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**Methods for the calibration of vibration  
and shock transducers —**

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

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

*Partie 21: Étalonnage de vibrations par comparaison à un transducteur  
de référence*



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# Contents

Page

Foreword.....	iv
Introduction .....	v
1 Scope.....	1
2 Normative references .....	1
3 Uncertainty of measurement.....	2
4 Requirements for apparatus and environmental conditions.....	3
4.1 General .....	3
4.2 Environmental conditions .....	3
4.3 Reference transducer.....	3
4.4 Vibration generation equipment.....	4
4.5 Voltage measuring instrumentation.....	6
4.6 Distortion measuring instrumentation.....	6
4.7 Oscilloscope.....	7
4.8 Phase shift measuring instrumentation .....	7
5 Calibration.....	7
5.1 Preferred amplitudes and frequencies .....	7
5.2 Measurement requirements .....	7
5.3 Calibration procedure.....	8
6 Expression of results.....	8
7 Reporting the calibration results.....	9
Annex A (normative) Expression of uncertainty of measurement in calibration .....	11
Annex B (normative) Definitions of amplitude sign and phase shift between mechanical motion and vibration transducer electrical output.....	20
Annex C (informative) Nomogram for conversion between acceleration, velocity and displacement .....	22
Annex D (informative) Example of uncertainty calculation.....	24
Bibliography .....	29

## 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 2.

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 16063-21 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration and shock*, Subcommittee SC 3, *Use and calibration of vibration and shock measuring instruments*.

This first edition of ISO 16063-21 cancels and replaces ISO 5347-3:1993, which has been technically revised.

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: Shock calibration by comparison to an accelerometer, velocity or force transducer*

## Introduction

The ISO 16063 series of standards is concerned with methods for the calibration of vibration and shock transducers under both standard laboratory conditions and in the field.

As such, the intended user group of this part of ISO 16063 is wide, ranging from metrologists in mechanical vibration to technicians evaluating the vibration characteristics of a machine or structure, or human exposure to vibration. The key to the application of this part of ISO 16063 is in the careful detailed specification and evaluation of measurement uncertainty, i.e. the error budget and computation of expanded uncertainty associated with the measurement of vibration.

This part of ISO 16063 is particularly intended for those engaged in vibration measurements requiring traceability to primary national or international standards through a secondary, reference, working or check standard (portable calibrator intended for field use) as defined in the *International vocabulary of basic and general terms in metrology* (VIM). The specifications for the instrumentation and the procedures given are intended to be used for calibration of rectilinear vibration transducers (with or without signal conditioning) to obtain the magnitude and (optional) phase shift of the complex sensitivity at frequencies in the range of 0,4 Hz to 10 kHz.

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# Methods for the calibration of vibration and shock transducers —

## Part 21:

### Vibration calibration by comparison to a reference transducer

#### 1 Scope

This part of ISO 16063 describes the calibration of rectilinear vibration transducers by comparison. Although it mainly describes calibration using direct comparison to a standard calibrated by primary methods, the methods described can be applied between other levels in the calibration hierarchy.

This part of ISO 16063 specifies procedures for performing calibrations of rectilinear vibration transducers by comparison in the frequency range from 0.4 Hz to 10 kHz. It is primarily intended for those who are required to meet ISO standardized methods for the measurement of vibration under laboratory conditions, where the uncertainty of measurement is relatively small. It can also be used under field conditions, where the uncertainty of measurement may be relatively large.

From knowledge of all significant sources of uncertainty affecting the calibration, the expanded uncertainty can be evaluated using the methods given in this part of ISO 16063. It also covers the assessment of uncertainties for calibrations performed using a check standard.

Comparison calibrations made in accordance with this part of ISO 16063 need to allow for the environmental conditions of the reference transducer calibration.

NOTE Transducer calibrations made under extreme environmental conditions are covered by other International Standards.

#### 2 Normative references

The following referenced documents are indispensable for the application 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 266, *Acoustics — Preferred frequencies*

ISO 2041:1990, *Vibration and shock — Vocabulary*

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

ISO 16063-11:1999, *Methods for the calibration of vibration and shock transducers — Part 11: Primary vibration calibration by laser interferometry*

*Guide to the expression of uncertainty in measurement (GUM)*. BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, 1993<sup>1)</sup>

1) Corrected and reprinted in 1995.