

INTERNATIONAL
RECOMMENDATION

OIML R 122
Annex C

Edition 1999 (E)

Equipment for speech audiometry
Annex C – Test report format

Appareils pour l'audiométrie vocale
Annexe C – Format du rapport d'essai



Contents

Foreword	3
Explanatory notes	4
General information concerning the pattern	5
Summary of the tests	6
C.1 Electrical safety	7
C.2 Talk-back system	7
C.3 Warm-up time	7
C.4 Sensitivity to temperature and humidity	7
C.5 Supply voltage	7
C.6 Electrostatic and electromagnetic interference	7
C.7 Unwanted sound	8
C.8 External signal input	9
C.9 Signal level indicator	9
C.10 Level range	10
C.11 Audiometer frequency response	11
C.12 Level accuracy	14
C.13 Level control	15
C.14 Harmonic distortion	16
C.15 Interrupter switch	18
C.16 Microphone frequency response	18
C.17 Level range (Masking sound)*	19
C.18 Frequency spectrum (Masking sound)*	19
C.19 Level accuracy (Masking sound)*	21
C.20 Level control (Masking sound)*	21
C.21 Earphones	21
C.22 Bone vibrator	22
C.23 Monitor earphone or loudspeaker	22
C.24 Inscriptions and marks	22
C.25 Instruction manual	23
References	24

* Note: In OIML R 122 (Edition 1996) the term “masking noise” is used for “masking sound”.

Foreword

The International Organization of Legal Metrology (OIML) is a worldwide, intergovernmental organization whose primary aim is to harmonize the regulations and metrological controls applied by the national metrological services, or related organizations, of its Member States.

The two main categories of OIML publications are:

- **International Recommendations (OIML R)**, which are model regulations that establish the metrological characteristics required of certain measuring instruments and which specify methods and equipment for checking their conformity; the OIML Member States shall implement these Recommendations to the greatest possible extent;
- **International Documents (OIML D)**, which are informative in nature and intended to improve the work of the metrological services.

OIML Draft Recommendations and Documents are developed by technical committees or subcommittees which are formed by the Member States. Certain international and regional institutions also participate on a consultation basis.

Cooperative agreements are established between OIML and certain institutions, such as ISO and IEC, with the objective

of avoiding contradictory requirements; consequently, manufacturers and users of measuring instruments, test laboratories, etc. may apply simultaneously OIML publications and those of other institutions.

International Recommendations and International Documents are published in French (F) and English (E) and are subject to periodic revision.

This publication - reference OIML R 122 Annex C, edition 1999 (E) - was developed by the OIML technical committee TC 13 *Measuring instruments for acoustics and vibration*. It was approved for publication by the International Committee of Legal Metrology in 1999.

OIML publications may be obtained from the Organization's headquarters:

Bureau International de Métrologie Légale
11, rue Turgot - 75009 Paris - France
Telephone: 33 (0)1 48 78 12 82 and 42 85 27 11
Fax: 33 (0)1 42 82 17 27
E-mail: biml@oiml.org
Internet: <http://www.oiml.org>

ANNEX C to OIML R 122

Test report format

(Mandatory for application within the *OIML Certificate System for Measuring Instruments*)

Explanatory notes

This *Test report format*, which is informative with regard to the implementation of OIML Recommendation R 122 in national regulations, presents a standardized format for the results of the various tests and examinations to which a pattern of a speech audiometer shall be submitted with a view to its approval. The tests are listed in Annex A of International Recommendation OIML R 122.

It is recommended that all metrology services or laboratories evaluating patterns of equipment for speech audiometry according to OIML R 122 or to national or regional regulations based on OIML R 122 use this *Test report format*, directly or after translation into a language other than English or French.

It is also recommended that this *Test report format* in English or in French (or in both languages) be transmitted by the country performing these tests to the relevant authorities of another country, under bi- or multi-lateral cooperation agreements. In the framework of the *OIML Certificate System for Measuring Instruments*, use of the *Test report format* is mandatory.

This *Test report format* is intended as a general document for all patterns of equipment for speech audiometry which claim to meet class A, A-E or class B, B-E requirements as described in any appropriate clauses of IEC 60645-2. This may mean that some items in the general *Test report format* are not relevant or cannot be completed, purely due to the design of a particular piece of equipment. Where this is the case “n/a” (i.e. not applicable) should be entered at the appropriate point in the report. Where possible, such items have been specifically identified in the following text.

Meaning of symbols and expressions used in the Tables:

+ = Approved

– = Not approved

n/a = Not applicable

mpe = Maximum permissible error as specified in clause 2 of OIML R 122; \pm if not indicated otherwise

The *Summary of the tests*, the Tables on *Inscriptions and markings* and the *Instruction manual* shall be completed according to the following example:

+	–	
×		Approved
	×	Not approved
n/a	n/a	Not applicable

“Date” in the test reports refers to the date on which the test was performed.

“Annex F to OIML R 104” in the text refers to the 1997 edition of Annex F to OIML R 104 *Pure-tone audiometers*.

Note concerning page numbering in this publication

In addition to the sequential numbering at the bottom of each page, a space has been left at the top of each page (starting on page 5) for numbering the pages of reports established following this model. In particular, some tests shall be repeated several times, each test being reported individually on a separate page following the relevant format. For a given report, it is advisable to complete the sequential numbering of each page by indicating the total number of pages in the report.

General information concerning the pattern

Application no.:
 Date:
 Manufacturer:
 Applicant:

Equipment for speech audiometry:

Model: Serial no.:

Type (class) of audiometer (claimed by manufacturer):

Model designation of transducers (as applicable):

Earphone(s):	Manufacturer:	Model:	Serial no.:
	Manufacturer:	Model:	Serial no.:
Insert earphone:	Manufacturer:	Model:	Serial no.:
Loudspeaker(s):	Manufacturer:	Model:	Serial no.:
	Manufacturer:	Model:	Serial no.:
Bone vibrator:	Manufacturer:	Model:	Serial no.:

Type(s) of acoustic couplers/ear simulators used for the acoustic tests:

.....

Accessories (if applicable):

Talk-back system:

Experimenter microphone:	Manufacturer:	Model:	Serial no.:
Patient microphone:	Manufacturer:	Model:	Serial no.:
Monitor earphone:	Manufacturer:	Model:	Serial no.:
Monitor loudspeaker:	Manufacturer:	Model:	Serial no.:
Speech replay system:	Manufacturer:	Model:	Serial no.:
External amplifier:	Manufacturer:	Model:	Serial no.:

Batteries (if applicable): Type: Nominal voltage: V Required number:

Note: The specifications are given by the manufacturer. If missing or deviating values are defined by the testing laboratory as a result of the tests performed, these values are to be marked in an appropriate manner.

Summary of the tests

Application no.:

Date:

No.	Test	+	-	Remarks	Page
C.1	Electrical safety				7
C.2	Talk-back system				7
C.3	Warm-up time				7
C.4	Sensitivity to temperature and humidity				7
C.5	Supply voltage				7
C.6	Electrostatic and electromagnetic interference			See <i>Note 2</i>	7
C.7	Unwanted sound				8
C.8	External signal input				9
C.9	Signal level indicator				9
C.10	Level range				10
C.11	Audiometer frequency response				11
C.12	Level accuracy				14
C.13	Level control				15
C.14	Harmonic distortion				16
C.15	Interrupter switch				18
C.16	Microphone frequency response				18
C.17	Level range (Masking sound)				19
C.18	Frequency spectrum (Masking sound)				19
C.19	Level accuracy (Masking sound)				21
C.20	Level control (Masking sound)				21
C.21	Earphones				21
C.22	Bone vibrator				22
C.23	Monitor earphone or loudspeaker				22
C.24	Inscriptions and marks				22
C.25	Instruction manual				23

Note 1: In the “Remarks” column, insertion of an “x” indicates that reference is made to a remark at the end of the corresponding paragraph on one of the following pages.

Note 2: No internationally agreed test procedures exist for the testing of electromagnetic susceptibility. It is recommended, however, to include tests during pattern evaluation. Tests are based on the procedures specified by the test laboratory or furnished by the manufacturer and the results are provided in the test report for information only (see C.6).

C.1 Electrical safety

The test refers to IEC 60645-1, subclause 5.1. Use the test report format given in clause F.1 of Annex F to OIML Recommendation R 104 *Pure-tone audiometers*.

C.2 Talk-back system

The test refers to IEC 60645-2, clause 15.

Does the speech audiometer contain a talk-back system (types A and A-E only)?

yes no

IEC 60645-2 gives no specification for the performance of the talk-back system facility, stating only that “it should have sufficiently good reproducing qualities to enable a wide range of speech level to be clearly heard”. The answer to the following question is therefore purely subjective.

Has the talk-back system sufficiently good reproducing qualities to enable a wide range of speech level to be clearly heard?

yes no

Remarks:

.....

C.3 Warm-up time

The test refers to IEC 60645-1, subclause 5.3. Use the test report format given in clause F.3 of Annex F to OIML R 104 *Pure-tone audiometers*.

C.4 Sensitivity to temperature and humidity

The test refers to IEC 60645-1, subclauses 5.4.1 and 5.4.4. Use the test report format given in clause F.4 of Annex F to OIML R 104 *Pure-tone audiometers*.

C.5 Supply voltage

The test refers to IEC 60645-1, subclauses 5.4.2, 5.4.3, 5.4.4 and 10.2.b. Use the test report format given in clause F.5 of Annex F to OIML R 104 *Pure-tone audiometers*.

C.6 Electrostatic and electromagnetic interference

The test refers to IEC 60645-1, subclause 5.4.5.

IEC 60645-1 does not specify, and it is not yet possible in general to specify, a method of evaluating the effects of these fields, applicable to all types of audiometers. Until a product specific standard becomes available giving these details, the testing laboratory should describe the method employed, and state the results. The test results are for information only (see *Note 2* under the table “Summary of the tests”).

Use the test report format given in clause F.6 of Annex F to OIML R 104 *Pure-tone audiometers*.

C.7 Unwanted sound

The test refers to IEC 60645-1, subclause 5.5 (except 5.5.3) and to IEC 60645-2, clause 12.

Environmental conditions:

Temperature: °C Relative humidity: % Ambient pressure: kPa

For subclause 5.5 of IEC 60645-1 use the test report formats given in clause F.7.a of Annex F to OIML R 104 *Pure-tone audiometers*.

Requirements: Output level control at 70 dB, calibration signal set to reference indication, voltage level at transducer input terminal measured (see subclause 5.5 of IEC 60645-1) with frequency weighting A, level in playing mode, L_1 , at least 45 dB higher than the corresponding voltage level in pause mode, L_0 .

Right earphone

Output level control dB	Playing mode: L_1 (ref.: 1 V) dB	Pause mode: L_0 (ref.: 1 V) dB	Difference $L_1 - L_0$ dB	Requirement fulfilled? + -
70				

Left earphone

Output level control dB	Playing mode: L_1 (ref.: 1 V) dB	Pause mode: L_0 (ref.: 1 V) dB	Difference $L_1 - L_0$ dB	Requirement fulfilled? + -
70				

Loudspeaker

Output level control dB	Playing mode: L_1 (ref.: 1 V) dB	Pause mode: L_0 (ref.: 1 V) dB	Difference $L_1 - L_0$ dB	Requirement fulfilled? + -
70				

Where the replay system is not supplied with the speech audiometer:

Has the manufacturer specified how conformity with the requirements given above is to be achieved?

yes no

Remarks:

.....

.....

.....

.....

C.8 External signal input

The test refers to IEC 60645-1, subclauses 6.2 and 7.2. Use the test report format given in clause F.8 of Annex F to OIML R 104 *Pure-tone audiometers*.

C.9 Signal level indicator

The test refers to IEC 60645-2, clause 7.

Is a signal level indicator provided?

yes no

Does this level indicator have a reference indication towards the maximum of the scale?

yes no

Is this level indicator connected to a point in the circuit before the output level control?

yes no

Is it possible to adjust the gain of the amplifier to compensate for a range of at least 20 dB in the level of input signals?

yes no

Is it possible to adjust the level of the calibration signal to the reference indication with an uncertainty of not more than 1 dB?

yes no

Response time characteristic of the level indicator:

Requirements: The level indicator shall have the response characteristic of a VU meter as specified in IEC 60268-17, clause 8. Therefore the rise time until the level indication has reached 99 % of the reference indication shall be $0.3 \text{ s} \pm 10 \%$.

Rise time s	mpe	Requirement fulfilled? + -
	$\pm 10 \%$	

The test laboratory shall report the characteristics of the test signal used.

Remarks:

.....

.....

.....

.....

C.10 Level range

The test refers to IEC 60645-2, subclauses 8.2 and 8.3.

Environmental conditions:

Temperature: °C Relative humidity: % Ambient pressure: kPa

A. Loudspeaker output

Requirements: The output level control shall cover at least a range from – 10 dB to 80 dB relative to its reference position.

Manufacturer’s specified output level range:

Provided minimum output level relative to its reference position dB	Provided maximum output level relative to its reference position dB	Requirement fulfilled? + –

B. Earphone output

Requirements: The output level control shall cover at least a range from – 10 dB to 100 dB relative to its reference position.

Manufacturer’s specified output level range:

Provided minimum output level relative to its reference position dB	Provided maximum output level relative to its reference position dB	Requirement fulfilled? + –

The test laboratory shall report the characteristics of the test signal used under A. and B. above.

Remarks:

.....

.....

.....

.....

C. Bone vibrator output

Requirements: Output level range to be specified by the manufacturer in terms of force level or hearing level for specified speech material.

Manufacturer’s specified output level range:

Provided minimum output level dB	Provided maximum output level dB	Manufacturer’s specifications fulfilled? + –

The test laboratory shall report the speech material specified by the manufacturer.

Remarks:

.....

.....

.....

.....

C.11 Audiometer frequency response

The test refers to IEC 60645-2, subclause 10.1.

Environmental conditions:

Temperature: °C Relative humidity: % Ambient pressure: kPa

A. Loudspeaker output

Requirements: The audiometer frequency response is tested under reference conditions (see IEC 60645-2, clause 6) by means of 1/3 octave bands of noise in a free sound field (see IEC 60645-2, subclause 10.1.1). The level is adjusted in such a way as to provide the reference indication of the signal level indicator. The output level control of the audiometer is set to 70 dB. The output sound pressure level, $L_F(f)$, generated by the loudspeaker shall not differ from the average sound pressure level, L_m , of the test signals in the frequency range 250 Hz to 4 000 Hz by more than the mpe given below.

Does the audiometer have an integral means of replaying analogue-recorded speech material (see mpe in the Table)?

yes no

Loudspeaker output sound pressure level, $L_F(f)$:

Loudspeaker: Manufacturer: Model: Serial no.:

Audiometer channel: left right

Frequency Hz	$L_F(f)$ (ref.: 20 µPa) dB	Difference $L_F(f) - L_m$ dB	mpe	Requirement fulfilled? + -
125 160 200			no integral replay: + 0 dB / - 10 dB integral replay: + 2 dB / - 12 dB	
250 315 400 500 630 800 1 000 1 250 1 600 2 000 2 500 3 150 4 000			no integral replay: ± 3 dB integral replay: ± 4 dB	
5 000 6 300			no integral replay: ± 5 dB integral replay: ± 7 dB	

L_m (ref.: 20 µPa) = dB

For audiometers with an external replaying device:

Has the manufacturer adequately specified how conformity with the above requirements is established?

yes no

Remarks:

.....

B. Earphone output in audiometer types A and B

Requirements: The audiometer frequency response is tested under reference conditions (see IEC 60645-2, clause 6) by means of 1/3 octave bands of noise in an acoustic coupler or ear simulator (see IEC 60645-2, subclause 10.1.1). The level is adjusted in such a way as to provide the reference indication of the signal level indicator. The output level control of the audiometer is set to 70 dB. The output sound pressure level, $L_C(f)$, generated by the earphone shall not differ from the average sound pressure level, L_m , of the test signals in the frequency range 250 Hz to 4 000 Hz by more than the mpe given below.

Does the audiometer have an integral means of replaying analogue-recorded speech material (see mpe in the Table)?

yes no

Earphone output sound pressure level, $L_C(f)$:

Earphone: Manufacturer: Model: Serial no.:

Audiometer channel: left right

Frequency Hz	$L_C(f)$ (ref.: 20 µPa) dB	Difference $L_C(f) - L_m$ dB	mpe	Requirement fulfilled? + -
125 160 200			no integral replay: + 0 dB / - 10 dB integral replay: + 2 dB / - 12 dB	
250 315 400 500 630 800 1 000 1 250 1 600 2 000 2 500 3 150 4 000			no integral replay: ± 3 dB integral replay: ± 4 dB	
5 000 6 300			no integral replay: ± 5 dB integral replay: ± 7 dB	

L_m (ref.: 20 µPa) = dB

Remarks:

.....

C. Earphone output in audiometer types A-E and B-E

Requirements: The audiometer frequency response is tested under reference conditions (see IEC 60645-2, clause 6) by means of 1/3 octave bands of noise in an acoustic coupler or ear simulator (see IEC 60645-2, subclause 10.1.1). The level is adjusted in such a way as to provide the reference indication of the signal level indicator. The output level control of the audiometer is set to 70 dB. The output sound pressure level, $L_C(f)$, generated by the earphone is then corrected to free-field levels, $L_F(f)$. $L_F(f)$ shall not differ from the average sound pressure level, L_m , of the test signals in the frequency range 250 Hz to 4 000 Hz by more than the mpe given below.

Does the audiometer have an integral means of replaying analogue-recorded speech material (see mpe in the Table)?

yes no

Earphone output sound pressure level, $L_C(f)$:

Earphone: Manufacturer: Model: Serial no.:

Audiometer channel: left right

Frequency Hz	$L_C(f)$ (ref.: 20 µPa) dB	Free-field correction ¹ dB	$L_F(f)$ (ref.: 20 µPa) dB	Difference $L_F(f) - L_m$ dB	mpe	Requirement fulfilled? + -
125 160 200					no integral replay: + 0 dB / - 10 dB integral replay: + 2 dB / - 12 dB	
250 315 400 500 630 800 1 000 1 250 1 600 2 000 2 500 3 150 4 000					no integral replay: ± 3 dB integral replay: ± 4 dB	
5 000 6 300					no integral replay: ± 5 dB integral replay: ± 7 dB	

L_m (ref.: 20 µPa) = dB

Remarks: ¹ The free-field correction is from:

D. Bone vibrator output

Requirements: The audiometer frequency response is tested in the frequency range 250 Hz to 4 000 Hz under reference conditions (see IEC 60645-2, subclause 6.5) by means of a test method specified by the manufacturer. The output force levels, $L_{FO}(f)$, generated by the bone vibrator on the mechanical coupler shall not differ from the frequency response, $L_m(f)$, specified by the manufacturer by more than the mpe which is also specified by the manufacturer.

Bone vibrator output force level, $L_{FO}(f)$:

Bone vibrator: Manufacturer: Model: Serial no.:

Audiometer channel: left right

Frequency Hz	$L_{FO}(f)$ (ref.: 1 μ N) dB	$L_m(f)$ (ref.: 1 μ N) dB	Difference $L_{FO}(f) - L_m(f)$ dB	mpe	Requirement fulfilled? + -
250					
315					
400					
500					
630					
800					
1 000					
1 250					
1 600					
2 000					
2 500					
3 150					
4 000					

Remarks:

.....

.....

.....

.....

C.12 Level accuracy

The test refers to IEC 60645-1, subclause 7.3 (2nd paragraph only) and to IEC 60645-2, clause 9.

For subclause 7.3 of IEC 60645-1 use the test report format given in clause F.14 of Annex F to OIML R 104 *Pure-tone audiometers*.

Environmental conditions:

Temperature: °C Relative humidity: % Ambient pressure: kPa

A. Air conduction

Requirements: For reference conditions (see IEC 60645-2, clause 6) and at the reference position of the output level control the calibration signal shall produce a sound pressure level (ref.: 20 µPa) of (20 ± 2) dB; (level indicator at reference point).

Loudspeaker: Manufacturer: Model: Serial no.:

Audiometer channel: left right

Earphone: Manufacturer: Model: Serial no.:

Audiometer channel: left right

Output level control dB	Loudspeaker: sound pressure level of calibration signal dB	Right earphone: sound pressure level of calibration signal dB	Left earphone: sound pressure level of calibration signal dB	Requirement fulfilled? + -

B. Bone conduction

Requirements: For reference conditions (see IEC 60645-2, clause 6), without free-field correction and at the reference position of the output level control the calibration signal shall produce a force level (ref.: 1 µN) of (55 ± 5) dB; (level indicator at reference point). In case of free-field correction the manufacturer shall state the corresponding force level.

Bone vibrator: Manufacturer: Model: Serial no.:

Audiometer channel: left right

Output level control dB	Bone vibrator: force level of calibration signal dB	Requirement fulfilled? + -

Remarks:

.....

.....

.....

.....

C.13 Level control

The test refers to IEC 60645-1, subclause 7.4.4 and to IEC 60645-2, subclause 8.1.

For subclause 7.4 of IEC 60645-1 use the test report format given in clause F.15.a of Annex F to OIML R 104 *Pure-tone audiometers*.

Has the output level control only one scale and one reference point?

yes no

Is the level control calibrated in intervals of 5 dB or less?

yes no

Is the level control clearly marked as to whether the scale refers to sound pressure level for speech (types A-E or B-E, reference position 20 dB) or hearing level for speech (types A or B, reference position 0 dB)?

yes no

Remarks:

.....

C.14 Harmonic distortion

The test refers to IEC 60645-2, clause 11.

Environmental conditions:

Temperature: °C Relative humidity: % Ambient pressure: kPa

A. Earphone output

Requirements: For reference conditions (see IEC 60645-2, clause 6) a pure tone of frequency f (250 Hz, 500 Hz, 1 000 Hz) is applied to the electrical input of the audiometer at a level of 9 dB above reference indication of the signal level indicator. At an output sound pressure level (ref.: 20 μ Pa) of 110 dB the total harmonic distortion of the signal generated by the earphone output shall not exceed 2.5 %.

Total harmonic distortion in %						Requirement fulfilled? + -
$f = 250$ Hz		$f = 500$ Hz		$f = 1\ 000$ Hz		
right earphone	left earphone	right earphone	left earphone	right earphone	left earphone	
						250 Hz: 500 Hz: 1 000 Hz:

Remarks:

.....

B. Loudspeaker output

Requirements: For reference conditions (see IEC 60645-2, subclause 6.3) a pure tone of frequency f (250 Hz, 500 Hz, 1 000 Hz) is applied to the electrical input of the audiometer at a level of 9 dB above reference indication of the signal level indicator. At an output sound pressure level (ref.: 20 μ Pa) of 80 dB the total harmonic distortion of the signal generated by the loudspeaker output shall not exceed 3 %; at an output sound pressure level (ref.: 20 μ Pa) of 100 dB the corresponding total harmonic distortion shall be less than 10 %.

Total harmonic distortion in %						Requirement fulfilled? + -
$f = 250$ Hz		$f = 500$ Hz		$f = 1\ 000$ Hz		
80 dB	100 dB	80 dB	100 dB	80 dB	100 dB	
						250 Hz 80 dB: 100 dB: 500 Hz 80 dB: 100 dB: 1 000 Hz 80 dB: 100 dB:

Remarks:

.....

.....

.....

.....

C. Bone vibrator output

Has the manufacturer stated the total harmonic distortion at the maximum output level of the bone vibrator?

yes no

Requirements: For reference conditions (see IEC 60645-2, subclause 6.4 or 6.5) a pure tone of frequency f (250 Hz, 500 Hz, 1 000 Hz) is applied to the electrical input of the audiometer at a level of 9 dB above reference indication of the signal level indicator. At the stated output level the total harmonic distortion of the signal generated by the vibrator output shall not exceed the stated value.

Total harmonic distortion in %						Requirement fulfilled? + -
$f = 250$ Hz		$f = 500$ Hz		$f = 1\ 000$ Hz		
						250 Hz: 500 Hz: 1 000 Hz:

Remarks:

.....

.....

.....

.....

C.15 Interrupter switch

The test refers to IEC 60645-1, subclause 7.6 and IEC 60645-2 clause 16.

Interrupter switches for the test and masking signals shall have the same characteristics as the tone interrupter switch specified in IEC 60645-1. Therefore, use the test report format given in clause F.16 of Annex F to OIML R 104 *Pure-tone audiometers*.

C.16 Microphone frequency response

The test refers to IEC 60645-2, subclause 10.2.

Environmental conditions:

Temperature: °C Relative humidity: % Ambient pressure: kPa

Has the manufacturer stated how the microphone is to be used (for example, angle of incidence) to meet the requirements given below?

yes no

Requirements: The microphone is tested by means of 1/3 octave bands of noise in a free sound field (see IEC 60645-2, subclause 10.2.1). The output voltage level, $L_{UM}(f)$, generated at the terminals of the microphone (or at the terminals of an appropriate compensating network) from any test signal in the frequency range 125 Hz to 8 000 Hz shall not differ from the average level at these test signals, L_m , by more than ± 3 dB.

Microphone output voltage level, L_{UM}

Frequency Hz	L_{UM} (ref.: 1 μ V) dB	Difference $L_{UM} - L_m$ dB	Requirement fulfilled? + -
125			
250			
500			
1 000			
2 000			
4 000			
8 000			

L_m (ref.: 1 μ V) = dB

Remarks:

.....

.....

.....

.....

C.17 Level range (Masking sound)

The test refers to IEC 60645-2, subclause 13.3.

Loudspeaker and earphone output:

Requirements: Relative to its reference position, the masking level control shall cover at least a range from 0 dB to 80 dB in steps of 5 dB or less.

Provided minimum hearing level of masking sound relative to its reference position	Provided maximum hearing level of masking sound relative to its reference position	Requirement fulfilled? + -

Is the step size of the masking output level 5 dB or less?

yes no

Remarks:

.....

C.18 Frequency spectrum (Masking sound)

The test refers to IEC 60645-2, subclause 13.1.

Environmental conditions:

Temperature: °C Relative humidity: % Ambient pressure: kPa

Does the sound for the masking of speech from the audiometer consist of a weighted random noise?

yes no

A. Loudspeaker output

Requirements: For reference conditions (see IEC 60645-2, clause 6) the spectrum level, $L_D(f)$, of the weighted random noise shall be measured acoustically in the sound field. The spectrum level shall be constant from 125 Hz to 1 000 Hz and shall fall at 12 dB/octave from 1 000 Hz to 6 000 Hz. This characteristic shall be met within ± 5 dB.

Frequency Hz	$L_D(f)$ dB	Difference $L_D(f) - L_D(1 \text{ kHz})$ dB	Requirement fulfilled? + -
125			
250			
500			
1 000			
2 000			
4 000			
6 000			

Remarks:

.....

.....

.....

.....

B. Uncorrected earphone output

Requirements: For reference conditions (see IEC 60645-2, clause 6) the spectrum level, $L_D(f)$, of the weighted random noise shall be measured acoustically in an acoustic coupler or ear simulator. The spectrum level shall be constant from 125 Hz to 1 000 Hz and shall fall at 12 dB/octave from 1 000 Hz to 6 000 Hz. This characteristic shall be met within ± 5 dB.

Sound pressure spectrum density level, L_D

Frequency Hz	$L_D(f)$ dB	Difference $L_D(f) - L_D(1 \text{ kHz})$ dB	Requirement fulfilled? + -
125			
250			
500			
1 000			
2 000			
4 000			
6 000			

Remarks:

.....

.....

.....

.....

C. Free-field equivalent earphone output

Requirements: For reference conditions (see IEC 60645-2, clause 6) the spectrum level, $L_D(f)$, of the weighted random noise shall be measured acoustically in an acoustic coupler or ear simulator and shall be corrected to equivalent free-field sound pressure levels, $L_{DF}(f)$. $L_{DF}(f)$ shall be constant from 125 Hz to 1 000 Hz and shall fall at 12 dB/octave from 1 000 Hz to 6 000 Hz. This characteristic shall be met within ± 5 dB.

Equivalent free-field sound pressure levels, L_{DF}

Frequency Hz	$L_D(f)$ dB	Free-field correction dB	$L_{DF}(f)$ dB	Difference $L_{DF}(f) - L_{DF}(1 \text{ kHz})$ dB	Requirement fulfilled? + -
125					
250					
500					
1 000					
2 000					
4 000					
6 000					

Remarks:

.....

.....

.....

.....

C.19 Level accuracy (Masking sound)

The test refers to IEC 60645-2, subclause 13.2.

Environmental conditions:

Temperature: °C Relative humidity: % Ambient pressure: kPa

Is the output level control clearly marked as to whether the scale refers to sound pressure level or effective masking level?

yes no

Requirements: For reference conditions (see IEC 60645-2, clause 6) and at the reference position of the masking level control (which shall be the same as in subclause 8.1 of IEC 60645-2) the masking sound shall produce a sound pressure level (ref.: 20 µPa) of 20 dB + 5/− 3 dB or be calibrated in terms of effective masking level.

Output level control dB	Measured sound pressure level (ref.: 20 µPa) dB	Requirement fulfilled? + −
If calibrated in effective masking level: 50		
If calibrated in sound pressure level: 70		

Remarks:

.....

.....

.....

.....

C.20 Level control (Masking sound)

The test refers to IEC 60645-1, subclause 7.5.3, 2nd paragraph only.

Use the test report format given in clause F.20 of Annex F to OIML R 104 *Pure-tone audiometers*.

C.21 Earphones

The test refers to IEC 60645-1, subclauses 9.1 and 10.2.j.

Use the test report format given in clause F.21 of Annex F to OIML R 104 *Pure-tone audiometers*.

C.22 Bone vibrator

The test refers to IEC 60645-1, subclauses 9.2 and 10.2.d.

Use the test report format given in clause F.22 of Annex F to OIML R 104 *Pure-tone audiometers*.

C.23 Monitor earphone or loudspeaker

The test refers to IEC 60645-2, clause 14.

Is the sound pressure level produced by the monitor earphone or loudspeaker adjustable within an adequate range (for example from 50 dB to 90 dB)?

yes no

Note: The range should be measured.

Is the sound pressure level produced by the monitor earphone or loudspeaker independent of the setting of the output level control?

yes no

Does this sound pressure level have an influence on the test signals?

influence no influence

Remarks:

.....

C.24 Inscriptions and marks

<i>Inscription or mark</i>	+	-
Manufacturer's name or trademark		
Model designation and serial number		
Type of audiometer		
Marking of transducers		
List of accessories where appropriate		
Seals or marks to protect		
Place for verification mark		

Remarks:

.....

C.25 Instruction manual

<i>Information</i>	+	-
Description of facilities and full operating instructions		
Permissible supply variation and environmental range		
Installation of the audiometer in order to minimize unwanted sound		
Headband force(s)		
Frequency response characteristics and masking effect of the masking sounds provided		
Warm-up time		
Sensitivities and nominal impedances of all input facilities		
Voltage and nominal impedances of all output facilities		
Pin assignment of all external plug connections		
Sound attenuation of earphones		
Damage temperature		
Maximum hearing level settings		
Method of calibration for broad-band masking noise		
Type of battery, battery check and replacement, expected battery lifetime		
Maintenance and calibration procedures and schedules		
Interface(s) for a computer or printer		
Reference conditions of the speech audiometer		
Coupler(s) used for calibration		
Difference between free field and coupler sensitivity levels for earphone(s)		
Difference between free field and coupler sensitivity levels for bone vibrator		
Bone vibrator output level frequency response and tolerances		
Reference calibration level		
Bone conduction output level range and harmonic distortion		
Methods of establishing conformity with IEC 60645-2		
Statement on the calibration of the speech signals		
Statement on the calibration of the masking signals		

Remarks:

.....

.....

.....

.....

References

- IEC 60268-17 *Sound system equipment. Part 17: Standard volume indicators*
Edition 1.0 - October 1990
- IEC 60645-1* *Audiometers - Part 1: Pure-tone audiometers*
Edition 1.0 - October 1992
- IEC 60645-2* *Audiometers - Part 2: Equipment for speech audiometry*
Edition 1.0 - November 1993
- OIML R 104 - Annex F *Pure-tone audiometers. Annex F: Test report format*
Edition 1997 (E)
- OIML R 122 *Equipment for speech audiometry*
Edition 1996 (E)

* *Note:* In OIML R 122 (Edition 1996) these IEC Publications are referenced by their original numbers, i.e. IEC 645-1 and IEC 645-2.