BRITISH STANDARD

BS EN
60704-3:2006

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

The European Standard EN 60704-3:2006 has the status of a British Standard

ICS 17.140.20; 97.040

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 60704-3:2006. It is identical with IEC 60704-3:2006. It supersedes BS EN 60704-3:1995 which will be withdrawn on 1 March 2009.

The UK participation in its preparation was entrusted to Technical Committee CPL/59, Performance of household electrical appliances, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

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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

(IEC 60704-3:2006)

Appareils électrodomestiques et analogues — Code d'essai pour la détermination du bruit aérien Partie 3: Procédure pour déterminer et vérifier l'annonce des valeurs d'émission acoustique (CEI 60704-3:2006)

Elektrische Geräte für den Hausgebrauch und ähnliche Zwecke — Prüfvorschrift für die Bestimmung der Luftschallemission Teil 3: Verfahren zur Bestimmung und Nachprüfung angegebener Geräuschemissionswerte (IEC 60704-3:2006)

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CENELEC

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Foreword

The text of document 59/434/FDIS, future edition 2 of IEC 60704-3, prepared by IEC TC 59, Performance of household electrical appliances, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60704-3 on 2006-03-01.

This European Standard supersedes EN 60704-3:1994.

Major changes in EN 60704-3:2006 involve revised values in Table A.1, including added values for fans and ovens and designation of values for standard deviations of production as informative rather than normative. Additionally, it was determined that standard deviations specified in part 2 documents of the IEC/EN 60704 series supersede the values given in Table A.1.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2006-12-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2009-03-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60704-3:2006 was approved by CENELEC as a European Standard without any modification.

CONTENTS

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 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 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.

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 IEC 60704-2 dealing with particular requirements for special categories of appliances.

It applies to appliances being produced in quantity (in series, batches, lots) manufactured to the same technical specification and characterized by the same labeled 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 referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60704-1:1997, *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, *Statistics – Vocabulary and symbols – Part 1: Probability and general statistical terms*

3 Terms and definitions

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

3.1
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:

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

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

NOTE For example, the A-weighted sound power level is L_{WA}.

3.2
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 IEC 60704-2

NOTE Henceforth the subscript $_{WA}$ is left out for reason of simplicity.

3.3
noise emission value
single value of the noise emission quantity

3.4
measured value
L_i:
noise emission value for an individual appliance determined in accordance with the appropriate requirements of IEC 60704

3.5
family of appliances
category of appliances
appliances of similar design or type or intended to perform the same functions

[ISO 7574-1, definition 3.5, modified]

3.6
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 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.

[ISO 7574-1, definition 3.6, modified]

3.7
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

[ISO 7574-1, definition 3.7, modified]

3.8
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 A batch may be either an entire production series or a portion thereof.

[ISO 7574-1, definition 3.8, modified].

3.9
size of the batch (or 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)

[ISO 7574-1, definition 3.9, modified].

3.10
sample
one or more appliances (or measured values) randomly selected from a lot (or population)

[ISO 7574-1, definition 3.10, modified].

3.11
size of the sample
n
number of items in the sample

[ISO 7574-1, definition 3.11].

3.12
arithmetic mean of a batch (or 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)

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

[ISO 7574-1, definition 3.12]

3.13
arithmetic mean of a sample
$\bar{L}$
sum of the measured values, L_i, in a sample divided by the size of the sample

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

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.

[ISO 7574-1, definition 3.13]

3.14
standard deviation of a batch (or 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

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

[ISO 7574-1, definition 3.14]

3.15
standard deviation of a sample
s
standard deviation of the sample is given by the equation

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

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

[ISO 7574-1, definition 3.15]

3.16
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)

[ISO 7574-1, definition 3.16, modified].

NOTE Values for the standard deviation of repeatability, σ_r, obtained in practice, are given in Annex A.

3.17
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). The standard deviation of reproducibility, therefore, includes the standard deviation of repeatability (see 3.16)

NOTE Estimates of the standard deviation of reproducibility, σ_R, obtained in practice, are given in annex A.

[ISO 7574-1, definition 3.17, modified].

3.18
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 Estimates of the standard deviation of production, σ_P, obtained in practice, are given in Annex A.

[ISO 7574-1, definition 3.18, modified]

3.19
total standard deviation
σ_t
square root of the sum of the squares of the standard deviation of reproducibility (3.17) and of the standard deviation of production (3.18)

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

[ISO 7574-1, definition 3.19]

NOTE Estimates of the total standard deviation, σ_t, obtained in practice are given in Annex A.

3.20
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 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.

[ISO 7574-1, definition 3.20, modified]

NOTE 2 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.

3.21
single sampling
type of sampling which consists in taking only one sample from the batch (See ISO 3534-1: 1993)

[ISO 7574-1, definition 3.21, modified]

3.22
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. The quantitative characteristic is the noise emission quantity (See ISO 3534-1:1993).

[ISO 7574-1, definition 3.24, modified]

3.23
probability of acceptance
P_a
probability that a batch of given quality (expressed by its proportion *p* of noise emission values exceeding the labeled value) will be accepted by a given sampling plan (See ISO 3534-1: 1993).

NOTE $(1 - P_a)$ is called "probability of rejection". If $(1 - P_a)$ has the fixed value α (see 3.25), this is called the "producer's risk". If P_a has the fixed value β (see 3.26), this is called the "consumer's risk".

[ISO 7574-1, definition 3.20, modified]

3.24
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 (See ISO 3534-1:1993).

NOTE The operating characteristic curve is fully determined by two specified points (for example, the producer's risk point and the consumer's risk point) or by one point (for example, the producer's risk point) and the sample size *n*.

[ISO 7574-1, definition 3.26]

3.25
producer's risk point
point on the operating characteristic curve corresponding to a predetermined and usually low probability of rejection α. This probability of rejection is called the "producer's risk" (See ISO 3534-1:1993).

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).

[ISO 7574-1, definition 3.27, modified]

3.26
consumer's risk point
point on the operating characteristic curve corresponding to a predetermined and usually low probability of acceptance β. This probability of acceptance is then called the "consumer's risk".

[ISO 7574-1, definition 3.28, modified]

4 General

4.1 Test method

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

4.2 Values and symbols

In this part the following values apply:

n (see 3.11) = 3

$1 - P_a = \alpha$ (see 3.23) = 5 %, $1 - \alpha$ = 95 %

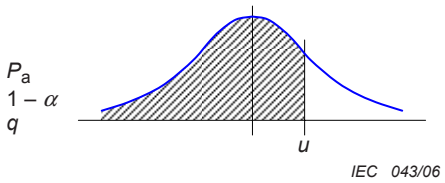
$P_{1-\alpha}$ (voir 3.25) = 6,5 %

U_{Pa}, $U_{1-\alpha}$ and U_q are values depending on the probability of accepatnce 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

Figure 1 – Quantile of the standardized distribution

4.3 Reference standard deviation

Table A.1 in Annex A 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 very small size, and the (practically 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 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 standard 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

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

Determine the value

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

where k is 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 – α = 95 % respectively values, fixed by this standard 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 labeler who wants to define the risk of rejection (or probability of acceptance) by himself (possibly a lower risk than 5 % as stated in Clause 5), and who has determined accurately for his production a total standard deviation, 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:

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

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

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

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 according to this part of IEC 60704 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 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

– standard deviation of repeatability $\sigma_{r;}$
– standard deviation of reproducibility σ_R
– standard deviation of production σ_P
– total standard deviation σ_t
– reference standard deviation σ_M

These values 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 are expressed in decibels.

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 – 1,3	1,1 – 1,5	1,5
Hair dryers	0,4	0,8	0,5 – 1,3	0,9 – 1,5	1,5
Hair clippers	0,4	1,0	0,8 – 1,2	1,3 -1,6	1,5
Fan heaters	0,4	1,0	0,3 – 1,1	1,0 – 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 – 1,5	1,4 – 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 with:

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

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 $\overline{L} = 75{,}4$ dB(A)

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

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

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 labeled with:

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

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); $L_3 = 78{,}5$ dB(A); mean value $\overline{L} = 78{,}7$ dB(A)

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

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

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

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);
  - arbitrarily chosen three values of total standard deviation σ_t = 1,0 dB; 2,0 dB; 3,0 dB;
  - arbitrarily chosen three values for probability of acceptance P_a (or risk of rejection 1 – P_a):

$$P_a = 99{,}9\ \%;\ 99\ \%;\ 95\ \%.$$

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 labeler

Total standard deviation σ_t in dB	1,0 ($< \sigma_M$)			2,0 ($= \sigma_M$)			3,0 ($> \sigma_M$)		
Real mean value μ in dB (re 1 pW)	70,0			70,0			70,0		
μ + 1,5 σ_t in dB (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	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	73	73	72	75	74	73	77	75	74

C.2 Example 2

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

$$L_i = 75{,}2;\ 75{,}5;\ 75{,}9;\ 76{,}1;\ 76{,}2;\ 76{,}3;\ 76{,}3;\ 76{,}6;\ 76{,}8.$$

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:

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

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

$$L_c = \mu + k\sigma_M + \frac{u_{Pa}}{\sqrt{n}} \times \sigma_T$$

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 labeler will calculate the following values to be declared if he chooses the risk of rejection:

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

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

1 % with u_{Pa} = 2,327

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

5 % with u_{Pa} = 1,645

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

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 for to be declared will be found according to Clause 6 with

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

if the labeler chooses the risk of rejection of correctly labeled samples:

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

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

1 % with u_{Pa} = 2,327

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

5 % with u_{Pa} = 1,645

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

Bibliography

ISO 3951:2005, *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, *Declaration and verification of noise emission values of machinery and equipment*

NOTE Harmonized as EN ISO 4871:1996 (not modified).

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*

NOTE Harmonized as EN 27574-1:1988 (not modified).

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*

NOTE Harmonized as EN 27574-4:1988 (not modified).

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60704-1	1997	Household and similar electrical appliances - Test code for the determination of airborne acoustical noise Part 1: General requirements	EN 60704-1	1997
IEC 60704-2	Series	Household and similar electrical appliances - Test code for the determination of airborne acoustical noise	EN 60704-2	Series
ISO 3534-1	1993	Statistics - Vocabulary and symbols Part 1: Probability and general statistical terms	-	-

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