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GB/T 11349.1-2018 / ISO 7626-1:2011

Replacing GB/T 11349.1-2006

**Mechanical vibration and shock - Experimental
determination of mechanical mobility - Part 1: Basic terms
and definitions, and transducer specifications**

机械振动与冲击 机械导纳的试验确定

第 1 部分：基本术语与定义、传感器特性

(ISO 7626-1:2011, IDT)

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Foreword

GB/T 11349 “Mechanical vibration and shock - Experimental determination of mechanical mobility” consists of the following three parts:

- Part 1: Basic terms and definitions, and transducer specifications;
- Part 2: Measurements using single-point translation excitation with an attached vibration exciter;
- Part 3: Measurement using impact excitation.

This Part is Part 1 of GB/T 11349.

This Part was drafted in accordance with the rules given in GB/T 1.1-2009.

This Part replaces GB/T 11349.1-2006 “Vibration and shock - Experimental determination of mechanical mobility - Part 1: Basic definitions and transducers”. Compared with GB/T 11349.1-2006, the main technical differences besides editorial modifications are as follows:

- MODIFY the standard name;
- MERGE “Symbols and units” and “Terms and definitions” INTO Clause 3 “Terms, definitions, and symbols”; DELETE the term “other frequency-response function related to mobility”; RETAIN Table 1 (see Clause 3 of this Part, Clauses 3 and 4 of the 2009 edition);
- INCLUDE part of the content in the introduction of GB/T 11349.1-2006 as the main text in the “Fundamentals and general relationships” clause (see Clause 4 of this Part, the introduction of the 2009 edition);
- ADJUST the dimensions, mass, polarity, frequency response, and transverse sensitivity of the accelerometer in the supplementary calibration item TO the basic calibration item; ADD the threshold in reference to the bandwidth of the transducer TO the supplementary calibration item; ADJUST the order of clauses and subclauses accordingly. (see 6.3 of this Part, 6.2 of the 2009 edition).
- CHANGE the recommended time interval for repeating basic calibrations and tests from 1 year to 2 years (see 7.1 of this Part, 7.1 of the 2009 edition).

This Part is identical to ISO 7626-1:2011 “Mechanical vibration and shock - Experimental determination of mechanical mobility - Part 1: Basic terms and definitions, and transducer specifications” (2nd edition, English version), using the translation method.

Mechanical vibration and shock - Experimental determination of mechanical mobility - Part 1: Basic terms and definitions, and transducer specifications

1 Scope

This Part of GB/T 11349 defines basic terms and specifies the calibration tests, environmental tests and physical measurements necessary to determine the suitability of impedance heads, force transducers and motion response transducers for use in measuring mechanical mobility. Primarily, this Part provides guidelines for the selection, calibration and evaluation of the transducers and instruments for their suitability in making mobility measurements. Procedures for carrying out mobility measurements in various circumstances are dealt with in subsequent parts of GB/T 11349.

This Part is limited to information which is basic to various types of driving-point and transfer mobility, accelerance and dynamic compliance measurements. Measurements of the blocked impedance are not dealt with.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 2298-2010 Mechanical vibration, shock and condition monitoring - Vocabulary (ISO 2041:2009, IDT)

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

ISO 16063 (all parts) Methods for the calibration of vibration and shock transducers

IEC 60263 Scales and sizes for plotting frequency characteristics and polar diagrams

3 Terms, definitions, and symbols

3.1 Terms and definitions

For the purpose of this document, the terms and definitions given in GB/T 2298 and the following apply.

5.2.4 The attachment should have a sufficiently small contact area to prevent stiffening or damping of the structure by the transducer or its mounting fixture.

5.2.5 When applying impulse excitation, zero drift of piezoelectric accelerometers due to the pyro-electric effect is likely to occur and this limits the accuracy of the measurement at low frequencies. Other types of motion transducers (e.g., piezoresistive, electrodynamic or some shear-type piezo-electronic accelerometers) can provide the solution to this problem.

5.3 Requirements for force measurement transducers

5.3.1 Some of the characteristics outlined in 5.1 are more important than others in the selection of a force measurement transducer to be used for mechanical mobility measurements. Since compromises in design have to be made, the items outlined in 5.3.2 to 5.3.4 shall be considered as being of prime importance.

5.3.2 The effective end mass (mass between the force-sensing element of the transducer and the structure) should be small enough to minimize extraneous inertial signals related to such mass (see 8.4).

5.3.3 The stiffness of the force transducer and its components should be selected so that no resonances involving this stiffness occur within the frequency range of interest. As a compromise, the effect of such resonances on the signal from the force-sensing element should be compensated for by suitable signal processing.

5.3.4 The static preload shall be adequate for the range of excitation forces required by the test application. Transducers with built-in preload are available to minimize this problem.

5.4 Requirements for impedance heads and attachments to the structure under test

5.4.1 A device which combines an accelerometer and a force transducer in one assembly for the purpose of mobility measurement is called “impedance head”. The design is a compromise based on the characteristics outlined in 5.2 and 5.3. However, certain characteristics of prime importance, given in 5.4.2 to 5.4.5, should be borne in mind.

5.4.2 The total compliance between the structure and the internal accelerometer should be small, because a large compliance causes errors in acceleration measurements.

NOTE: The total compliance is the sum of the attachment compliance and the internal compliance of the impedance head. The attachment compliance includes the localized “die effect” compliance of the structure under test. The total compliance can be measured as described in Annex C.

5.4.3 The effective end mass (mass between the force-sensing element of the transducer and the structure) should be small in relation to the free effective mass of the structure under test.

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