
**Rotating shaft vibration measuring
systems —**

Part 1:
Relative and absolute sensing of radial
vibration

Systèmes de mesure des vibrations des arbres tournants —

Partie 1: Captage relatif et captage absolu des vibrations radiales



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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.

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 10817-1 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration and shock*, Subcommittee SC 3, *Use and calibration of vibration and shock measuring instruments*.

ISO 10817 consists of the following parts, under the general title *Rotating shaft vibration measuring systems*:

- *Part 1: Relative and absolute sensing of radial vibration*
- *Part 2: Signal processing*

Annexes A and B of this part of ISO 10817 are for information only.

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Rotating shaft vibration measuring systems —

Part 1:

Relative and absolute sensing of radial vibration

1 Scope

This part of ISO 10817 gives details of how to obtain reproducible measurement results in order to enable the monitoring and evaluation of shaft vibrations according to the ISO 7919 series. As such, it is concerned primarily with the measurement of shaft vibrations for large machines (e.g. steam turbine generator sets, gas turbines, industrial turbosets, hydraulic machines).

This part of ISO 10817 is applicable to radial vibration measuring systems on shafts, both for absolute and relative measurements. It covers the sensing device (i.e. transducer), signal conditioning, attachment methods and calibration procedures.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 10817. 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 10817 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 683-1, *Heat-treatable steels, alloy steels and free-cutting steels — Part 1: Direct-hardening unalloyed and low-alloyed wrought steel in form of different black products.*

ISO 2041, *Vibration and shock — Vocabulary.*

ISO 4287, *Geometrical Product Specification (GPS) — Surface texture: Profile method — Terms, definitions and surface texture parameters.*

ISO 5347, *Methods for the calibration of vibration and shock pick-ups (all parts).*

ISO 5348, *Mechanical vibration and shock — Mechanical mounting of accelerometers.*

ISO 7919-1:1996, *Mechanical vibration of non-reciprocating machines — Measurements on rotating shafts and evaluation criteria — Part 1: General guidelines.*

ISO 7919-2, *Mechanical vibration of non-reciprocating machines — Measurements on rotating shafts and evaluation criteria — Part 2: Large land-based steam turbine generator sets.*

ISO 7919-3, *Mechanical vibration of non-reciprocating machines — Measurements on rotating shafts and evaluation criteria — Part 3: Coupled industrial machines.*

ISO 7919-4, *Mechanical vibration of non-reciprocating machines — Measurements on rotating shafts and evaluation criteria — Part 4: Gas turbine sets*.

ISO 7919-5, *Mechanical vibration of non-reciprocating machines — Measurements on rotating shafts and evaluation criteria — Part 5: Machine sets in hydraulic power generating and pumping plants*.

ISO 8042, *Characteristics to be specified for seismic pick-ups*.

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

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

IEC 60068-2-6, *Environmental testing — Part 2: Tests — Test Fc: Vibration (sinusoidal)*.

IEC 60068-2-29, *Environmental testing — Part 2: Tests — Test Eb and guidance: Bump*.

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*.

3 Terms and definitions

For the purposes of this part of ISO 10817, the terms and definitions given in ISO 2041 apply.

4 Shaft vibration measuring systems overview

A measuring system to evaluate the radial vibration of a rotating shaft can be thought of as consisting of several distinct subsystems: a transducer or transducers for either relative or absolute vibration measurement; a transducer signal-conditioning instrumentation and associated cabling; a phase reference to relate a position on the rotating shaft to the position of the measurement in the time domain (e.g. a shaft encoder); signal processing instrumentation to output the measurement in a specified format, and an output device to display the measurement. Figure 1 shows the interrelationship of these subsystems. ISO 10817-2 covers instrumentation requirements for signal processing and analysis.

The output signals from the measuring devices, S_{ext} , can be processed via specific systems and software packages which provide the quantities required for machine analysis and maintenance purposes. These systems and software packages are not part of this part of ISO 10817.

The relative motions are generally measured with non-contacting transducers. The absolute rotor motions can be sensed with non-contacting relative motion transducers in combination with an absolute motion detection made at the positions of the relative motion transducers. These absolute motion measurements could also be sensed by seismic transducers, e.g. shaft-riding transducers.

This part of ISO 10817 deals with the signal sensing block only, see Figure 1.

¹⁾ Revision of ISO 5347-0.