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Methods for the calibration of vibration and shock transducers —

Part 12: Primary vibration calibration by the reciprocity method

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

Partie 12: Étalonnage primaire de vibrations par méthode réciproque

Reference number
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 part of ISO 16063 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16063-12 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration and shock*, Subcommittee SC 3, *Use and calibration of vibration and shock measuring instruments*.

ISO 16063 consists of the following parts, under the general title *Methods for the calibration of vibration and shock transducers*:

— *Part 1: Basic concepts*

— *Part 11: Primary vibration calibration by laser interferometry*

— *Part 12: Primary vibration calibration by the reciprocity method*

— *Part 13: Primary shock calibration using laser interferometry*

— *Part 21: Vibration calibration by comparison to a reference transducer*

— *Part 22: Secondary shock calibration*

Annex A forms a normative part of this part of ISO 16063. Annex B is for information only.

Methods for the calibration of vibration and shock transducers —

Part 12:
Primary vibration calibration by the reciprocity method

1 Scope

This part of ISO 16063 specifies the instrumentation and procedures to be used for primary calibration of accelerometers using the reciprocity method and the SI system of units.

It is applicable to the calibration of rectilinear accelerometers over a frequency range of 40 Hz to 5 kHz and a frequency-dependent amplitude range of 10 m/s^2 to 100 m/s^2 and is based on the use of the coil of an electrodynamic vibrator as the reciprocal transducer.

Calibration of the sensitivity of a transducer can be obtained using this part of ISO 16063 provided that the signal conditioner or amplifier used with the transducer during calibration has been adequately characterized. In order to achieve the uncertainties of measurement given in clause 3, it has been assumed that the transducer has been calibrated in combination with its signal conditioner or amplifier (the combination of which in this part of ISO 16063 is referred to as the “accelerometer”).

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 16063. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 16063 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 266, *Acoustics — Preferred frequencies*

ISO 16063-1:1998, *Methods for the calibration of vibration and shock transducers — Part 1: Basic concepts*

3 Uncertainty of measurement

At a reference frequency of 160 Hz and a reference amplitude of 100 m/s^2, 50 m/s^2, 20 m/s^2 or 10 m/s^2, the applicable limits of uncertainty are 0,5 % of the modulus (magnitude) of complex sensitivity and 1° of the argument (phase shift) of complex sensitivity. Over the full range of amplitudes and frequencies, the limits of uncertainty in the measured magnitude and phase shift of sensitivity are 1 % and 2°, respectively.

All users of this part of ISO 16063 are expected to make uncertainty budgets according to annex A to document the uncertainty of measurement.

The uncertainty of measurement is expressed as the expanded measurement uncertainty in accordance with ISO 16063-1 (referred to here as “uncertainty”).

4 Symbols

A general list of symbols used in this part of ISO 16063 is contained in Table 1. Specific symbols used in formulae are defined following the formulae in which they appear.