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Methods for the calibration of vibration and shock transducers —

Part 45: In-situ calibration of transducers with built in calibration coil

Méthodes pour l'étalonnage des transducteurs de vibrations et de chocs —

Partie 45: Partie 45: Étalonnage sur site des transducteurs munis d'une bobine d'étalonnage intégrée

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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).

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This document was prepared by Technical Committee ISO/TC 108, *Mechanical vibration, shock and condition monitoring*.

A list of all parts in the ISO 16063 series can be found on the ISO website.

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Methods for the calibration of vibration and shock transducers —

Part 45: In-situ calibration of transducers with built in calibration coil

1 Scope

This document specifies the calibration of vibration transducers with built-in calibration coils in laboratory and in situ. In laboratory, the method described can be applied to calibrate the vibration sensitivity and electrical sensitivity, and to obtain the coefficient of calibration coil. In situ, it can be used to calibrate the electrical sensitivity and vibration sensitivity using electrical instrumentation.

This document specifies the instrumentation and procedure for performing calibrations of vibration transducers with built-in calibration coils in the frequency range typically from 0,1 Hz to 100 Hz.

The expanded uncertainty can be evaluated using the method given in this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16063-1, *Methods for the calibration of vibration and shock transducers — Part 1: Basic concepts*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at www.iso.org/obp

— IEC Electropedia: available at www.electropedia.org

3.1
vibration transducer with built-in calibration coils
vibration transducer employing calibration coils as internal exciting elements for which seismic mass is excited to vibrate by electromagnetic force produced by the exciting electrical signal of the calibration coil

EXAMPLE 1 Pendulum.

EXAMPLE 2 Seismometers and electromagnetic transducers with built-in calibration coils.

3.2
electrical sensitivity
<for vibration transducer with built-in calibration coils> ratio of the electrical output of the vibration transducer to the exciting electrical signal of the calibration coil in the absence of mechanical excitation parallel to a specified axis of *sensitivity* (3.3) at the mounting surface

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3.3
sensitivity
<for linear transducer> ratio of the transducer electrical output to its mechanical input during sinusoidal excitation applied parallel to a specified axis of sensitivity at the mounting surface

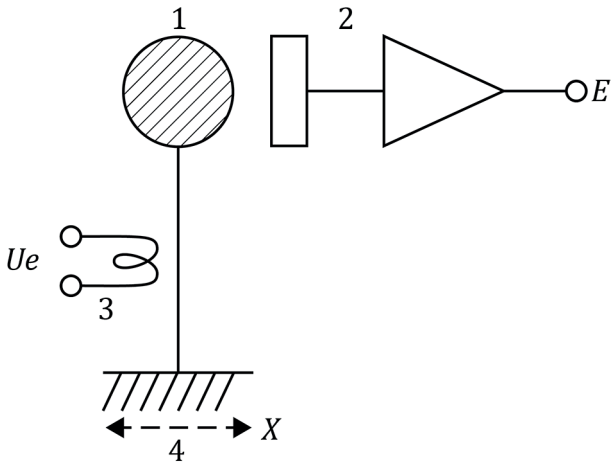
3.4
coefficient of calibration coil
<for vibration transducer with built-in calibration coils> ratio of the *electrical sensitivity* (3.2) to *sensitivity* (3.3)

Note 1 to entry: The coefficient of calibration coil is frequency dependent.

4 Calibration

4.1 General

The principle of a vibration transducer with built-in calibration coils is illustrated in Figure 1. The pendulum vibrates under the inertia force produced by measured vibration. A calibration coil can be used to produce the equivalent electromagnetic force to simulate the inertial force required to vibrate the pendulum.



Key

1	pendulum	*Ue*	exciting electrical signal of the calibration coil
2	sensing element	*E*	output electrical signal of the transducer
3	calibration coil	*X*	vibration measured by the transducer
4	measured vibration		

Figure 1 — Principle of a vibration transducer with built-in calibration coils

The signals and instrumentations used in the calibration of vibration transducers with built-in calibration coils are shown in Figure 2.

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