *Electroacoustics – Instruments for measurement of aircraft noise – Performance requirements for systems to measure one-third-octave-band sound pressure levels in noise certification of transport-category aeroplanes*

IEC 61938:1996, *Audio, video and audiovisual systems – Interconnections and matching values – Preferred matching values of analogue signals*

ISO 354:2003, *Acoustics – Measurement of sound absorption coefficients in a reverberant room*