
**Mechanical vibration and shock —
Experimental determination of
mechanical mobility —**

**Part 5:
Measurements using impact excitation
with an exciter which is not attached
to the structure**

*Vibrations et chocs mécaniques — Détermination expérimentale de la
mobilité mécanique —*

*Partie 5: Mesurages à partir d'une excitation par choc appliquée par
un exciteur non solidaire de la structure*

ISO 7626-5:2019

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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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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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 108, *Mechanical vibration, shock and condition monitoring*.

This second edition cancels and replaces the first edition (ISO 7626-5:1994), which has been technically revised.

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

- updating of normative and informative references in the bibliography;
- redrawing of figures and graphs.

A list of all parts in the ISO 7626 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.

Introduction

0.1 General introduction to the ISO 7626 series on mobility measurement

Dynamic characteristics of structures assumed to behave linearly can be determined as a function of frequency from mobility measurements or measurements of the related frequency-response functions (FRF), known as accelerance and dynamic compliance. Each of these frequency-response functions is the phasor of the motion response at a point on a structure due to a unit force (or moment) excitation at the same or any other point. The magnitude and the phase of these functions are frequency dependent.

Accelerance and dynamic compliance differ from mobility only in that the motion response is expressed in terms of acceleration or displacement, respectively, instead of velocity. In order to simplify the various parts of the ISO 7626 series, only the term “mobility” will be used. It is understood that all test procedures and requirements described are also applicable to the determination of accelerance and dynamic compliance.

Typical applications for mobility measurements are for:

- a) predicting the dynamic response of structures to known or assumed input excitation;
- b) determining the modal properties of a structure (natural frequencies, damping ratios and mode shapes);
- c) predicting the dynamic interaction of interconnected structures;
- d) checking the validity and improving the accuracy of mathematical models of structures;
- e) determining the frequency dependent dynamic properties (i.e. the complex modulus of elasticity) of materials.

For some applications, a complete description of the dynamic characteristics can be required using measurements of forces and linear velocities along three mutually perpendicular axes as well as measurements of moments and rotational velocities about these three axes. This set of measurements results in a 6×6 mobility matrix for each location of interest. For N locations on a structure, the system thus has an overall mobility matrix of size $6N \times 6N$.

NOTE 1 In general, the measurement directions do not need to be perpendicular to each other, but only their linear independence is needed.

For most practical applications, it is not necessary to know the entire $6N \times 6N$ matrix. Often it is sufficient to measure the driving-point mobility and a few transfer mobilities by exciting with a force at a single point in a single direction and measuring the linear response motions at key points on the structure. In other applications, only rotational mobilities can be of interest.

In order to simplify its use in the various mobility measurement tasks encountered in practice, ISO 7626 is published as a series comprising:

- ISO 7626-1, which covers basic definitions and transducers. The information in ISO 7626-1 is common to most mobility measurement tasks.
- ISO 7626-2, which covers mobility measurements using single-point linear excitation with an attached exciter.
- ISO 7626-5 (this document), which covers mobility measurements using impact excitation with an exciter which is not attached to the structure.

Mechanical mobility is defined as the frequency-response function formed by the ratio of the phasor of the linear or rotational velocity response to the phasor of the applied force or moment excitation. If the response is measured with an accelerometer, conversion to velocity is used to obtain the mobility.