INTERNATIONAL STANDARD

ISO 5348

Second edition
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Mechanical vibration and shock — Mechanical mounting of accelerometers

Vibrations et chocs mécaniques — Fixation mécanique des accéléromètres

Reference number
ISO 5348:1998(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 5348 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 second edition cancels and replaces the first edition (ISO 5348:1987), which has been technically revised.

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Introduction

The method most commonly used for determining the vibratory motion, v_S, of a structure or body S is that using an electromechanical transducer T.

Vibration-monitoring transducers fall into two broad classes: contacting and non-contacting transducers. Non-contacting structural response transducers are placed in close proximity to the structure and include such generic types as eddy-current probes and optical proximity probes. Contacting transducers are placed in mechanical contact with the structural system and include such generic types as piezoelectric and piezoresistive accelerometers and seismic velocity transducers. This International Standard is concerned with the contacting type of accelerometers which currently are in wide use. The concern with using such transducers is that the mechanical coupling between the accelerometer and the test structure may significantly alter the response of the accelerometer, the structure, or both. This International Standard attempts to isolate parameters of concern in the selection of a method to mount the accelerometer onto the structure.

This International Standard deals with accelerometers which are connected to the surface of the structure in motion by means of a mechanical mounting F (see figure 1).

The information supplied by such a transducer is the electric signal, u, generated by the action of its own motion, v_T. The information desired is the vibratory motion, v_S, at a specified location on the structure S.

The electric signal, u, generated by the transducer deviates from what it would have been, if that particular accelerometer effectively measured the vibratory motion, v_S, of the structure, owing to non-ideal transfer of motion from S to the sensitive elements of the accelerometer T.

Deviations may also occur owing to misalignment of the sensitive axis of the transducer, base bending, temperature transients, mounting torque and cable whip.

The mechanical mounting will change the useful frequency range for a given accuracy with regard to amplitude as well as phase response (see 5.4.5).

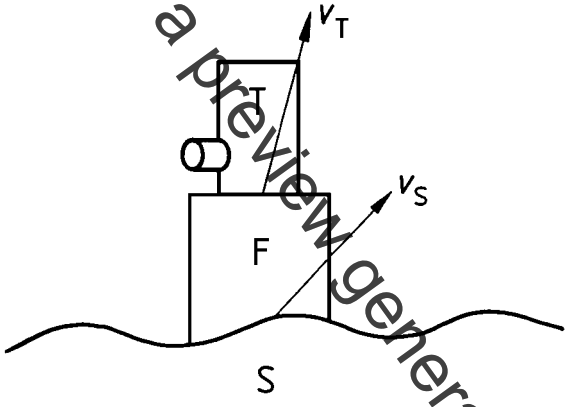
Mechanical vibration and shock — Mechanical mounting of accelerometers

1 Scope

This International Standard describes the mounting characteristics of accelerometers to be specified by the manufacturer and makes recommendations to the user for mounting accelerometers.

Application of this International Standard is limited to the mounting of accelerometers which are mounted on the surface of the structure in motion, as illustrated in the simplified diagram shown in figure 1.

It is not applicable to other types of transducers, such as relative motion pick-ups.



Key

S is the structure;
F is a means of mounting;
T is an accelerometer;
v_S is vibratory motion of the structure;
v_T is vibratory motion of the accelerometer.

Figure 1 — Accelerometer mounting

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

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

ISO 5347-14:1993, *Methods for the calibration of vibration and shock pick-ups — Part 14: Resonance frequency testing of undamped accelerometers on a steel block.*

ISO 5347-22:1997, *Methods for the calibration of vibration and shock pick-ups — Part 22: Accelerometer resonance testing — General methods.*

ISO 8042:1988, *Shock and vibration measurements — Characteristics to be specified for seismic pick-ups.*

3 Definitions

For the purposes of this International Standard, the terms and definitions given in ISO 2041 apply.

4 Characteristics to be specified by manufacturers of accelerometers

The manufacturer shall specify the following characteristics:

a) mounting-surface characteristics pertinent to the mounting device(s) furnished with the accelerometer, e.g. surface finish roughness, surface flatness, hole perpendicularity and tap class;

b) the geometrical dimensions of the accelerometer including

   — the position of the centre of gravity of the accelerometer as a whole,

   — the position of the centre of gravity of the seismic mass of the accelerometer;

c) the mounting technique used during calibration;

d) the recommended and maximum (i.e. for less than 2 % change in the useful frequency range) mounting torque;

e) temperature limitations of the accelerometer and fastening device;

f) pertinent mechanical characteristics, i.e.

   — total mass,

   — material of base,

   — the lowest unmounted resonance frequency of the accelerometer,

   — the frequency response characteristic under well-defined mounting conditions, describing the object on which the transducer is mounted in terms of mass, material and dimensions,

   — the maximum transverse sensitivity, and the frequency at which it was determined;

g) a description of the various fastening devices provided for the accelerometer, i.e.

   — diameter,

   — thread,

   — material;

h) the frequency response curves of the accelerometer with the type of mechanical mounting recommended by the manufacturer and the effect of special mounting devices supplied with the accelerometer, in particular

   — axial stiffness, with account taken of the state of the surface of the structure in contact with the accelerometer and the tightening torque of the accelerometer,

   — transverse deflection stiffness, on the same basis.

For other characteristics to be specified by the manufacturer, refer to ISO 8042.