



SLOVENSKI STANDARD
SIST EN 12096:2000
01-december-2000

Mechanical vibration - Declaration and verification of vibration emission values

Mechanical vibration - Declaration and verification of vibration emission values

Mechanische Schwingungen - Angabe und Nachprüfung von Schwingungskennwerten

Vibrations mécaniques - Déclaration et vérification des valeurs d'émission vibratoire

Ta slovenski standard je istoveten z: EN 12096:1997

[SIST EN 12096:2000](https://standards.iteh.ai/catalog/standards/sist/77346528-77a0-41ec-b278-5fd3435b4af/sist-en-12096-2000)

<https://standards.iteh.ai/catalog/standards/sist/77346528-77a0-41ec-b278-5fd3435b4af/sist-en-12096-2000>

ICS:

| | | |
|--------|--|--|
| 17.160 | Vibracije, meritve udarcev in vibracij | Vibrations, shock and vibration measurements |
|--------|--|--|

SIST EN 12096:2000

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 12096:2000

<https://standards.iteh.ai/catalog/standards/sist/77346528-77a0-41ec-b278-5fd3435bf4af/sist-en-12096-2000>

EUROPEAN STANDARD

EN 12096

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 1997

ICS 13.160; 17.160

Descriptors: safety of machinery, vibration, measurement, vibration severity, maximum value, verification, statistical analysis, ergonomics, human body

English version

Mechanical vibration - Declaration and verification of vibration emission values

Vibrations mécaniques - Déclaration et vérification des valeurs d'émission vibratoire - Mécanische Schwingungen - Angabe und Nachprüfung von Schwingungskennwerten

(standards.iteh.ai)

SIST EN 12096:2000

<https://standards.iteh.ai/catalog/standards/sist/77346528-77a0-41ec-b278-5fd3435b4af/sist-en-12096-2000>

This European Standard was approved by CEN on 1997-07-03. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 231 "Mechanical vibration and shock", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 1998, and conflicting national standards shall be withdrawn at the latest by January 1998.

This European Standard contains five annexes A to E which are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

iTeh STANDARD PREVIEW

(standards.iteh.ai)

Introduction

Information on vibration emission of vibrating machinery is needed by users, planners, manufacturers and authorities, for example to comply with the obligations described in the EU Machinery Directives 89/392/EEC and 91/368/EEC. This information is required for comparing the vibration emissions from different products and for assessing the vibration against vibration requirements.

In order for vibration emission values to be useful, uniform methods are necessary for following purposes:

- measurement of the vibration values,
- determination of the declared vibration emission value,
- presentation of the declared vibration emission value,
- verification of the declared vibration emission value.

The statistical methods used for declaration and verification in this European Standard are equivalent to those used in acoustics (see EN 27574).

NOTE: This note concerns German words for "declaration" and "verification".



1 Scope

This European Standard establishes the requirements for declaration and verification of vibration emission values. It applies to hand-arm and whole-body vibration values achieved by measurements according to type-B and type-C standards. It

- gives guidance on the declaration of vibration emission values,
- describes vibration and product information to be given in technical documents supplied to users by the manufacturer,
- specifies the method for verifying the declared vibration emission values stated by the manufacturer.

The values to be used for the declaration of vibration emission are r.m.s. values of weighted acceleration measured preferably according to a vibration test code (see 3.1.5).

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- ENV 25349 Mechanical vibration — Guidelines for the measurement and the assessment of human exposure to hand-transmitted vibration (ISO 5349:1986)
- ENV 28041 Human response to vibration — Measuring instrumentation (ISO 8041:1990)
- ISO 2631-1 Mechanical vibration and shock — Evaluation of human exposure to whole-body vibration — Part 1: General requirements

3 Definitions and symbols

For the purposes of this European Standard, the following definitions apply. They are grouped in two categories: general definitions and vibration-related definitions. Definitions of statistical terms are to be found in annex A.

3.1 General definitions

3.1.1 machinery: An assembly of linked parts or components, at least one of which moves, with the appropriate actuators, control and power circuits etc., joined together for a specific application, in particular for the processing, treatment, moving or packaging of material.

The term machinery also covers an assembly of machines which, in order to achieve the same end, are arranged and controlled so that they function as an integral whole.

3.1.2 family of machinery: Machinery of similar design or type, intended to perform the same functions.

3.1.3 batch [lot] of machinery: A number of units of machinery intended to perform the same function, produced in quantity, manufactured to the same technical specifications and characterized by the same declared vibration emission value.

NOTE: The batch may be an entire production series or a portion thereof.

3.1.4 operating mode: A condition in which the machinery is performing its intended function, which may be artificially simulated, as specified in a relevant standard.

3.1.5 vibration test code: A type-C standard related to a specified family or sub-family or type of machinery. It gives all the information necessary to efficiently carry out the determination of the vibration emission characteristics needed for declaration and verification according to this European Standard. It ensures compatibility and allows comparison of test results.

iTeh STANDARD PREVIEW

3.2 Vibration-related definitions

(standards.iteh.ai)

3.2.1 acceleration: The r.m.s. value of the vibration acceleration.

3.2.2 hand-arm weighted acceleration, $a_{h,w}$: The acceleration at the measuring point determined by measurement using a weighting filter according to ENV 28041 or by calculation as specified in ENV 25349. It is expressed in m/s^2 .

3.2.3 whole-body weighted acceleration, a_{wx} , a_{wy} , a_{wz} and a_w : The acceleration at the measuring point determined by measurement using weighting filters according to ENV 28041 and ISO 2631-1. It is expressed in m/s^2 .

3.2.4 measured vibration emission value, a : The value representing the measured vibration emission value of a single machine or the mean value obtained from a reasonable big sample of a batch of machinery. It is expressed in m/s^2 . The measured vibration emission value is not rounded.

NOTE: The measured vibration emission value, a , can be either one of the weighted values according to 3.2.2 or 3.2.3.

3.2.5 uncertainty, K : The value representing the measurement uncertainty of the measured vibration emission value, a , and also, in the case of batches, production variations of machinery. It is expressed in m/s^2 .

3.2.6 declared vibration emission value, a and K : The measured vibration emission value, a , and its associated uncertainty, K . The sum of a and K indicates the limit below which the vibration value of the single machine, and/or a specified large proportion of the vibration values of the batch of the machines, are stated to lie when the machines are new.

3.2.7 vibration emission declaration: The information on vibration emission of a machine, given by the manufacturer or supplier in technical documents or other literature, concerning vibration emission values. The vibration emission declaration has the form of a dual-number value.

4 Declaration of vibration emission values

The declaration of the vibration emission value, a and K , of machinery is the sole responsibility of the manufacturer.

The declared vibration emission values shall be determined for the machine in an operating mode according to the description in the relevant vibration test code. If no vibration test code exists the most representative operating mode should be used.

Guidelines for determination of declared vibration emission values of machinery are given in annex B. The guidelines are made in such a fashion that the declared values can be verified according to the procedures of this European Standard.

NOTE: If data required for the determination of K are unavailable from other standards applicable to the particular machine, guidance can be found in annex D.

5 Presentation of declared vibration emission values

The presentation of declared vibration emission values according to this European Standard for machinery, shall when given in technical documents contain the following information:

- Identification of the product with sufficient detail to determine the applicability of the declared vibration emission values.
- The words "Declared vibration emission value in accordance with EN 12096" followed by the vibration emission value, a , and the uncertainty, K , both in m/s^2 for the operating mode described in the relevant vibration test code.
- Identification of the relevant type-C standard, or, if no type-C standard exists,
- identification of the applied operating mode and the relevant type-B standard.

The value of the measured vibration emission value, a , is to be given in m/s^2 and presented by using two and a half significant digits for numbers starting with 1 (e. g. 1,20 m/s^2 , 14,5 m/s^2), otherwise two significant digits are sufficient (e. g. 0,93 m/s^2 , 8,9 m/s^2). The value of the uncertainty, K , shall be presented with the same number of decimals as a .

Examples of declared vibration emission values are given in annex C.

6 Verification of declared vibration emission values

6.1 General

Verification of declared vibration emission values can be required for two different reasons:

- in order to verify the declared value of one particular machine, or
- in order to verify the declared value of a batch or production series of machinery.

Verification shall be effected by means of vibration measurements made according to the same vibration test code or basic measurement method, and under the same machinery operating mode (see 3.1.4) as that one to which the declared vibration emission values refer.

The procedures given in 6.2 and 6.3 shall be used for verification under reproducibility conditions.

NOTE: Reproducibility conditions exist when the measurements can be repeated with similar results of the inspecting laboratory and when there are no systematic deviations between the testing laboratory and other laboratories testing the same object.

When the declaration contains only one value, the guidelines given in annex D can be used for estimating the uncertainty K .

6.2 Verification of a single machine

If one machine is evaluated, the declared vibration emission value is verified if the resulting vibration emission value is less than or equal to the value of $a + K$ as declared by the manufacturer.

NOTE: The procedure for verifying the declared vibration emission value for a single machine conforms with that one described in EN 27574-2 for noise.

6.3 Verification of a batch of machinery

6.3.1 General

This procedure shall be used to verify the declared vibration emission value of a batch (or of a production series) of machinery when more than one machine from a batch is available. For the purpose of this European Standard, a sample size of up to three machines is needed.

NOTE: The procedure for verifying the declared vibration emission value for a batch conforms with that one described in EN 27574-4 for noise.

6.3.2 Verification method

The verification of a batch is carried out as follows.

Derive the values A , B and C from the declared vibration emission value, a and K . A , B and C are calculated based on a and K , according to

$$\begin{aligned} A &= a + 0,20 K \\ B &= a + 1,13 K \\ C &= a + 0,65 K \end{aligned} \quad (1)$$

Measure one machine, randomly selected from the batch. The resulting vibration value, a_1 , is compared to the values A and B :

if $a_1 \leq A$, the declared value is verified for the batch;

if $a_1 > B$, the declared value is not verified for the batch, the batch is rejected;

if $A < a_1 \leq B$, measure two additional machines, randomly selected from the batch.

The mean value of the three resulting vibration values, a_3 , is compared to the value C :

if $a_3 \leq C$, the declared value is verified for the batch;

if $a_3 > C$, the declared value is not verified for the batch, the batch is rejected.

The individual machines from this batch, on which measurements have been made, are, however, verified as single machines if they fulfil the requirements of 6.2.

NOTE: The constants used for the determination of A , B and C are derived from the procedure for verification of the declared value as described in the statistical methods for verification of sound power levels using the double sampling method described in EN 27574-4.

According to this European Standard $K = 1,5 \sigma_t$ (see annex B). The value of the total standard deviation, σ_t , is used as reference standard deviation, σ_M , at the verification: $\sigma_M = \sigma_t$. For the double sampling method using one unit in the first sample and two units in the second sample, the following formulae and constants are used:

$$\begin{aligned} A &= a + K \left(1 - \frac{1,194}{1,5} \right) \\ B &= a + K \left(1 - \frac{0,201}{1,5} \right) \\ C &= a + K \left(1 - \frac{0,533}{1,5} \right) \end{aligned} \quad (2)$$