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Plastics - Determination of dynamic mechanical properties - Part 3: Flexural vibration - Resonance-curve method (ISO 6721-3:2021)

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**Plastics - Determination of dynamic mechanical properties
 - Part 3: Flexural vibration - Resonance-curve method (ISO
 6721-3:2021)**

Plastiques - Détermination des propriétés mécaniques
 dynamiques - Partie 3: Vibration en flexion - Méthode
 en résonance (ISO 6721-3:2021)

Kunststoffe - Bestimmung dynamisch-mechanischer
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 Resonanzkurven-Verfahren (ISO 6721-3:2021)

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European foreword

This document (EN ISO 6721-3:2021) has been prepared by Technical Committee ISO/TC 61 "Plastics" in collaboration with Technical Committee CEN/TC 249 "Plastics" the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

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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



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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 5, *Physical-chemical properties*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 249, *Plastics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 6721-3:1994), which has been technically revised. It also incorporates the Technical Corrigendum ISO 6721-3:1994/Cor 1:1995.

The main changes compared to the previous edition are as follows:

- the document has been revised editorially;
- the normative references have been updated;
- the NOTE in [Clause 3](#) has been moved to [Clause 4](#);
- the method of specimen density measurement has been defined.

A list of all parts in the ISO 6721 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Plastics — Determination of dynamic mechanical properties —

Part 3: Flexural vibration — Resonance-curve method

1 Scope

This document 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method*

ISO 1183-2, *Plastics — Methods for determining the density of non-cellular plastics — Part 2: Density gradient column method*

ISO 1183-3, *Plastics — Methods for determining the density of non-cellular plastics — Part 3: Gas pycnometer method*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6721-1 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

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) is determined and, from the curve obtained, the flexural storage modulus E'_f is calculated in the range above 0,5 MPa and the loss factor given by $\tan \delta = E''_f/E'_f$ is calculated in the range between about 10^{-2} and 10^{-1} (see NOTE). 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 is determined by that of the loss factor and by the value of the storage modulus.