SLOVENSKI STANDARD

SIST HD 305 S1:2004

julij 2004

IEC reference coupler for the measurement of hearing aids using earphones coupled to the ear by means of ear inserts

ICS 11.180.15

Referenčna številka
SIST HD 305 S1:2004(en)

C E N E L E C

DATE OF ISSUE OF THE COVER SHEET : 1977-05-15

EUROPEAN COMMITTEE FOR ELECTROTECHNICAL STANDARDIZATION

CENELEC HARMONIZATION DOCUMENT

HD 305

IEC 126 (1973 - 2nd edition)

IEC reference coupler for the measurement of hearing aids using earphones coupled to the ear by means of ear inserts

This Harmonization Document was adopted by CENELEC on 1975-10-08.

The National Electrotechnical Committees, members of CENELEC, in

A : Austria
B : Belgium
CH : Switzerland
D : Germany
DK : Denmark
F : France
I : Italy
IRL : Ireland
N : Norway
NL : Netherlands
P : Portugal
S : Sweden
SF : Finland
UK : United Kingdom

Reference of the relevant National Harmonized Standards overleaf

are obliged, in accordance with the CENELEC Internal Regulations, to implement this Harmonization Document in their respective country by

- Issuing harmonized national standard(s) and/or
- Withdrawing conflicting national standard(s)

Latest date of implementation : 1977-01-01

Clas. No 97.6

NORME INTERNATIONALE
INTERNATIONAL STANDARD

CEI
IEC
126

Deuxième édition
Second edition
1973

Coupleur de référence de la CEI pour la mesure des appareils de correction auditive utilisant des écouteurs couplés à l'oreille par des embouts

IEC reference coupler for the measurement of hearing aids using earphones coupled to the ear by means of ear inserts

Bureau Central de la Commission Electrotechnique Internationale 3, rue de Varembé Genève, Suisse

Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

CODE PRIX
PRICE CODE J

Pour prix, voir catalogue en vigueur
For price, see current catalogue

CONTENTS

Page

Foreword 5

Preface 5

Clause

1. Scope and object 7

2. Definition 7

3. Construction 7

3.1 General 7

3.2 The cavity 7

3.3 Calibrated pressure microphone 9

3.4 Connection of the hearing aid to the coupler 9

Figure 1 13

Figure 2 15

Figure 3 17

INTERNATIONAL ELECTROTECHNICAL COMMISSION

IEC REFERENCE COUPLER FOR THE MEASUREMENT OF HEARING AIDS USING EARPHONES COUPLED TO THE EAR BY MEANS OF EAR INSERTS

FOREWORD

1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.

3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendations and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

PREFACE TO THE FIRST EDITION (1961)

The first draft of this recommendation was prepared by the Danish National Committee and discussed in part by IEC Technical Committee No. 29, Electroacoustics, at a meeting held in Philadelphia in 1954. It was followed by three further drafts, which were respectively discussed at meetings held in Berne, September 1955, Paris, February 1957, and Stockholm, July 1958.

Following the Stockholm meeting, a final draft was submitted to the National Committees in August 1959, for approval under the Six Months' Rule.

The following countries voted explicitly in favour of publication:

Austria
Belgium
Czechoslovakia
Denmark
Finland
France
Germany
Hungary
India
Italy
Japan
Netherlands
Norway
Poland
Sweden
Switzerland
Union of Soviet Socialist Republics
United Kingdom
United States of America

PREFACE

This recommendation has been prepared by Sub-Committee 29C, Measuring Devices, of IEC Technical Committee No. 29, Electro-acoustics.

Since the issue of the first edition in 1961, it appeared necessary to describe, in a more precise manner, the coupling of different types of hearings aids to the IEC coupler. Consequently, a draft was prepared for an amendment to the first edition. As a result of the meeting held in London in April 1971, a final draft, document 29C(Central Office)13, was submitted to National Committees for approval under the Six Months' Rule in October 1971.

The following countries voted explicitly in favour of the publication of the second edition:

Australia
Belgium
Canada
Czechoslovakia
Denmark
Finland
France
Germany
Israel
Japan
Netherlands
Norway
Romania
South Africa (Republic of)
Sweden
Switzerland
Turkey
Union of Soviet Socialist Republics
United Kingdom
United States of America

IEC REFERENCE COUPLER FOR THE MEASUREMENT OF HEARING AIDS USING EARPHONES COUPLED TO THE EAR BY MEANS OF EAR INSERTS

1. Scope and object

The object of this recommendation is to describe a coupler for loading the earphone with a specified acoustic impedance when determining the physical performance characteristics, in the frequency range 200 Hz to 5000 Hz, of air-conduction hearing aids using earphones coupled to the ear by means of ear inserts, e.g. ear moulds or similar devices. The coupler described is a development of an earlier 2 cm^3 coupler.

The use of this coupler does not allow the actual performance of a hearing aid on a person to be obtained; however, the IEC recommends its use as a simple and ready means for the exchange of specifications and of physical data on hearing aids.

2. Definition

2.1 *Coupler*

A coupler is a cavity of predetermined shape and volume, which is used for the testing of earphones in conjunction with a calibrated microphone adapted to measure the pressure developed within the cavity (see IEC Publication 50 (08), International Electrotechnical Vocabulary, Electroacoustics).

3. Construction

3.1 *General*

The coupler shall be constructed of hard, non-porous and non-magnetic material and have a mass of at least 100 g, including the microphone. The coupler consists essentially of a cylindrical cavity whose reactance is that of a volume of 2 cm^3. The base of the cylindrical cavity usually consists of the diaphragm of a microphone of high mechanical impedance, by means of which the sound pressure level in the coupler is measured.

The external diameter of the coupler should be kept as small as possible in order to minimize diffractional errors which might affect the measurements when the coupler has to be placed in a free sound field. The wall thickness, however, should not be less than 2 mm.

3.2 *The cavity*

The volume of the cavity shall have an effective value of 2 cm^3 $\pm$ 1 %: the dimensions, therefore, shall be corrected for any front cavity associated with the microphone, for the finite diaphragm impedance, the protective grid, etc. The correction may conveniently be made by adjusting the height of the cavity.

The diameter of the cylindrical cavity shall be not less than 18.0 mm and not greater than 21.0 mm.

A fine capillary tube, partially filled along its total length by a wire, shall connect the cavity to the external air in order to equalize the static pressure. This tube shall not affect the modulus of the impedance of the cavity by more than 1 % in the frequency range 200 Hz to 5 000 Hz.

3.3 *Calibrated pressure microphone*

The diameter of the free portion of the diaphragm of the calibrated pressure microphone shall not exceed the diameter of the cylindrical cavity. Within the frequency range 200 Hz to 5 000 Hz, the magnitude of the mechanical impedance of the diaphragm shall be greater than 10 times the magnitude of the mechanical impedance of a 2 cm^3 cavity as seen from the diaphragm. If intermediate between 10 and 100 times this cavity impedance, the mechanical impedance of the diaphragm shall correspond to that of a pure stiffnes in the above frequency range.

If it is necessary to use a microphone for which the diameter of the free part of the diaphragm is less than the diameter of the cavity of the coupler, the axes of the microphone and the cylindrical cavity shall coincide. If a probe tube microphone is employed, the base of the cavity shall be rigid, and the aperture of the probe shall be placed on the axis of the cylindrical cavity.

The general construction of the coupler and mounting of the microphone shall be such that the response of the microphone is not affected by spurious vibrations or by sound transmitted along abnormal paths.

3.4 *Connection of the hearing aid to the coupler*

3.4.1 *Hearing aid with insert earphone*

Where possible, the ear insert shall be replaced by an ear mould substitute consisting essentially of a rigid tube, coaxial with the cavity, of length 18 ±0.18 mm and internal diameter 3 ±0.03 mm representing the tubular portion of an average ear mould.

The connection between the nub of the earphone and the ear mould substitute shall be made airtight by using a suitable wax or by some other sealing device, care being taken to avoid the inclusion of any extraneous cavities which might affect the performance of the earphone.

The principal features of an example of the IEC reference coupler with ear mould substitute and showing the connection of the earphone with the ear mould substitute are indicated in Figure 1, page 13. Other forms than the one illustrated may be used, provided that they conform to the above specifications.

If it is inappropriate to disconnect the ear insert from the receiver, the ear insert shall be connected directly to the entrance of the cylindrical cavity and shall be coaxial with it. A suitable wax or other device shall be used to ensure an airtight seal, care being taken to avoid the inclusion of any extraneous cavities which might affect the performance of the earphone.

3.4.2 *Hearing aids of the behind-the-ear type and hearing spectacles*

The hearing aid with its acoustic outlet attachment (e.g. elbow and flexible connecting tube of behind-the-ear instruments or nub and flexible connecting tube of hearing spectacles), shall be connected to the 2 cm^3 coupler with ear mould substitute as described in Sub-clause 3.4.1 by means of a coupling device of rigid material, having the same internal diameter as the nominal diameter of the end of the acoustic outlet attachment ±2 % and a length of 5 ±0.1 mm. The connection between the coupling device and the ear mould substitute shall be made airtight by using a suitable