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

GB/T 45159.3-2024

**Mechanical vibration and shock - Characterization of the
dynamic mechanical properties of visco-elastic materials - Part
3: Cantilever shear beam method
(English Translation)**

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is Part 3 of GB/T 45159 "Characterization of dynamic mechanical properties of viscoelastic materials subject to mechanical vibration and shock".

GB/T 45159 has published the following parts.

- Part 1: Principles and guidelines;
- Part 2: Resonance method;
- Part 3: Cantilever shear beam method.

This document is equivalent to ISO 18437-3:2005 "Mechanical vibration and shock - Characterization of dynamic mechanical properties of viscoelastic materials - Part 3 Division. Cantilever shear beam method.

The following minimal editorial changes were made to this document.

- Incorporates the amendments to ISO 18437-3:2005/Amd1.2010, the clauses involved in these amendments have been adopted in its external the side margins are marked with double vertical lines (||).

Introduction

GB/T 45159 provides three methods for measuring the elastic modulus and loss factor of viscoelastic materials, and two methods for measuring Poisson's ratio.

The method provides unified regulations for users, including the operating principle, measuring device, measurement and data analysis, and is planned to consist of 6 parts.

- Part 1: Principles and guidance. The purpose is to outline three methods for measuring the elastic modulus and loss factor of viscoelastic materials, and Two methods for measuring Poisson's ratio are presented, along with the test setup, measurement range, and limitations of each method.

- Part 2: Resonance method. The purpose is to provide unified technical regulations for users of the resonance method.

- Part 3: Cantilever shear beam method. The purpose is to provide unified technical regulations for users of the cantilever shear beam method.

- Part 4: Dynamic stiffness method. The purpose is to provide unified technical regulations for users of the dynamic stiffness method.

- Part 5: Poisson's ratio based on comparison of measurements and finite element analysis.

The use of Poisson's ratio shall provide users with uniform technical regulations.

- Part 6: Time-temperature superposition. The purpose is to provide unified technical regulations for users of time-temperature superposition.

Mechanical vibration and shock Dynamic mechanics of viscoelastic materials
Characterization of properties - Part 3: Cantilever shear beam method

1 Scope

This document specifies the cantilever shear beam method for laboratory measurements of the dynamic mechanical properties of elastic materials used in vibration isolators.

The specimen beam end is rotated to avoid clamping errors.

This document applies to systems that measure shock and vibration in the frequency range from a fraction of Hz to 20kHz.

This document applies to resilient materials commonly used in vibration isolator designs to reduce.

- a) Vibration transmission and radiation noise of equipment, structure or vehicle (fluid radiation noise, air noise, structure radiation noise, etc.);
- b) The impact of low-frequency vibration on the human body, or the damage to structures and equipment caused by severe low-frequency vibration.

This document and ISO 18437-2 specify the measurement methods and data collection and analysis methods for.

---Design of vibration isolators;

---Selection of optimal resilience material;

--- Theoretical calculation of vibration transmissibility of vibration isolators;

---Information required for product development;

---Product information provided by manufacturers and suppliers;

---Product quality control.

The validity of this measurement method requires that the vibration characteristics of the isolator behave linearly. This also applies if the static load-deformation curve it is a vibration isolation element that is nonlinear, but its dynamic characteristics appear to be approximately linear under given static preload conditions.

This measurement method measures multiple data curves within 40Hz (the common frequency range is 0.3Hz~30Hz) and at different test temperatures.

Line, using the principle of time-temperature superposition to translate multiple original curves to generate a line with a wider frequency band than the original curve (generally 10-3Hz~109Hz) Dynamic mechanical properties curve.

Note: In this document, "dynamic mechanical properties" refers to basic elastic properties such as

complex Young's modulus that vary with temperature and frequency, and also includes those that vary with static preload.

characteristic.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

ISO 472 Plastics-Vocabulary Note. GB/T 2035-2008 Plastics terms and definitions (ISO 472:1999, IDT) ring-Vocabulary) Note. GB/T 2298-2010 Mechanical vibration, shock and condition monitoring vocabulary (ISO 2041:2009, IDT) ISO 4664-1 Rubber, vulcanized or thermoplastic rubber - Determination of dynamic properties - Part 1: General Note. GB/T 9870.1-2006 Determination of dynamic properties of vulcanized rubber or thermoplastic rubber Part 1: General (ISO 4664-1:2005, IDT)