SLOVENSKI STANDARD
SIST EN ISO 10846-3:2002

01-december-2002

Akustika in vibracije - Laboratorijsko merjenje vibro-akustičnih prenosnih lastnosti elastičnih elementov - 3. del: Posredna metoda za ugotavljanje dinamične togosti elastičnih podpor za translatorno gibanje (ISO 10846-3:2002)

Acoustics and vibration - Laboratory measurement of vibro-acoustic transfer properties of resilient elements - Part 3: Indirect method for determination of the dynamic stiffness of resilient supports for translatory motion (ISO 10846-3:2002)

Akustik und Schwingungstechnik - Laborverfahren zur Messung der vibro-akustischen Transfereigenschaften elastischer Elemente - Teil 3: Indirektes Verfahren für die Bestimmung der dynamischen Steifigkeit elastischer Elemente für translatorische Schwingungen (ISO 10846-3:2002)

Acoustique et vibrations - Mesurage en laboratoire des propriétés de transfert vibro-acoustique des éléments élastiques - Partie 3: Raideur dynamique en translation des supports élastiques (Méthode indirecte) (ISO 10846-3:2002)

Ta slovenski standard je istoveten z: **EN ISO 10846-3:2002**

ICS:

17.140.01	Akustična merjenja in blaženje hrupa na splošno	Acoustic measurements and noise abatement in general
17.160	Vibracije, meritve udarcev in vibracij	Vibrations, shock and vibration measurements

SIST EN ISO 10846-3:2002 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 10846-3

June 2002

ICS 17.140.01

English version

Acoustics and vibration - Laboratory measurement of vibro-acoustic transfer properties of resilient elements - Part 3: Indirect method for determination of the dynamic stiffness of resilient supports for translatory motion (ISO 10846-3:2002)

Acoustique et vibrations - Mesurage en laboratoire des propriétés de transfert vibro-acoustique des éléments élastiques - Partie 3: Raideur dynamique en translation des supports élastiques (Méthode indirecte) (ISO 10846-3:2002)

Akustik und Schwingungstechnik - Laborverfahren zur Messung der vibro-akustischen Transfereigenschaften elastischer Elemente - Teil 3: Indirektes Verfahren für die Bestimmung der dynamischen Steifigkeit elastischer Elemente für translatorische Schwingungen (ISO 10846-3:2002)

This European Standard was approved by CEN on 29 May 2002.

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 Management Centre or to any CEN member.

This European Standard exists 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 Management Centre 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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

CORRECTED 2003-03-19

Foreword

This document (EN ISO 10846-3:2002) has been prepared by Technical Committee ISO/TC TC 43 "Acoustics" in collaboration with Technical Committee CEN/TC 211 "Acoustics ", the secretariat of which is held by DS.

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 December 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 10846-3:2002 has been approved by CEN as a European Standard without any modifications.

NOTE Normative references to International Standards are listed in Annex ZA (normative).

Annex ZA
(normative)

Normative references to international publications with their relevant European publications

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 (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

Publication	Year	Title	EN	Year
ISO 266	1997	Acoustics - Preferred frequencies	EN ISO 266	1997

INTERNATIONAL STANDARD

ISO 10846-3

First edition
2002-06-01

Acoustics and vibration — Laboratory measurement of vibro-acoustic transfer properties of resilient elements —

Part 3: Indirect method for determination of the dynamic stiffness of resilient supports for translatory motion

Acoustique et vibrations — Mesurage en laboratoire des propriétés de transfert vibro-acoustique des éléments élastiques —

Partie 3: Méthode indirecte pour la détermination de la raideur dynamique en translation des supports élastiques

Reference number
ISO 10846-3:2002(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 10846 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10846-3 was prepared jointly by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*, and ISO/TC 108, *Mechanical vibration and shock*.

ISO 10846 consists of the following parts, under the general title *Acoustics and vibration — Laboratory measurement of vibro-acoustic transfer properties of resilient elements*:

— *Part 1: Principles and guidelines*

— *Part 2: Dynamic stiffness of elastic supports for translatory motion — Direct method*

— *Part 3: Indirect method for determination of the dynamic stiffness of resilient supports for translatory motion*

— *Part 4: Dynamic stiffness of elements other than resilient supports for translatory motion*

— *Part 5: Driving point method for determination of the low frequency dynamic stiffness of elastic supports for translatory motion*

Annexes A, B and C of this part of ISO 10846 are for information only.

Introduction

Passive vibration isolators of various kinds are used to reduce the transmission of vibrations. Examples are automobile engine mounts, resilient supports for buildings, resilient mounts and flexible shaft couplings for shipboard machinery and small isolators in household appliances.

This part of ISO 10846 specifies an indirect method for measuring the dynamic transfer stiffness function of linear resilient supports. This includes resilient supports with non-linear static load-deflection characteristics provided that the elements show an approximate linearity for vibrational behaviour for a given static preload. This part of ISO 10846 belongs to a series of International Standards on methods for the laboratory measurement of vibro-acoustic properties of resilient elements, which also includes parts on measurement principles and on a direct and a driving point method. ISO 10846-1 provides global guidance for the selection of the appropriate International Standard.

The laboratory conditions described in this part of ISO 10846 include the application of static preload, where appropriate.

The results of the indirect method are useful for isolators, which are used to reduce the transmission of structureborne sound (primarily frequencies above 20 Hz). The method does not characterize isolators completely, which are used to attenuate low frequency vibration or shock excursions.

Acoustics and vibration — Laboratory measurement of vibro-acoustic transfer properties of resilient elements —

Part 3: Indirect method for determination of the dynamic stiffness of resilient supports for translatory motion

1 Scope

This part of ISO 10846 specifies a method for determining the dynamic transfer stiffness for translations of resilient supports, under specific preload. The method concerns the laboratory measurements of vibration transmissibility and is called the indirect method. This method is applicable to test elements with parallel flanges (see Figure 1).

NOTE 1 Vibration isolators which are the subject of this part of ISO 10846 are those which are used to reduce the transmission of audiofrequency vibrations (structureborne sound, 20 Hz to 20 kHz) to a structure which may, for example, radiate unwanted fluidborne sound (airborne, waterborne or other).

NOTE 2 In practice the size of the available test rig(s) can give restrictions for very small and for very large resilient supports.

NOTE 3 Samples of continuous supports of strips and mats are included in the method. Whether or not the sample describes the behaviour of the complex system sufficiently, is the responsibility of the user of this part of ISO 10846.

Measurements for translations normal and transverse to the flanges are covered in this part of ISO 10846. Annex A provides guidance for the measurement of transfer stiffnesses which include rotatory components.

The method covers the frequency range from f_2 up to f_3. The values of f_2 and f_3 are determined by the test set-up and the isolator under test. Typically 20 Hz $\leqslant f_2 \leqslant$ 50 Hz and 2 kHz $\leqslant f_3 \leqslant$ 5 kHz.

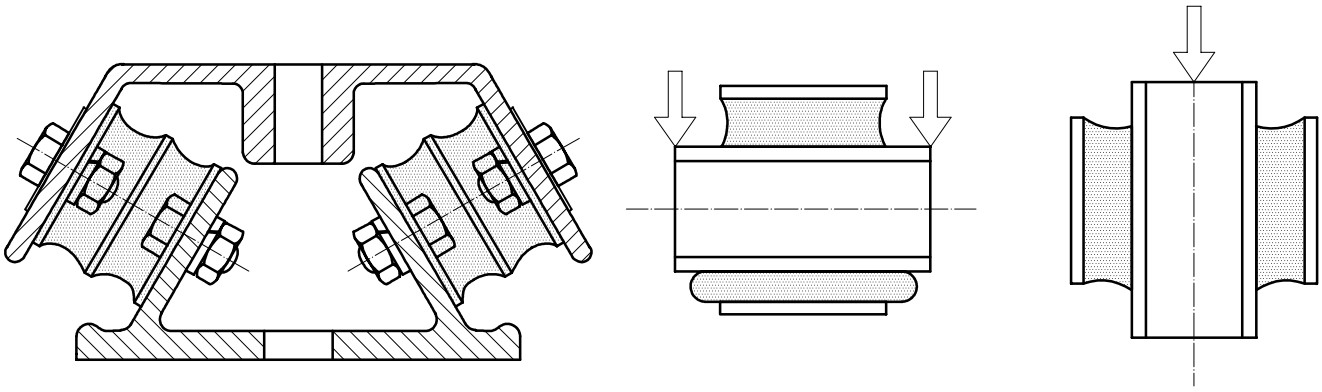
The data obtained according to the method specified in this part of ISO 10846 can be used for

— product information provided by manufacturers and suppliers,

— information during product development,

— quality control, and

— calculation of the transfer of vibration through isolators.



NOTE 1 When a resilient support has no parallel flanges, an auxiliary fixture should be included as part of the test element to arrange for parallel flanges.

NOTE 2 Arrows indicate load direction.

Figure 1 — Examples of resilient supports with parallel flanges

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10846. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 10846 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 266, *Acoustics — Preferred frequencies*

ISO 2041:1990, *Vibration and shock — Vocabulary*

ISO 5347-3[1)], *Methods for the calibration of vibration and shock pick-ups — Part 3: Secondary vibration calibration*

ISO 5348, *Mechanical vibration and shock — Mechanical mounting of accelerometers*

ISO 7626-1, *Vibration and shock — Experimental determination of mechanical mobility — Part 1: Basic definitions and transducers*

ISO 7626-2, *Vibration and shock — Experimental determination of mechanical mobility — Part 2: Measurements using single-point translation excitation with an attached vibration exciter*

1) To be revised as ISO 16063-21.

3 Terms and definitions

For the purposes of this part of ISO 10846, the terms and definitions given in ISO 2041 and the following apply.

3.1
vibration isolator
resilient element
isolator designed to attenuate the transmission of vibration in a frequency range

[ISO 2041:1990, definition 2.110]

3.2
resilient support
vibration isolator suitable for supporting part of the mass of a machine, a building or another type of structure

3.3
test element
resilient support under test including flanges and auxiliary fixtures, if any

3.4
blocking force
F_b
dynamic force on the output side of a vibration isolator which results in zero displacement output

3.5
dynamic transfer stiffness
$k_{2,1}$
ratio of complex force on the blocked output side of a resilient element to complex displacement on the input side during sinusoidal vibration

NOTE 1 The indices "1" and "2" denote the input and output side respectively.

NOTE 2 The value of $k_{2,1}$ can be dependent upon static preload, temperature and other conditions. At low frequencies $k_{2,1}$ is solely determined by elastic and dissipative forces and $k_{2,1} = k_{1,1}$ ($k_{1,1}$ denotes the ratio of force and displacement on the input side).

NOTE 3 At higher frequencies inertial forces in the resilient element play a role as well and $k_{2,1} \neq k_{1,1}$.

3.6
loss factor of resilient element
η
ratio of the imaginary part of $k_{2,1}$ and the real part of $k_{2,1}$ (i.e. tangent of the phase angle of $k_{2,1}$) in the low frequency range, where inertial forces in the element are negligible

3.7
frequency-averaged dynamic transfer stiffness
k_{av}
function of frequency of the average value of the dynamic stiffness over a frequency band Δf (see 8.2)

3.8
point contact
contact area which vibrates as the surface of a rigid body

3.9
normal translation
translational vibration normal to the flange of a resilient element