

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

Household and similar electrical appliances – Test code for the determination of airborne acoustical noise –

Part 2-10: Particular requirements for electric cooking ranges, ovens, grills, microwave ovens and any combination of these

<https://standards.iteh.ai/catalog/standards/sist/2249299f-2e8e-4bc3-bf22-100000000000/iec-60704-2-10-2011>

Appareils électrodomestiques et analogues – Code d'essai pour la détermination du bruit aérien –

Partie 2-10: Règles particulières pour les cuisinières, les fours, les grils, les fours à micro-ondes et toute combinaison de ces appareils



## THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2011 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.

[IEC 60704-2-10-2011](mailto:IEC.60704-2-10-2011)

- 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 2-10: Particular requirements for electric cooking ranges, ovens, grills,  
microwave ovens and any combination of these

<https://standards.iteh.ai/catalog/standards/sist/2249299f-2e8e-4bc3-bf22->

Appareils électrodomestiques et analogues – Code d'essai pour la détermination  
du bruit aérien –

Partie 2-10: Règles particulières pour les cuisinières, les fours, les grils, les fours  
à micro-ondes et toute combinaison de ces appareils

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

PRICE CODE  
CODE PRIX

M

ICS 17.140.20; 97.040.20

ISBN 978-2-88912-662-0

# INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

### Part 2-10: Particular requirements for electric cooking ranges, ovens, grills, microwave ovens and any combination of these

#### 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 60704-2-10 has been prepared by subcommittee 59K: Ovens and microwave ovens, cooking ranges and similar appliances, of IEC technical committee 59: Performance of household and similar electrical appliances.

This second edition cancels and replaces the first edition published in 2004 and constitutes an adaptation to the third edition of IEC 60704-1(2010).

Compared to the first edition (2004) of this Part 2-10, this second edition doesn't contain the description of an appropriate test enclosure which has now been incorporated in Part 1.

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

FDIS	Report on voting
59K/224/FDIS	59K/228/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.

This Part 2-10 is intended to be used in conjunction with IEC 60704-1:2010 (3rd edition) *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 1: General requirements*.

NOTE When "Part 1" is mentioned in this standard, it refers to IEC 60704-1.

This Part 2-10 supplements or modifies the corresponding clauses in IEC 60704-1, so as to establish the test code for electric cooking ranges, ovens, grills, microwave ovens and any combination of these. When a particular subclause of Part 1 is not mentioned in this Part 2-10, that subclause is applicable as far as reasonable. Where this Part 2-10 states "addition", "modification" or "replacement", the relevant requirements, test specifications or explanatory matter in Part 1 is to be adapted accordingly.

Subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1.

Unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause.

Additional annexes are lettered AA, BB, etc.

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

The measuring conditions specified in this Part 2-10 of IEC 60704 provide for sufficient accuracy in determining the noise emitted and comparing the results of measurements taken by different laboratories, whilst simulating as far as possible the practical use of electric cooking ranges, ovens, grills, microwave ovens and any combination of these.

It is recommended to consider the determination of noise levels as part of a comprehensive testing procedure covering many aspects of the properties and performance of household appliances.

Compared to the first edition (2004) of this Part 2-10, the second edition doesn't contain the description of an appropriate test enclosure which has now been incorporated in Part 1.

NOTE As stated in the Introduction to IEC 60704-1, this test code is concerned with airborne noise only.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[IEC 60704-2-10:2011](https://standards.iteh.ai/catalog/standards/sist/2249299f-2e8e-4bc3-bf22-6ff93be32dd9/iec-60704-2-10-2011)

<https://standards.iteh.ai/catalog/standards/sist/2249299f-2e8e-4bc3-bf22-6ff93be32dd9/iec-60704-2-10-2011>

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

### Part 2-10: Particular requirements for electric cooking ranges, ovens, grills, microwave ovens and any combination of these

## 1 Scope and object

This clause of Part 1 is applicable except as follows:

### 1.1 Scope

#### 1.1.1 General

*Addition:*

These particular requirements apply to electric cooking ranges, ovens, grills, microwave ovens and any combination of these for household and similar use.

NOTE 101 These particular requirements do not apply to hobs due to lack of standardised load (pans) representative of normal use and ensuring a good repeatability of tests. For these applications, the loading and operating conditions are under consideration.

This standard does not apply to appliances or parts of appliances that use gas energy.

#### 1.1.2 Types of noise

*Replacement:*

The methods specified in ISO 3743-1, ISO 3743-2 and ISO 3744 can be used for measuring noise emitted by electric cooking ranges, ovens, grills, microwave ovens and any combination of these.

#### 1.1.3 Size of the source

*Replacement:*

The method specified in ISO 3744 is applicable to noise sources of any size. When applying ISO 3743-1 and ISO 3743-2, care should be taken that the maximum size of the appliance under test fulfils the requirements specified in 1.3 of ISO 3743-1:1994 and ISO 3743-2:1994.

## 1.2 Object

*Addition:*

The methods described are specified for appliances without an operator present.

Requirements for the declaration of noise emission values are not within the scope of this standard.

NOTE 101 For determining and verifying noise emission values declared in product specifications, see IEC 60704-3.

### 1.3 Measurement uncertainty

*Replacement:*

The estimated values of standard deviations of sound power levels, determined according to this standard, are as follows:

**Table 101 – Standard deviations of sound power levels**

Standard deviation dB	
$\sigma_r$ (repeatability)	$\sigma_R$ (reproducibility)
0,4	1,0

#### 1.101 Standard deviation for declaration and verification

For the purpose of determining and verifying declared noise emission values according to IEC 60704-3, the following values apply:

**Table 102 – Standard deviations for declaration and verification**

Standard deviation dB		
$\sigma_P$ (production)	$\sigma_t$ (total)	$\sigma_M$ (reference)
1,0 – 1,7	1,4 – 2,0	2,0

## 2 Normative references

<https://standards.iteh.ai/catalog/standards/sist/2249299f-2e8e-4bc3-bf22-6ff93bc32dd9/iec-60704-2-10-2011>

This clause of Part 1 is applicable except as follows.

*Addition:*

ISO 7235:2003, *Acoustics - Laboratory measurement procedures for ducted silencers and air-terminal units - Insertion loss, flow noise and total pressure loss*

## 3 Terms and definitions

This clause of Part 1 is applicable except as follows.

*Addition:*

### 3.101

#### cooking range

appliance having a hob and at least one oven; it may incorporate a grill

[IEC 60350:1999, definition 3.1]

### 3.102

#### hob

appliance or part of an appliance which incorporates one or more cooking zones

[IEC 60350:1999, definition 3.2]

NOTE 101 A hob is also known as a cook top.



**3.103****oven**

appliance or compartment of a cooking range in which food is cooked by radiation, by natural convection, by forced-air circulation, by steam or by a combination of these heating methods

[IEC 60350:1999, definition 3.10]

**3.104****grill**

appliance or part of an appliance in which food is cooked by radiant heat

[IEC 60350:1999, definition 3.9]

**3.105****steam function**

function by which food is heated with steam up to boiling temperature of water at ambient pressure

**3.106****hot steam function**

function by which food is heated with hot steam ( $T > 100\text{ °C}$ ) at ambient pressure

[Amendment 1:2005 of IEC 60350:1999, definition 3.18 modified]

**3.107****forced air circulation function**

heat transmission to the food by forced air convection, i.e. circulating the air with the help of a fan

<https://standards.iteh.ai/catalog/standards/sist/2249299f-2e8e-4bc3-bf22-6ff93be32dd9/iec-60704-2-10-2011>

[Amendment 1:2005 of IEC 60350:1999, definition 3.17]

NOTE 101 This does not include circulated functions that operate a grill element only.

**3.108****microwave oven**

appliance using electromagnetic energy in the ISM frequency band of 2450 MHz for heating food and beverages in the cavity

[IEC 60705:2010, definition 3.1]

NOTE 101 The microwave oven may incorporate a browning element.

NOTE 102 ISM frequency bands are the electromagnetic frequencies established by the ITU and reproduced in CISPR 11.

**3.109****other heating function**

heating by energy other than microwave

**3.110****cooling fan**

fan integrated in an appliance for the purpose of avoiding excessive temperatures

### 3.111

#### **standard test load**

for functions using microwave energy, a cylindrical container of borosilicate glass with a maximum wall thickness of 3 mm, an outside diameter of approximately 190 mm and a height of approximately 90 mm, filled with  $1000 \text{ g} \pm 50 \text{ g}$  of water at  $20 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$

NOTE 101 A glass rod or similar is placed in the glass container to prevent accidents due to the boiling delay factor.

NOTE 102 To avoid noise from boiling water the load has to be changed before the measurements.

NOTE 103 Other heating functions are operated and measured without load.

## **4 Measurement methods and acoustical environments**

This clause of Part 1 is applicable except as follows.

### **4.2 Direct method**

*Addition:*

NOTE 101 If pure tone components are present in the noise emitted by the source, the estimated standard deviation of the measured sound pressure levels in the special reverberation room may increase. In such cases additional microphone positions or source positions may be necessary as specified in ISO 3743-2.

### **4.3 Comparison method**

*Addition:*

NOTE 101 If pure tone components are present in the noise emitted by the source, the estimated standard deviation of the measured sound pressure levels in the hard-walled test room or in the special reverberation room may increase. In such cases additional microphone positions or source positions may be necessary as specified in ISO 3743-1 or ISO 3743-2.

## **5 Instrumentation**

This clause of Part 1 is applicable.

## **6 Operation and location of appliance under test**

This clause of Part 1 is applicable except as follows.

### **6.1 Equipping and pre-conditioning of appliances**

#### **6.1.1**

*Replacement:*

The appliance is equipped with drive units and accessories that are necessary to run the motor(s). All other accessories for example roasting trays, oven cavity dividers, baking sheets, grill grids etc. shall be removed.

If according to the manufacturer's instructions an appliance with integrated air extraction can be connected to an exhaust device, the standard exhaust as described in Figure 101 shall be connected. It consists of a pipe connected to a muffler. The pipe shall be metallic with smooth inner walls and shall have the widest diameter among those specified by the manufacturer. If not stated, a standard pipe with the best fitting diameter shall be used. The muffler shall have an insertion loss as specified in the table of Figure 101. It shall have a circular section with the same internal diameter as that of the pipe and a length as specified in Figure 101 and shall not have protruding parts inside that may cause additional pressure drops. The pipe and

the muffler shall also comply with all the specifications reported in Figure 101 and care shall be taken that they do not radiate noise. Horizontal, vertical or inclined mounting of the pipe and the muffler is possible. If the air outlet is located at the rear side of the appliance, a 90° bend of the same type as the standard exhaust system shall be used for connection of the appliance to the standard exhaust system.

#### 6.1.2

*Replacement:*

Prior to noise measurements, the appliance, equipped according to 6.1.1, shall have been in operation at maximum speed and power for at least 10 min. The load shall be chosen according to 3.111.

#### 6.1.3

*Replacement:*

Stabilising is included in operating, according to 6.4.2.

### 6.2 Supply of electrical energy and of water or gas

6.2.3 and 6.2.4 Not applicable.

### 6.4 Loading and operating of appliances during test

#### 6.4.2

*Replacement:*

[IEC 60704-2-10:2011](https://standards.iteh.ai/catalog/standards/sist/2249299f-2e8e-4bc3-bf22-c095bc32ad/iec-60704-2-10-2011)

Unless otherwise specified in this standard, for each function settings shall be chosen that produce the highest noise emission. As a result the highest noise emission value from all functions shall be reported. Any cleaning mode shall be disregarded.

In the case of multiple cavity ovens, the multiple cavities shall be operated simultaneously.

NOTE 101 In general, the highest noise emission occurs at the highest air circulation, turntable speed, rotisserie speed, fan speed, microwave power, etc. When provided, the manufacturer's instructions should be taken into account.

For microwave function, including all possible combined functions, a load according to 3.111 shall be applied. Measurements shall be started 2 min after switching on and shall be finished before boiling occurs.

For other heating functions, temperature conditions shall be as follows:

- boiling temperature of water for steam function;
- 175 °C for ovens with forced air circulation heating function and hot steam function;
- 200 °C for all other heating functions;
- maximum setting for grill function.

Measurements shall be started when the specified temperature is reached. On grills, measurements shall be started 15 min after switching on.

NOTE 102 If there is no indicator, reaching of the specified temperature could be controlled with a power meter.

**6.4.3** Not applicable.

## **6.5 Location and mounting of appliances**

**6.5.2** Not applicable.

### **6.5.3**

*Modification:*

$D = 25 \text{ cm} \pm 0,5 \text{ cm}$

## **7 Measurement of sound pressure levels**

This clause of Part 1 is applicable except as follows.

### **7.1 Microphone array, measurement surface and RSS location for essentially free-field conditions over reflecting plane(s)**

#### **7.1.4**

*Replacement:*

For counter-top or table-type appliances, 7.1.2 applies.

**7.1.5 to 7.1.6** Not applicable.

### **7.4 Measurements**

#### **7.4.1**

<https://standards.iteh.ai/catalog/standards/sist/2249299f-2e8e-4bc3-bf22-6ff93be32dd9/iec-60704-2-10-2011>

*Addition:*

The averaging time shall be at least 30 s for a stable noise. In the case of varying noise emission, the averaging time shall include at least 3 periods, each period being representative for the varying noise.

## **8 Calculation of sound pressure and sound power levels**

This clause of Part 1 is applicable.

## **9 Information to be recorded**

This clause of Part 1 is applicable except as follows.

**9.6.3** Not applicable.

**9.7.4** Not applicable.

### **9.9.3**

*Replacement:*

Function with the highest noise emission value.