INTERNATIONAL STANDARD

ISO 5347-11

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

Part 11: Testing of transverse vibration sensitivity

Méthodes pour l'étalonnage de capteurs de vibrations et de chocs —

Partie 11: Essai de sensibilité aux vibrations transversales

Reference number
ISO 5347-11:1993(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 5347-11 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*

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

Part 11:
Testing of transverse vibration sensitivity

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 transverse vibration sensitivity testing. It applies to rectilinear velocity and acceleration pick-ups.

This part of ISO 5347 is applicable for a frequency range from 20 Hz to 5 000 Hz and a dynamic range from 10 m/s^2 to 1 000 m/s^2 (frequency-dependent) and from 1 mm/s to 1 m/s (frequency-dependent).

The limits of uncertainty applicable are ± 10 % of reading.

NOTE 1 Some (especially velocity) pick-ups may require testing by rotational vibration along their sensing axis.

2 Apparatus

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

2.2 Vibrator, having a fixture for transverse vibration of the pick-up. It shall be possible to mount the accelerometer at different angles about its sensing axis, preferably for continuous rotation over at least 180°.

The transverse acceleration of the vibrator fixture shall, in the case of test frequencies and standard pick-ups, be < 2 % of the vibration in the intended direction and, in the case of special pick-ups, < 1 %, which can be achieved by proficient fixture design and by testing at selected frequencies.

3 Preferred amplitudes and frequencies

One amplitude and, if no resonance frequencies are found, six frequencies equally covering the pick-up frequency range shall be chosen from the following series:

a) **Amplitude**, in metres per second squared:

1; 2; 5; 10; 20; 50; or their multiples of ten;

reference amplitude for velocity pick-ups 100 mm/s^2 (second choice: 20 mm/s^2);

reference amplitude for accelerometers 100 m/s^2 (second choice: 10 m/s^2).

b) **Frequency**, in hertz:

20; 40; 80; 160; 315; 630; 1 250; 2 500; 5 000;

reference frequency 160 Hz (second choice: 80 Hz).

4 Method

4.1 Test procedure

Vibrate the pick-up at the reference amplitude and frequency in its sensing axis to determine its sensitivity. Determine the maximum and minimum values for transverse sensitivity by vibrating perpendicularly to the main axis of the pick-up. Then check the transverse response at different frequencies by frequency sweeping.

The directions and magnitudes of the maximum and minimum transverse responses shall be reported at

the reference frequency. It shall also be reported if the response differs at other frequencies (main resonance or preferred frequencies).

4.2 Expression of results

Calculate the transverse sensitivity, S_{trans}, expressed as a percentage, using the following formula:

$$S_{trans} = \frac{A_{trans}}{A} \times 100$$

where

A_{trans} is the transverse response amplitude;

A is the vibration amplitude in the test direction.

NOTE 2 The maximum and minimum values for the transverse sensitivity can be a function of frequency.

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