International Standard 7574/3

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Acoustics — Statistical methods for determining and verifying stated noise emission values of machinery and equipment — Part 3 : Simple (transition) method for stated values for batches of machines

Acoustique — Méthodes statistiques pour la détermination et le contrôle des valeurs déclarées d'émission acoustique des machines et équipements — Partie 3: Méthode simplifiée (transitoire) pour valeurs déclarées de lots de machines

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

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Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Acoustics — Statistical methods for determining and verifying stated noise emission values of machinery and equipment — Part 3 : Simple (transition) method for stated values for batches of machines

0 Introduction

A general introduction to the four-part series of ISO 7574 is given in ISO 7574/1.

For the purposes of this part of ISO 7574, the term "labelled value" stands for all kinds of stated values (e.g. information on a label, the upper noise limit set by an authority, the agreed contract value) for which the methods may be applied.

1 Scope and field of application

This part of ISO 7574 is derived from ISO 7574/4. It provides guidelines for determining the labelled value, L_C, by the labeller and specifies a simple method for verifying compliance of the noise emissions of a batch (lot) of machinery or equipment with its labelled value, L_C. This method may be used when a specific noise labelling code (in accordance with clause 6 of ISO 7574/4) specifying the reference standard deviation, sample size and sampling procedure for the family of machines does not yet exist. If a specific noise labelling code exists, it shall be used, in which case reference to this part of ISO 7574 shall not be made.

This part of ISO 7574 should preferably be used only by agreement, e.g. as reached in the standards relating to the relevant machinery industry or in a contract.

This part of ISO 7574 does not deal with the consequences that ensue if the stated value is not confirmed as verified for a batch of machines.

2 References

ISO 3741, *Acoustics — Determination of sound power levels of noise sources — Precision methods for broad-band sources in reverberation rooms.*

ISO 3742, *Acoustics — Determination of sound power levels of noise sources — Precision methods for discrete-frequency and narrow-band sources in reverberation rooms.*

ISO 3743, *Acoustics — Determination of sound power levels of noise sources — Engineering methods for special reverberation test rooms.*

ISO 3744, *Acoustics — Determination of sound power levels of noise sources — Engineering methods for free-field conditions over a reflecting plane.*

ISO 3745, *Acoustics — Determination of sound power levels of noise sources — Precision methods for anechoic and semi-anechoic rooms.*

ISO 3746, *Acoustics — Determination of sound power levels of noise sources — Survey method.*

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

ISO 7574/4, *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 Definitions

For the purposes of this part of ISO 7574, the definitions given in ISO 7574/1 apply.

4 General

When checking compliance of a batch with its labelled value, this part of ISO 7574 works on the principle that the labelled value indicates the limit below which a specified large proportion of the noise emission values of the batch shall lie. This proportion accounts for both the variability between the machines and the random measurement errors occurring under reproducibility conditions (see 3.17 in ISO 7574/1).

NOTE — In the application of this part of ISO 7574, it is assumed that all measurements will be performed by a testing laboratory which has appropriate test facilities and trained staff.

5 Guidelines for the determination of the labelled value, L_c, by the labeller

As the determination of the labelled value for a batch of machines is the sole responsibility of the labeller, this clause is given for guidance only.

The measured values of individual machines, L_i^*, of the relevant batch shall be determined in accordance with the specific measurement test code for the specific family of machines. (The asterisk in the symbol is used here to differentiate between measurements in conformity with this clause and those in conformity with clause 6.)

NOTES

1 If such a specific measurement test code does not exist, the methods specified in ISO 3741, ISO 3742, ISO 3743, ISO 3744 and ISO 3745[1] may be used if the installation and operating conditions typical of normal use are clearly stated or agreed.

2 If the specific measurement test code for the family of machines provides more than one mode of operation in normal use, the mode yielding the highest value of $\overline{L}^*$ or the mode agreed upon in the relevant machinery industry or in the contract should be used to determine L_c. The installation and operating conditions and the measurement test code used should be clearly stated.

The mean value, $\overline{L}^*$, is calculated from the measured values, L_i^*, of the individual machines in a sample.

The labelled value, L_c, of a batch of machines may be determined by adding a constant, K, to the mean value of the sample, $\overline{L}^*$:

$$L_c = \overline{L}^* + K$$

In general, it is preferable to choose a sample size as large as practicable in determinations of the mean value in order to reduce the uncertainties associated with the noise source. The constant, K, is a positive number, determined by the labeller on the basis of the definition of the labelled value (see clause 4) with respect to the verification procedure of clause 6. According to clause 6, the value of K should be greater than or equal to 5 dB. This value is given for guidance only. More guidance is given in clause 5 of ISO 7574/4 assuming that $\sigma_M = 3{,}5$ dB.

NOTE — Testing may be necessary from time to time in order to ensure that the labelled value continues to be correct. Testing is also required whenever physical changes are made to the production machines that may affect their noise emissions.

6 Verifying the labelled value for a batch of machines

If no special noise labelling code exists for the specific family of machines to be verified, verification of the labelled value, L_c, is then carried out as follows :

a) A sample size of $n = 3$ is taken at random from the batch under consideration.

b) The measured values, L_i, are determined in accordance with the specific measurement test code for the specific family of machines, or, if no such code exists, in accordance with ISO 3741, ISO 3742, ISO 3743, ISO 3744 or ISO 3745[1] using the same installation and operating conditions as specified in clause 5. L_i shall not be rounded prior to statistical calculations.

c) The mean value is given by

$$\overline{L} = \frac{1}{3}\sum_{i=1}^{3} L_i$$

d) The rules governing the decision shall be as follows:

if $\overline{L} < L_c - 2$ dB, the labelled value is confirmed as verified for the batch;

if $\overline{L} > L_c - 2$ dB, the labelled value is not confirmed as verified for the batch.

NOTES

1 The above procedure is equivalent to the procedure outlined in ISO 7574/4 for:

— a single sampling inspection,

— a sample size of $n = 3$, and

— a reference standard deviation of $\sigma_M = 3{,}5$ dB.

The above procedure is applicable for reproducibility conditions (see 3.17 in ISO 7574/1), and for repeatability conditions (see 3.16 in ISO 7574/1). It should be ascertained that no outstanding systematic error of measurement results is connected with relevant laboratories.

2 If the actual total standard deviation for this specific batch of machines differs from $\sigma_M = 3{,}5$ dB, see ISO 7574/4, clause 5, and annexes A and B.

7 Information to be given

The specific measurement test code for the specific family of machines, or, if no such code exists, ISO 3741, ISO 3742, ISO 3743, ISO 3744 or ISO 3745, and the installation and operating conditions used shall be stated.

1) This does not preclude the use of other International Standards, e.g. ISO 3746, which may form the basis of the special measurement test code.