INTERNATIONAL ISO

Third edition
2021-01

Mechanical vibration and shock — Mechanical mounting of accelerometers

Vibrations et chocs mécaniques — Fixation mécanique des accéléromètres

Reference number
ISO 5348:2021(E)

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Published in Switzerland

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Foreword

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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).

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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 third edition cancels and replaces the second edition (ISO 5348:1998), which has been technically revised.

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

— the theory of mass and stiffness influence on the frequency response obtained has been expanded;

— the frequency responses have been replaced by actual measurements and have been made more comparable;

— the influence of electrical loops has been added.

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

The method most commonly used for determining the vibratory motion of a structure or body is the use of an electromechanical vibration transducer, also called a transducer or a vibration sensor. These vibration transducers can be divided into the two broad classes: non-contacting and contacting transducers.

Non-contacting transducers are relative measuring transducers recording a motion in relation to a fixed space coordinate system. Typical examples are eddy-current probes, optical sensors and laser vibrometers. These transducers have no direct mechanical contact with the structure and are therefore not dealt with in this document.

Contacting transducers are mounted onto the structure by mechanical coupling. This includes, for example, piezoelectric, capacitive and piezoresistive accelerometers as well as seismic velocity transducers. These absolute measuring transducers record the motion by seismic forces from the space coordinate system onto which they are mounted. If such a transducer is mounted onto a structure, the properties of the mounting can significantly influence the frequency response of the structure as well as the vibration transducer. Very large measurement deviations can occur in case of lack of care in the mounting property, particularly at high frequencies.

Under certain circumstances the mass, geometry and mounting stiffness of the transducer can directly influence the measured vibration amplitude of the structure. This effect occurs for example if the masses of the transducer and the structure are in the same order of magnitude.

This document is concerned with the contacting type of seismic accelerometers and seismic velocity transducers which are currently in wide use. The concern with using such transducers is that the mechanical coupling between the accelerometer and the test structure can significantly alter the response of the accelerometer, the structure or both. This document attempts to isolate parameters of concern in the selection of a method to mount the accelerometer onto the structure.

In a basic sense, many aspects of velocity transducer mounting are similar to those of accelerometers, but they are not identical. Please refer to 6.2.1.

This document does not cover geophones.