Acoustics and vibration - Laboratory measurement of vibroacyustic transfer properties of resilient elements - Part 4: Dynamic stiffness of elements other than resilient supports for translatory motion

Acoustics and vibration - Laboratory measurement of vibroacyustic transfer properties of resilient elements - Part 4: Dynamic stiffness of elements other than resilient supports for translatory motion

EESTI STANDARDIKESKUS

EESTI STANDARDI EESSÕNA **NATIONAL FOREWORD**

Käesolev Eesti standard EVS-EN ISO 10846-4:2004 sisaldab Euroopa standardi EN ISO 10846-4:2003 ingliskeelset teksti. Käesolev dokument on jõustatud 23.11.2004 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes. Standard on kättesaadav Eesti standardiorganisatsioonist.	This Estonian standard EVS-EN ISO 10846-4:2004 consists of the English text of the European standard EN ISO 10846-4:2003. This document is endorsed on 23.11.2004 with the notification being published in the official publication of the Estonian national standardisation organisation. The standard is available from Estonian standardisation organisation.

Käsitlusala: This part of ISO 10846 specifies two methods for determining the dynamic transfer stiffness for translations of resilient elements other than resilient supports. Examples are resilient bellows, shaft couplings, power supply cables, hoses and pipe hangers (see Figure 1). Elements filled with liquids, such as oil or water, are excluded.	**Scope:** This part of ISO 10846 specifies two methods for determining the dynamic transfer stiffness for translations of resilient elements other than resilient supports. Examples are resilient bellows, shaft couplings, power supply cables, hoses and pipe hangers (see Figure 1). Elements filled with liquids, such as oil or water, are excluded.

ICS 17.140.01

Võtmesõnad:

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 10846-4

September 2003

ICS 17.140.01

English version

Acoustics and vibration

Laboratory measurement of vibro-acoustic transfer properties of resilient elements

Part 4: Dynamic stiffness of elements other than resilient supports for translatory motion (ISO 10846-4 : 2003)

Acoustique et vibrations – Mesurage en laboratoire des propriétés de transfert vibro-acoustique des éléments élastiques – Partie 4: Raideur dynamique en translation des éléments autres que les supports élastiques (ISO 10846-4 : 2003)

Akustik und Schwingungstechnik – Laborverfahren zur Messung der vibroakustischen Transfereigenschaften elastischer Elemente – Teil 4: Bestimmung der dynamischen Transfersteifigkeit von elastischen Elementen mit Ausnahme elastischer Stützelemente für translatorische Schwingungen (ISO 10846-4 : 2003)

This European Standard was approved by CEN on 2003-08-01.

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.

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 Management Centre has the same status as the official versions.

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

CEN

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

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

Ref. No. EN ISO 10846-4 : 2003 E

Foreword

International Standard

ISO 10846-4 : 2003 Acoustics and vibration – Laboratory measurement of vibro-acoustic transfer properties of resilient elements – Part 4: Dynamic stiffness of elements other than resilient supports for translatory motion,

which was prepared by ISO/TC 43 'Acoustics' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 211 'Acoustics', the Secretariat of which is held by DS, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by March 2004 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 10846-4 : 2003 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative).

Contents

Page

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 a direct and an indirect method for measuring the dynamic transfer stiffness function of linear resilient elements (other than resilient supports) such as resilient bellows, hoses, shaft couplings, power supply cables and pipe hangers. This part of ISO 10846 belongs to a series of International Standards on methods for the laboratory measurement of the vibro-acoustic properties of resilient elements, which also includes documents on measurement principles and on a direct, an indirect and a driving point method for resilient supports. 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 method described in this part of ISO 10846 are useful for resilient elements that are used to reduce the transmission of structure-borne sound (primarily frequencies above 20 Hz). The method does not characterize completely elements that are used to attenuate low-frequency vibration or shock excursions.

1 Scope

This part of ISO 10846 specifies two methods for determining the dynamic transfer stiffness for translations of resilient elements other than resilient supports. Examples are resilient bellows, shaft couplings, power supply cables, hoses and pipe hangers (see Figure 1). Elements filled with liquids, such as oil or water, are excluded.

NOTE 1 Pipe hangers are extensionally deflected, as opposed to elastic supports which are compressed. Therefore, the test conditions are different from those described in ISO 10846-2 and ISO 10846-3.

The methods are applicable to resilient elements with flat flanges or flat clamp interfaces. It is not necessary that the flanges be parallel.

Resilient elements which are the subject of this part of ISO 10846 are those that are used to reduce

a) the transmission of audiofrequency vibrations (structure-borne sound, 20 Hz to 20 kHz) to a structure which may, for example, radiate unwanted sound (airborne, waterborne or other), and

b) the transmission of low-frequency vibrations (typically 1 Hz to 80 Hz), which may, for example, act upon human subjects or cause damage to structures of any size when the vibration is too severe.

In practice, the size of the available test rig(s) determines restrictions for very small and for very large resilient elements.

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

The direct method can be applied in the frequency range from 1 Hz up to a frequency that is usually determined by the lowest resonance frequency of the test arrangement frame (typically 300 Hz for test rigs with dimensions of the order of 1 m).

NOTE 2 In practice, the lower frequency limit depends on the dynamic excitation system.

The indirect method covers a frequency range that is determined by the test set-up and the isolator under test. The range is typically from a lower frequency between 20 Hz and 50 Hz, to an upper frequency between 2 kHz and 5 kHz.

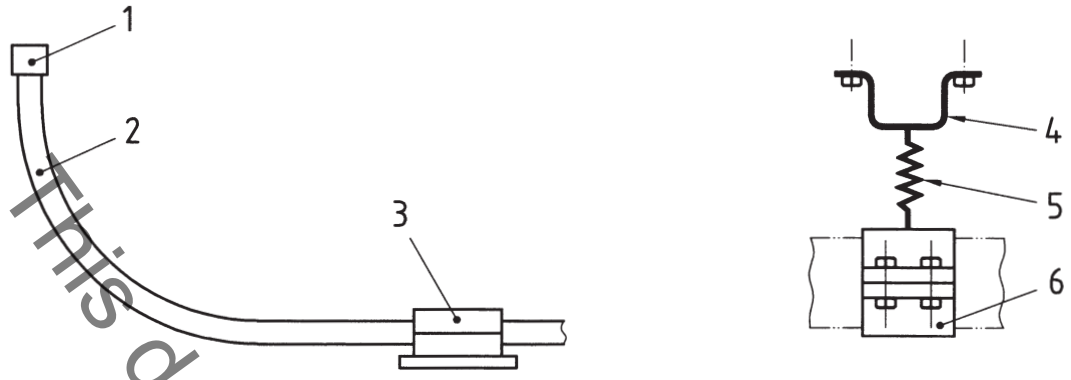
The data obtained according to the methods specified in this part of ISO 10846 can be used for

— product information provided by manufacturers and suppliers,

— information during product development,

— quality control, and

— calculation of the transfer of vibration through resilient elements.



a) **Power cable including connector and clamping device**

b) **Pipe hanger**

Key

1 connector
2 cable
3 clamp
4 fixture
5 flexible element
6 pipe clamp

Figure 1 — Examples of resilient elements with flat flanges or clamps

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.

ISO 266, *Acoustics — Preferred frequencies*

ISO 2041, *Vibration and shock — Vocabulary*

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*

ISO 10846-1, *Acoustics and vibration — Laboratory measurement of vibro-acoustic transfer properties of resilient elements — Part 1: Principles and guidelines*

ISO 16063-21, *Methods for the calibration of vibration and shock transducers — Part 21: Vibration calibration by comparison with a reference transducer*

GUM:1993, *Guide to the expression of uncertainty in measurement.* BIPM/IEC/IFCC/ISO/IUPAC/IUPAP/OIML