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Mechanical vibration – Declaration and verification of vibration emission values

The European Standard EN 12096:1997 has the status of a Swedish Standard. This document contains the official English version of EN 12096:1997.

Swedish Standards corresponding to documents referred to in this Standard are listed in "Catalogue of Swedish Standards", issued by SIS. The Catalogue lists, with reference number and year of Swedish approval, International and European Standards approved as Swedish Standards as well as other Swedish Standards.

Vibration och stöt – Angivande och kontroll av vibrationsvärden

Europastandarden EN 12096:1997 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 12096:1997.

Motsvarigheten och aktualiteten i svensk standard till de publikationer som omnämns i denna standard framgår av "Katalog över svensk standard", som ges ut av SIS. I katalogen redovisas internationella och europeiska standarder som fastställts som svenska standarder och övriga gällande svenska standarder.

ICS 13.160; 17.160

EUROPEAN STANDARD
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English version

**Mechanical vibration – Declaration and verification
of vibration emission values**

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

Mechanische Schwingungen – Angabe und
Nachprüfung von Schwingungskennwerten

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

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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.

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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 the 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.

3.2 Vibration-related definitions

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 reasonably 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 values 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.