INTERNATIONAL STANDARD

ISO 6721-3

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Plastics — Determination of dynamic mechanical properties —

Part 3:
Flexural vibration — Resonance-curve method

Plastiques — Détermination des propriétés mécaniques dynamiques —
Partie 3: Vibration en flexion — Méthode en résonance

Reference number
ISO 6721-3:1994(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 voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 6721-3 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 2, *Mechanical properties*.

Together with ISO 6721-1, it cancels and replaces ISO 6721:1983, which has been technically revised.

ISO 6721 consists of the following parts, under the general title *Plastics — Determination of dynamic mechanical properties*:

— *Part 1: General principles*

— *Part 2: Torsion-pendulum method*

— *Part 3: Flexural vibration — Resonance-curve method*

— *Part 4: Tensile vibration — Non-resonance method*

— *Part 5: Flexural vibration — Non-resonance method*

— *Part 6: Shear vibration — Non-resonance method*

— *Part 7: Torsional vibration — Non-resonance method*

Annexes A and B of this part of ISO 6721 are for information only.

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Plastics — Determination of dynamic mechanical properties —

Part 3:
Flexural vibration — Resonance-curve method

1 Scope

This part of ISO 6721 specifies a bending-vibration method based upon resonance curves for determining the flexural complex modulus E_f^* of homogeneous plastics and the damping properties of laminated plastics intended for acoustic insulation, for example systems consisting of a metal sheet coated with a damping plastic layer, or sandwich systems consisting of two sheet-metal layers with an intermediate plastic layer. For many purposes, it is useful to determine these properties as a function of temperature and frequency.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 6721. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6721 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 6721-1:1994, *Plastics — Determination of dynamic mechanical properties — Part 1: General principles.*

3 Definitions

See ISO 6721-1:1994, clause 3.

NOTE 1 As stated in ISO 6721-1, frequencies derived from resonance curves based on deformation-rate amplitude measurements can be exactly related to dynamic properties. For the recommended range of the loss factor of this part of the International Standard, i.e. $\tan \delta < 0{,}1$, resonance curves based upon deformation amplitudes can also be used. For highly damping materials, see ISO 6721-1:1994, annex A.

4 Principle

A specimen is submitted to forced bending vibrations in the frequency range between about 10 Hz and 1 000 Hz. The resonance curve (see ISO 6721-1:1994, subclause 3.11) is determined and, from the curve obtained, the flexural storage modulus E'_f (see ISO 6721-1:1994, subclause 3.2) is calculated in the range above 0,5 MPa and the loss factor given by $\tan \delta = E''_f / E'_f$ (see ISO 6721-1:1994, subclause 3.6) is calculated in the range between about 10^{-2} and 10^{-1} (see note 1). The test frequency can be varied by making measurements at more than one vibrational order. The measurement range for the flexural loss modulus E''_f (see ISO 6721-1:1994, subclause 3.3) is determined by that of the loss factor and by the value of the storage modulus.

The mode of oscillation used is designated oscillation mode III (see ISO 6721-1:1994, table 2) and the type of modulus measured is designated E_f (see ISO 6721-1:1994, table 3).

The test is performed on rectangular bars, either mounted vertically with the upper end clamped and the other end free (method A) or suspended horizontally by fine fibres at vibrational nodes (method B) (see figure 1). Method A is suitable for testing specimens