

**Plastics - Determination of dynamic mechanical  
properties - Part 1: General principles (ISO 6721-1:2011)**

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## NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 6721-1:2011 sisaldab Euroopa standardi EN ISO 6721-1:2011 ingliskeelset teksti.

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English Version

Plastics - Determination of dynamic mechanical properties - Part  
1: General principles (ISO 6721-1:2011)

Plastiques - Détermination des propriétés mécaniques  
dynamiques - Partie 1: Principes généraux (ISO 6721-  
1:2011)

Kunststoffe - Bestimmung dynamisch-mechanischer  
Eigenschaften - Teil 1: Allgemeine Grundlagen (ISO 6721-  
1:2011)

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## Foreword

This document (EN ISO 6721-1:2011) 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of an identical text or by endorsement, at the latest by November 2011, and conflicting national standards shall be withdrawn at the latest by November 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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### Endorsement notice

The text of ISO 6721-1:2011 has been approved by CEN as a EN ISO 6721-1:2011 without any modification.

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## Introduction

The methods specified in the first nine parts of ISO 6721 can be used for determining storage and loss moduli of plastics over a range of temperatures or frequencies by varying the temperature of the specimen or the frequency of oscillation. Plots of the storage or loss moduli, or both, are indicative of viscoelastic characteristics of the specimen. Regions of rapid changes in viscoelastic properties at particular temperatures or frequencies are normally referred to as transition regions. Furthermore, from the temperature and frequency dependencies of the loss moduli, the damping of sound and vibration of polymer or metal-polymer systems can be estimated.

Apparent discrepancies may arise in results obtained under different experimental conditions. Without changing the observed data, reporting in full (as described in the various parts of ISO 6721) the conditions under which the data were obtained will enable apparent differences observed in different studies to be reconciled.

The definitions of complex moduli apply exactly only to sinusoidal oscillations with constant amplitude and constant frequency during each measurement. On the other hand, measurements of small phase angles between stress and strain involve some difficulties under these conditions. Because these difficulties are not involved in some methods based on freely decaying vibrations and/or varying frequency near resonance, these methods are used frequently (see ISO 6721-2 and ISO 6721-3). In these cases, some of the equations that define the viscoelastic properties are only approximately valid.

# Plastics — Determination of dynamic mechanical properties —

## Part 1: General principles

### 1 Scope

The various parts of ISO 6721 specify methods for the determination of the dynamic mechanical properties of rigid plastics within the region of linear viscoelastic behaviour. This part of ISO 6721 is an introductory section which includes the definitions and all aspects that are common to the individual test methods described in the subsequent parts.

Different deformation modes may produce results that are not directly comparable. For example, tensile vibration results in a stress which is uniform across the whole thickness of the specimen, whereas flexural measurements are influenced preferentially by the properties of the surface regions of the specimen.

Values derived from flexural-test data will be comparable to those derived from tensile-test data only at strain levels where the stress-strain relationship is linear and for specimens which have a homogeneous structure.

### 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 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 293, *Plastics — Compression moulding of test specimens of thermoplastic materials*

ISO 294 (all parts), *Plastics — Injection moulding of test specimens of thermoplastic materials*

ISO 295, *Plastics — Compression moulding of test specimens of thermosetting materials*

ISO 1268 (all parts), *Fibre-reinforced plastics — Methods of producing test plates*

ISO 2818, *Plastics — Preparation of test specimens by machining*

ISO 4593, *Plastics — Film and sheeting — Determination of thickness by mechanical scanning*

ISO 6721-2:2008, *Plastics — Determination of dynamic mechanical properties — Part 2: Torsion-pendulum method*

ISO 6721-3, *Plastics — Determination of dynamic mechanical properties — Part 3: Flexural vibration — Resonance-curve method*