INTERNATIONAL STANDARD

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

Part 19: Testing of magnetic field sensitivity

Méthodes pour l'étalonnage de capteurs de vibrations et de chocs —
Partie 19: Essai de sensibilité de champ magnétique

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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.

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 5347-19 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 19:
Testing of magnetic field 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 magnetic field sensitivity testing. It applies to all kinds of pick-ups, whereby pick-up output due to applied magnetic field is determined.

This part of ISO 5347 is applicable for a reference magnetic field of 10^{-3} T[1] r.m.s. at 50 Hz or 60 Hz.

2 Apparatus

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

2.2 Coil, for radiating a magnetic field of 10^{-3} T r.m.s. It is recommended that a coil of ten turns of insulated copper wire on nonconducting material, having an inside diameter of 120 mm ± 1 mm and a height of 3 mm ± 0,5 mm, be used.

At the centreline, 50 mm ± 1 mm from the lower end of the coil, the magnetic field is 10^{-3} T r.m.s. at a current of 20 A r.m.s.

Parameters for low-height coils for radiating magnetic fields can be calculated from the following formula:

$$B = 0{,}63 \times 10^{-6} \times I \times n \frac{r^2}{(l^2 + r^2)^{1,5}}$$

where

B is the magnetic field, in tesla, r.m.s. value;

I is the current, in amperes, r.m.s. value;

n is the number of full turns;

r is the inside radius of the coil, in metres;

l is the distance on the centreline from the lower end of the coil to the centre of the pick-up, in metres.

2.3 Current-measuring equipment, covering the range from 0 to 20 A and uncertainty maximum ± 1 % of reading.

2.4 Pick-up amplifier.

2.5 Voltage-measuring equipment, with uncertainty maximum ± 1 % of reading.

3 Method

3.1 Test procedure

Move the known magnetic field, according to 2.2, around the pick-up and measure the output.

Precautions shall be taken to differentiate between the output from the pick-up due to the magnetic field and the output due to the motion of the magnetic field.

1) 1 T (tesla) = 1 Wb/m^2 = 10^4 Gs (gauss)

3.2 Expression of results

Calculate the magnetic field sensitivity, S_B, in millimetres per tesla, in metres (per second per tesla) [m/(s/T)] or in metres per (second squared per tesla) [m/(s^2/T)] (depending on the type of pick-up), using the following formula:

$$S_B = \frac{V_B}{B}$$

where

V_B is the pick-up output, in millimetres, in metres per second or in metres per second squared (as appropriate);

B is the magnetic field, in tesla.

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