ORGANISATION INTERNATIONALE
DE MÉTROLOGIE LÉGALE

INTERNATIONAL RECOMMENDATION

# Pure-tone audiometers
# Annex F: Test report format

Audiomètres à sons purs
Annexe F: Format du rapport d'essai

OIML R 104
Annex F

Edition 1997 (E)

CONTENTS

# 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:

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This publication - reference OIML R 104, Annex F, edition 1997 (E) - was developed by the OIML technical committee TC 13 *Measuring instruments for acoustics and vibration*. It was approved for final publication by the International Committee of Legal Metrology in 1995.

# PURE-TONE AUDIOMETERS

## ANNEX F

## TEST REPORT FORMAT

Note: This annex is informative with regard to the implementation of International Recommendation OIML R 104 in national regulations; however, use of the test report format is mandatory for application of the Recommendation within the OIML Certificate System.

The "Test report format", the subject of this Annex, aims at presenting, in a standardized format, the results of the various tests to which a pattern of a pure-tone audiometer shall be submitted with a view to its approval. These tests are listed in Annex D of International Recommendation OIML R 104.

All metrology services or laboratories evaluating patterns of pure-tone audiometers according to national regulations based on R 104 are strongly advised to use this "Test report format" directly or after translation into a language other than English or French. Its direct use in English or in French, or in both languages, is even more strongly recommended whenever test results are transmitted by the country performing these tests to the approving authorities of another country, under bi- or multi-lateral cooperation agreements.

### EXPLANATORY NOTES

Key to symbols and expressions used in the following pages:

\+ = Approved

– = Not approved

mpe = Maximum permissible error as specified in clause 2 of R 104

The "Summary of tests" and the tables on "Inscriptions and marks" and the "Instruction manual" shall be completed according to this example.

| + | – | |
|---|---|---|
| × | | Approved |
| | × | Not approved |
| / | / | Not applicable |

"Date" in the test reports refers to the date of testing.

"Deviation" means the difference between the measured value and the expected value. In some cases, deviation is to be understood as the relative deviation.

GENERAL INFORMATION CONCERNING THE PATTERN

Application No:

Manufacturer:

Applicant:

Representative (name, telephone):

Model designation:

Type of audiometer (claimed by manufacturer):

Model designations of transducers:

Earphone(s):

Insert earphone:

Loudspeaker(s):

Bone vibrator:

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

Accessories:

Handswitch:

Battery (if applicable): type: .....
nominal voltage: .....
number required: .....

Remarks:

SUMMARY OF THE TESTS

| No. | Test | + | – |
|---|---|---|---|
| F.1 | Electrical safety | | |
| F.2 | Subject's response system | | |
| F.3 | Warm-up time | | |
| F.4 | Sensitivity to temperature and humidity | | |
| F.5 | Supply voltage | | |
| F.6 | Electrostatic and electromagnetic interference | | |
| F.7 | Unwanted sound | | |
| F.8 | External signal input | | |
| F.9 | Frequency and hearing level range | | |
| F.10 | Frequency accuracy | | |
| F.11 | Harmonic distortion | | |
| F.12 | Rate of frequency change | | |
| F.13 | Frequency modulation | | |
| F.14 | Level accuracy | | |
| F.15 | Hearing level control | | |
| F.16 | Tone switching | | |
| F.17 | Level range (Masking sound) | | |
| F.18 | Frequency spectrum (Masking sound) | | |
| F.19 | Level accuracy (Masking sound) | | |
| F.20 | Level control (Masking sound) | | |
| F.21 | Earphones | | |
| F.22 | Bone vibrator | | |
| F.23 | Inscriptions and marks | | |
| F.24 | Instruction manual | | |

Remarks:

F.1 Electrical safety
The test refers to IEC 645-1, clause 5.1.

Application No: Date:

Model designation: Observer:

Do the instruments conform to minimum IEC safety requirements (IEC 601-1)?

☐ yes see Certificate No .....
of testing laboratory .....

☐ no

Remarks:

F.2 Subject's response system
The test refers to IEC 645-1, clauses 5.2 and 10.2o.

Application No: Date:

Model designation: Observer:

Serial No:

Does the switch enable easy and reliable operation using one hand without generating any noise that might disturb the hearing threshold level measurement? (tested subjectively with a recommended minimum number of ten press/release sequences).

☐ yes ☐ no

In the case of a computer-controlled audiometer:
Is an information given about the time window for the subject's response?

☐ yes ☐ no

Remarks:

F.3 Warm-up time
The test refers to IEC 645-1, clause 5.3.

Application No: Date:

Model designation: Observer:

Serial No: Temperature:

Unit stored during the last 5 hours at a temperature of ..... °C

Nominal frequency and hearing level chosen: ..... Hz, ..... dB

Corresponding RETSPL: .....

| Period after switch-on min | Measured frequency Hz | Measured hearing level dB | Measured total distortion % | mpe |
|---|---|---|---|---|
| | | | | Frequency:<br>Type 1: 1 %<br>Type 2: 2 %<br>Types 3 to 5: 3 %<br>Hearing level:<br>125 Hz to 4 000 Hz: ± 3 dB<br>> 4 000 Hz: ± 5 dB<br><br>Total distortion :<br>see clause 11 of this report |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Minimum warm-up time: ..... min

Minimum warm-up time specified by the manufacturer: ..... min

Remarks:

F.4 Sensitivity to temperature and humidity
The test refers to IEC 645-1, clauses 5.4.1 and 5.4.4.

Application No: Date:

Model designation: Observer:

Serial number:

| | |
|---|---|
| Test conditions: | One earphone; 1 000 Hz indicated frequency (or, for a Type 5 audiometer, the nearest frequency if 1 000 Hz is not provided); hearing level of 100 dB or at the maximum hearing level, whichever is the lower; a minimum of four combinations of values of temperature (15 °C to 35 °C) and relative humidity (30 % to 90 %). |

Ambient pressure between: ..... kPa and ..... kPa

| Ambient temperature °C | Relative humidity % | Frequency setting Hz | Measured frequency Hz | Relative deviation % | mpe |
|---|---|---|---|---|---|
| | | | | | Type 1: 1 %<br>Type 2: 2 %<br>Types 3 to 5: 3 % |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Hearing level control $L_{HL}$: ..... dB

| Ambient temperature °C | Relative humidity % | Measured SPL $L_m$ dB | RETSPL $L_{RETSPL}$ dB | Deviation $L_m - L_{RETSPL} - L_{HL}$ dB | mpe |
|---|---|---|---|---|---|
| | | | | | ± 3 dB |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

| Ambient temperature °C | Relative humidity % | Frequency setting Hz | Hearing level control dB | Total harmonic distortion % | mpe |
|---|---|---|---|---|---|
| | | | | | 2.5 % |
| | | | | | |
| | | | | | |
| | | | | | |

Remarks:

F.5 Supply voltage

Application No: Date:

Model designation: Observer:

Serial No: Temperature:

F.5.a Battery operation
The test refers to IEC 645-1, clauses 5.4.2, 5.4.4 and 10.2b.

Are the limits of battery voltages within which the specifications will be met stated by the manufacturer?

☐ yes ☐ no

Is a suitable indicator provided?

☐ yes ☐ no

| | |
|---|---|
| Test conditions: | One earphone; 1 000 Hz indicated frequency (or the nearest frequency if 1 000 Hz is not provided); hearing level of 100 dB or at the maximum hearing level, whichever is the lower. |

Lower limit of battery voltage used for the results in the following tables: ... V

| Frequency setting Hz | Measured frequency Hz | Relative deviation % | mpe |
|---|---|---|---|
| | | | Type 1: 1 %<br>Type 2: 2 %<br>Types 3 to 5: 3 % |

| Hearing level control $L_{HL}$ dB | Measured SPL $L_m$ dB | RETSPL $L_{RETSPL}$ dB | Deviation $L_m - L_{RETSPL} - L_{HL}$ dB | mpe |
|---|---|---|---|---|
| | | | | ± 3 dB |

| Frequency setting Hz | Hearing level control dB | Total harmonic distortion % | mpe |
|---|---|---|---|
| | | | 2.5 % |

Remarks:

F.5 Supply voltage (cont.)

F.5.b Mains operation
The test refers to IEC 645-1, clauses 5.4.3, 5.4.4 and 10.2b.

| | |
|---|---|
| Test conditions: | One earphone; indicated frequency 1 000 Hz (or the nearest frequency if 1 000 Hz is not provided); hearing level of 100 dB or at the maximum hearing level, whichever is the lower. |

Least favorable combination within the limits of ± 10 % supply voltage and ± 5 % mains frequency used for the results in the following table:

.....V, ..... Hz

| Frequency setting Hz | Measured frequency Hz | Relative deviation % | mpe |
|---|---|---|---|
| | | | Type 1: 1 %<br>Type 2: 2 %<br>Types 3 to 5: 3 % |

| Hearing level control $L_{HL}$ dB | Measured SPL $L_m$ dB | RETSPL $L_{RETSPL}$ dB | Deviation $L_m - L_{RETSPL} - L_{HL}$ dB | mpe |
|---|---|---|---|---|
| | | | | ± 3 dB |

| Frequency setting Hz | Hearing level control dB | Total harmonic distortion % | mpe |
|---|---|---|---|
| | | | 2.5 % |

For the following requirement no test method is specified in IEC 645-1. The testing laboratory should describe the method employed, and state the results.

Are the specifications also met for the following short term voltage reductions of the mains supply: reduction by 100 % for 10 ms, by 50 % for 20 ms, and by 20 % for 50 ms?

☐ yes ☐ no

Remarks:

F.6 Electrostatic and electromagnetic interference
The test refers to IEC 645-1, clause 5.4.5.

Application No: Date:

Model designation: Observer:

Serial number:

Note: IEC 645-1 does not specify, and in general it is not yet possible to specify, a method of evaluating the effect of these fields, applicable to all types of audiometers. The testing laboratory should describe the method employed, state the pass/fail criteria and state the results.
It is recommended that the unwanted sound from the transducer produced in the presence of the electromagnetic field should not exceed a level corresponding to 60 dB hearing level.

Remarks:

F.7 Unwanted sound
The test refers to IEC 645-1, clause 5.5.

Application No: Date:

Model designation: Observer:

Serial number:

F.7.a Unwanted sounds from an earphone

a.1 **Either** measured by an indirect electrical method:

| | |
|---|---|
| Test conditions: | r.m.s. voltage (time weighted F) measured across a dummy load in place of the test earphone. |

a.1.1 Hearing level control setting at 60 dB, tone switched "off ":
Was the electrical signal in each 1/3-octave band within the range 125 Hz to 8 kHz at least 10 dB below the signal corresponding to the RETSPL?

☐ yes

☐ no, at frequencies .....

a.1.2 Hearing level control set to 70 dB or greater, tone switched "on":
Was the unwanted signal in the non-test earphone or a substitute dummy load at least 70 dB below the test tone?

☐ yes

☐ no, at frequencies .....

a.2 **Or** measured by a subjective method:

| | |
|---|---|
| Test conditions: | At least 2 otologically normal test subjects (HTL ≤ 10 dB up to 4 kHz and ≤ 15 dB above); test room appropriate according to clause 11 of ISO 8253-1; tests conducted in both "ON" and "OFF" position of tone switch; measurements at any setting of hearing level control; above 70 dB (250 Hz to 6 kHz) or 50 dB (outside 250 Hz to 6 kHz) with inserted electrical attenuator in the earphone connection. |

Did any test subject detect sound other than the test sound from the test earphone or the non-test earphone respectively?

☐ no

☐ yes, at frequencies and settings of .....

Remarks:

F.7 Unwanted sound (cont.)

F.7.b Unwanted sound from a bone vibrator

Model designation of bone vibrator: .....

At the following test frequencies the bone vibrator will radiate sound to such an extent that the validity of the bone conduction measurement might be impaired:

| Frequency<br><br>Hz | Measured mean impairment<br>dB | Measured maximum impairment<br>dB | No impairment detected (+) |
|---|---|---|---|
| .....<br>2 000<br>3 000<br>4 000<br>6 000<br>8 000 | | | ( )<br>( )<br>( )<br>( )<br>( )<br>( ) |

The results above were measured by the following testing laboratory: .....
.....

according to the measurement procedure given in clause 5.5.3 of IEC 645-1 by means of a number of ..... test subjects.

Note: If test results for the bone vibrator are available from a former test the measurements need not be repeated.

F.7.c Unwanted sound radiated by the audiometer

| | |
|---|---|
| Test conditions: | At least two test subjects (HTL ≤ 10 dB up to 4 kHz and ≤ 15 dB above), located at a distance of 1 m from the audiometer; electrical output of the audiometer absorbed in a resistive load; each setting of the hearing level dial up to and including 50 dB; the limitation on noise from controls applies only to noise that could furnish the patient with a clue which might influence the test result.<br>Note: The test is only to be performed for audiometers which are intended to be used in the same room as the test subject. |

For the purpose of the following tests, the electrical output of the audiometer was terminated with a resistive load of ..... Ω.

c.1 Test subjects with unoccluded ears (in the case of bone conduction):
Was any sound audible to the test subjects due to the operation of the audiometer controls?

☐ yes, at frequencies .....

☐ no

c.2 Test subjects wearing a pair of disconnected earphones:
Was any sound audible to the test subjects due to the operation of the audiometer controls?

☐ yes, at frequencies .....

☐ no

Remarks:

F.8 External signal input
The test refers to IEC 645-1, clauses 6.2 and 7.2.

Application No: Date:

Model designation: Observer:

Are the frequency response characteristics of the acoustic output specified by the manufacturer (250 Hz to 8 000 Hz)?

☐ yes ☐ no

Is the external signal capable of being monitored by a signal indicator?

☐ yes ☐ no

If a signal indicator is provided:

Is the reading of the signal indicator that is considered to be a reference point for a 1 kHz pure tone specified by the manufacturer?

☐ yes ☐ no

Are the characteristics of the signal indicator (i.e. time weighting, dynamic range and rectifier characteristics) specified by the manufacturer?

☐ yes ☐ no

Is the signal indicator connected to a point in the circuit before the hearing level control?

☐ yes ☐ no

Is a 20 dB-gain adjustment provided in the overall level of the signal presented?

☐ yes ☐ no

Is the output level which is required to bring the monitor indicator to its reference indication stated by the manufacturer?

☐ yes ☐ no

Remarks:

F.9 Frequency and hearing level range
The test refers to IEC 645-1, clauses 6.1.1, 8.1 and 8.2.1.

Application No: Date:

Model designation: Observer:

Serial number:

| Provided frequency<br><br>Hz | Air conduction Provided max. hearing level<br>dB | Bone conduction Provided max. hearing level<br>dB | Provided min. hearing level<br><br>dB | Requirement of Table 4 of IEC 645-1 fulfilled?<br>+ \| – |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Remarks:

F.10 Frequency accuracy
The test refers to IEC 645-1, clauses 6.1.2 and 8.

Application No: Date:

Model designation: Observer:

Serial number: Temperature:

| Nominal frequency Hz | Measured frequency Hz | Relative deviation % | mpe |
|---|---|---|---|
| | | | a) fixed frequency audiometers<br>Type 1: 1 %<br>Type 2: 2 %<br>Types 3 to 5: 3 %<br><br>b) continuous sweep frequency audiometers: 5 % |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Remarks:

F.11 Harmonic distortion
The test refers to IEC 645-1, clauses 6.1.3 and 8.

Application No: Date:

Model designation: Observer:

Serial number: Temperature:

F.11.a Air conduction

| | |
|---|---|
| Hearing level: | 75 dB for frequencies 125 Hz to 250 Hz, 90 dB for 315 Hz to 400 Hz, 110 dB for 500 Hz to 5 000 Hz, or relevant maximum output level for the audiometer, whichever is the lower. |

| Nominal frequency<br>Hz | 2nd harm. distortion<br>% | 3rd harm. distortion<br>% | 4th harm. distortion and higher<br>% | Sub-harm. distortion<br>% | Total harm. distortion<br>% |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| mpe for 125 Hz to 5 000 Hz as % of sound pressure | 2 | 2 | 0.3 | 0.3 (only 315 Hz to 5 000 Hz) | 2.5 |

Remarks:

F.11 Harmonic distortion (cont.)

F.11.b Bone conduction

| | |
|---|---|
| Hearing level: | 20 dB for frequencies 250 Hz to 400 Hz, 50 dB for 500 Hz to 800 Hz, 60 dB for 1 000 Hz to 5 000 Hz, or relevant maximum output level for the audiometer, whichever is the lower. |

| Nominal frequency<br><br>Hz | 2nd harm. distortion<br><br>% | 3rd harm. distortion<br><br>% | 4th harm. distortion and higher<br>% | Total harm. distortion<br><br>% |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| mpe for 250 Hz to 5 000 Hz as % of vibratory force | 5 | 2 | 1 | 5.5 |

Remarks:

F.12 Rate of frequency change
The test refers to IEC 645-1, clauses 6.1.4.

Application No: Date:

Model designation: Observer:

Serial number: Temperature:

F.12.a Sweep frequency audiometers

| Center octave frequency Hz | Rate of frequency change octave/min | mpe |
|---|---|---|
| | | one of the rates shall be: 1 octave/min ± 20 % |
| | | |
| | | |

Remarks:

F.12.b Automatic recording audiometers with fixed frequencies

| Frequency Hz | Period s | Limit |
|---|---|---|
| | | ≥ 30 s at each frequency |
| | | |
| | | |

Remarks:

F.13 Frequency modulation
The test refers to IEC 645-1, clauses 6.1.5 and 10.2i.

Application No: Date:

Model designation: Observer:

Where frequency modulated signals are provided, is the:

- frequency of the modulating signal stated?

☐ yes ☐ no

- modulation wave form stated?

☐ yes ☐ no

- modulation range stated?

☐ yes ☐ no

Are the tolerances that apply to the above also stated?

☐ yes ☐ no

Remarks:

F.14 Level accuracy
The test refers to IEC 645-1, clauses 7.3 and 8.2.4.

Application No: Date:

Model designation: Observer:

Serial number: Temperature:

F.14.a Air conduction

a.1 One channel connected to transducer

| Frequency<br>Hz | Hearing level control $L_{HL}$<br>dB | Measured SPL $L_m$<br>dB | RETSPL $L_{RETSPL}$<br>dB | Deviation $L_m - L_{RETSPL} - L_{HL}$<br>dB | mpe |
|---|---|---|---|---|---|
| | | | | | 125 Hz to 4 000 Hz: ± 3 dB<br>> 4 000 Hz: ± 5 dB |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Remarks:

F.14 Level accuracy (cont.)

F.14.a Air conduction (cont.)

a.1 Two or more channels connected to transducer

| Frequency<br><br>Hz | Hearing level control $L_{HL}$<br><br>dB | One channel connected Measured SPL $L_{C1}$<br>dB | More channels connected Measured SPL $L_{Cm}$<br>dB | Deviation $L_{C1}$-$L_{Cm}$<br><br>dB | mpe |
|---|---|---|---|---|---|
| | | | | | For all $L_{HL}$ up to $L_{HLmax}$ –20 dB;<br>125 Hz to 4 000 Hz:<br>± 1 dB<br>> 4 000 Hz:<br>± 2 dB |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Remarks:

F.14 Level accuracy (cont.)

F.14.b Bone conduction

| Frequency<br><br>Hz | Hearing level control $L_{HL}$<br><br>dB | Measured FL $L_m$ (re 1 µN)<br>dB | RETFL $L_{RETFL}$ (re 1 µN)<br>dB | Deviation $L_m - L_{RETFL} - L_{HL}$<br><br>dB | mpe |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | 125 Hz to 4 000 Hz: ± 3 dB |
| | | | | | |
| | | | | | > 4 000 Hz: ± 5 dB |
| | | | | | |
| | | | | | |

Remarks:

F.15 Hearing level control
The test refers to IEC 645-1, clauses 7.4, 8.2.2, 8.2.4 and 8.2.5.

Application No: Date:

Model designation: Observer:

Serial number: Temperature:

F.15.a Signal level and reference level

| Hearing level control dB | Lowest frequency Measured SPL $L_{ci}$ dB | Difference $L_{ci} - L_{ci+1}$ dB | 1 000 Hz Measured SPL $L_{ci}$ dB | Difference $L_{ci} - L_{ci+1}$ dB | Highest frequency Measured SPL $L_{ci}$ dB | Difference $L_{ci} - L_{ci+1}$ dB | mpe |
|---|---|---|---|---|---|---|---|
| | | | | | | | Measured difference between two successive indications of hearing level not more than 5 dB (manual audiometers) or 10 dB (automatic recording audiometers) apart: ≤ 3/10 of indicated interval in dB, or 1 dB whichever is smaller. |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

For manual audiometers only:
Does the hearing level indicator have only one scale and one reference point common to all frequencies?

☐ yes ☐ no

Does the hearing level indicator have calibrated intervals of 5 dB or lower (Types 1 to 4 only)?

☐ yes ☐ no

Does the 0 dB setting of the hearing level indicator correspond to RETSPL at each frequency (Type 1 to 4 only)?

☐ yes ☐ no

Remarks:

F.15 Hearing level control (cont.)

F.15.b Signal level

For automatic recording audiometers only:

| | |
|---|---|
| Rate of change: | At least 2.5 dB/s for Types 1 to 3 audiometers, 2.5 dB/s or 5 dB/s for Type 4 audiometers; possible additional rates: 1.25 dB/s and 5 dB/s. |

| Provided rate of change dB/s | Requirement fulfilled? + \| – | Measured rate of change at ..... Hz dB/s | Relative difference % | mpe |
|---|---|---|---|---|
| | | | | ± 20 % |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Remarks:

F.15 Hearing level control (cont.)

F.15.c Reference level

Is the test tone or the reference tone adjustable in intervals of 2.5 dB or less (Types 1 and 2 only)?

☐ yes ☐ no

Does the operation of the reference tone level control influence the output of the test tone by more than ± 1 dB?

☐ yes ☐ no

| ..... Hz<br>Hearing level setting<br>dB | Measured level of test tone<br>dB | Measured level of reference tone<br>dB | Difference of measured levels<br>dB | mpe |
|---|---|---|---|---|
| | | | | 500 Hz to 4 000 Hz: ± 3 dB<br>all other frequencies: ± 5 dB |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Note: More than one frequency shall be tested.

Remarks:

F.16 Tone switching
The test refers to IEC 645-1, clauses 7.6 and 8.

Application No: Date:

Model designation: Observer:

Serial number: Temperature:

F.16.a Manual and computer-controlled audiometers
Test tones and reference tones

| Frequency<br><br>Hz | On/off ratio<br>Hearing level<br>< 60 dB > 60 dB<br>dB dB | Rise/fall times<br>"On"-position<br>AC BC<br>s s | Rise/fall times<br>"Off"-position<br>DH EG<br>s s | Limits |
|---|---|---|---|---|
| | | | | AC and DH:<br>≤ 200 ms |
| | | | | BC and EG:<br>≥ 20 ms |
| | | | | |

SPL rise between B and C without discontinuities?

☐ yes ☐ no (..... Hz)

SPL fall between E and G without discontinuities?

☐ yes ☐ no (..... Hz)

Overshoots larger than 1 dB?

☐ yes (..... Hz) ☐ no

Undershoots larger than 1 dB?

☐ yes (..... Hz) ☐ no

For computer-controlled audiometers only:
Time available for a subject to respond to a test stimulus specified?

☐ yes ☐ no

Algorithm for the test procedure specified?

☐ yes ☐ no

Remarks:

F.16 Tone switching (cont.)

F.16.b Automatic recording audiometers

Change from automatic pulsed to continuous test tones available?

☐ yes ☐ no

| Frequency<br>Hz | On/off ratio<br>dB | Pulse sequence<br>Rise time BC<br>s | Fall time EG<br>s | On phase CE<br>s | On/off times FJ/JK<br>s | Limits |
|---|---|---|---|---|---|---|
| | | | | | | BC and EG each:<br>≥ 20 ms; ≤ 50 ms<br>CE:<br>≥ 150 ms<br>FJ and JK each:<br>(225 ± 35) ms |
| | | | | | | |
| | | | | | | |
| | | | | | | |

SPL rise between B and C without discontinuities?

☐ yes ☐ no (..... Hz)

SPL fall between E and G without discontinuities?

☐ yes ☐ no (..... Hz)

Remarks:

F.17 Level range (Masking sound)
The test refers to IEC 645-1, clauses 7.5.4.

Application No: Date:

Model designation: Observer:

Serial number:

| Requirement: | Maximum hearing level of masking sound at least:<br>60 dB at 250 Hz, 75 dB at 500 Hz and 80 dB from 1 kHz to 4 kHz. |
|---|---|

Visual check:

| Frequency<br><br>Hz | Maximum hearing level of masking sound<br>dB | Requirement fulfilled?<br>+ \| – | Level adjustable from 0 dB to the required HL fulfilled?<br>+ \| – |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

Remarks:

F.18 Frequency spectrum (Masking sound)
The test refers to IEC 645-1, clauses 6.3 and 10.2n.

Application No: Date:

Model designation: Observer:

Serial number: Temperature:

F.18.a Narrow-band noise

a.1 Cut-off frequencies

| | |
|---|---|
| Test conditions: | Measurement of sound pressure spectrum density level $L_D$; band limits at –3 dB points of $L_D$, referred to $L_D$ at center frequency; coupler measurements up to 5 kHz, electrical measurements across transducer terminals above 5 kHz. |

| | |
|---|---|
| mpe: | Cut-off frequencies $f_l$ and $f_u$ shall lie within the band limits $f_l$ (min.), $f_l$ (max.) or $f_u$ (min.), $f_u$ (max.) respectively, given in Table 6 of IEC 645-1. |

Upper and lower cut-off frequencies:

| | Lower cut-off frequency $f_l$ | | | Upper cut-off frequency $f_u$ | | |
|---|---|---|---|---|---|---|
| Center frequency Hz | $f_l$ (min.) Hz | Measured $f_l$ Hz | $f_l$ (max.) Hz | $f_u$ (min.) Hz | Measured $f_u$ Hz | $f_u$ (max.) Hz |
| | | | | | | |
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Remarks:

F.18 Frequency spectrum (Masking sound) (cont.)

F.18.a Narrow-band noise

a.2 Decay of $L_D$ outside band limits

| | |
|---|---|
| Test conditions: | Measurement of sound pressure spectrum density level shall be made acoustically for frequencies up to 5 kHz and electrically across transducer terminals above 5 kHz. Measurements are not required outside the range from 31.5 Hz to 10 kHz. |

| | |
|---|---|
| mpe: | $L_D$ shall fall outside $f_1$ or $f_u$ at a rate of at least 12 dB per octave for at least 3 octaves and shall not rise above –36 dB relative to $L_D$ at center frequency $f_0$ thereafter. |

| < 1/8 $f_1$ | 1/8 $f_1$ | 1/4 $f_1$ | 1/2 $f_1$ | Frequencies in Hz $f_1$ | $f_0$ | $f_u$ | 2 $f_u$ | 4 $f_u$ | 8 $f_u$ | > 8 $f_u$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | Level $L_D$ (f) in dB | | | | | |
| | | | | | | | | | | |
| $L_D$ (f) – $L_D$ ($f_1$) in dB | | | | | ---------- | | $L_D$ (f) – $L_D$ ($f_u$) in dB | | | |
| | | | | | ---------- | | | | | |

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Remarks:

F.18 Frequency spectrum (Masking sound) (cont.)

F.18.b Broad-band noise

| Test conditions: Measurements in the acoustic coupler or artificial ear for all frequencies. |
|---|

b.1 White noise

Sound pressure spectrum density level $L_D$:

| Frequency<br><br>Hz | $L_D$ (f)<br><br>dB | Difference<br>$L_D$ (f) – $L_D$ (1 kHz)<br>dB | mpe |
|---|---|---|---|
| 250<br>315<br>400 | | | |
| 500<br>630<br>800 | | | ± 5 dB |
| 1 000<br>1 250<br>1 600 | | | |
| 2 000<br>2 500<br>3 150 | | | |
| 4 000 | | | |

Remarks:

F.18 Frequency spectrum (Masking sound) (cont.)

F.18.b Broad-band noise

| Test conditions: Measurements in the acoustic coupler or artificial ear for all frequencies. |
|---|

b.2 Weighted broad-band noise

Sound pressure spectrum density level $L_D$:

| Frequency<br>Hz | $L_D$ (f)<br>dB | RETSPL<br>$L_{RETSPL}$<br>dB | Difference<br>$L_D$ (f) – $L_{RETSPL}$<br>dB | mpe |
|---|---|---|---|---|
| 250<br>315<br>400 | | | | ± 5 dB |
| 500<br>630<br>800 | | | | |
| 1 000<br>1 250<br>1 600 | | | | |
| 2 000<br>2 500<br>3 150 | | | | |
| 4 000 | | | | |

Remarks:

b.3 Other masking sounds

Are the spectral properties of the masking sound provided specified by the manufacturer?

☐ yes ☐ no

F.19 Level accuracy (Masking sound)
The test refers to IEC 645-1, clauses 7.5.2 and 7.5.3.

Application No: Date:

Model designation: Observer:

Serial number: Temperature:

| Frequency<br>Hz | Masking level control $L_{HL}$<br>dB | Measured SPL $L_m$<br>dB | RETSPL $L_{RETSPL}$<br>dB | Deviation $L_m - L_{RETSPL} - L_{HL}$<br>dB | mpe |
|---|---|---|---|---|---|
| | | | | | |
| | | | | | |
| | | | | | + 5 dB / -3 dB |
| | | | | | |
| | | | | | |

For narrow-band noise:
Masking level control calibrated in decibels of effective masking (ISO 389-4)?

☐ yes ☐ no

For other sounds:
Masking level control calibrated in SPL or in effective masking?

☐ yes ☐ no

Overall SPL and SPL in 1/3 octave bands over the usable frequency range specified by the manufacturer?

☐ yes ☐ no

Remarks:

F.20 Level control (Masking sound)
The test refers to IEC 645-1, clause 7.5.3.

Application No: Date:

Model designation: Observer:

Serial number: Temperature:

| Hearing level control dB | Lowest frequency Measured SPL $L_{ci}$ dB | Difference $L_{ci} - L_{ci+1}$ dB | 1 000 Hz Measured SPL $L_{ci}$ dB | Difference $L_{ci} - L_{ci+1}$ dB | Highest frequency Measured SPL $L_{ci}$ dB | Difference $L_{ci} - L_{ci+1}$ dB | mpe |
|---|---|---|---|---|---|---|---|
| | | | | | | | Measured difference between two successive indications of hearing level not more than ± 5 dB apart: ≤ 3/10 of indicated interval in dB or 1 dB, whichever is smaller |
| | | | | | | | |
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Remarks:

F.21 Earphones
The test refers to IEC 645-1, clauses 9.1 and 10.2j.

Application No: Date:

Model designation: Observer:

Model designation of earphone:

Type: supra-aural ..... insert ..... circum-aural ..... (+)

Headband force: .....N (Nominal value and tolerance: .....N ± ..... N)

Left and right earphone readily identifiable?

☐ yes ☐ no ☐ not applicable

RETSPL values standardized in ISO ..... or measured by the following national metrology institute: .....
Coupler used for calibration: .....

Sound attenuation measured in accordance with ISO 4869-1 by the following testing laboratory: .....

Note: If test results for the earphone are available from a former test the measurements need not be repeated.

In the case of a supra-aural earphone: Does the earphone meet all requirements in clause 9.1.1 of IEC 645-1?

☐ yes ☐ no

Remarks:

F.22 Bone vibrator
The test refers to IEC 645-1, clauses 9.2 and 10.2d.

Application No: Date:

Model designation: Observer:

Model designation of bone vibrator:

Mastoid application (headband width 145 mm): ..... (+)

Forehead application (headband width 190 mm): ..... (+)

Headband force: ..... N (Nominal value and mpe: 5.4 N ± 0.5 N)

Does the vibrator meet the requirements of clause 9.2.1 of IEC 645-1?

☐ yes ☐ no

Remarks:

F.23 Inscriptions and marks

Application No: Date:

Model designation: Observer:

Serial number:

| Inscription or mark | + | – |
|---|---|---|
| Manufacturer's name or trade mark | | |
| 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:

F.24 Instruction manual

Application No: Date:

Model designation: Observer:

| Information | + | – |
|---|---|---|
| Description of facilities and full operating instructions | | |
| Permissible supply variation and environmental range | | |
| Installation of the audiometer in order to minimize unwanted sound | | |
| RETSPL or RETFL of all transducers and their origin | | |
| Coupler (s) used for calibration | | |
| Headband force (s) | | |
| Mastoid or forehead placement of bone vibrator | | |
| 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 | | |
| Mode of operation and rate of change of SPL of automatic recording audiometers | | |
| Rate of change of frequency for audiometers with continuously variable frequency | | |
| Characteristics of frequency modulated signals | | |
| Sound attenuation of earphones | | |
| Damage temperature | | |
| Maximum hearing level settings at each test frequency | | |
| Effects of airborne sound radiation of bone vibrator and means to obtain correct test results | | |
| Actual bandwidth of narrow-band masking sound | | |
| Method of calibration for broad-band masking sound | | |
| Time window for subject's response of a computer-controlled audiometer | | |
| Type of battery, battery check and replacement, expected battery lifetime | | |
| Maintenance and calibration procedures and schedules | | |
| Interface (s) for a computer or printer | | |

Remarks:

Printed in France

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