IEC 60704-2-13

Edition 1.0 2005-12

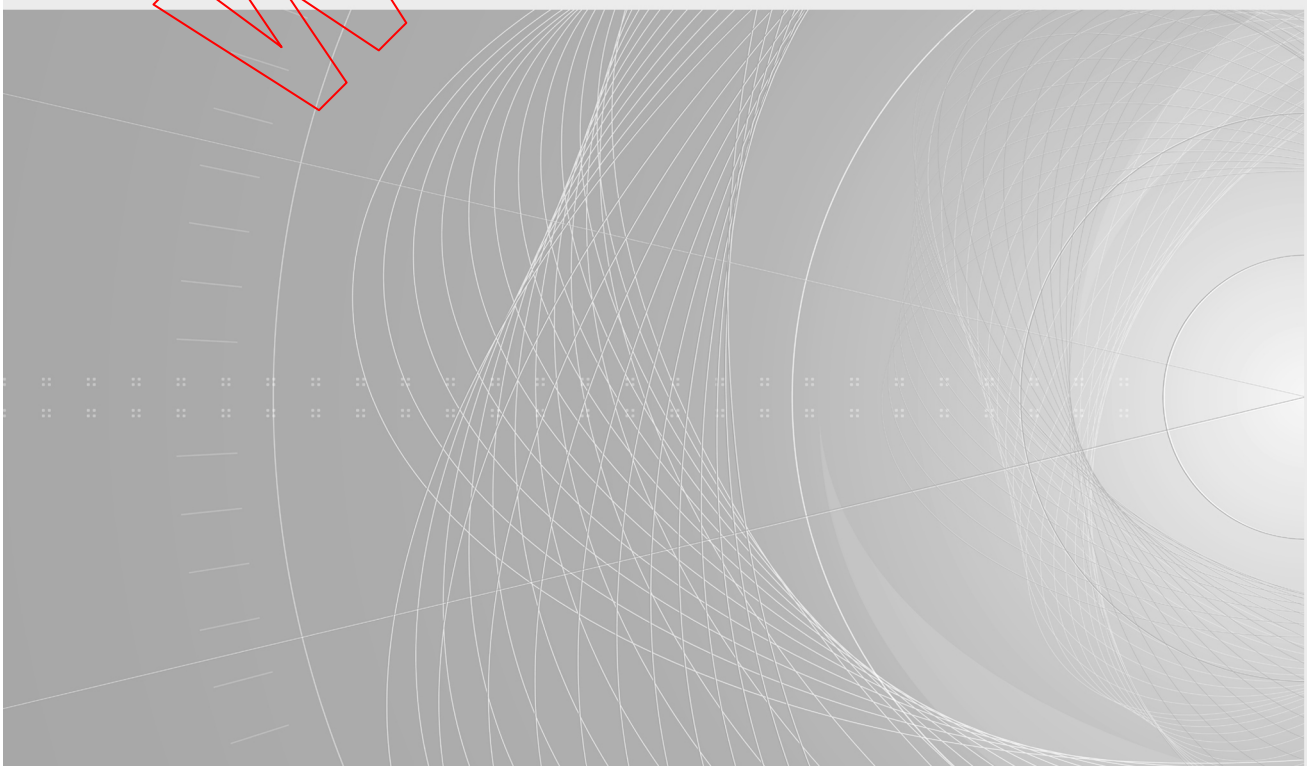
INTERNATIONAL STANDARD

NORME INTERNATIONALE

AMENDMENT 1
AMENDEMENT 1

Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2-13: Particular requirements for range hoods

Appareils électrodomestiques et analogues – Code d'essai pour la détermination du bruit aérien – Partie 2-13: Règles particulières pour les hottes de cuisine



IEC 60704-2-13 A1:2005

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX K

ICS 17.140.20; 97.040.20

ISBN 2-8318-9538-3

FOREWORD

This amendment has been prepared by IEC technical committee 59: Performance of household electrical appliances.

This bilingual version, published in 2008-01, corresponds to the English version.

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

FDIS	Report on voting
59/422/FDIS	59/432A/RVD

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

The French version of this amendment has not been voted upon.

The committee has decided that the contents of this amendment and the base publication will remain unchanged until the maintenance result 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- withdrawn,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

This amendment introduces a description of the intensimetric method for the determination of sound power levels of range hoods in addition to the other methods described in the standard, for the use of which the text of IEC 60704-2-13 remains unchanged. According to the method described here, the sound power level is obtained by measuring the component of sound intensity normal to a measurement surface that surrounds the range hood.

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CONTENTS

Add, after the listing for Annex AA, the title of the new bibliography as follows:

Bibliography

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1 Scope and object

1.1.1 General

Add, to the existing text, the following new paragraph:

Intensimetric method for the determination of sound power levels shall not be used for the purpose of verification.

1.1.2 Types of noise

Replace the existing text of the addition by the following new text:

Addition:

The method is applicable to any source for which a physically stationary measurement surface can be defined, and on which the noise generated by the source is stationary in time (as defined in Clause 3), therefore it is not suitable for sources of impulsive noise consisting of short duration noise bursts. This method is not suitable if the source under test has significant noise over 6,3 kHz in one-third-octave band centre frequencies and over 4 kHz in one-octave band centre frequencies.

1.1.3 Size of the source

Replace the existing text of the replacement by the following new text:

Replacement:

The size of the noise source is unrestricted. The extent of the source is defined by the choice of the measurement surface.

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Add the following subclause:

1.3 Measurement uncertainty

Replacement:

The uncertainty in the determination of the sound power level of a noise source is related:

- to the nature of the sound field of the source;
- to the nature of the extraneous sound field;
- to the absorption of the source under test;
- to the type of intensity-field sampling and measurement procedure employed.

The normal range for A-weighted data is covered by the one-octave bands from 63 Hz to 4 kHz, and the one-third-octave bands from 50 Hz to 6,3 kHz. The estimated values of standard deviations of sound power levels, determined according to this standard for both the discrete points method and the scanning method are as indicated in Table 101.

Table 101 – Standard deviations of sound power levels

Standard deviation (dB)	
σ_r (repeatability)	σ_R (reproducibility)
1,5	2,0

2 Normative references

Add the following new references:

IEC 61043:1993, *Electroacoustics – Instruments for the measurement of sound intensity – Measurement with pairs of pressure sensing microphones*

ISO 9614-1:1993, *Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 1: Measurement at discrete points*

ISO 9614-2:1996, *Acoustics – Determination of sound power levels of noise sources using sound intensity – Part 2: Measurement by scanning*

3 Terms and definitions

Add the following definition:

3.1
terms and definitions pertinent to determination of sound power levels

Replacement:

These may be found in ISO 9614-1 and ISO 9614-2.

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4 Measurement methods and acoustical environments

Add the following subclause:

4.1 General

Replacement:

The total noise emitted by machinery or equipment, and radiated in all directions to the space surrounding the machine, can be characterized by the sound power of the machine. The sound power of a machine is essentially independent of the environment in which the machine is installed.

Therefore, the concept of sound power level has been chosen for expressing the noise emission of appliances for household and similar purposes.

The preferred noise emission quantity is the A-weighted sound power level, in decibels (re. 1 pW).

According to this standard, one method is used, the direct method as described in 4.2 below.

4.2 Direct method

Replace the existing text of the addition with the following new text:

Addition:

The measurement can be performed according to two intensimetric methods, the "discrete points method" and the "scanning method", as described below.

4.2.101 Discrete points method

Define, as the measurement surface, a parallelepiped-shaped surface around the range hood; then divide it in partial areas (segment) so as to obtain a grid. The dimension of the parallelepiped depends on the dimension of the range hood: the distance between each face of the parallelepiped and the range hood under test depends on the value of F_2 and F_3 indicators (see Annexes A and B of ISO 9614-1) but shall be at least 10 cm. The density of measurement positions on parallelepiped faces depends on extraneous noise and on the value of the F_4 indicator (see Annexes A and B of ISO 9614-1). The total sound power of the source is obtained from calculation of the partial sound power of each segment of the parallelepiped, by multiplying the "local" intensity sound by its partial area, and then by adding all the partial sound powers (absolute value).

4.2.102 Scanning method

This method is very similar to the previous one (4.2.101), with the only difference being that each face of the parallelepiped is not divided in partial areas, but is continuously scanned with the intensimetric probe, and the space and time average of intensity sound is multiplied by its area; then the total sound power of the range hood is obtained by adding the partial sound powers of each face of the parallelepiped.

NOTE The distance of 20 cm between each face of the parallelepiped and the range hood is usually acceptable.

4.3 Comparison method

Replace the existing text of the addition with the following new text:

Not applicable.

Add the following subclauses:

4.4 Acoustical environments

4.4.1 General requirements and criterion for adequacy of the test environment

Replacement:

For the discrete points method, the general requirements and criterion for adequacy of the test environment are given in Clauses 4 and 5 of ISO 9614-1.

For the scanning method, they are given in Clauses 4 and 5 of ISO 9614-2.

4.4.2 Criterion for background noise level

Not applicable.

5 Instrumentation

5.1 Instrumentation for measuring acoustical data

Add, to the existing addition, the following new paragraphs:

Sound intensity measurement instruments and probes that meet the requirements of IEC 61043 shall be used. Class 1 instruments shall be used.

To check the instrumentation for proper operation prior to each series of measurements, the field-check procedure specified by the manufacturer shall be applied.

6 Operation and location of appliances under test

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6.5 Location and mounting of appliances

6.5.1 *Replace the existing text of the replacement with the following:*

Replacement:

Range hoods not intended to be placed against a wall shall be supported by resilient means (examples are given in Figure 102 of IEC 60704-2-13). Care shall be taken in order to avoid any kind of interference between the supports and air intake of appliance under test.

The lower edge of the appliance shall be placed at a height of 0,6 m from the horizontal reflecting plane or from the floor of the test room.

The reference grid shall enclose the standard stand shown in Figure 102 and the range hood under test. This parallelepiped-shaped reference surface shall be placed on the floor.

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6.5.4 *Replace the existing text of the replacement with the following:*

Replacement:

Range hoods intended to be placed against a wall shall be supported by resilient means without any contact with the vertical wall (examples are given in Figure 102). Care shall be taken in order to avoid any kind of interference between the supports and air intake of appliance under test.

The lower edge of the appliance shall be placed at a height of 0,6 m from the horizontal reflecting plane or from the floor of the test room. The rear edge of the range hood shall be placed at a distance of 1 cm from the second vertical reflecting plane.

The reference grid shall enclose the standard stand shown in Figure 102 and the range hood under test. This parallelepiped-shaped reference surface shall be placed on the floor. The vertical reflecting plane and the horizontal reflecting plane or the floor enclosed in the reference surface shall have an absorption coefficient α less than 0,06.

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7 Measurement of sound pressure levels

Replace the totality of this clause as follows:

7 Measurement of sound pressure levels

This clause of Part 1 is replaced as follows:

7 Measurement of normal sound intensity component levels

7.1 Initial test

7.1.1 Discrete points method

Choose a typical measurement position on the initial measurement surface for the assessment of whether the sound field is stationary or not. With the appliance under test turned on, calculate indicator F_1 for all frequency bands of measurement according to A.2.1 of Annex A of ISO 9614-1. The temporal variability of the sound field shall not exceed the values specified in Table B.3 in Annex B of ISO 9614-1.

Extraneous noise is insignificant if A-weighted sound pressure levels measured at five positions (distributed reasonably uniformly over the measurement surface) fall by at least 20 dB when the source is turned off.

Calculate the field indicators F_2, F_3 and F_4 for all frequency bands of measurement according to Annex A of ISO 9614-1, and introduce them into the formulae given for the qualification procedure of B.1.1 of Annex B of ISO 9614-1. When this requirement is fulfilled for each frequency band, the initial sound power determination is qualified as a final result within the range of uncertainty given in 1.3.

7.1.2 Scanning method

Make two separate scans (the two individual scan paths shall be orthogonal) on each segment of the measurement surface, and separately record the partial sound power levels $L_{wi(1)}$ and $L_{wi(2)}$ according to 9.2 of ISO 9614-2 for all frequency bands of measurement. The values shall fulfill criterion 3 of B.1.3 in ISO 9614-2.

Evaluate indicator F_{pI} for all frequency bands of measurement according to equation (A.1) of A.2.1 of Annex A of ISO 9614-2 and introduce the values into the formula given for qualification procedure B.1 of Annex B of ISO 9614-2. F_{pI} shall be less than 20 dB.

Evaluate indicator $F_{+/-}$ for all frequency bands of measurement according to equation (A.2) of A.2.2 of Annex A of ISO 9614-2 and introduce the values into the formula given for the qualification procedure of B.1.2 of Annex B of ISO 9614-2.

7.2 Measurements

7.2.1 Discrete points method

When the preliminary tests described in 7.1 have been carried out, measure the normal component of sound intensity in each frequency band of interest and for each segment of parallelepiped-shaped grid. The probe shall be placed normal to the surface. The "local" value, I_{ni} , is obtained by time integration of the acoustic signal over a period of at least 20 s.

7.2.2 Scanning method

Carry out scanning either manually or by means of a mechanized traversing system. The extraneous intensity generated by this mechanism, as measured by the probe, shall be at least 20 dB lower than the one generated by the appliance on the measurement surface. Move the intensity probe continuously along specified paths on each segment of the selected measurement surface. The basic element of a scan is a single straight line. The duration of each scan over an individual segment shall not be less than 20 s. Initiate time averaging at the beginning of the scan over each segment and terminate it at the completion of the scan of the segment.

8 Calculation of sound pressure and sound power levels

Replace the totality of this clause as follows:

8 Calculation of sound pressure and sound power levels

This clause of Part 1 is replaced as follows:

8 Calculation of sound intensity and sound power levels

8.1 Calculation of partial sound powers for each segment of surface

Calculate a partial A-weighted sound power, P_i, for each segment of the measurement surface from the equation:

$$P_i = I_{ni} \cdot S_i$$

where

P_i is the partial A-weighted sound power for segment i given by the sum of all the sound power levels found in each frequency band;

I_{ni} is the sum of A-weighted normal intensity components in all frequency bands of interest for segment i:

Discrete points method: is the signed magnitude of the normal sound intensity component measured at position i on the measurement surface;

Scanning method: is the mean segment-average normal sound intensity component measured on segment i of the measurement surface:

$I_{ni} = [I_{ni}(1) + I_{ni}(2)]/2$

and $I_{ni}(1)$ and $I_{ni}(2)$ are the values of I_{ni} obtained from two separate scans of segment i;

S_i is the area of segment i.

Where the normal sound intensity component level, $L_{Ini,}$ at position i is expressed as XX dB, the value of I_{ni} shall be calculated from the equation:

$$I_{ni} = I_0 \times 10^{XX/10}$$

Where the normal sound intensity component level, $L_{Ini,}$ at position i is expressed as (-) XX dB, the value of I_{ni} shall be calculated from the equation:

$$I_{ni} = -I_0 \times 10^{XX/10}$$

In these equations $I_0 = 10^{-12}$ W/m^2