First edition
2008-06-01

Mechanical vibration and shock — Characterization of the dynamic mechanical properties of visco-elastic materials —

Part 4: Dynamic stiffness method

Vibrations et chocs mécaniques — Caractérisation des propriétés mécaniques dynamiques des matériaux visco-élastiques —

Partie 4: Méthode de la raideur dynamique

Reference number
ISO 18437-4:2008(E)

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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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.

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The main task of technical committees is to prepare International Standards. 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.

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

ISO 18437-4 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration, shock and condition monitoring*.

ISO 18437 consists of the following parts, under the general title *Mechanical vibration and shock — Characterization of the dynamic mechanical properties of visco-elastic materials*:

— *Part 2: Resonance method*

— *Part 3: Cantilever shear beam method*

— *Part 4: Dynamic stiffness method*

The following parts are under preparation:

— *Part 1: Principles and guidelines*

— *Part 5: Poisson's ratio based on finite element analysis*

Introduction

Visco-elastic materials are used extensively to reduce vibration magnitudes, of the order of hertz to kilohertz, in structural systems through dissipation of energy (damping) or isolation of components, and in acoustical applications that require modification of the reflection, transmission, or absorption of energy. The design, modelling and characterization of such systems often require specific dynamic mechanical properties (the Young, shear, and bulk moduli and their corresponding loss factors) in order to function in an optimum manner. Energy dissipation is due to interactions on the molecular scale and can be measured in terms of the lag between stress and strain in the material. The visco-elastic properties (modulus and loss factor) of most materials depend on frequency, temperature, and strain amplitude. The choice of a specific material for a given application determines the system performance. The goal of this part of ISO 18437 is to provide details, in principle, of the operation of the direct dynamic stiffness method, the measurement equipment used in performing the measurements, and the analysis of the resultant data. A further aim is to assist users of this method and to provide uniformity in the use of this method. This part of ISO 18437 applies to the linear behaviour observed at small strain amplitudes, although the static stiffness may be non-linear.