INTERNATIONAL STANDARD

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

Part 2: Direct 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 2: Méthode directe pour la détermination de la raideur dynamique en translation des supports élastiques

Reference number
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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 2.

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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 10846-2 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*, and ISO/TC 108, *Mechanical vibration, shock and condition monitoring*.

This second edition cancels and replaces the first edition (ISO 10846-2:1997), which has been technically revised.

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: Direct method for determination of the dynamic stiffness of resilient supports for translatory motion*

— *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 transfer stiffness of resilient supports for translatory motion*

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Introduction

Passive resilient elements 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 method for measuring the dynamic transfer stiffness function of linear resilient supports. This includes resilient supports with non-linear static load-deflection characteristics, as long as the elements show an approximate linearity for vibration 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 documents on measurement principles, on an indirect method and on a driving point method. ISO 10846-1 provides 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.

The results of the method described in this part of ISO 10846 are useful for resilient supports that are used to prevent low-frequency vibration problems and to attenuate structure-borne sound in the lower part of the audible frequency range. However, for complete characterization of resilient elements that are used to attenuate low- frequency vibration or shock excursions, additional information is needed, which is not provided by this method.

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

Part 2:
Direct method for determination of the dynamic stiffness of resilient supports for translatory motion

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1 Scope

This part of ISO 10846 specifies a method for determining the dynamic transfer stiffness for translations of resilient supports, under specified preload. The method concerns the laboratory measurement of vibrations on the input side and blocking output forces and is called “the direct method”. The method is applicable to test elements with parallel flanges (see Figure 1).

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

— the transmission of vibration in the lower part of the audible frequency range (typically 20 Hz to 500 Hz) to a structure which may, for example, radiate unwanted fluid-borne sound (airborne, waterborne or others), and

— 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 vibration is too severe.

NOTE 1 In practice, the size of the available test rig(s) can restrict the use of very small or very large resilient supports.

NOTE 2 Samples of continuous supports of strips and mats are included in this 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.

The direct method covers the frequency range from 1 Hz up to a frequency f_{UL}, which is usually determined by the test rig.

NOTE 3 Because of the large variety of test rigs and test elements, f_{UL} is variable. In this part of ISO 10846, the adequacy of the test rig is not defined for a fixed frequency range, but on the basis of measured data, as described in 6.1 to 6.4.

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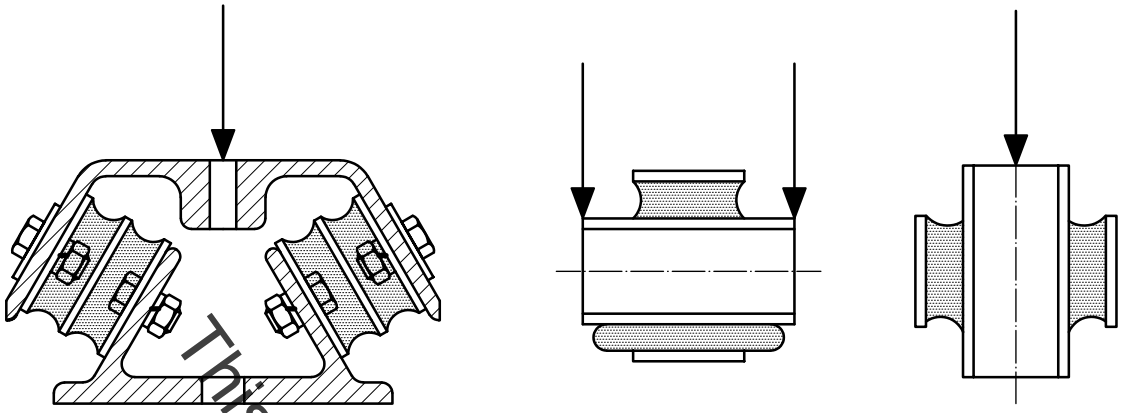

NOTE 1 When a resilient support has no parallel flanges, an auxiliary fixture is included as part of the test element to arrange for parallel flanges.

NOTE 2 The arrows indicate the load direction.

Figure 1 — Example of resilient supports with parallel flanges

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

— product information provided by manufacturers and suppliers;

— information during product development;

— quality control;

— calculation of the transfer of vibration energy through isolators.

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:—[1)], *Mechanical vibration, shock and condition monitoring — 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 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 to a reference transducer*

ISO/IEC Guide 98-3[2)], *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement* (*GUM 1995*)

1) To be published. (Revision of ISO 2041:1990)

2) ISO/IEC Guide 98-3 will be published as a re-issue of the *Guide to expression of uncertainty in measurement* (GUM), 1995.

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