INTERNATIONAL STANDARD

ISO 5347-7

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Methods for the calibration of vibration and shock pick-ups —

Part 7:
Primary calibration by centrifuge

Méthodes pour l'étalonnage de capteurs de vibrations et de chocs —
Partie 7: Étalonnage primaire par centrifugeur

Reference number
ISO 5347-7:1993(E)

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.

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 5347-7 was prepared by Technical Committee ISO/TC 108, *Mechanical vibration and shock*, Sub-Committee SC 3, *Use and calibration of vibration and shock measuring instruments*.

ISO 5347 consists of the following parts, under the general title *Methods for the calibration of vibration and shock pick-ups*:

— *Part 0: Basic concepts*

— *Part 1: Primary vibration calibration by laser interferometry*

— *Part 2: Primary shock calibration by light cutting*

— *Part 3: Secondary vibration calibration*

— *Part 4: Secondary shock calibration*

— *Part 5: Calibration by Earth's gravitation*

— *Part 6: Primary vibration calibration at low frequencies*

— *Part 7: Primary calibration by centrifuge*

— *Part 8: Primary calibration by dual centrifuge*

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— *Part 9: Secondary vibration calibration by comparison of phase angles*

— *Part 10: Primary calibration by high-impact shocks*

— *Part 11: Testing of transverse vibration sensitivity*

— *Part 12: Testing of transverse shock sensitivity*

— *Part 13: Testing of base strain sensitivity*

— *Part 14: Resonance frequency testing of undamped accelerometers on a steel block*

— *Part 15: Testing of acoustic sensitivity*

— *Part 16: Testing of mounting torque sensitivity*

— *Part 17: Testing of fixed temperature sensitivity*

— *Part 18: Testing of transient temperature sensitivity*

— *Part 19: Testing of magnetic field sensitivity*

— *Part 20: Primary vibration calibration by the reciprocity method*

Annex A forms an integral part of this part of ISO 5347.

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Methods for the calibration of vibration and shock pick-ups

Part 7:
Primary calibration by centrifuge

1 Scope

ISO 5347 comprises a series of documents dealing with methods for the calibration of vibration and shock pick-ups.

This part of ISO 5347 lays down detailed specifications for the instrumentation and procedure to be used for primary calibration of accelerometers using centrifuge calibration.

This part of ISO 5347 applies to rectilinear accelerometers with zero-frequency response, mainly of the strain gauge or piezoresistive type, and to primary standard and working pick-ups.

It is applicable for a calibration range from 10 m/s^2 to 1 000 m/s^2 (higher accelerations possible) at 0 Hz.

The limits of uncertainty applicable are ± 1 % of reading.

2 Apparatus

2.1 Equipment capable of maintaining room temperature at 23 °C ± 3 °C.

2.2 Balanced table or **arm**, rotating about a vertical axis with uniform angular speed. For the calibration range from 10 m/s^2 to 100 m/s^2 the table/arm shall be level within ± 0,5° of horizontal. For ranges higher than 100 m/s^2, levelling is allowed to within ± 2°.

The rotational frequency shall be uniform within ± 0,05 % of the nominal value.

The pick-up axis of sensitivity shall be aligned within ± 0,5°.

The radius of rotation to the centre of the pick-up mass element shall be measured with an uncertainty less than ± 0,1 %. If the accelerometer is substituted by impedances not sensitive to acceleration, the hum and noise when the centrifuge is rotating at the calibration speeds shall be at least 60 dB below reading.

2.3 Instrumentation for measuring rotational frequency, with an uncertainty of maximum ± 0,05 % of reading.

2.4 Voltage instrumentation for measuring accelerometer d.c. output, with an uncertainty of maximum ± 0,01 % of reading.

3 Preferred values

Six acceleration values, in metres per second squared, equally covering the accelerometer range, shall be chosen from the following series:

10; 20; 50; 100; 200; 500 or their multiples of ten.

The reference acceleration shall be 100 m/s^2 (second choice: 50 m/s^2).

4 Method 1 (with measurement of the radius of rotation)

4.1 Test procedure

Rotate the table or arm at different frequencies determined by calculation from the standard levels using the following formula:

$$a = 4\pi^2 n^2 r$$