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Specification for

Artificial mastoids for the calibration of bone vibrators used in hearing aids and audiometers

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Electronic Equipment Standards Policy Committee (EEL/-) to Technical Committee EEL/24, upon which the following bodies were represented:

- British Medical Association
- British Radio and Electronic Equipment Manufacturers' Association
- British Society of Audiology
- British Telecommunications plc
- Confederation of British Industry
- Department of Health
- Department of Trade and Industry (National Physical Laboratory)
- Health and Safety Executive
- Institute of Acoustics
- Institute of Sound and Vibration Research
- Institution of Electrical Engineers
- Medical Research Council
- Ministry of Defence
- National Health Service
- Royal Aeronautical Society
- Royal National Institute for the Deaf
- Society of Environmental Engineers
- Society of Hearing Aid Audiologists Ltd
- University of Exeter
- Coopted Members

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National foreword

This British Standard has been prepared under the direction of the Electronic Equipment Standards Policy Committee and is identical with IEC 373:1990 “*Mechanical coupler for measurements on bone vibrators*”, published by the International Electrotechnical Commission (IEC). It supersedes BS 4009:1975 which is withdrawn.

Cross-references

International Standard	Corresponding British Standard
IEC 118-9:1985	BS 6083 <i>Hearing aids</i> Part 9:1986 <i>Methods for measurement of characteristics of hearing aids with bone vibrator output</i> (Identical)
IEC 645:1979	BS 5966:1980 <i>Specification for audiometers</i> (Identical)
ISO 266:1975	BS 3593:1963 <i>Recommendations on preferred frequencies for acoustical measurements</i> (Technically equivalent)
ISO 7566:1987	BS 6950:1988 <i>Specification for a standard reference zero for the calibration of pure tone bone conduction audiometers</i> (Identical)

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover 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

This standard specifies requirements for mechanical couplers used for calibrating bone-conduction audiometers and for making measurements on bone vibrators and bone-conduction hearing aids in the frequency range from 125 Hz to 8 000 Hz inclusive.

2 Objects

2.1 Audiometry

The purpose of this standard, as applied to audiometry, is to provide a means of calibrating bone vibrators of the types used in bone-conduction audiometry by specifying a standardized mechanical impedance with which to load the vibrator and a device for measuring the alternating force produced. Reference equivalent threshold force levels corresponding to the normal threshold of hearing are specified by ISO 7566. For this application the bone vibrator is required to have a plane circular tip area of $175 \pm 25 \text{ mm}^2$ and to be applied to the mechanical coupler with a static force of $5,4 \pm 0,5 \text{ N}$, as specified in IEC 645. The mechanical coupler is also intended for other measurements on bone vibrators for audiometers viz. frequency response, unwanted sound radiation, harmonic distortion, etc.

2.2 Hearing aids

The purpose of this standard, as applied to hearing aids, is to provide a means of measuring the electro-mechanical characteristics (sensitivity, frequency response, harmonic distortion, etc.) of bone vibrators used in hearing aids, or the acousto-mechanical characteristics of complete hearing aids of the bone conduction type, when dynamically loaded by a specified mechanical impedance and applied with a static force in the range 1,7 N to 4 N.

3 Definitions

For the purpose of this standard the following terms apply:

3.1

bone vibrator

an electro-mechanical transducer intended to produce the sensation of hearing by vibrating the cranial bones

3.2

mechanical coupler

a device designed to present a specified mechanical impedance to a bone vibrator applied with a specified static force, and equipped with a mechano-electric transducer to determine the alternating force level at the surface of contact between vibrator and mechanical coupler

3.3

alternating force level (force level)

twenty times the logarithm to the base 10 of the ratio of the r.m.s. value of the force transmitting the vibration to the reference value of one micronewton ($1 \mu\text{N}$). Unit: dB

3.4

mechanical impedance of a sinusoidally vibrating object at a specified frequency. The complex quotient of the alternating force transmitting the vibration to the component of velocity of the object in the direction of the force. Unit: Nsm^{-1}

3.5

mechanical impedance level

twenty times the logarithm to the base 10 of the ratio of the absolute value (modulus) of the mechanical impedance to the reference value of 1 Nsm^{-1} . Unit: dB

3.6

mechanical resistance

the real part of the (complex) mechanical impedance

3.7

mechanical reactance

the imaginary part of the (complex) mechanical impedance

NOTE By convention, mechanical reactance due to inertia is assigned a positive sign.

3.8

sensitivity level

twenty times the logarithm to the base 10 of the ratio of the sensitivity of a mechanical coupler, defined as electrical output in volts for an applied alternating force in newtons, to the reference sensitivity of 1 V/N . Unit: dB