

Specification for

Instruments for the measurement of aural acoustic impedance/admittance

The European Standard EN 61027:1993 has the status of a
British Standard

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Contents

	Page
Cooperating organizations	Inside front cover
National foreword	ii
Foreword	2
Text of EN 61027	3
National annex NA (informative) Committees responsible	Inside back cover
National annex NB (informative) Cross-references	Inside back cover

National foreword

This British Standard has been prepared under the direction of the Electronic Equipment Standards Policy Committee and is the English language version of EN 61027:1993 *Instruments for the measurement of aural acoustic impedance/admittance*, published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC 1027:1991 published by the International Electrotechnical Commission (IEC).

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 16, 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.

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Descriptors: Electromedical devices, audiology, measurement, instruments for the measurement, impedance, probe, equipment specifications, calibration

English version

Instruments for the measurement of aural acoustic impedance/admittance

(IEC 1027:1991)

Impédancemètres ou admittancemètres utilisés
en audiologie
(CEI 1027:1991)

Geräte für die Messung der akustischen
Impedanz/Admittanz des Ohres
(IEC 1027:1991)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 1027:1991 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as European Standard.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 61027 on 9 December 1992.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1993-12-01
- latest date of withdrawal of conflicting national standards (dow) 1993-12-01

Annexes designated “normative” are part of the body of the standard. In this standard, Annex ZA is normative.

Contents

	Page
Foreword	2
Introduction	3
1 Scope	3
2 Object	3
3 Definitions	3
4 Characteristics to be specified by the manufacturer	5
5 Specifications for aural impedance/admittance instruments	6
6 Methods of test of performance	10
7 Calibration cavities	12
8 General requirements	12
9 Symbols, forms and formats for acoustic impedance/admittance data	13
Annex A (informative) Recommended Units and terms	15
Annex ZA (normative) Other international publications quoted in this standard with the references of the relevant European publications	16
Figure 1 — Overall temporal characteristics measured in a test cavity in response to step-wise input changes, starting at T_o	11
Table 1 — Mandatory functions for aural impedance/admittance instruments	7
Table 2 — Pure tone harmonic distortion	9
Table 3 — Minimum hearing level ranges or sound pressure level ranges for different stimuli	9

Introduction

Developments in the field of diagnostic hearing measurement have resulted in a number of instruments designed to evaluate the acoustic impedance/admittance of the human ear by means of acoustic probe signals having different frequencies and temporal characteristics. The practical use of such instruments concerns to a large extent the changes in acoustic impedance/admittance caused either by varying the air pressure in the external acoustic meatus or by activating the middle ear muscle reflex.

1 Scope

This standard covers instruments designed primarily for the measurement of modulus of acoustic impedance/admittance in the human external acoustic meatus using a probe tone of 226 Hz. It is recognized that other probe signals may also be used. The standard defines the characteristics to be specified by the manufacturer, lays down performance specifications for four types of instrument and specifies the facilities to be provided on three of these types. Methods of test to be used for approval testing rather than routine calibration are also specified.

2 Object

The purpose of this standard is to ensure that measurements made under comparable test conditions with different instruments complying with the standard will be consistent. The standard is not intended to restrict development or incorporation of new features, nor to discourage innovative approaches.

3 Definitions

For the purpose of this standard the following definitions shall apply.

NOTE The units in this standard conform to the International System of Units (SI). However, for audiological measurements test results have traditionally often been reported in other units. To provide information on the conversion from such units to SI units, Annex A has been compiled.

3.1

aural impedance/admittance

throughout this standard the term aural impedance/admittance will be employed as a general term covering all aspects of aural acoustic impedance/admittance, except where reference is made to specific derivatives

3.2

acoustic impedance

at a given surface, the complex ratio of sound pressure averaged over the surface to volume velocity through it. The symbol is Z_a and the unit is the pascal second per metre to the third power ($\text{Pa} \cdot \text{s}/\text{m}^3$). The quantity usually measured is the modulus

3.3

acoustic resistance

the real component of complex acoustic impedance. The symbol is R_a and the unit is the pascal second per metre to the third power ($\text{Pa} \cdot \text{s}/\text{m}^3$)

3.4

acoustic reactance

the imaginary component of complex acoustic impedance. The symbol is X_a and the unit is the pascal second per metre to the third power ($\text{Pa} \cdot \text{s}/\text{m}^3$)

3.5

acoustic admittance

at a given surface, the reciprocal of acoustic impedance at the same surface. The symbol is Y_a and the unit is the metre to the third power per pascal second ($\text{m}^3/\text{Pa} \cdot \text{s}$). Thus, the acoustic admittance at a given surface is the complex ratio of the volume velocity through the surface to the sound pressure averaged over the surface. The quantity usually measured is the modulus

3.6

acoustic conductance

the real component of complex acoustic admittance. The symbol is G_a and the unit is the metre to the third power per pascal second ($\text{m}^3/\text{Pa} \cdot \text{s}$)

3.7

acoustic susceptance

the imaginary component of complex acoustic admittance. The symbol is B_a and the unit is the metre to the third power per pascal second ($\text{m}^3/\text{Pa} \cdot \text{s}$)

3.8

acoustic inertance

the ratio of the driving sound pressure to the resulting rate of change in volume velocity. The symbol is M_a and the unit is the pascal second to the second power per metre to the third power ($\text{Pa} \cdot \text{s}^2/\text{m}^3$)

3.9

acoustic compliance

the ratio of volume displacement to sound pressure. The symbol is C_a and the unit is the metre to the third power per pascal (m^3/Pa)