IEC 60704-3

Edition 3.0 2019-05
REDLINE VERSION

INTERNATIONAL STANDARD

colour inside

Household and similar electrical appliances – Test code for the determination of airborne acoustical noise –
Part 3: Procedure for determining and verifying declared noise emission values

IEC 60704-3:2019-05 RLV(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 17.140.20; 97.030

ISBN 978-2-8322-7027-1

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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International Standard IEC 60704-3 has been prepared by IEC technical committee 59: Performance of household electrical appliances.

IEC 60704-1:2010 has served as a basis for the elaboration of this standard.

This third edition cancels and replaces the second edition published in 2006. This edition constitutes a technical revision. It includes the following significant technical changes with respect to the previous edition:

a) in Annex A, standard deviations that are now specified for various appliance categories in the parts of IEC 60704-2 have been excluded from Table A.1;
b) furthermore, this edition makes reference to new standards and is implementing ISO/IEC Directives, Part 2 in a more accurate manner.

Standard deviations specified in part 2 documents of the IEC 60704 series supersede the values given in Table A.1.

The text of this International Standard is based on the following documents:

CDV	Report on voting
59/675/CDV	59/680A/RVC

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

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

This International Standard is to be used in conjunction with IEC 60704-1:2010 and the latest edition of IEC 60704-2 (all parts).

A list of all parts in the IEC 60704 series, published 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 document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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- withdrawn,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

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INTRODUCTION

~~Although the noise levels produced by household appliances are not known to present a hazard to the hearing of users or other exposed persons, and as a result no noise limits have been specified by relevant authorities responsible for health protection,~~ A comprehensive and correct declaration of noise emission ~~will be~~ is very helpful to enable the potential buyer to make a good choice between appliances of the same category (serving for the same purpose) of different makes or for different models.

In order to ensure a correct declaration of noise emission values, this part of IEC 60704 ~~prescribes~~ describes a simple method for verifying declared values and provides information for determining the noise emission values.

~~The necessary measurements are carried out according to the relevant parts of IEC 60704.~~

Different countries are implementing different market surveillance strategies. This document is not implementing a mandatory market surveillance strategy.

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

Part 3: Procedure for determining and verifying declared noise emission values

1 Scope

This part of IEC 60704 describes procedures for determining and verifying the declared values of the noise emitted by household and similar appliances.

It applies to all categories of household and similar electrical appliances covered by IEC 60704-1 and all parts of IEC 60704-2 ~~dealing with~~, which include particular requirements for special categories of appliances.

It applies to appliances being produced in quantity, such as in batches, series or lots, which are manufactured to the same technical specification and characterized by the same ~~labeled~~ declared value of noise emission.

This part of IEC 60704:

– considers the term "declaration" to include all means for providing information on the noise emission values to potential users (consumers) of the appliances; this includes labels, brochures, advertisements, commercial and technical information papers, etc.;

– considers the declaration for appliances manufactured by mass production~~, with the same declared value for the lot (batch)~~;

– specifies a simple statistical method for verifying the declared values by investigating a sample of only three appliances.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60704-1:~~1997~~2010, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 1: General requirements*

IEC 60704-2 (all parts), *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2: Particular requirements*

ISO 3534-1:~~1993~~2006, *Statistics – Vocabulary and symbols – Part 1: Probability and general statistical terms*

ISO 7574-4:1985, *Acoustics – Statistical methods for determining and verifying stated noise emission values of machinery and equipment – Part 4: Methods for stated values for batches of machines*

3 Terms, definitions and calculations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60704-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
sound power level
L_W
ten times the logarithm to the base 10 of the ratio of the sound power of a source to the reference sound power, expressed in decibels

$$L_W = 10 \lg \frac{W}{W_0} \text{ dB}$$

Note 1 to entry: The reference sound power is 1 pW (10^{-12} W). The frequency weighting, or the midband frequency of the frequency band used, is indicated in the symbol.

Note 2 to entry: For example, the A-weighted sound power level is L_{WA}.

3.1.2
A-weighted sound power level
L_{WA}
sound power level of an appliance, in decibels, determined according to the appropriate requirements specified in IEC 60704-1 and the relevant part of IEC 60704-2

Note 1 to entry: Henceforth, the subscript $_{WA}$ is left out for reasons of simplicity.

3.1.3
noise emission value
single value of the noise emission quantity

3.1.4
measured value
L_i
noise emission value for an individual appliance determined in accordance with the appropriate requirements of IEC 60704

3.1.5
family of appliances
category of appliances
appliances of similar design or type, or intended to perform the same functions

[SOURCE: ISO 7574-1:1985, 3.5, modified – The notes have been deleted, "category of appliances" has been added as a preferred term, "machines" has been replaced by "appliances" in the term and in the definition, and "or equipment" has been deleted from the definition.]

3.1.6
declared value
L_c
value of the noise emission quantity which is rounded to the nearest decibel stated for all appliances of a complete series of production or of a batch thereof, when the appliances are new

Note 1 to entry: The declared value indicates the upper statistical value below which a specified large proportion of noise emission values of the relevant batch lies. L_c depends on the specified verification procedure, which is designed such that there is a probability of acceptance of 95 % for the batch, when no more than 6,5 % of all noise emission values exceeds L_c, and if the specified reference standard deviations σ_M equals the actual total standard deviation σ_t.

[SOURCE: ISO 7574-1:1985, 3.6, modified – The term "stated value; labelled value" has been replaced by "declared value"; the first sentence has been rephrased to "which is rounded to

the nearest decibel stated for all appliances of a complete series of production or of a batch thereof" and "when the appliances are new" has been added; the second sentence has been deleted; the fact "are new" is integrated in first sentence and notes 1 and 2 have been replaced by a Note 1 to entry.]

3.1.7
declaration
statement of the declared value, L_c, which is included in brochures, advertisements, product or commercial literature and/or affixed to an appliance or part thereof for providing information on the noise emission values to potential users (buyers, consumers) of the appliance

Note 1 to entry: The term "labeller" is used in this document for a person making declarations.

[SOURCE: ISO 7574-1:1985, 3.7, modified – The term "label" has been replaced by "declaration", "brochures, advertisements, or commercial literature" have been added, the phrase after "and/or affixed" has been replaced by "to an appliance or part thereof for providing information on the noise emission values to potential users (buyers, consumers) of the appliance" and Note 1 to entry has been added.]

3.1.8
batch of appliances
group of the same family produced in quantity, manufactured to the same technical specifications and characterized by the same declared value, L_c

Note 1 to entry: A batch may be either an entire production series or a portion thereof.

[SOURCE: ISO 7574-1:1985, 3.8, modified – The term "batch (lot) of machines" has been replaced by "batch of appliances" and the note has been transferred into Note 1 to entry.]

3.1.9
size of the batch
size of the population
N
number of items (appliances in the batch or noise emission values in the population) of the batch (or of the population)

[SOURCE: ISO 7574-1:1985, 3.9, modified – The term "size of the population" has been explicitely added as a preferred term, word "machines" is replaced by "appliances" and phrase "of the batch (or of the population)" is added.]

3.1.10
sample
one or more appliances (or measured values) randomly selected from a lot (or population)

[SOURCE: ISO 7574-1:1985, 3.10, modified – "Machines" is replaced by "appliances".]

3.1.11
size of the sample
n
number of items in the sample

[SOURCE: ISO 7574-1:1985, 3.11].

3.1.12
arithmetic mean of a batch
arithmetic mean of a population
μ
sum of the noise emission values in a batch (or in a population) divided by the size of the batch (or of the population)

$$\mu = \frac{1}{N} \sum_{i=1}^{N} L_i$$

[SOURCE: ISO 7574-1:1985, 3.12, modified – The term "arithmetic mean of a population" has been explicitly added and the formula has been deleted.]

3.1.13
arithmetic mean of a sample
$\bar{L}$
sum of the measured values, L_i, in a sample divided by the size of the sample

$$\bar{L} = \frac{1}{n} \sum_{i=1}^{n} L_i$$

Note 1 to entry: The arithmetic mean value of the sample, $\bar{L}$ is used as an estimator of the mean value of a batch (or of a population), μ.

[SOURCE: ISO 7574-1:1985, 3.13, modified – The formula has been deleted and the explanation has been transferred to Note 1 to entry.]

3.1.14
standard deviation of a batch
standard deviation of a population
σ
standard deviation of the noise emission values of the batch (or of the population) ~~of the size N is given by the equation~~

$$\sigma = \sqrt{\frac{1}{N} \sum_{i=1}^{N} (L_i - \mu)^2}$$

[SOURCE: ISO 7574-1:1985, 3.14, modified – The phrase "of size N is given by the equation" and the related formula have been deleted.]

3.1.15
standard deviation of a sample
s
~~standard deviation of the sample is given by the equation~~

$$s = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (L_i - \bar{L})^2}$$

standard deviation of the noise emission values of the sample

Note 1 to entry: The standard deviation of the sample, s, is used as an estimator of the standard deviation of a batch (or of a population), σ.

[SOURCE: ISO 7574-1:1985, 3.15, modified – Phrase "of the noise emission" has been added, formula has been deleted and the explanation has been transferred to Note 1 to entry.]

3.1.16
standard deviation of repeatability

σ_r

standard deviation of noise emission values obtained under repeatability conditions, that is the repeated application of the same noise emission measurement method on the same noise source within a short interval of time under the same conditions (same laboratory, same operator, same measuring equipment)

Note 1 to entry: Values for the standard deviation of repeatability, σ_r, obtained in practice, are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.16, modified – The phrase "same apparatus" has been replaced by "same measurement equipment", reference to ISO 5725 has been deleted and Note 1 to entry has been added.]

3.1.17
standard deviation of reproducibility

σ_R

standard deviation of noise emission values obtained under reproducibility conditions, that is the repeated application of the same noise emission measurement method on the same noise source at different times and under different conditions (different laboratory, different operator, different measuring apparatus)

Note 1 to entry: The standard deviation of reproducibility includes ~~therefore~~ the standard deviation of repeatability (see 3.1.16).

Note 2 to entry: Estimates of the standard deviation of reproducibility, σ_R, obtained in practice, are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.17, modified – The reference to ISO 5725 has been deleted, the second sentence has been transferred to Note 1 to entry and Note 2 to entry has been added.]

3.1.18
standard deviation of production

σ_p

standard deviation of noise emission values obtained on different appliances from batches of the same category (family), using the same noise emission measurement method under repeatability conditions (same laboratory, same operator, same measuring apparatus)

Note 1 to entry: Estimates of the standard deviation of production, σ_P, obtained in practice, are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.18, modified – Phrase at the beginning has been replaced by "of noise emission values obtained on different appliances from batches of the same category (family)", the note has been deleted and Note 1 to entry has been added.]

3.1.19
total standard deviation

σ_t

square root of the sum of the squares of the standard deviation of reproducibility (see 3.1.17) and of the standard deviation of production (see 3.1.18)

$$\sigma_t = \sqrt{\sigma_R^2 + \sigma_p^2}$$

Note 1 to entry: Estimates of the total standard deviation, σ_t, obtained in practice are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.19, modified – The formula has been deleted and Note 1 to entry has been added.]

3.1.20
reference standard deviation
σ_M
total standard deviation specified and fixed for the family of appliances under consideration which is considered to be typical for batches from this family

Note 1 to entry: The use of a fixed σ_M for each category of appliances enables the application of a statistical method to deal with small sample sizes.

Note 2 to entry: Values of the reference standard deviation, σ_M, fixed for the various categories of household appliances (obtained from practical investigations) are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.20, modified – The words "and fixed" have been added, "machines" has been replaced by "appliances", first sentence of note has been transferred to a Note 1 of entry, remaining part of the note has been deleted and Note 2 to entry has been added.]

3.1.21
single sampling
type of sampling which consists in taking only one sample from the batch

Note 1 to entry: See ISO 3534-1:~~1993~~2006.

[SOURCE: ISO 7574-1:1985, 3.21, modified – Reference to ISO 3534-1 has been transferred to Note 1 to entry.]

3.1.22
inspection by variables
method which consists in measuring a quantitative characteristic for each item of a population or of a sample taken from this population

Note 1 to entry: The quantitative characteristic is the noise emission quantity.

Note 2 to entry: See ISO 3534-1:~~1993~~2006.

[SOURCE: ISO 7574-1:1985, 3.24, modified – Second sentence has been transferred to Note 1 to entry, reference to ISO 3534-1 has been transferred to a Note 2 to entry and notes 1 and 2 have been deleted.]

3.1.23
probability of acceptance
P_a
probability that a batch of given quality (expressed by its proportion p of noise emission values exceeding the ~~labeled~~ declared value) will be accepted by a given sampling plan

Note 1 to entry: $(1–P_a)$ is called "probability of rejection". If $(1–P_a)$ has the fixed value α (see 3.1.25), this is called the "producer's risk". If P_a has the fixed value β (see 3.1.26), this is called the "consumer's risk".

Note 2 to entry: See ISO 3534-1:~~1993~~2006.

[SOURCE: ISO 7574-1:1985, ~~3.20~~ 3.25, modified – Word "labelled" has been replaced by "declared", the note has been transferred to Note 1 of entry and ISO 3534-1 has been transferred to Note 2 to entry.]

3.1.24
operating characteristic curve
OC
curve showing, for a given sampling plan, the probability of acceptance P_a of a batch as a function of its proportion p of noise emission values exceeding the declared values

Note 1 to entry: The operating characteristic curve is fully determined by two specified points [for example, the producer's risk point (see 3.1.25) and the consumer's risk point (see 3.1.26)) or by one point (for example, the producer's risk point) and the sample size n.

Note 2 to entry: See ISO 3534-1:~~1993~~2006.

[SOURCE: ISO 7574-1:1985, 3.26, modified – The note has been transferred to Note1 to entry and reference to ISO 3534-1 is made in Note 2 to entry.]

3.1.25
producer's risk point
point on the operating characteristic curve corresponding to a predetermined and usually low probability of rejection α

Note 1 to entry: This probability of rejection is called the "producer's risk".

Note 2 to entry: The corresponding quality level is the proportion $p_{1-\alpha}$ of noise emission values of the batch exceeding the declared value. For a continuous production, the proportion $p_{1-\alpha}$ would be approximately equal to the acceptable quality level (AQL).

Note 3 to entry: See ISO 3534-1:~~1993~~2006.

[SOURCE: ISO 7574-1:1985, 3.27, modified – The last sentence has been transferred to Note 1 to entry, the explanation has been transferred to Note 2 to entry, NOTE 1 has been deleted, NOTE 2 has been added to Note 2 to entry and reference to ISO 3534-1 is made in Note 3 to entry.]

3.1.26
consumer's risk point
point on the operating characteristic curve corresponding to a predetermined and usually low probability of acceptance β

Note 1 to entry: This probability of acceptance is then called the "consumer's risk".

Note 2 to entry: See ISO 3534-1:2006.

[SOURCE: ISO 7574-1:1985, 3.28, modified – The second sentence has been transferred to Note 1 to entry, the third sentence has been deleted and reference to ISO 3534-1 is made in Note 2 to entry.]

3.2 Calculations

For the purposes of this document, the following calculation formulas apply:

3.2.1
sound power level
L_W

$$L_W = 10 \cdot \lg \frac{W}{W_0} \text{ dB}$$

where W is the sound power of a source and W_0 is the reference sound power, 1 pW (10^{-12} W).

Note 1 to entry: See 3.1.1.

3.2.2
arithmetic mean of a batch (or of a population)
μ

$$\mu = \frac{1}{N} \sum_{i=1}^{N} L_i$$

where N and L_i are defined in 3.1.9 and 3.1.4, respectively.

Note 1 to entry: See 3.1.12.

3.2.3
arithmetic mean of a sample
$\overline{L}$

$$\overline{L} = \frac{1}{n} \sum_{i=1}^{n} L_i$$

where n and L_i are defined in 3.1.11 and 3.1.4., respectively.

Note 1 to entry: See 3.1.13.

3.2.4
standard deviation of a batch (or of a population)
σ

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(L_i - \mu)^2}$$

where N, μ and L_i are defined in 3.1.9, 3.1.12 and 3.1.4, respectively.

Note 1 to entry: See 3.1.14.

3.2.5
standard deviation of a sample
s

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{N}(L_i - \bar{L})^2}$$

where n, $\bar{L}$, and L_i are defined in 3.1.11, 3.1.13 and 3.1.4, respectively.

Note 1 to entry: See 3.1.15.

3.2.6
total standard deviation
σ_t

$$\sigma_t = \sqrt{\sigma_R^2 + \sigma_p^2}$$

where σ_R and σ_p are defined in 3.1.17 and 3.1.18, respectively.

Note 1 to entry: See 3.1.19.

4 General

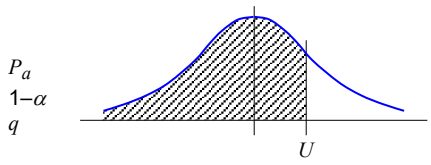
4.1 Test method

All the measurements shall be performed according to IEC 60704 by a testing laboratory that shall have appropriate test facilities and trained staff.

4.2 Values and symbols

In this document, the following values apply:

n (see 3.1.11)	=	3
$1-P_a = \alpha$ (see 3.1.23)	=	5 %, $1-\alpha$ = 95 %
$p_{1-\alpha}$ (see 3.1.25)	=	6,5 %
U_{Pa}, $U_{1-\alpha}$ and U_q		are values depending on the probability of acceptance P_a or $1-\alpha$ (quantile of the standardized distribution) (see Figure 1)
U_{Pa}		is selected by the labeller
$U_{1-\alpha}$	=	1,645
U_q	=	1,514



P_a, 1–α, q	U_{Pa}, $U_{1-\alpha}$, U_q
99,9 %	3,091
99,75 %	2,807
99,50 %	2,576
99,25 %	2,433
99,00 %	2,327
97,50 %	1,960
95,00 %	1,645
93,50 %	1,514
92,50 %	1,440
90,00 %	1,282
75,00 %	0,674
50,00 %	0,000

IEC

Figure 1 – Quantile of the standardized distribution

4.3 Reference standard deviation

Table A.1 states fixed values for the reference standard deviation σ_M.

5 Verification of declared noise emission values

5.1 Basis of the procedure

The procedure for checking declared noise emission values of appliances coming in series or batches from quantity production is for simplicity based on the "σ-method" with a fixed value of reference standard deviation, σ_M, for each of the various categories of household appliances (see Annex A), with single sampling of a very small size, and the (in practice not fully correct) assumption that the noise emission values of a series or a batch will follow a normal distribution.

Verifying compliance of the batch with the declared value is based on the following assumptions:

– the noise emission values of the batch approximate to a normal distribution, characterized by the mean value μ and the specified reference standard deviation σ_M;

– the rejection probability for a batch is equal to a specified value α if the declared value L_c is chosen so that the proportion of noise emission values of the batch exceeding L_c is equal to the specified value $p_{1-\alpha}$.

If the batch and the declared value, L_c, conform with the values α = 5 % and $p_{1-\alpha}$ = 6,5 %, the sampling inspection procedures are set in such a way that the batch will be accepted with the probability of 1–α = 95 % and the mean value will be expected to lie approximately 1,5 σ_M below the declared value.

NOTE The procedure for verifying declared noise emission values does not deal with the consequences to be drawn if the declared value is not ~~verified~~ confirmed for a series or a batch of appliances.

5.2 Verification procedure

Take at random a sample of the size $n = 3$ (fixed by this document for verification purposes) from the series or the batch under consideration.

Measure for each of the items the noise emission value L_i (i = 1, 2, 3) and determine the arithmetic mean of these values $\bar{L}$ ~~from~~

$$\bar{L} = \frac{1}{n} \sum_{i=1}^{n} L_i$$

in accordance with 3.2.3.

Determine the value

$$A = L_c - k \cdot \sigma_M$$

where k is the acceptability constant calculated from the formula (see ISO 7574-4).

$$k = u_q - \frac{u_{1-\alpha}}{\sqrt{n}} = 0{,}564$$

u_q and $u_{1-\alpha}$ represent the quantiles of the reduced standardized distribution for the values q = $1-p_{1-\alpha}$ = 93,5 % and $1-\alpha$ = 95 % respectively ~~values~~, fixed by this document for verification purposes.

If $\bar{L} \leq A$, the declared value is confirmed as verified for the series or the batch.

If $\bar{L} > A$, the declared value is not confirmed as verified for the series or the batch.

For examples, see Annex B.

6 Determination of noise emission values for declaration

6.1 Basis of the procedure

A labeller who wants to define the risk of rejection (or probability of acceptance) by himself, ~~(possibly~~ at a lower risk than 5 % ~~as~~ stated in Clause 5~~)~~, and ~~who~~ has determined accurately ~~for his production a~~ the total standard deviation for production, deviating from the reference standard deviation fixed for the category of appliances under consideration, may calculate a declared value L_c.

6.2 Determination procedure

Choose u_{Pa}.

Determine:

– the arithmetic mean of production μ;

– the value of the total standard deviation σ_t.

Calculate L_c from the following formula:

$$L_c = \mu + k \cdot \sigma_M + \frac{u_{Pa}}{\sqrt{n}} \sigma_t$$

which reads as, taking into account the values of the different parameters fixed by this document for verification purposes:

$$L_c = \mu + 0{,}564 \cdot \sigma_M + 0{,}577 \cdot u_{Pa} \cdot \sigma_t$$

For examples, see Annex C.

6.3 Presentation of noise emission values

The declared values shall be expressed as clearly as possible in order to provide the prospective user (buyer) with the correct information. In particular, it shall be emphasized that sound power levels, which shall not be confused with sound pressure values, are used for declaring noise emission values.

When noise emission values are declared in accordance with this document, it shall be clear that they are expressed as an A-weighted sound power level in decibels (re 1 pW) and indicate an upper statistical value below which a large proportion of the noise emission values of the considered batch lies (it is not a mean value).

The value of L_c ~~has to~~ shall be rounded to the nearest decibel.

Annex A
(normative)

Noise emission of household appliances – Standard deviations

~~In Table A.1 estimated and fixed values are compiled for the~~ In general, the following standard deviation values are given in the parts of IEC 60704-2:

– standard deviation of repeatability σ_r;

– standard deviation of reproducibility σ_R;

– standard deviation of production σ_P;

– total standard deviation σ_t;

– reference standard deviation σ_M

The values are expressed in decibels.

For other appliance categories, values for the standard deviations are given in Table A.1.

These values, with the exception of the standard deviation of production σ_P, have been determined ~~for the most interesting categories of household appliances, relative to their noise emission,~~ during practical investigations carried out by a number of experienced industrial laboratories. The values of the standard deviation of production σ_P are for guidance only.

Table A.1 – Standard deviation

Appliance category	Standard deviation dB				
	σ_r	σ_R	σ_p	σ_t	σ_M
~~Vacuum cleaners~~	~~0,3~~	~~0,8~~	~~0,5 – 1,0~~	~~0,9 – 1,3~~	~~1,5~~
Shavers	0,4	0,8	0,7 to 1,3	1,1 to 1,5	1,5
Hair dryers	0,4	0,8	0,5 to 1,3	0,9 to 1,5	1,5
Hair clippers	0,4	1,0	0,8 to 1,2	1,3 to 1,6	1,5
Fan heaters	0,4	1,0	0,3 to 1,1	1,0 to 1,6	1,5
~~Storage heaters~~	~~0,4~~	~~1,0~~	~~0,7 – 1,1~~	~~1,2 – 1,5~~	~~2,0~~
~~Range hoods~~	~~0,4~~	~~1,0~~	~~1,5 – 1,7~~	~~1,8 – 2,0~~	~~2,0~~
Kitchen machines	0,5	1,0	0,9 to 1,5	1,4 to 1,8	2,0
~~Dishwashers~~	~~0,5~~	~~0,8~~	~~1,0 – 1,5~~	~~1,3 – 1,7~~	~~2,0~~
~~Spin extractors~~	~~0,5~~	~~1,0~~	~~1,0 – 1,2~~	~~1,4 – 1,6~~	~~2,0~~
~~Tumble dryers~~	~~0,4~~	~~0,8~~	~~0,7 – 1,0~~	~~1,1 – 1,3~~	~~1,5~~
~~Washing machines~~	~~0,6~~	~~1,0~~	~~1,0 – 2,2~~	~~1,4 – 2,4~~	~~2,5~~
~~Refrigerators~~	~~0,4~~	~~0,7~~	~~0,7 – 1,5~~	~~1,0 – 1,7~~	~~2,0~~
~~Freezers~~	~~0,4~~	~~0,7~~	~~1,0 – 2,0~~	~~1,2 – 2,1~~	~~2,5~~
~~Fans~~	~~0,4~~	~~1,0~~	~~0,5 – 1,0~~	~~1,1 – 1,4~~	~~1,5~~
~~Ovens~~	~~0,4~~	~~1,0~~	~~1,0 – 1,7~~	~~1,4 – 2,0~~	~~2,0~~

~~When a part 2 specifies standard deviations, these values shall supersede the values given above in Table A.1.~~

~~In Table A.1, the values of standard deviations of production σ_P are informative and not normative.~~

Annex B
(informative)

Verification of noise emission values – Examples

B.1 Example 1

A series of vacuum cleaners, manufacturer A, type X is ~~labeled~~ declared with:

$$L_c = 77 \text{ dB(A), re 1 pW}$$

~~For checking~~ For verification, a sample of $n = 3$ is investigated with the result:

$L_1 = 75{,}5$ dB(A); $L_2 = 74{,}5$ dB(A); $L_3 = 76{,}1$ dB(A); mean value $\bar{L} = 75{,}4$ dB(A)

with the given $L_c = 77$ dB(A) and the fixed value $\sigma_M = 1{,}5$ dB for vacuum cleaners and $k = 0{,}564$:

$$A = L_c - k \cdot \sigma_M = 76{,}2 \text{ dB(A)}$$

Result: $\bar{L} = 75{,}4$ dB(A) < $A = 76{,}2$ dB(A) – the declared value is confirmed.

B.2 Example 2

A series of vacuum cleaners, manufacturer B, type Y is ~~labeled~~ declared with:

$$L_c = 79 \text{ dB(A), re 1 pW}$$

~~For checking~~ For verification, a sample of $n = 3$ is investigated with the result:

$L_1 = 78{,}7$ dB(A); $L_2 = 79{,}0$ dB(A) and $L_3 = 78{,}5$ dB(A); mean value $\bar{L} = 78{,}7$ dB(A)

with the given $L_c = 79$ dB(A) and the fixed value $\sigma_M = 1{,}5$ dB for vacuum cleaners and $k = 0{,}564$:

$$A = L_c - k \cdot \sigma_M = 78{,}2 \text{ dB(A)}$$

Result: $\bar{L} = 78{,}7$ dB(A) > $A = 78{,}2$ dB(A) – the declared value is not confirmed.

~~NOTE~~ The declared value should be changed to $L_c = 80$ dB(A) to pass this verification test.

Annex C
(informative)

Determination of noise emission values – Examples

C.1 Example 1

Table C.1 gives the results of the calculated and rounded declared values L_C, the real mean μ and μ + 1,5 σ_t (q = 93,5 %) as a function of arbitrarily chosen values for the total standard deviation σ_t and arbitrarily chosen values for the probability of acceptance P_a under the following conditions:

– for the production of the labeller:
  - mean value of the production μ = 70,0 dB(A);
  - three arbitrarily chosen values of total standard deviation σ_t = 1,0 dB or 2,0 dB or 3,0 dB;
  - three arbitrarily chosen values for probability of acceptance P_a (or risk of rejection 1 – P_a):

P_a = 99,9 % or 99 % or 95 %.

Table C.1 – Calculated noise emission values as a function of the total standard deviation σ_t and the probability of acceptance P_a as assumed by the labeller

Total standard deviation σ_t in dB	1,0 (< σ_M)			2,0 (= σ_M)			3,0 (> σ_M)		
Real mean value μ in dB (re 1 pW(A))	70,0			70,0			70,0		
μ + 1,5 σ_t in dB(A) (q = 93,5 %)	71,5			73,0			74,5		
Probability of acceptance P_a in %	99,9	99	95	99,9	99	95	99,9	99	95
Calculated declared value L_c in dB(A)	73,0	72,5	72,0	74,7	73,8	73,0	76,5	75,1	74,0
Rounded declared value L_c in dB(A)	73	73	72	75	74	73	77	75	74

C.2 Example 2

For a new model of vacuum cleaner, a pilot production of 9 items has shown the following 9 noise values:

~~L_i = 75,2; 75,5; 75,9; 76,1; 76,2; 76,3; 76,3; 76,6; 76,8.~~

L_1 = 75,2 dB(A); L_2 = 75,5 dB(A); L_3 = 75,9 dB(A); L_4 = 76,1 dB(A); L_5 = 76,2 dB(A); L_6 = 76,3 dB(A); L_7 = 76,3 dB(A); L_8 = 76,6 dB(A) and L_9 = 76,8 dB(A).

From these values, $\overline{L}$ = 76,1 dB(A) and σ_P = 0,48 dB are calculated.

From these tests determining the standard deviation of reproducibility, carried out at a number of experienced laboratories, σ_R = 0,8 dB has been found.

For these data, the total standard deviation will be:

$$\sigma_t = \sqrt{{\sigma_R}^2 + {\sigma_p}^2} = 0{,}93 \text{ dB}$$

The value to be declared will be found from the following equation (see Clause 6):

$$L_c = \mu + k \cdot \sigma_M + \frac{u_{Pa}}{\sqrt{n}} \sigma_t$$

taking into account the data for the verification procedure with

$$n = 3,\ k = 0{,}564\ (\alpha = 5\ \%;\ q = 93{,}5\ \%),\ \sigma_M = 1{,}5 \text{ dB}.$$

The labeller will calculate the following values to be declared if he chooses a risk of rejection of:

0,1 % with $u_{Pa} = 3{,}091$

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{3{,}091}{\sqrt{3}} 0{,}93) \text{ dB(A)} = 78{,}6 \text{ dB(A)} \approx \underline{79 \text{ dB(A)}}, \text{ re 1 pW}$$

1 % with $u_{Pa} = 2{,}327$

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{2{,}327}{\sqrt{3}} 0{,}93) \text{ dB(A)} = 78{,}2 \text{ dB(A)} \approx \underline{78 \text{ dB(A)}}, \text{ re 1 pW}$$

5 % with $u_{Pa} = 1{,}645$

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{1{,}645}{\sqrt{3}} 0{,}93) \text{ dB(A)} = 77{,}8 \text{ dB(A)} \approx \underline{78 \text{ dB(A)}}, \text{ re 1 pW}$$

C.3 Example 3

For a series of a vacuum cleaner model the mean value and the total standard deviation have been determined to be

$$\mu = \bar{L} = 76{,}1 \text{ dB(A) and } \sigma_t = 1{,}7 \text{ dB}.$$

Acceptable values to be declared will be found in accordance with Clause 6, with:

$$n = 3,\ k = 0{,}564\ (\alpha = 5\ \%;\ q = 93{,}5\ \%),\ \sigma_M = 1{,}5 \text{ dB},$$

if the labeller chooses the risk of rejection of correctly ~~labeled~~ declared samples:

0,1 % with $u_{Pa} = 3{,}091$

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{3{,}091}{\sqrt{3}} 1{,}7) \text{ dB(A)} = 80{,}0 \text{ dB(A)} \approx \underline{80 \text{ dB(A)}}, \text{ re 1 pW}$$

1 % with $u_{Pa} = 2{,}327$

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{2{,}327}{\sqrt{3}} 1{,}7) \text{ dB(A)} = 79{,}2 \text{ dB(A)} \approx \underline{79 \text{ dB(A)}}, \text{ re 1 pW}$$

5 % with u_{Pa} = 1,645

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{1{,}645}{\sqrt{3}} 1{,}7)\ \text{dB(A)} = 78{,}6\ \text{dB(A)} \approx 79\ \text{dB(A)},\ \text{re 1 pW}$$

Bibliography

ISO 3951-1:2005, *Sampling procedures for inspection by variables – Part 1: Specification for single sampling plans indexed by acceptance quality limit (AQL) for lot-by-lot inspection for a single quality characteristic and a single AQL*

ISO 4871:1996, *Acoustics – Declaration and verification of noise emission values of machinery and equipment*

ISO 5725 (all parts), *Accuracy (trueness and precision) of measurement methods and results*

ISO 7574-1:1985, *Acoustics – Statistical methods for determining and verifying stated noise emission values of machinery and equipment – Part 1: General considerations and definitions*

~~ISO 7574-4:1985, *Acoustics – Statistical methods for determining and verifying stated noise emission values of machinery and equipment – Part 4: Methods for stated values for batches of machines*~~

IEC 60704-3

Edition 3.0 2019-05

INTERNATIONAL STANDARD

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Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 3: Procedure for determining and verifying declared noise emission values

Appareils électrodomestiques et analogues – Code d'essai pour la détermination du bruit aérien – Partie 3: Méthode de détermination et de vérification des valeurs déclarées d'émission sonore

IEC 60704-3:2019-05(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 3: Procedure for determining and verifying declared noise emission values

FOREWORD

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International Standard IEC 60704-3 has been prepared by IEC technical committee 59: Performance of household electrical appliances.

IEC 60704-1:2010 has served as a basis for the elaboration of this standard.

This third edition cancels and replaces the second edition published in 2006. This edition constitutes a technical revision. It includes the following significant technical changes with respect to the previous edition:

a) in Annex A, standard deviations that are now specified for various appliance categories in the parts of IEC 60704-2 have been excluded from Table A.1;
b) furthermore, this edition makes reference to new standards and is implementing ISO/IEC Directives, Part 2 in a more accurate manner.

Standard deviations specified in part 2 documents of the IEC 60704 series supersede the values given in Table A.1.

The text of this International Standard is based on the following documents:

CDV	Report on voting
59/675/CDV	59/680A/RVC

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

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

This International Standard is to be used in conjunction with IEC 60704-1:2010 and the latest edition of IEC 60704-2 (all parts).

A list of all parts in the IEC 60704 series, published 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 document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

IMPORTANT – The "colour inside" logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

INTRODUCTION

A comprehensive and correct declaration of noise emission is very helpful to enable the potential buyer to make a good choice between appliances of the same category (serving for the same purpose) of different makes or for different models.

In order to ensure a correct declaration of noise emission values, this part of IEC 60704 describes a simple method for verifying declared values and provides information for determining the noise emission values.

Different countries are implementing different market surveillance strategies. This document is not implementing a mandatory market surveillance strategy.

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

Part 3: Procedure for determining and verifying declared noise emission values

1 Scope

This part of IEC 60704 describes procedures for determining and verifying the declared values of the noise emitted by household and similar appliances.

It applies to all categories of household and similar electrical appliances covered by IEC 60704-1 and all parts of IEC 60704-2, which include particular requirements for special categories of appliances.

It applies to appliances being produced in quantity, such as in batches, series or lots, which are manufactured to the same technical specification and characterized by the same declared value of noise emission.

This part of IEC 60704:

– considers the term "declaration" to include all means for providing information on the noise emission values to potential users (consumers) of the appliances; this includes labels, brochures, advertisements, commercial and technical information papers, etc.;

– considers the declaration for appliances manufactured by mass production;

– specifies a simple statistical method for verifying the declared values by investigating a sample of only three appliances.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60704-1:2010, *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 1: General requirements*

IEC 60704-2 (all parts), *Household and similar electrical appliances – Test code for the determination of airborne acoustical noise – Part 2: Particular requirements*

ISO 3534-1:2006, *Statistics – Vocabulary and symbols – Part 1: Probability and general statistical terms*

ISO 7574-4:1985, *Acoustics – Statistical methods for determining and verifying stated noise emission values of machinery and equipment – Part 4: Methods for stated values for batches of machines*

3 Terms, definitions and calculations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60704-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1.1
sound power level
L_W
ten times the logarithm to the base 10 of the ratio of the sound power of a source to the reference sound power, expressed in decibels

Note 1 to entry: The reference sound power is 1 pW (10^{-12} W). The frequency weighting, or the midband frequency of the frequency band used, is indicated in the symbol.

Note 2 to entry: For example, the A-weighted sound power level is L_{WA}.

3.1.2
A-weighted sound power level
L_{WA}
sound power level of an appliance, determined according to the appropriate requirements specified in IEC 60704-1 and the relevant part of IEC 60704-2

Note 1 to entry: Henceforth, the subscript $_{WA}$ is left out for reasons of simplicity.

3.1.3
noise emission value
single value of the noise emission quantity

3.1.4
measured value
L_i
noise emission value for an individual appliance determined in accordance with the appropriate requirements of IEC 60704

3.1.5
family of appliances
category of appliances
appliances of similar design or type, or intended to perform the same functions

[SOURCE: ISO 7574-1:1985, 3.5, modified – The notes have been deleted, "category of appliances" has been added as a preferred term, "machines" has been replaced by "appliances" in the term and in the definition, and "or equipment" has been deleted from the definition.]

3.1.6
declared value
L_c
value of the noise emission quantity which is rounded to the nearest decibel stated for all appliances of a complete series of production or of a batch thereof, when the appliances are new

Note 1 to entry: The declared value indicates the upper statistical value below which a specified large proportion of noise emission values of the relevant batch lies. L_c depends on the specified verification procedure, which is designed such that there is a probability of acceptance of 95 % for the batch, when no more than 6,5 % of all noise emission values exceeds L_c, and if the specified reference standard deviations σ_M equals the actual total standard deviation σ_t.

[SOURCE: ISO 7574-1:1985, 3.6, modified – The term "stated value; labelled value" has been replaced by "declared value"; the first sentence has been rephrased to "which is rounded to the nearest decibel stated for all appliances of a complete series of production or of a batch thereof" and "when the appliances are new" has been added; the second sentence has been deleted; the fact "are new" is integrated in first sentence and notes 1 and 2 have been replaced by a Note 1 to entry.]

3.1.7
declaration
statement of the declared value, L_c, which is included in brochures, advertisements, product or commercial literature and/or affixed to an appliance or part thereof for providing information on the noise emission values to potential users (buyers, consumers) of the appliance

Note 1 to entry: The term "labeller" is used in this document for a person making declarations.

[SOURCE: ISO 7574-1:1985, 3.7, modified – The term "label" has been replaced by "declaration", "brochures, advertisements, or commercial literature" have been added, the phrase after "and/or affixed" has been replaced by "to an appliance or part thereof for providing information on the noise emission values to potential users (buyers, consumers) of the appliance" and Note 1 to entry has been added.]

3.1.8
batch of appliances
group of the same family produced in quantity, manufactured to the same technical specifications and characterized by the same declared value, L_c

Note 1 to entry: A batch may be either an entire production series or a portion thereof.

[SOURCE: ISO 7574-1:1985, 3.8, modified – The term "batch (lot) of machines" has been replaced by "batch of appliances" and the note has been transferred into Note 1 to entry.]

3.1.9
size of the batch
size of the population
N
number of items (appliances in the batch or noise emission values in the population) of the batch (or of the population)

[SOURCE: ISO 7574-1:1985, 3.9, modified – The term "size of the population" has been explicitely added as a preferred term, word "machines" is replaced by "appliances" and phrase "of the batch (or of the population)" is added.]

3.1.10
sample
one or more appliances (or measured values) randomly selected from a lot (or population)

[SOURCE: ISO 7574-1:1985, 3.10, modified – "Machines" is replaced by "appliances".]

3.1.11
size of the sample
n
number of items in the sample

[SOURCE: ISO 7574-1:1985, 3.11].

3.1.12
arithmetic mean of a batch
arithmetic mean of a population
μ
sum of the noise emission values in a batch (or in a population) divided by the size of the batch (or of the population)

[SOURCE: ISO 7574-1:1985, 3.12, modified – The term "arithmetic mean of a population" has been explicitly added and the formula has been deleted.]

3.1.13
arithmetic mean of a sample
$\overline{L}$
sum of the measured values, L_i, in a sample divided by the size of the sample

Note 1 to entry: The arithmetic mean value of the sample, $\overline{L}$ is used as an estimator of the mean value of a batch (or of a population), μ.

[SOURCE: ISO 7574-1:1985, 3.13, modified – The formula has been deleted and the explanation has been transferred to Note 1 to entry.]

3.1.14
standard deviation of a batch
standard deviation of a population
σ
standard deviation of the noise emission values of the batch (or of the population)

[SOURCE: ISO 7574-1:1985, 3.14, modified – The phrase "of size N is given by the equation" and the related formula have been deleted.]

3.1.15
standard deviation of a sample
s
standard deviation of the noise emission values of the sample

Note 1 to entry: The standard deviation of the sample, s, is used as an estimator of the standard deviation of a batch (or of a population), σ.

[SOURCE: ISO 7574-1:1985, 3.15, modified – Phrase "of the noise emission" has been added, formula has been deleted and the explanation has been transferred to Note 1 to entry.]

3.1.16
standard deviation of repeatability
σ_r
standard deviation of noise emission values obtained under repeatability conditions, that is the repeated application of the same noise emission measurement method on the same noise source within a short interval of time under the same conditions (same laboratory, same operator, same measuring equipment)

Note 1 to entry: Values for the standard deviation of repeatability, σ_r, obtained in practice, are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.16, modified – The phrase "same apparatus" has been replaced by "same measurement equipment", reference to ISO 5725 has been deleted and Note 1 to entry has been added.]

3.1.17
standard deviation of reproducibility
σ_R
standard deviation of noise emission values obtained under reproducibility conditions, that is the repeated application of the same noise emission measurement method on the same noise source at different times and under different conditions (different laboratory, different operator, different measuring apparatus)

Note 1 to entry: The standard deviation of reproducibility includes the standard deviation of repeatability (see 3.1.16).

Note 2 to entry: Estimates of the standard deviation of reproducibility, σ_R, obtained in practice, are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.17, modified – The reference to ISO 5725 has been deleted, the second sentence has been transferred to Note 1 to entry and Note 2 to entry has been added.]

3.1.18
standard deviation of production
σ_p
standard deviation of noise emission values obtained on different appliances from batches of the same category (family), using the same noise emission measurement method under repeatability conditions (same laboratory, same operator, same measuring apparatus)

Note 1 to entry: Estimates of the standard deviation of production, σ_P, obtained in practice, are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.18, modified – Phrase at the beginning has been replaced by "of noise emission values obtained on different appliances from batches of the same category (family)", the note has been deleted and Note 1 to entry has been added.]

3.1.19
total standard deviation
σ_t
square root of the sum of the squares of the standard deviation of reproducibility (see 3.1.17) and of the standard deviation of production (see 3.1.18)

Note 1 to entry: Estimates of the total standard deviation, σ_t, obtained in practice are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.19, modified – The formula has been deleted and Note 1 to entry has been added.]

3.1.20
reference standard deviation
σ_M
total standard deviation specified and fixed for the family of appliances under consideration which is considered to be typical for batches from this family

Note 1 to entry: The use of a fixed σ_M for each category of appliances enables the application of a statistical method to deal with small sample sizes.

Note 2 to entry: Values of the reference standard deviation, σ_M, fixed for the various categories of household appliances (obtained from practical investigations) are given in Annex A.

[SOURCE: ISO 7574-1:1985, 3.20, modified – The words "and fixed" have been added, "machines" has been replaced by "appliances", first sentence of note has been transferred to a Note 1 of entry, remaining part of the note has been deleted and Note 2 to entry has been added.]

3.1.21
single sampling
type of sampling which consists in taking only one sample from the batch

Note 1 to entry: See ISO 3534-1:2006.

[SOURCE: ISO 7574-1:1985, 3.21, modified – Reference to ISO 3534-1 has been transferred to Note 1 to entry.]

3.1.22
inspection by variables
method which consists in measuring a quantitative characteristic for each item of a population or of a sample taken from this population

Note 1 to entry: The quantitative characteristic is the noise emission quantity.

Note 2 to entry: See ISO 3534-1:2006.

[SOURCE: ISO 7574-1:1985, 3.24, modified – Second sentence has been transferred to Note 1 to entry, reference to ISO 3534-1 has been transferred to a Note 2 to entry and notes 1 and 2 have been deleted.]

3.1.23
probability of acceptance
P_a
probability that a batch of given quality (expressed by its proportion p of noise emission values exceeding the declared value) will be accepted by a given sampling plan

Note 1 to entry: $(1–P_a)$ is called "probability of rejection". If $(1–P_a)$ has the fixed value α (see 3.1.25), this is called the "producer's risk". If P_a has the fixed value β (see 3.1.26), this is called the "consumer's risk".

Note 2 to entry: See ISO 3534-1:2006.

[SOURCE: ISO 7574-1:1985, 3.25, modified – Word "labelled" has been replaced by "declared", the note has been transferred to Note 1 of entry and ISO 3534-1 has been transferred to Note 2 to entry.]

3.1.24
operating characteristic curve
OC
curve showing, for a given sampling plan, the probability of acceptance P_a of a batch as a function of its proportion p of noise emission values exceeding the declared values

Note 1 to entry: The operating characteristic curve is fully determined by two specified points [for example, the producer's risk point (see 3.1.25) and the consumer's risk point (see 3.1.26)) or by one point (for example, the producer's risk point) and the sample size n.

Note 2 to entry: See ISO 3534-1:2006.

[SOURCE: ISO 7574-1:1985, 3.26, modified – The note has been transferred to Note1 to entry and reference to ISO 3534-1 is made in Note 2 to entry.]

3.1.25
producer's risk point
point on the operating characteristic curve corresponding to a predetermined and usually low probability of rejection α

Note 1 to entry: This probability of rejection is called the "producer's risk".

Note 2 to entry: The corresponding quality level is the proportion $p_{1-\alpha}$ of noise emission values of the batch exceeding the declared value. For a continuous production, the proportion $p_{1-\alpha}$ would be approximately equal to the acceptable quality level (AQL).

Note 3 to entry: See ISO 3534-1:2006.

[SOURCE: ISO 7574-1:1985, 3.27, modified – The last sentence has been transferred to Note 1 to entry, the explanation has been transferred to Note 2 to entry, NOTE 1 has been deleted, NOTE 2 has been added to Note 2 to entry and reference to ISO 3534-1 is made in Note 3 to entry.]

3.1.26
consumer's risk point
point on the operating characteristic curve corresponding to a predetermined and usually low probability of acceptance β

Note 1 to entry: This probability of acceptance is then called the "consumer's risk".

Note 2 to entry: See ISO 3534-1:2006.

[SOURCE: ISO 7574-1:1985, 3.28, modified – The second sentence has been transferred to Note 1 to entry, the third sentence has been deleted and reference to ISO 3534-1 is made in Note 2 to entry.]

3.2 Calculations

For the purposes of this document, the following calculation formulas apply:

3.2.1
sound power level
L_W

$$L_W = 10 \cdot \lg \frac{W}{W_0} \text{ dB}$$

where W is the sound power of a source and W_0 is the reference sound power, 1 pW (10^{-12} W).

Note 1 to entry: See 3.1.1.

3.2.2
arithmetic mean of a batch (or of a population)
μ

$$\mu = \frac{1}{N}\sum_{i=1}^{N} L_i$$

where N and L_i are defined in 3.1.9 and 3.1.4, respectively.

Note 1 to entry: See 3.1.12.

3.2.3
arithmetic mean of a sample
$\overline{L}$

$$\overline{L} = \frac{1}{n}\sum_{i=1}^{n} L_i$$

where n and L_i are defined in 3.1.11 and 3.1.4., respectively.

Note 1 to entry: See 3.1.13.

3.2.4
standard deviation of a batch (or of a population)
σ

$$\sigma = \sqrt{\frac{1}{N}\sum_{i=1}^{N}(L_i - \mu)^2}$$

where N, μ and L_i are defined in 3.1.9, 3.1.12 and 3.1.4, respectively.

Note 1 to entry: See 3.1.14.

3.2.5
standard deviation of a sample
s

$$s = \sqrt{\frac{1}{n-1}\sum_{i=1}^{N}\left(L_i - \overline{L}\right)^2}$$

where n, $\overline{L}$, and L_i are defined in 3.1.11, 3.1.13 and 3.1.4, respectively.

Note 1 to entry: See 3.1.15.

3.2.6
total standard deviation
σ_t

$$\sigma_t = \sqrt{{\sigma_R}^2 + {\sigma_p}^2}$$

where σ_R and σ_p are defined in 3.1.17 and 3.1.18, respectively.

Note 1 to entry: See 3.1.19.

4 General

4.1 Test method

All the measurements shall be performed according to IEC 60704 by a testing laboratory that shall have appropriate test facilities and trained staff.

4.2 Values and symbols

In this document, the following values apply:

n (see 3.1.11) = 3

$1–P_a = \alpha$ (see 3.1.23) = 5 %, $1–\alpha$ = 95 %

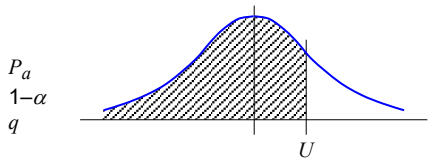
$p_{1–\alpha}$ (see 3.1.25) = 6,5 %

U_{Pa}, $U_{1–\alpha}$ and U_q are values depending on the probability of acceptance P_a or $1–\alpha$ (quantile of the standardized distribution) (see Figure 1)

U_{Pa} is selected by the labeller

$U_{1–\alpha}$ = 1,645

U_q = 1,514



P_a, $1–\alpha$, q	U_{Pa}, $U_{1–\alpha}$, U_q
99,9 %	3,091
99,75 %	2,807
99,50 %	2,576
99,25 %	2,433
99,00 %	2,327
97,50 %	1,960
95,00 %	1,645
93,50 %	1,514
92,50 %	1,440
90,00 %	1,282
75,00 %	0,674
50,00 %	0,000

IEC

Figure 1 – Quantile of the standardized distribution

4.3 Reference standard deviation

Table A.1 states fixed values for the reference standard deviation σ_M.

5 Verification of declared noise emission values

5.1 Basis of the procedure

The procedure for checking declared noise emission values of appliances coming in series or batches from quantity production is for simplicity based on the "σ-method" with a fixed value of reference standard deviation, σ_M, for each of the various categories of household appliances (see Annex A), with single sampling of a very small size, and the (in practice not fully correct) assumption that the noise emission values of a series or a batch will follow a normal distribution.

Verifying compliance of the batch with the declared value is based on the following assumptions:

– the noise emission values of the batch approximate to a normal distribution, characterized by the mean value μ and the specified reference standard deviation σ_M;

– the rejection probability for a batch is equal to a specified value α if the declared value L_c is chosen so that the proportion of noise emission values of the batch exceeding L_c is equal to the specified value $p_{1–\alpha}$.

If the batch and the declared value, L_c, conform with the values α = 5 % and $p_{1–\alpha}$ = 6,5 %, the sampling inspection procedures are set in such a way that the batch will be accepted with the probability of $1–\alpha$ = 95 % and the mean value will be expected to lie approximately 1,5 σ_M below the declared value.

NOTE The procedure for verifying declared noise emission values does not deal with the consequences to be drawn if the declared value is not confirmed for a series or a batch of appliances.

5.2 Verification procedure

Take at random a sample of the size $n = 3$ (fixed by this document for verification purposes) from the series or the batch under consideration.

Measure for each of the items the noise emission value L_i (i = 1, 2, 3) and determine the arithmetic mean of these values $\overline{L}$ in accordance with 3.2.3.

Determine the value

$$A = L_c - k \cdot \sigma_M$$

where k is the acceptability constant calculated from the formula (see ISO 7574-4).

$$k = u_q - \frac{u_{1-\alpha}}{\sqrt{n}} = 0{,}564$$

u_q and $u_{1-\alpha}$ represent the quantiles of the reduced standardized distribution for the values q = $1-p_{1-\alpha}$ = 93,5 % and $1-\alpha$ = 95 % respectively, fixed by this document for verification purposes.

If $\overline{L} \leq A$, the declared value is confirmed as verified for the series or the batch.

If $\overline{L} > A$, the declared value is not confirmed as verified for the series or the batch.

For examples, see Annex B.

6 Determination of noise emission values for declaration

6.1 Basis of the procedure

A labeller who wants to define the risk of rejection (or probability of acceptance) by himself, at a lower risk than 5 % stated in Clause 5, and has determined accurately the total standard deviation for production, deviating from the reference standard deviation fixed for the category of appliances under consideration, may calculate a declared value L_c.

6.2 Determination procedure

Choose u_{Pa}.

Determine:

– the arithmetic mean of production μ;

– the value of the total standard deviation σ_t.

Calculate L_c from the following formula:

$$L_c = \mu + k \cdot \sigma_M + \frac{u_{Pa}}{\sqrt{n}} \sigma_t$$

which reads as, taking into account the values of the different parameters fixed by this document for verification purposes:

$$L_c = \mu + 0{,}564 \cdot \sigma_M + 0{,}577 \cdot u_{Pa} \cdot \sigma_t$$

For examples, see Annex C.

6.3 Presentation of noise emission values

The declared values shall be expressed as clearly as possible in order to provide the prospective user (buyer) with the correct information. In particular, it shall be emphasized that

sound power levels, which shall not be confused with sound pressure values, are used for declaring noise emission values.

When noise emission values are declared in accordance with this document, it shall be clear that they are expressed as an A-weighted sound power level in decibels (re 1 pW) and indicate an upper statistical value below which a large proportion of the noise emission values of the considered batch lies (it is not a mean value).

The value of L_c shall be rounded to the nearest decibel.

Annex A
(normative)

Noise emission of household appliances – Standard deviations

In general, the following standard deviation values are given in the parts of IEC 60704-2:

– standard deviation of repeatability σ_r;

– standard deviation of reproducibility σ_R;

– standard deviation of production σ_P;

– total standard deviation σ_t;

– reference standard deviation σ_M.

The values are expressed in decibels.

For other appliance categories, values for the standard deviations are given in Table A.1.

These values, with the exception of the standard deviation of production σ_P, have been determined during practical investigations carried out by a number of experienced industrial laboratories. The values of the standard deviation of production σ_P are for guidance only.

Table A.1 – Standard deviation

Appliance category	Standard deviation dB				
	σ_r	σ_R	σ_p	σ_t	σ_M
Shavers	0,4	0,8	0,7 to 1,3	1,1 to 1,5	1,5
Hair dryers	0,4	0,8	0,5 to 1,3	0,9 to 1,5	1,5
Hair clippers	0,4	1,0	0,8 to 1,2	1,3 to 1,6	1,5
Fan heaters	0,4	1,0	0,3 to 1,1	1,0 to 1,6	1,5
Kitchen machines	0,5	1,0	0,9 to 1,5	1,4 to 1,8	2,0

Annex B
(informative)

Verification of noise emission values – Examples

B.1 Example 1

A series of vacuum cleaners, manufacturer A, type X is declared with:

$$L_c = 77 \text{ dB(A), re 1 pW}$$

For verification, a sample of $n = 3$ is investigated with the result:

L_1 = 75,5 dB(A); L_2 = 74,5 dB(A); L_3 = 76,1 dB(A); mean value $\overline{L}$ = 75,4 dB(A)

with the given L_c = 77 dB(A) and the fixed value σ_M = 1,5 dB for vacuum cleaners and k = 0,564:

$$A = L_c - k \cdot \sigma_M = 76{,}2 \text{ dB(A)}$$

Result: $\overline{L}$ = 75,4 dB(A) < A = 76,2 dB(A) – the declared value is confirmed.

B.2 Example 2

A series of vacuum cleaners, manufacturer B, type Y is declared with:

$$L_c = 79 \text{ dB(A), re 1 pW}$$

For verification, a sample of $n = 3$ is investigated with the result:

L_1 = 78,7 dB(A); L_2 = 79,0 dB(A) and L_3 = 78,5 dB(A); mean value $\overline{L}$ = 78,7 dB(A)

with the given L_c = 79 dB(A) and the fixed value σ_M = 1,5 dB for vacuum cleaners and k = 0,564:

$$A = L_c - k \cdot \sigma_M = 78{,}2 \text{ dB(A)}$$

Result: $\overline{L}$ = 78,7 dB(A) > A = 78,2 dB(A) – the declared value is not confirmed.

The declared value should be changed to L_c = 80 dB(A) to pass this verification test.

Annex C
(informative)

Determination of noise emission values – Examples

C.1 Example 1

Table C.1 gives the results of the calculated and rounded declared values L_C, the real mean μ and μ + 1,5 σ_t (q = 93,5 %) as a function of arbitrarily chosen values for the total standard deviation σ_t and arbitrarily chosen values for the probability of acceptance P_a under the following conditions:

– for the production of the labeller:
  - mean value of the production μ = 70,0 dB(A);
  - three arbitrarily chosen values of total standard deviation σ_t = 1,0 dB or 2,0 dB or 3,0 dB;
  - three arbitrarily chosen values for probability of acceptance P_a (or risk of rejection 1 – P_a):

P_a = 99,9 % or 99 % or 95 %.

Table C.1 – Calculated noise emission values as a function of the total standard deviation σ_t and the probability of acceptance P_a as assumed by the labeller

Total standard deviation σ_t in dB	1,0 (< σ_M)			2,0 (= σ_M)			3,0 (> σ_M)		
Real mean value μ in dB (re 1 pW(A))	70,0			70,0			70,0		
μ + 1,5 σ_t in dB(A) (q = 93,5 %)	71,5			73,0			74,5		
Probability of acceptance P_a in %	99,9	99	95	99,9	99	95	99,9	99	95
Calculated declared value L_c in dB(A)	73,0	72,5	72,0	74,7	73,8	73,0	76,5	75,1	74,0
Rounded declared value L_c in dB(A)	73	73	72	75	74	73	77	75	74

C.2 Example 2

For a new model of vacuum cleaner, a pilot production of 9 items has shown the following 9 noise values:

L_1 = 75,2 dB(A); L_2 = 75,5 dB(A); L_3 = 75,9 dB(A); L_4 = 76,1 dB(A); L_5 = 76,2 dB(A); L_6 = 76,3 dB(A); L_7 = 76,3 dB(A); L_8 = 76,6 dB(A) and L_9 = 76,8 dB(A).

From these values, $\overline{L}$ = 76,1 dB(A) and σ_P = 0,48 dB are calculated.

From these tests determining the standard deviation of reproducibility, carried out at a number of experienced laboratories, σ_R = 0,8 dB has been found.

For these data, the total standard deviation will be:

$$\sigma_t = \sqrt{{\sigma_R}^2 + {\sigma_p}^2} = 0{,}93 \text{ dB}$$

The value to be declared will be found from the following equation (see Clause 6):

$$L_c = \mu + k \cdot \sigma_M + \frac{u_{Pa}}{\sqrt{n}} \sigma_t$$

taking into account the data for the verification procedure with

n = 3, k = 0,564 (α = 5 %; q = 93,5 %), σ_M = 1,5 dB.

The labeller will calculate the following values to be declared if he chooses a risk of rejection of:

0,1 % with u_{Pa} = 3,091

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{3{,}091}{\sqrt{3}} 0{,}93) \text{ dB(A)} = 78{,}6 \text{ dB(A)} \approx \underline{79 \text{ dB(A)}}, \text{ re 1 pW}$$

1 % with u_{Pa} = 2,327

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{2{,}327}{\sqrt{3}} 0{,}93) \text{ dB(A)} = 78{,}2 \text{ dB(A)} \approx \underline{78 \text{ dB(A)}}, \text{ re 1 pW}$$

5 % with u_{Pa} = 1,645

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{1{,}645}{\sqrt{3}} 0{,}93) \text{ dB(A)} = 77{,}8 \text{ dB(A)} \approx \underline{78 \text{ dB(A)}}, \text{ re 1 pW}$$

C.3 Example 3

For a series of a vacuum cleaner model the mean value and the total standard deviation have been determined to be

$\mu = \bar{L}$ = 76,1 dB(A) and σ_t = 1,7 dB.

Acceptable values to be declared will be found in accordance with Clause 6, with:

n = 3, k = 0,564 (α = 5 %; q = 93,5 %), σ_M = 1,5 dB,

if the labeller chooses the risk of rejection of correctly declared samples:

0,1 % with u_{Pa} = 3,091

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{3{,}091}{\sqrt{3}} 1{,}7) \text{ dB(A)} = 80{,}0 \text{ dB(A)} \approx \underline{80 \text{ dB(A)}}, \text{ re 1 pW}$$

1 % with u_{Pa} = 2,327

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{2{,}327}{\sqrt{3}} 1{,}7) \text{ dB(A)} = 79{,}2 \text{ dB(A)} \approx \underline{79 \text{ dB(A)}}, \text{ re 1 pW}$$

5 % with u_{Pa} = 1,645

$$L_c = (76{,}1 + 0{,}564 \cdot 1{,}5 + \frac{1{,}645}{\sqrt{3}} 1{,}7) \text{ dB(A)} = 78{,}6 \text{ dB(A)} \approx \underline{79 \text{ dB(A)}}, \text{ re 1 pW}$$

Bibliography

ISO 3951-1:2005, *Sampling procedures for inspection by variables – Part 1: Specification for single sampling plans indexed by acceptance quality limit (AQL) for lot-by-lot inspection for a single quality characteristic and a single AQL*

ISO 4871:1996, *Acoustics – Declaration and verification of noise emission values of machinery and equipment*

ISO 5725 (all parts), *Accuracy (trueness and precision) of measurement methods and results*

ISO 7574-1:1985, *Acoustics – Statistical methods for determining and verifying stated noise emission values of machinery and equipment – Part 1: General considerations and definitions*

SOMMAIRE

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – CODE D'ESSAI POUR LA DÉTERMINATION DU BRUIT AÉRIEN –

Partie 3: Méthode de détermination et de vérification des valeurs déclarées d'émission sonore

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La Norme internationale IEC 60704-3 a été établie par le comité d'études 59 de l'IEC: Aptitude à la fonction des appareils électrodomestiques.

L'IEC 60704-1:2010 a servi de base à l'élaboration de la présente norme.

Cette troisième édition annule et remplace la deuxième édition parue en 2006. Cette édition constitue une révision technique. Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) dans l'Annexe A, les écarts-types qui sont à présent spécifiés pour différentes catégories d'appareils dans les parties de l'IEC 60704-2 ont été exclus du Tableau A.1;

b) en outre, cette édition fait référence à de nouvelles normes et met en application les Directives ISO/IEC, Partie 2 d'une manière plus précise.

Les écarts-types spécifiés dans une Partie 2 de la série IEC 60704 se substituent aux valeurs données dans le Tableau A.1.

Le texte de cette Norme internationale est issu des documents suivants:

CDV	Rapport de vote
59/675/CDV	59/680A/RVC

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Cette Norme internationale doit être utilisée conjointement avec l'IEC 60704-1:2010 et la dernière édition de l'IEC 60704-2 (toutes les parties).

Une liste de toutes les parties de la série IEC 60704, publiées sous le titre général *Appareils électrodomestiques et analogues – Code d'essai pour la détermination du bruit aérien*, peut être consultée sur le site web de l'IEC.

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INTRODUCTION

Une déclaration correcte et détaillée de l'émission sonore est très utile à l'acheteur potentiel pour effectuer un bon choix entre des appareils de même catégorie (ayant la même utilisation) de différentes marques ou de différents modèles.

Afin d'assurer une déclaration correcte des valeurs d'émission sonore, la présente partie de l'IEC 60704 décrit une méthode simple pour vérifier les valeurs déclarées et fournit des informations pour déterminer les valeurs d'émission sonore.

Les différents pays appliquent des stratégies différentes de surveillance du marché. Le présent document ne met pas en œuvre une stratégie de surveillance de marché obligatoire.

APPAREILS ÉLECTRODOMESTIQUES ET ANALOGUES – CODE D'ESSAI POUR LA DÉTERMINATION DU BRUIT AÉRIEN –

Partie 3: Méthode de détermination et de vérification des valeurs déclarées d'émission sonore

1 Domaine d'application

La présente partie de l'IEC 60704 décrit les méthodes de détermination et de vérification des valeurs déclarées du bruit émis par les appareils domestiques et analogues.

Elle s'applique à toutes les catégories d'appareils à usage domestique et analogue couverts par l'IEC 60704-1 et toutes les parties de l'IEC 60704-2, qui contiennent des exigences particulières applicables à certaines catégories d'appareils.

Elle s'applique aux appareils produits en quantité (en série, en lots) fabriqués suivant les mêmes spécifications techniques et caractérisés par la même valeur déclarée d'émission sonore.

La présente partie de l'IEC 60704:

– utilise le terme "déclaration" pour englober tous les moyens utilisés pour fournir des informations sur les valeurs d'émission sonore aux utilisateurs potentiels (consommateurs) des appareils; ce terme inclut les étiquettes, les notices, les publicités, les fiches techniques et commerciales d'information, etc.;

– traite de la déclaration pour des appareils fabriqués en série;

– décrit une méthode statistique simple pour vérifier les valeurs déclarées en étudiant un échantillon limité à trois appareils.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60704-1:2010, *Appareils électrodomestiques et analogues – Code d'essai pour la détermination du bruit aérien – Partie 1: Règles générales*

IEC 60704-2 (toutes les parties), *Appareils électrodomestiques et analogues – Code d'essai pour la détermination du bruit aérien – Partie 2: Exigences particulières*

ISO 3534-1:2006, *Statistiques – Vocabulaire et symboles – Partie 1: Termes statistiques généraux et termes utilisés en calcul des probabilités*

ISO 7574-4:1985, *Acoustique – Méthodes statistiques pour la détermination et le contrôle des valeurs déclarées d'émission acoustique des machines et équipements – Partie 4: Méthodes pour valeurs déclarées de lots de machines*

3 Termes, définitions et calculs

3.1 Termes et définitions

Pour les besoins du présent document, les termes et définitions donnés dans l'IEC 60704-1 ainsi que les suivants s'appliquent.

L'ISO et l'IEC tiennent à jour des bases de données terminologiques destinées à être utilisées en normalisation, consultables aux adresses suivantes:

- IEC Electropedia: disponible à l'adresse http://www.electropedia.org/
- ISO Online browsing platform: disponible à l'adresse http://www.iso.org/obp

3.1.1
niveau de puissance acoustique
L_W
dix fois le logarithme décimal du rapport de la puissance acoustique d'une source à la puissance acoustique de référence, exprimé en décibels

Note 1 à l'article: La puissance acoustique de référence est 1 pW (10^{-12} W). La pondération en fréquence, ou la fréquence à mi-bande de la bande de fréquences utilisée, est indiquée dans le symbole.

Note 2 à l'article: Par exemple, le niveau de puissance acoustique pondéré A est L_{WA}.

3.1.2
niveau de puissance acoustique pondéré A
L_{WA}
niveau de puissance acoustique d'un appareil déterminé conformément aux exigences appropriées de l'IEC 60704-1 et de la partie applicable de l'IEC 60704-2

Note 1 à l'article: Dans la suite de la présente partie, l'indice $_{WA}$ a été supprimé par souci de simplification.

3.1.3
valeur d'émission sonore
valeur particulière de la grandeur d'émission sonore

3.1.4
valeur mesurée
L_i
valeur d'émission sonore d'un appareil spécifique, déterminée conformément aux exigences appropriées de l'IEC 60704

3.1.5
famille d'appareils
catégorie d'appareils
appareils de conception ou de type similaires ou destinés à remplir les mêmes fonctions

[SOURCE: ISO 7574-1:1985, 3.5, modifié – Les notes ont été supprimées, "catégorie d'appareils" a été ajouté en tant que terme privilégié, "appareils" remplace "machines" dans le terme et dans la définition, et "ou équipements" a été supprimé de la définition.]

3.1.6
valeur déclarée
L_c
valeur de la grandeur d'émission sonore arrondie au décibel le plus proche spécifiée pour tous les appareils d'une série de production complète ou d'un lot de ces appareils, les appareils étant neufs

Note 1 à l'article: La valeur déclarée indique la valeur statistique supérieure en dessous de laquelle se trouve une proportion importante spécifiée de valeurs d'émission sonore du lot concerné. L_c dépend de la méthode de vérification prescrite, qui est telle qu'il y ait une probabilité d'acceptation de 95 % pour le lot, lorsqu'au plus 6,5 % de toutes les valeurs d'émission sonore dépassent L_c, et si l'écart-type de référence prescrit σ_M est égal à l'écart-type de référence total réel σ_t.

[SOURCE: ISO 7574-1:1985, 3.6, modifié – Le terme "valeur déclarée; valeur annoncée" a été remplacé par "valeur déclarée"; la première phrase a été remplacée par "arrondie au décibel le plus proche spécifiée pour tous les appareils d'une série de production complète ou d'un lot de ces appareils" et "les appareils étant neufs" a été ajouté; la deuxième phrase a été supprimée, le fait "étant neufs" est intégré dans la première phrase et les notes 1 et 2 ont été remplacées par une Note 1 à l'article.]

3.1.7
déclaration
indication de la valeur déclarée, L_c, qui est incluse dans les notices, la publicité, la documentation technique ou commerciale, et/ou fixée à un appareil ou à une partie de celui-ci pour fournir aux utilisateurs potentiels (acheteurs, consommateurs) des informations sur les valeurs d'émission sonore de l'appareil en question

Note 1 à l'article: L'expression "celui qui procède à la déclaration" est utilisée dans le présent document pour une personne faisant des déclarations.

[SOURCE: ISO 7574-1:1985, 3.7, modifié – Le terme "étiquette" a été remplacé par "déclaration", "les notices, la publicité, la documentation technique ou commerciale" a été ajouté, la phrase suivant "et/ou fixée" a été remplacée par "à un appareil ou à une partie de celui-ci pour fournir aux utilisateurs potentiels (acheteurs, consommateurs) des informations sur les valeurs d'émission sonore de l'appareil en question" et la Note 1 à l'article a été ajoutée.]

3.1.8
lot d'appareils
groupe de la même famille produit en quantité, fabriqué selon les mêmes spécifications techniques, et caractérisé par la même valeur déclarée, L_c

Note 1 à l'article: Un lot peut être soit une production de série dans son ensemble, soit une de ses fractions.

[SOURCE: ISO 7574-1:1985, 3.8, modifié – Le terme "lot (série) de machines" a été remplacé par "lot d'appareils" et la note a été transférée dans la Note 1 à l'article.]

3.1.9
effectif du lot
effectif de la population
N
nombre d'individus (appareils dans le lot ou valeurs d'émission sonore dans la population) du lot (ou de la population)

[SOURCE: ISO 7574-1:1985, 3.9, modifié – Le terme "effectif de la population" a été explicitement ajouté en tant que terme privilégié, le mot "machines" est remplacé par "appareils" et l'expression "du lot (ou de la population)" est ajoutée.]

3.1.10
échantillon
un ou plusieurs appareils (ou valeurs mesurées) choisis de façon aléatoire dans un lot (ou une population)

[SOURCE: ISO 7574-1:1985, 3.10, modifié – "Machines" est remplacé par "appareils".]

3.1.11
effectif de l'échantillon
n
nombre d'individus de l'échantillon

[SOURCE: ISO 7574-1:1985, 3.11]

3.1.12
moyenne arithmétique d'un lot
moyenne arithmétique d'une population
μ
quotient de la somme des valeurs d'émission sonore d'un lot (ou d'une population) par l'effectif du lot (ou de la population)

[SOURCE: ISO 7574-1:1985, 3.12, modifié – Le terme "moyenne arithmétique d'une population" a été explicitement ajouté et la formule a été supprimée.]

3.1.13
moyenne arithmétique d'un échantillon
$\overline{L}$
quotient de la somme des valeurs mesurées, L_i, dans un échantillon par l'effectif de l'échantillon

Note 1 à l'article: La valeur arithmétique moyenne de l'échantillon, $\overline{L}$ est utilisée comme estimateur de la valeur moyenne du lot (ou de la population), μ.

[SOURCE: ISO 7574-1:1985, 3.13, modifié – La formule a été supprimée et l'explication a été transférée dans la Note 1 à l'article.]

3.1.14
écart-type d'un lot
écart-type d'une population
σ
écart-type des valeurs d'émission sonore d'un lot (ou d'une population)

[SOURCE: ISO 7574-1:1985, 3.14, modifié – L'expression "d'effectif N est donné par la formule" et la formule correspondante ont été supprimées.]

3.1.15
écart-type d'un échantillon
s
écart-type des valeurs d'émission sonore d'un échantillon

Note 1 à l'article: L'écart-type s de l'échantillon est utilisé comme estimateur de l'écart-type σ du lot (ou de la population).

[SOURCE: ISO 7574-1:1985, 3.15, modifié – L'expression "des valeurs d'émission sonore " a été ajoutée, la formule a été supprimée et l'explication a été transférée dans la Note 1 à l'article.]

3.1.16
écart-type de répétabilité
σ_r
écart-type des valeurs d'émission sonore obtenues dans des conditions de répétabilité, c'est-à-dire l'application répétée de la même méthode de mesurage d'émission sonore à la même source de bruit dans un court intervalle de temps et dans les mêmes conditions (même laboratoire, même opérateur, même équipement de mesure)

Note 1 à l'article: Des valeurs de l'écart-type de répétabilité, σ_r, obtenues en pratique, sont données à l'Annexe A.

[SOURCE: ISO 7574-1:1985, 3.16, modifié – L'expression "même appareillage" a été remplacée par "même équipement de mesure", la référence à l'ISO 5725 a été supprimée et la Note 1 à l'article a été ajoutée.]

3.1.17
écart-type de reproductibilité
σ_R
écart-type des valeurs d'émission sonore obtenues dans des conditions de reproductibilité, c'est-à-dire l'application répétée de la même méthode de mesurage d'émission sonore à la même source de bruit à différents moments et dans différentes conditions (laboratoires différents, opérateurs différents et équipements de mesure différents)

Note 1 à l'article: L'écart-type de reproductibilité inclut l'écart-type de répétabilité (voir 3.1.16).

Note 2 à l'article: Des valeurs estimées de l'écart-type de reproductibilité, σ_R, obtenues en pratique, sont données à l'Annexe A.

[SOURCE: ISO 7574-1:1985, 3.17, modifié – La référence à la norme ISO 5725 a été supprimée, la deuxième phrase a été transférée dans la Note 1 à l'article et la Note 2 à l'article a été ajoutée.]

3.1.18
écart-type de production
σ_p
écart-type des valeurs d'émission sonore obtenues sur différents appareils de lots de la même catégorie (famille) en utilisant la même méthode de mesurage de l'émission sonore dans des conditions de répétabilité (même laboratoire, même opérateur, même appareillage)

Note 1 à l'article: Des valeurs estimées d'écarts-types de production, σ_P, obtenues en pratique, sont données à l'Annexe A.

[SOURCE: ISO 7574-1:1985, 3.18, modifié – L'expression au début a été remplacée par "des valeurs d'émission sonore obtenues sur différents appareils de lots de la même catégorie (famille)", la note a été supprimée et la Note 1 à l'article a été ajoutée.]

3.1.19
écart-type total
σ_t
racine carrée de la somme des carrés des écarts-types de reproductibilité (voir 3.1.17) et de production (voir 3.1.18)

Note 1 à l'article: Des valeurs estimées de l'écart-type total, σ_t, obtenues en pratique, sont données à l'Annexe A.

[SOURCE: ISO 7574-1:1985, 3.19, modifié – La formule a été supprimée et la Note 1 à l'article a été ajoutée.]

3.1.20
écart-type de référence
σ_M
écart-type total prescrit et fixé pour la famille d'appareils à l'étude, qui est considéré comme typique pour les lots de cette famille

Note 1 à l'article: L'utilisation d'un σ_M fixé pour chaque catégorie d'appareils permet l'application d'une méthode statistique à des échantillons de faible effectif.

Note 2 à l'article: Des valeurs de l'écart-type de référence, σ_M, fixées pour les différentes catégories d'appareils domestiques (déterminées à partir d'essais pratiques) sont données à l'Annexe A.

[SOURCE: ISO 7574-1:1985, 3.20, modifié – Les mots "et fixé" ont été ajoutés, "machines" a été remplacé par "appareils", la première phrase de la note a été transférée dans une Note 1 à l'article, la partie restante de la note a été supprimée et la Note 2 à l'article a été ajoutée.]

3.1.21
échantillonnage simple
type d'échantillonnage qui consiste à prélever seulement un échantillon du lot

Note 1 à l'article: Voir l'ISO 3534-1:2006.

[SOURCE: ISO 7574-1:1985, 3.21, modifié – La référence à l'ISO 3534-1 a été transférée dans la Note 1 à l'article.]

3.1.22
contrôle par mesures
méthode qui consiste à mesurer un paramètre quantitatif de chaque individu d'une population ou d'un échantillon prélevé dans cette population

Note 1 à l'article: Le paramètre quantitatif est la grandeur d'émission sonore.

Note 2 à l'article: Voir l'ISO 3534-1:2006.

[SOURCE: ISO 7574-1:1985, 3.24, modifié – La deuxième phrase a été transférée dans la Note 1 à l'article, la référence à l'ISO 3534-1 a été transférée dans la Note 2 à l'article et les notes 1 et 2 ont été supprimées.]