BRITISH STANDARD

BS 6955-14: 1994
ISO 5347-14: 1993

Calibration of vibration and shock pick-ups —

Part 14: Method of test for resonance frequency of undamped accelerometers on a steel block

UDC 534.1:681.327.7:53.089.6

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the General Mechanical Engineering Standards Policy Committee (GME/-) to Technical Committee GME/21, upon which the following bodies were represented:

Electricity Association
Federation of Civil Engineering Contractors
Imperial College of Science and Technology
Institute of Sound and Vibration Research
Institution of Mechanical Engineers
Lloyd's Register of Shipping
Ministry of Defence
Open University
Power Generation Contractors Association [PGCA (BEAMA Ltd.)]
Railway Industry Association of Great Britain
Sira Test and Certification Ltd.
Society of British Aerospace Companies Limited

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

British Coal Corporation
Health and Safety Executive
Society of Environmental Engineers
University of Cranfield

This British Standard, having been prepared under the direction of the General Mechanical Engineering Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 March 1994

The following BSI references relate to the work on this standard:
Committee reference GME/21
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Amendments issued since publication

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Contents

National foreword

This Part of BS 6955 has been prepared under the direction of the General Mechanical Engineering Standards Policy Committee. It is identical with 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*, published by the International Organization for Standardization (ISO).

ISO 5347-14 was prepared by Technical Committee ISO/TC 108, Mechanical vibration and shock, in which the UK played an active part.

BS 6955 consists of the following Parts, which are identical with the corresponding Parts of ISO 5347:

— *Part 0: Guide to basic principles*;

— *Part 1: Methods for primary vibration calibration by laser interferometry*;

— *Part 2: Method for primary shock calibration by light cutting*;

— *Part 3: Method for secondary vibration calibration*;

— *Part 4: Method for secondary shock calibration*;

— *Part 5: Method for calibration by Earth's gravitation*;

— *Part 6: Method for primary vibration calibration at low frequencies*;

— *Part 7: Methods for primary calibration by centrifuge*;

— *Part 8: Method for primary calibration by dual centrifuge*;

— *Part 9: Method for secondary vibration calibration by comparison of phase angles*;

— *Part 10: Method for primary calibration by high impact shocks*;

— *Part 11: Method of test for transverse vibration sensitivity*;

— *Part 12: Method of test for transverse shock sensitivity*;

— *Part 13: Method of test for base strain sensitivity*;

— *Part 14: Method of test for resonance frequency of undamped accelerometers on a steel block*;

— *Part 15: Method of test for acoustic sensitivity*;

— *Part 16: Method of test for mounting torque sensitivity*;

— *Part 17: Method of test for fixed temperature sensitivity;*

— *Part 18: Method of test for transient temperature sensitivity*;

— *Part 19: Method of test for magnetic field sensitivity*.

Part 20 of ISO 5347 is in preparation. It is envisaged that when it is published it will be implemented as Part 20 of BS 6955.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, page 1 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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 resonance frequency testing. It is a very limited method applicable exclusively to undamped accelerometers, mainly of the piezoelectric type, having a mass of less than 30 g.

This part of ISO 5347 is applicable for a frequency range from 1 kHz to 50 kHz.

The general method for resonance frequency determination, by frequency sweeping and measuring sensitivity as a function of frequency, will be dealt with in a future part of ISO 5347.

2 Apparatus

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

2.2 *Steel block,* 28 mm × 28 mm × 28 mm, having a mass of about 180 g.

The surface of the block on which the accelerometer is to be mounted shall have a roughness value, expressed as the arithmetical mean deviation, R_a, of < 1 µm.

The flatness shall be such that the surface is contained between two parallel planes at a distance apart of 5 µm.

The drilled and tapped holes for connecting the pick-up shall have a perpendicularly tolerance to the surface of < 10 µm, i.e. the centreline of the hole shall be contained in a cylindrical zone of 10 µm diameter and a height equal to the hole depth.

2.3 *Memory frequency analyser* or *oscilloscope,* having the following characteristics:

— frequency range: 1 Hz to 50 Hz;

— uncertainty for frequency: ± 5 % of reading.

3 Method

3.1 Test procedure

Mount the accelerometer and its fixture on the steel block in accordance with the manufacturer's instructions.

Suspend the accelerometer by its cable and strike the steel block with a hammer.

Measure the lowest resonance frequency in the measuring and the transverse directions. It should be noted that it can be very difficult to distinguish between axial and transverse resonances.

The nature of the hammer surface and its dimensions may alter the results. More reliable results are obtainable by using a type of hammer instrumented by an accelerometer and a memory FFT analyser, and thus obtaining the results as a transfer function.

3.2 Expression of results

The results shall be reported as mounted resonance frequency, in kilohertz, on a 180 g steel block.

For frequencies above 50 kHz, the manufacturer shall specify the size, mass, material and first resonance frequency of the block.

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