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

Part 1:
Basic concepts

*Méthodes pour l'étalonnage des transducteurs de vibrations et de chocs —
Partie 1: Concepts de base*



Contents

Page

1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Characteristics to be measured	4
4.1 General.....	4
4.2 Direct response.....	4
4.3 Spurious response	5
5 Calibration methods	7
5.1 General.....	7
5.2 Primary calibration methods	8
5.3 Comparison calibration methods.....	17
6 Expression of uncertainty of measurement.....	18
Annex A (informative) Expression of uncertainty of measurement in calibration.....	19
Bibliography	22

© ISO 1998

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

Printed in Switzerland

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.

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.

International Standard ISO 16063-1 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 16063-1 cancels and replaces ISO 5347-0:1987, of which it constitutes a minor revision. A new clause 6, new annex A, and an enlarged bibliography have been included.

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

- *Part 1: Basic concepts*
- *Part 2: Primary calibrations*
- *Part 3: Secondary calibrations*
- *Part 4: Environmental calibrations*

Parts 2 to 4 are under preparation and will consist of a revision of parts 1 to 23 of ISO 5347.

Annex A of this part of ISO 16063 is for information only.

Introduction

The calibration of vibration and shock transducers has become increasingly important as the need has grown for accurate measurements of the shocks and vibrations to which man and a wide variety of equipment are subjected in service. Several methods have been used or proposed for these calibrations and some of them are described in this part of ISO 16063. Clause 5 describes methods which have proved to be reliable means for the primary calibration of vibration and shock transducers.

Methods of calibration for both vibration and shock transducers are included in this International Standard because it has proved to be impracticable to make a distinction between transducers used in measurements of vibrations and those used in measurements of shocks.

This International Standard is limited to the calibration of acceleration, velocity and displacement transducers. It does not deal with transducers used for measurements of force, pressure or strain, even though some of these may be calibrated using similar methods. Furthermore, transducers used to measure rotational vibratory motion are also excluded because, at present, they are few in number and the calibration hardware and methods are somewhat different from those for the rectilinear transducers covered by this International Standard.

This part of ISO 16063 contains definitions and describes basic primary calibration. In addition, it describes, in general terms, various methods for the calibration of vibration and shock transducers as well as methods for measuring characteristics other than sensitivity. In order to be able to carry out a calibration with known accuracy, detailed specifications for instruments and procedures have to be laid down. Information of this kind for each method of calibration will be specified in subsequent parts of ISO 16063 (i.e. revisions of parts 1 to 23 of the ISO 5347 series).

The transducer may be calibrated as a unit by itself; it may include a cable connection and/or a conditioning device. The calibration system shall always be properly described.

A bibliography is included and the references are referred to in the text by numbers in square brackets.

Methods for the calibration of vibration and shock transducers —

Part 1

Basic concepts

1 Scope

This part of ISO 16063 describes methods for the calibration of vibration and shock transducers. It also includes methods for the measurement of characteristics in addition to the sensitivity.

One primary calibration method has been selected as the preferred method (see 5.2.1). Comparison calibration methods for vibration and shock are also described (see 5.3). More detailed descriptions are given in parts 1 to 23 of ISO 5347 (see references [1] to [22]).

This part of ISO 16063 is applicable to continuous-reading rectilinear acceleration, velocity and displacement transducers and recommends a preferred method which has proved to give reliable and reproducible results.

It is not applicable to methods for the calibration of rotational transducers.

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 1101:1983, *Technical drawings — Geometrical tolerancing — Tolerances of form, orientation, location and run-out — Generalities, definitions, symbols, indications on drawings*.

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

ISO 2954:1975, *Mechanical vibration of rotating and reciprocating machinery — Requirements for instruments for measuring vibration severity*.

GUM: *Guide to the Expression of Uncertainty in Measurement*. BIPM/IEC/IFCC/ISO/OIML/IUPAC, 1995.

3 Terms and definitions

For the purposes of this part of ISO 16063, the terms and definitions given in ISO 2041, together with the following, apply.

3.1

transducer

device for converting the mechanical motion to be measured, for example acceleration in a given direction, into a quantity which may be conveniently measured or recorded

NOTE A transducer may include auxiliary equipment for amplifying, supplying necessary operating power, providing necessary circuit elements, indicating or recording its output, etc.