

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

---

**Household and similar electrical appliances – Test code for the determination of  
airborne acoustical noise –  
Part 1: General requirements**

**Appareils électrodomestiques et analogues – Code d’essai pour la détermination  
du bruit aérien –  
Partie 1: Exigences générales**



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2010 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, 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 either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de la CEI ou du Comité national de la CEI du pays du demandeur.

Si vous avez des questions sur le copyright de la CEI ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de la CEI de votre pays de résidence.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland  
Email: [inmail@iec.ch](mailto:inmail@iec.ch)  
Web: [www.iec.ch](http://www.iec.ch)

### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

### About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: [www.iec.ch/searchpub](http://www.iec.ch/searchpub)

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: [www.iec.ch/webstore/custserv](http://www.iec.ch/webstore/custserv)

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: [csc@iec.ch](mailto:csc@iec.ch)  
Tel.: +41 22 919 02 11  
Fax: +41 22 919 03 00

### A propos de la CEI

La Commission Electrotechnique Internationale (CEI) est la première organisation mondiale qui élabore et publie des normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

### A propos des publications CEI

Le contenu technique des publications de la CEI est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

- Catalogue des publications de la CEI: [www.iec.ch/searchpub/cur\\_fut-f.htm](http://www.iec.ch/searchpub/cur_fut-f.htm)

Le Catalogue en-ligne de la CEI vous permet d'effectuer des recherches en utilisant différents critères (numéro de référence, texte, comité d'études,...). Il donne aussi des informations sur les projets et les publications retirées ou remplacées.

- Just Published CEI: [www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)

Restez informé sur les nouvelles publications de la CEI. Just Published détaille deux fois par mois les nouvelles publications parues. Disponible en-ligne et aussi par email.

- Electropedia: [www.electropedia.org](http://www.electropedia.org)

Le premier dictionnaire en ligne au monde de termes électroniques et électriques. Il contient plus de 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans les langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International en ligne.

- Service Clients: [www.iec.ch/webstore/custserv/custserv\\_entry-f.htm](http://www.iec.ch/webstore/custserv/custserv_entry-f.htm)

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions, visitez le FAQ du Service clients ou contactez-nous:

Email: [csc@iec.ch](mailto:csc@iec.ch)  
Tél.: +41 22 919 02 11  
Fax: +41 22 919 03 00

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

---

**Household and similar electrical appliances – Test code for the determination of  
airborne acoustical noise –  
Part 1: General requirements**

**Appareils électrodomestiques et analogues – Code d’essai pour la détermination  
du bruit aérien –  
Partie 1: Exigences générales**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX



ICS 13.120; 97.170

ISBN 2-8318-1080-5

## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope and object.....	7
1.1 Scope.....	7
1.1.1 General .....	7
1.1.2 Types of noise .....	7
1.1.3 Size of the source.....	7
1.2 Object .....	7
1.3 Measurement uncertainty .....	8
2 Normative references .....	8
3 Terms and definitions .....	9
4 Measurement methods and acoustical environments .....	10
4.1 General.....	10
4.2 Direct method.....	10
4.3 Comparison method .....	11
4.4 Acoustical environments.....	11
4.4.1 General requirements and criterion for adequacy of the test environment .....	11
4.4.2 Criterion for background noise level .....	11
4.4.3 Environmental conditions.....	12
5 Instrumentation .....	12
5.1 Instrumentation for measuring acoustical data.....	12
5.2 Instrumentation for measuring climatic conditions.....	12
5.3 Instrumentation for measuring operating conditions.....	12
6 Operation and location of appliances under test .....	12
6.1 Equipping and pre-conditioning of appliances.....	12
6.2 Supply of electric energy and of water or gas .....	13
6.3 Climatic conditions .....	13
6.4 Loading and operating of appliances during tests .....	14
6.5 Location and mounting of appliances.....	14
7 Measurement of sound pressure levels.....	16
7.1 Microphone array, measurement surface and RSS location for essentially free field conditions over reflecting plane(s) .....	16
7.2 Microphone array and RSS location in hard-walled test rooms .....	18
7.3 Microphone array and RSS location in special reverberation test rooms .....	18
7.4 Measurements.....	19
8 Calculation of sound pressure and sound power levels .....	19
8.1 General.....	19
8.2 Corrections for background noise levels .....	20
8.3 Corrections for the test environment.....	20
8.4 Calculation of sound pressure level averaged over the microphone positions .....	20
8.5 Calculation of sound power levels with the comparison method .....	21
8.6 Calculation of sound power levels in free field conditions over a reflecting plane.....	21
8.7 Calculation of A-weighted sound power level with the direct method in special reverberation test rooms.....	21

9	Information to be recorded.....	22
9.1	General data .....	22
9.2	Description of appliance under test .....	22
9.3	Measurement method.....	22
9.4	Acoustical test environment.....	22
9.5	Instrumentation .....	23
9.6	Equipment and pre-conditioning of appliance under test.....	23
9.7	Electric supply, water supply, etc. ....	23
9.8	Climatic conditions .....	23
9.9	Operation of the appliance under test.....	23
9.10	Location and mounting of the appliance under test.....	23
9.11	Microphone array .....	23
9.12	Measurement data.....	24
9.13	Calculated sound pressure and sound power levels .....	24
10	Information to be reported .....	24
10.1	General data 9.1 .....	24
10.2	Appliance under test 9.2.....	24
10.3	Test conditions for the appliance .....	25
10.4	Acoustical data.....	25
	Annex A (normative) Standard test table.....	31
	Annex B (normative) Test enclosure .....	32
	Annex C (informative) Guidelines for the design of simple test rooms with essentially free field conditions .....	33
	Bibliography.....	34
	Figure 1 – Measurement surface – parallelepiped – with key microphone positions, for floor free-standing appliances .....	26
	Figure 2 – Measurement surface – parallelepiped – with key microphone positions, for floor standing appliances placed against a wall.....	26
	Figure 3 – Measurement surface – parallelepiped – with key microphone positions, for high floor-standing appliances placed against a wall.....	27
	Figure 4 – Measurement surface – hemisphere – with key microphone positions, for hand-held, table type and floor-treatment appliances .....	28
	Figure 5 – Measurement surface – quarter-sphere – with key microphone positions, for small floor-standing appliances placed against a wall .....	29
	Figure 6 – Measurement surface – parallelepiped – with five or nine microphone positions for stand-type appliances .....	30
	Figure A.1 – Example of standard test table.....	31
	Figure B.1 – Test enclosure .....	32

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –  
TEST CODE FOR THE DETERMINATION  
OF AIRBORNE ACOUSTICAL NOISE –****Part 1: General requirements**

## 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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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 60704-1 has been prepared by IEC technical committee 59: Performance of household and similar electrical appliances.

This third edition cancels and replaces the second edition published in 1997 and constitutes an update and an editorial revision. It also includes the description of an appropriate test enclosure for appliances to be built in.

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

FDIS	Report on voting
59/546/FDIS	59/549/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.

A list of all the parts in the IEC 60704 series, under the general title *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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

## INTRODUCTION

Although the noise emitted by household appliances does not generally present a hazard to the hearing of the operator and other exposed persons, the need for standardization procedures for the determination of the noise emitted has been recognized for a long time. Such procedures should be specified, not only for special types of appliances, but also the principles should be applicable to the majority of appliances in general use.

Generally, the determination of noise levels is only part of a comprehensive testing procedure covering many aspects of the properties and performances of the appliance. It is therefore important that the requirements for noise measurements (such as test environment, instrumentation, and amount of labour involved) should be kept at a modest level.

The results of noise measurements will be used for many purposes, for example for noise declaration, as well as for comparing the noise emitted by a specific appliance to the noise emitted by other appliances of the same family. In other cases, the results will be taken as a basis for engineering action in the development stages of new pieces of equipment, or in deciding on means for sound insulation. For all purposes, it is important to specify procedures with known accuracy so that the results of measurements taken by different laboratories can be compared.

These conditions have, as far as possible, been taken into account in the preparation of this test code. The acoustic measuring methods are based on those described in ISO 3743-1, ISO 3743-2 and ISO 3744.

The adoption of these methods permits the use of semi-anechoic rooms, special reverberation test rooms and hard-walled test rooms. The result of the measurements is the sound power level of the appliance. Within the measuring uncertainty specific to these methods, the results from the determination under free field conditions over a reflecting plane are equal to those obtained in reverberant fields. The use of intensity methods as described in ISO 9614-1 and ISO 9614-2 is subject to a specific part 2.

It should be emphasized that this test code is concerned with airborne noise only. In some cases, structure-borne noise, for example transmitted to the adjoining room, may be of importance.



# HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – TEST CODE FOR THE DETERMINATION OF AIRBORNE ACOUSTICAL NOISE –

## Part 1: General requirements

### 1 Scope and object

#### 1.1 Scope

##### 1.1.1 General

This part of IEC 60704 applies to electric appliances (including their accessories or components) for household and similar use, supplied from mains or from batteries.

By similar use is understood the use in similar conditions as in households, for example in inns, coffee-houses, tea-rooms, hotels, barber or hairdresser shops, launderettes, etc., if not otherwise specified in part 2.

This standard does not apply to

- appliances, equipment or machines designed exclusively for industrial or professional purposes;
- appliances which are integrated parts of a building or its installations, such as equipment for air conditioning, heating and ventilating (except household fans, cooker hoods and free standing heating appliances), oil burners for central heating, pumps for water supply and for sewage systems;
- separate motors or generators;
- appliances for outdoor use.

##### 1.1.2 Types of noise

A classification of different types of noise is given in ISO 12001. The method specified in ISO 3744 is suitable for measurements of all types of noise emitted by household appliances. The methods specified in ISO 3743-1 and ISO 3743-2 are suitable for all types of noise, except for sources of impulsive noise consisting of short duration noise bursts. This will be taken into account in the preparation of parts 2.

##### 1.1.3 Size of the source

The method specified in ISO 3744 is applicable to noise sources of any size. Limitations for the size of the source are given in 1.3 of ISO 3743-1 and ISO 3743-2. This will be taken into account in the preparation of parts 2.

#### 1.2 Object

This standard is concerned with objective methods of engineering accuracy (grade 2 according to ISO 12001) for determining sound power levels  $L_W$ , expressed in decibels (dB) with reference to a sound power of one picowatt (1 pW), of airborne acoustical noise within the specified frequency range of interest (generally including the octave bands with centre frequencies from 125 Hz to 8 000 Hz), and for prescribed operating conditions of the appliance to be measured.

The following quantities are used: