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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 33061.3-2025

**Plastics - Determination of dynamic mechanical properties -
Part 3: Resonance-curve method under flexural vibration**

塑料 动态力学性能的测定 第3部分：弯曲振动下共振曲线法

(English Translation)

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Table of Contents

Foreword
Introduction
1 Scope
2 Normative references
3 Terms and Definitions
4 Principles

Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 3 of GB/T 33061 "Determination of Dynamic Mechanical Properties of Plastics". GB/T 33061 has already published the following...

part.

---Part 1: General Rules;

---Part 2: The Torsional Pendulum Method;

---Part 3: Resonance Curve Method under Bending Vibration;

---Part 4: Non-resonant tensile vibration method;

---Part 5: Non-resonant bending vibration method;

---Part 6: Non-resonant shear vibration method;

---Part 7: Non-resonant torsional vibration method;

---Part 10: Determination of Complex Shear Vibration Viscometer Using a Parallel Plate Vibrating Rheometer;

---Part 11: Glass Transition Temperature;

---Part 12: Non-resonant compression vibration method.

This document is modified to adopt ISO 6721-3:2021 "Determination of dynamic mechanical properties of plastics - Part 3: Bending vibration resonance curve method".

This document has undergone the following structural adjustments compared to ISO

6721-3:2021.

---10.1~10.4 correspond to 10.2~10.5 in ISO 6721-3:2021, where the formulas and symbols in 10.1~10.3 correspond to...

10.1 of ISO 6721-3:2021.

The technical differences between this document and ISO 19064-2:202, and the reasons therefor, are as follows.

---ISO 6721-1 (see Chapters 3, 4, 5.2, 5.4, 5.6, 5.7, 6.1) has been replaced by the normatively referenced GB/T 33061.1.

(6.3, Chapters 7, 8, 9.1, 9.2, 9.5, 9.6, 9.7, 10.2, and Chapter 12) to adapt to my country's technological conditions and increase operability.

Actual nature;

--- "If the sample is not clamped" has been changed to "Method B" (see 6.2) for operator convenience;

---A method for "cutting from the finished product" in the preparation of multi-layer structure specimens has been added (see 6.3) to adapt to my country's technical conditions and increase operability.

Actual nature;

---ISO 1183-1 has been replaced by GB/T 1033.1 (normative reference), and ISO 1183-2 has been replaced by GB/T 1033.2.

GB/T 1033.3 replaces ISO 1183-3 (see 9.3) to adapt to my country's technical conditions and increase operability;

---The frequency resolution requirements have been changed (see 11.2) to increase operability.

The following editorial changes have been made to this document.

---To align with existing standards, the standard title has been changed to "Determination of Dynamic Mechanical Properties of Plastics - Part 3: Resonance Curve under Bending Vibration".

Line Method;

---The calculation method for resonance peaks in the note has been changed (see 10.2).

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Petroleum and Chemical Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Plastics Standardization (SAC/TC15).

Introduction

GB/T 33061 specifies various methods for determining the dynamic mechanical properties of rigid plastics within the linear viscoelastic behavior range. Dynamic mechanical properties are...

Viscoelasticity analysis (DMA) measures the response of a material under alternating stress or strain under programmed temperature control, and the results reflect the viscoelasticity of the material.

This document uses the DMA method to determine the flexural storage modulus, flexural loss modulus, and flexural loss of plastics based on resonance curves under bending vibration.

The factor changes with temperature. Based on the above results, the damping properties and other related information of the plastic can be characterized, which is of great significance for many applications of plastics.

Righteous.

GB/T 33061, "Determination of Dynamic Mechanical Properties of Plastics", specifies the methods for determining the dynamic mechanical properties of rigid plastics within the linear viscoelastic behavior range.

The method for assessing mechanical properties is proposed to consist of the following parts.

---Part 1: General Rules. The purpose is to establish general definitions and related content for test methods for determining dynamic mechanical properties.

---Part 2: Torsional Pendulum Method. The aim is to establish a comparable method for determining the stored energy and loss components of the torsional modulus.

---Part 3: Resonance Curve Method under Bending Vibration. The aim is to determine the complex bending modulus of homogeneous plastics and the lamination used for sound insulation.

Determining the damping properties of plastics and establishing comparable methods.

---Part 4: Non-resonant tensile vibration method. The purpose is to establish a forced non-resonant method for determining the tensile complex modulus of plastics.

Comparable methods.

---Part 5: Non-resonant bending vibration method. The purpose is to establish a forced non-resonant method for determining the complex bending modulus of plastics.

Comparable methods.

---Part 6: Non-resonant shear vibration method. The aim is to establish a forced non-resonant method for determining the complex shear modulus of plastics.

Comparable methods.

---Part 7: Non-resonant torsional vibration method. The aim is to obtain the torsional non-resonant complex modulus of the shear modulus of strip or rod-shaped solid polymers.

The resonance method was used to determine and establish comparable methods.

---Part 8: Longitudinal Shear Vibration Wave Propagation Method. The aim is to store the longitudinal complex modulus and shear complex modulus of polymers.

Determination of energy components and establishment of comparable methods.

---Part 9: Tensile Vibration Sound Velocity Pulse Propagation Method. The purpose is to determine the stored energy component of the complex tensile modulus of polymers.

The method of comparison.

---Part 10: Determination of Complex Shear Vibration Viscosity Using a Parallel Plate Vibrating Rheometer. The aim is to provide information on the dynamic rheology of polymer melts.

The determination of the test method can establish comparable methods.

---Part 11: Glass Transition Temperature. The purpose is to establish a reliable method for determining the glass transition temperature (T_g) of dynamic mechanical properties.

The method of comparison.

---Part 12: Non-resonant compressive vibration method. The aim is to establish a comparable method for determining the complex compressive modulus of polymers.

Determination of dynamic mechanical properties of plastics Part 3: Resonance Curve Method under Bending Vibration

1 Scope

This document describes the determination of the complex flexural modulus (E^*f) of plastics and the damping properties of sound-insulating laminated plastics using resonance curves under bending vibration.

method.

This document applies to multilayer structures composed of homogeneous plastic, metal plates, and damping plastic coatings, consisting of two metal layers and an intermediate plastic layer.