SLOVENSKI STANDARD
SIST EN 29052-1:1997

01-april-1997

Akustika - Ugotavljanje dinamične togosti - 1. del: Materiali, ki se uporabljajo pod plavajočimi podi v bivalnih prostorih (ISO 9052-1:1989)

Acoustics - Determination of dynamic stiffness - Part 1: Materials used under floating floors in dwellings

Akustik - Bestimmung der dynamischen Steifigkeit - Teil 1: Materialien, die unter schwimmenden Estrichen in Wohngebäuden verwendet werden

Acoustique - Détermination de la raideur dynamique - Partie 1: Matériaux utilisés sous les dalles flottantes dans les bâtiments d'habitation

Ta slovenski standard je istoveten z: EN 29052-1:1992

ICS:

91.060.30	Stropi. Tla. Stopnice	Ceilings. Floors. Stairs
91.100.60	Materiali za toplotno in zvočno izolacijo	Thermal and sound insulating materials

SIST EN 29052-1:1997 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 29052-1:1992

June 1992

UDC 699.844-405.8:534.833:620.1:533.6.011.2

Descriptors: Acoustics, acoustics insulation, residential buildings, slabs, insulation materials: acoustics, determination, dynamic stiffness, vibration tests

English version

Acoustics - Determination of dynamic stiffness - Part 1: Materials used under floating floors in dwellings

Acoustique - Détermination de la raideur dynamique - Partie 1: Matériaux utilisés sous les dalles flottantes dans les bâtiments d'habitation

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This European Standard was approved by CEN on 1992-06-24. 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, 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

Following the positive result of the Unique acceptance procedure, CEN adopted the International Standard

ISO 9052-1:1989 "Acoustics - Determination of dynamic stiffness - Part 1: Materials used under floating floors in dwellings"

This European Standard has been drawn up in order to comply with the request of the Standing Committee for construction following Council Directive 89/106/EEC on construction products and the provisional mandate "Protection against noice (BC/CEN/08/1991) related to it and issued by EEC and EFTA.

National standards identical to this European Standard shall be published at the latest by 1992-12-31 and conflicting national standards shall be withdrawn at the latest by 1992-12-31.

In accordance with the Common CEN/CENELEC Rules the following countries are bound to implement this European Standard : Austria, Belgium, Denmark, Finland, France, Greece, Germany, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

ENDORSEMENT NOTICE

The text of the International Standard ISO 9052-1:1989 was approved by CEN as a European Standard with agreed editorial modifications as given below :

- figures 2 and 3 to be inverted keeping the existing titles.

INTERNATIONAL STANDARD

ISO 9052-1

First edition
1989-02-15

Acoustics — Determination of dynamic stiffness —

Part 1 : Materials used under floating floors in dwellings

Acoustique — Détermination de la raideur dynamique —

Partie 1 : Matériaux utilisés sous les dalles flottantes dans les bâtiments d'habitation

Reference number
ISO 9052-1 : 1989 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 9052-1 was prepared by Technical Committee ISO/TC 43, *Acoustics*.

ISO 9052 will consist of the following parts, under the general title *Acoustics — Determination of dynamic stiffness*:

— *Part 1: Materials used under floating floors in dwellings*

— *Part 2: Materials used for vibration and sound insulation of equipment in buildings*

Acoustics — Determination of dynamic stiffness —

Part 1:
Materials used under floating floors in dwellings

1 Scope

This part of ISO 9052 specifies the test method for determining the dynamic stiffness of resilient materials used under floating floors. Dynamic stiffness is one of the parameters that determine the sound insulation of such floors in dwellings.

This part of ISO 9052 applies to the determination of dynamic stiffness per unit area of resilient materials with smooth surfaces (see clause 6) used in a continuous layer under floating floors in dwellings. It does not apply to loadings lower than 0,4 kPa[1)], for example materials in wall linings, or greater than 4 kPa[1)], for example materials under machinery foundations (see note 2).

This part of ISO 9052 is mainly intended to be used for comparing production samples of similar materials of known specified quality.

For restrictions concerning the airflow resistivity of the resilient material to be tested, see 8.2.

NOTES

1 The dependence of dynamic stiffness on prestatic load is of minor importance in the case of materials usually applied in wall linings, for example polystyrene or mineral fibre. The differences between dynamic stiffness values measured with a static load of 2 kPa in accordance with this part of ISO 9052 and those measured with a very low preload are of the order of 10 % to 20 %.

2 A further part of ISO 9052 will deal with the determination of dynamic stiffness of materials used in technical floating floors (high static load).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9052. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9052 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 9053 : —[2)], *Acoustics — Materials for acoustical applications — Determination of airflow resistance.*

3 Definitions

3.1 dynamic stiffness: The ratio of dynamic force to dynamic displacement.

For the purposes of this part of ISO 9052, dynamic stiffness per unit area, s', is used and is given by the following equation:

$$s' = \frac{F/S}{\Delta d} \qquad \dots (1)$$

where

S is the area of the test specimen;

F is the dynamic force acting perpendicularly on the test specimen;

Δd is the resulting dynamic change in thickness of the resilient material.

In this part of ISO 9052, the following quantities are used:

— dynamic stiffness per unit area of the material's structure, s'_s;

— dynamic stiffness per unit area of enclosed gas (e.g. air), s'_a;

— apparent dynamic stiffness per unit area of the test specimen, s'_t;

— the dynamic stiffness per unit area of the installed resilient material, s'.

1) 1 Pa = 1 N/m^2

2) To be published.

3.2 natural frequency, f_0: Frequency of free oscillation of a system.

The natural frequency of a resiliently supported floor is given by the following equation:

$$f_0 = \frac{1}{2\pi}\sqrt{\frac{s'}{m'}} \qquad \ldots (2)$$

where

s' is the dynamic stiffness per unit area of the installed resilient material;

m' is the mass per unit area of the supported floor.

3.3 resonant frequency, f_r: Frequency at which resonance occurs in the test arrangement.

The resonant frequency is given by the following equation:

$$f_r = \frac{1}{2\pi}\sqrt{\frac{s'_t}{m'_t}} \qquad \ldots (3)$$

where

s'_t is the apparent dynamic stiffness per unit area of the test specimen;

m'_t is the total mass per unit area used during the test.

4 Principle

Determination of the apparent dynamic stiffness per unit area of the test specimen, s'_t, by a resonance method in which the resonant frequency, f_r, of the fundamental vertical vibration of a spring-and-mass system is measured, the spring being the test specimen of the resilient material under test and the mass being a load plate.

5 Test arrangement

The specimen shall be placed between two horizontal surfaces, i.e. the base (or baseplate) and the load plate. The load plate shall be square, with dimensions (200 ± 3) mm × (200 ± 3) mm, and made of steel. The base (or baseplate) and the load plate shall have profile irregularities of less than 0,5 mm and be sufficiently rigid to avoid bending waves in the frequency range of interest.

The excitation is applied by one of the methods shown in figures 1, 2 or 3.

The total load on the test specimen including all measuring and/or excitation equipment shall be 8 kg ± 0,5 kg.

Excitation and measuring devices shall be applied in such a way that only vertical oscillations (i.e. without rotational components) occur.

For the test set-up shown in figure 1, the inertia of the base shall be such that in vibration its velocity is negligible compared with that of the load plate.

For the test arrangements shown in figures 2 and 3, the mass of the baseplate shall be at least 100 kg.

6 Test specimen

At least three square specimens of dimensions 200 mm × 200 mm shall be taken. The surfaces of the test specimens shall be considered to be smooth if the surface irregularities are less than 3 mm.

The test specimen shall be covered with a waterproof plastic foil, approximately 0,02 mm thick, on which a thin paste of plaster of Paris and water is applied to a depth of at least 5 mm so that any unevenness is covered. Before the plaster begins to set, the load plate shall be bedded onto it as shown in figures 1a), 2a) and 3a).

In the case of closed cell materials, the joint between the specimen and the base (or baseplate) shall be sealed around the perimeter with a fillet of petroleum jelly. See figures 1b), 2b) and 3b).

7 Procedure

7.1 General

The resonant frequency, f_r, of the fundamental vertical vibration of the test specimen and the load plate can be determined by using either sinusoidal, white noise or pulse signals.

All these methods are equivalent. In case of dispute, the method using sinusoidal signals (7.2) shall be the reference method.

7.2 Sinusoidal signals

Obtain the resonant frequency by varying the frequency of excitation, while keeping the excitation force constant.

If the resonant frequency depends on the amplitude of the excitation force, this dependence shall be determined down to as low a value as possible and the resonant frequency shall be found by extrapolation to zero force amplitude.

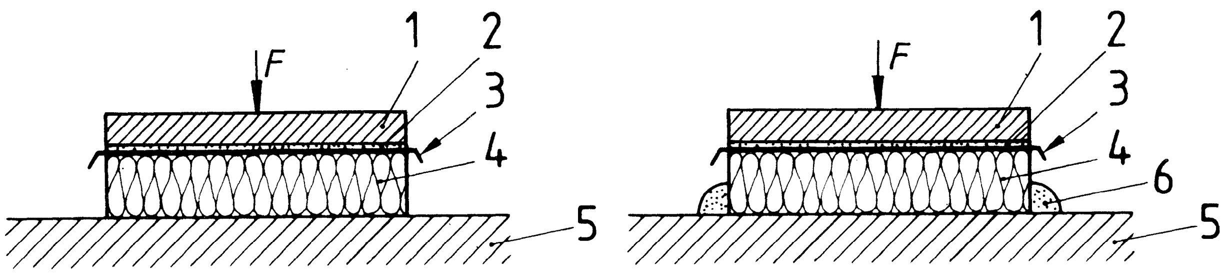
Depending on the expected stiffness value, the measurement interval used as the basis for extrapolation shall be as follows:

$0{,}2\ \text{N} \leqslant F \leqslant 0{,}8\ \text{N}$ where $s' > 50\ \text{MN/m}^3$

$0{,}1\ \text{N} \leqslant F \leqslant 0{,}4\ \text{N}$ where $s' \leqslant 50\ \text{MN/m}^3$

Within these intervals, measurements shall be taken at least at three points.

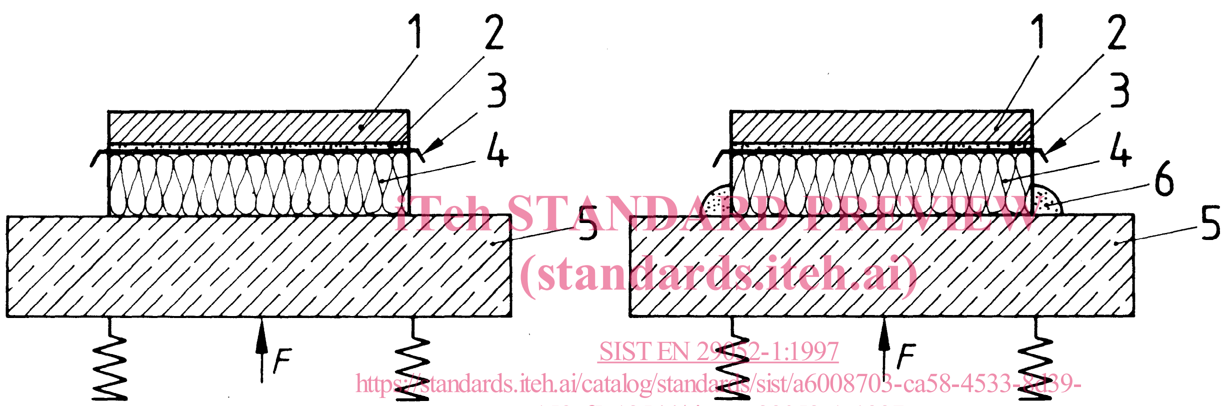
NOTE — When testing material with high internal damping, the vertical vibration maximum is not pronounced. In this case, resonance can be detected by observing the phase shift between the excitation and vibration signal.



a) Open cell materials

b) Closed cell materials

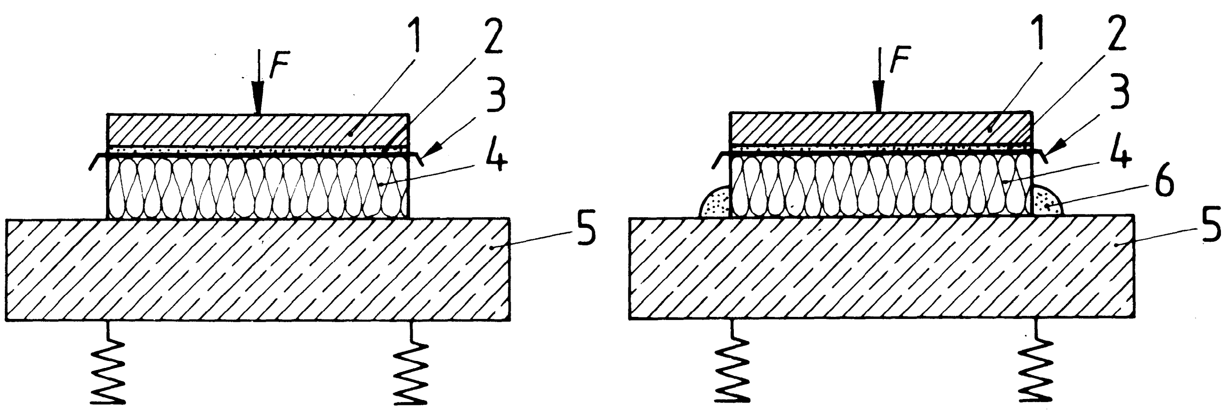
Figure 1 — Excitation of the load plate — Vibration measurement of the load plate only



a) Open cell materials

b) Closed cell materials

Figure 2 — Excitation of the load plate — Vibration measurements of both the load plate and the baseplate



a) Open cell materials

b) Closed cell materials

Figure 3 — Excitation of the baseplate — Vibration measurements of both the load plate and the baseplate