

Audio and audiovisual equipment — Digital audio parts — Basic measurement methods of audio characteristics —

Part 4: Personal computer

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National foreword

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**Audio and audiovisual equipment -
Digital audio parts -
Basic measurement methods of audio characteristics
Part 4: Personal computer
(IEC 61606-4:2005)**

Equipements audio et audiovisuels -
Parties audionumériques -
Méthodes fondamentales pour
la mesure des caractéristiques audio
Partie 4: Ordinateur personnel
(CEI 61606-4:2005)

Audio- und Audiovisuelle Geräte -
Digitale Tonteile -
Grundlegende Messverfahren der
Audio-Eigenschaften
Teil 4: Personal-Computer
(IEC 61606-4:2005)

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CENELEC

European Committee for Electrotechnical Standardization
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Foreword

The text of the International Standard IEC 61606-4:2005, prepared by IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the formal vote and was approved by CENELEC as EN 61606-4 on 2006-12-01 without any modification.

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Endorsement notice

The text of the International Standard IEC 61606-4:2005 was approved by CENELEC as a European Standard without any modification.

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AUDIO AND AUDIOVISUAL EQUIPMENT – DIGITAL AUDIO PARTS – BASIC MEASUREMENT METHODS OF AUDIO CHARACTERISTICS –

Part 4: Personal computer

1 Scope

This part of IEC 61606 specifies the basic measurement methods of a linear PCM signal for an audio part of personal computers (PCs) and applies to both desktop and portable computers. The common measuring conditions and methods are described in IEC 61606-1. Specific conditions and methods of measurement for PCs are given in this standard.

NOTE 1 The methods described are mostly based on sampling frequencies from 8 kHz to 192 kHz and bit length from 8 bit to 24 bit.

NOTE 2 This standard describes tests for equipment which has digital input with analogue output and analogue input with digital output. Digital input data are provided from an internal HDD or other memory media and output digital data are recorded to an internal HDD or main memories.

NOTE 3 The methods specified in this standard are not applicable to systems incorporating bit-rate reduced digital audio signals that have data loss or to 1-bit signals. This part does not apply to analogue input with analogue output and digital input with digital output as described in IEC 61606-1.

NOTE 4 When a CPU in a PC is overloaded by tasks other than those for audio input/output, the PC may fail to record/reproduce the whole audio data. This standard applies only to the measurement in which input/output data are recorded/reproduced without such missing data. The performance of a PC with missing audio data may be evaluated by the short-term distortion measurement although such evaluation is not within the scope of this standard.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60038, *IEC standard voltages*

IEC 60268-2, *Sound system equipment – Part 2: Explanation of general terms and calculation methods*

IEC 61606-1, *Audio and audiovisual equipment – Digital audio parts – Basic measurement methods of audio characteristics – Part 1: General*

IEC 61606-2, *Audio and audiovisual equipment – Digital audio parts – Basic measurement methods of audio characteristics – Part 2: Consumer use*

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61606-1, as well as the following, apply.

3.1.1**personal computer****PC**

personal computer which is designed to be used by one person at a time

NOTE 1 A PC does not include optional sound cards or any board or drive installed by the user after purchase.

NOTE 2 A PC may be used by more than one person when it is used with network computers.

3.1.2**standard input signal amplitude**

input analogue signal amplitude which corresponds to the digital **full-scale level**:

- analogue input terminal: 2 V r.m.s.
- microphone terminal: 100 mV r.m.s.

3.1.3**standard output signal amplitude**

output analogue signal amplitude which corresponds to the digital **full-scale level**:

- analogue output terminal: 2 V r.m.s.

NOTE If the **EUT** cannot output the amplitude of 2 V r.m.s., 1 V r.m.s. may be used for the measurement. In that case, measured data should be indicated with the measured voltage.

- headphone terminal: maximum output amplitude

3.1.4**normal measuring amplitude**

analogue signal amplitude equal to 1/10 of the **standard input signal amplitude**

3.1.5**normal source impedance**

impedance which is connected to the analogue input terminals of the **EUT**:

- analogue input terminal: 2,2 k Ω
- microphone terminal: 600 Ω

3.1.6**normal load impedance**

load impedance which is connected to the output terminals of the **EUT**:

- load of analogue output terminal: 22 k Ω
- load of headphone terminal: 32 Ω
- load of speaker terminals: 8 Ω or equal to the impedance of internal speakers

3.1.7**factory setting**

default setting of **EUT** as defined by the manufacturer

3.1.8**standard medium**

internal storage medium which provides digital test data at the standard setting and should be a hard disk drive (HDD) working on the **EUT**

NOTE If the **EUT** is not equipped with a HDD, another memory medium which is used as a main memory may be used. In this case, it should be stated with the results.

3.1.9**recording medium**

internal data storage medium on which audio playback data are recorded for the analogue-in/digital-out measurement and should be a hard disk drive (HDD)

NOTE If the **EUT** is not equipped with a HDD, another memory medium which is used as a main memory may be used.

3.1.10

working medium

internal storage medium from which digital test data are provided at the working setting

NOTE This medium should be a main data source when audio signal is played on the **EUT**, such as a compact disc (CD).

3.2 Abbreviated terms

EUT	equipment under test, which is a PC in this standard
AC	alternating current
r.m.s.	root-mean square
LPCM	linear pulse code modulation
LSB	least significant bit

3.3 Rated values

For a full explanation of these terms, see IEC 60268-2. The following are rated conditions for digital audio equipment which should be specified by the manufacturer:

- rated supply voltage;
- rated supply frequency;
- rated digital input **word length**;
- rated **sampling frequency**(ies).

4 Measuring conditions

4.1 Environmental conditions

The following environmental conditions with the indicated tolerances shall be used:

- air pressure: 96 kPa $\pm$ 10 kPa
- ambient temperature: 15 °C to 35 °C
- relative humidity: (60 $\pm$ 15) %

4.2 Power supplies

An a.c. power supply or a battery shall be used. If a battery is used, it should be stated with the results.

4.2.1 Supply voltage

Rated a.c. power supply voltage, as specified in IEC 60038, shall be used. The tolerance of the supply voltage should be ± 10 % or less.

4.2.2 Frequency(ies)

AC power supply frequency(ies) specified by the manufacturer shall be used. The tolerance of the frequency should be +2 %, –4 % or less.

4.2.3 Noises at the power supply output

Noises at the power supply output should be less than the amplitude which affects the result of measurement.

4.2.4 Battery

Only the battery designed for the **EUT** or built in the **EUT** shall be used.

4.3 Test signal frequencies

The frequency of the test signal shall be selected from the values in Table 1. In catalogues and other documents, where precision is not required or implied in the description, it is permitted to use the nominal values shown in this table. Unless otherwise specified, the reference frequency for measurements shall be 997 Hz, which may be stated in non-critical contexts, as 1 kHz.

Table 1 – Frequencies used in the measurement

Nominal frequency	Dimensions in Hz									
	Actual frequency									
	$f_s = 8\ 000$	$f_s = 11\ 025$	$f_s = 16\ 000$	$f_s = 22\ 050$	$f_s = 32\ 000$	$f_s = 44\ 100$	$f_s = 48\ 000$	$f_s = 88\ 200$	$f_s = 96\ 000$	$f_s = 192\ 000$
4	4	4	4	4	4	4	4	4	4	4
8	7	7	7	7	7	7	7	7	7	7
16	17	17	17	17	17	17	17	17	17	17
32	31	31	31	31	31	31	31	31	31	31
63	61	61	61	61	61	61	61	61	61	61
125	127	127	127	127	127	127	127	127	127	127
250	251	251	251	251	251	251	251	251	251	251
500	499	499	499	499	499	499	499	499	499	499
1 000	997	997	997	997	997	997	997	997	997	997
2 000	1 999	1 999	1 999	1 999	1 999	1 999	1 999	1 999	1 999	1 999
3 700	3 677	–	–	–	–	–	–	–	–	–
4 000	–	4 001	4 001	4 001	4 001	4 001	4 001	4 001	4 001	4 001
5 100	–	5 059	5 059	–	–	–	–	–	–	–
7 400	–	–	7 351	–	–	–	–	–	–	–
8 000	–	–	–	7 993	7 993	7 993	7 993	7 993	7 993	7 993
10 000	–	–	–	–	10 007	10 007	10 007	10 007	10 007	10 007
10 100	–	–	–	10 141	–	–	–	–	–	–
12 500	–	–	–	–	12 503	12 503	12 503	–	–	–
14 700	–	–	–	–	14 717	14 717	14 717	–	–	–
16 000	–	–	–	–	–	16 001	16 001	16 001	16 001	16 001
18 000	–	–	–	–	–	17 987	17 987	–	–	–
20 000	–	–	–	–	–	–	19 997	19 997	19 997	19 997
20 300	–	–	–	–	–	20 269	–	–	–	–
22 000	–	–	–	–	–	–	22 079	–	–	–
30 000	–	–	–	–	–	–	–	29 989	29 989	–
35 000	–	–	–	–	–	–	–	34 981	34 981	–
40 000	–	–	–	–	–	–	–	40 429	40 429	40 429
44 000	–	–	–	–	–	–	–	–	44 159	–
50 000	–	–	–	–	–	–	–	–	–	49 999
70 000	–	–	–	–	–	–	–	–	–	70 001
80 000	–	–	–	–	–	–	–	–	–	79 999
88 000	–	–	–	–	–	–	–	–	–	88 301

If a sweep signal is used in the measurement, the sweep frequency range is from 16 Hz to $1/2 \times f_s$.

4.4 Standard setting

4.4.1 Standard input condition for the EUT

4.4.1.1 Analogue signal input condition

4.4.1.1.1 Microphone Input

Signal amplitude: **normal measuring amplitude**

Source impedance: **normal source impedance**

4.4.1.1.2 Analogue Input

Signal amplitude: **normal measuring amplitude**

Source impedance: **normal source impedance**

4.4.1.2 Digital signal Input condition

The test digital signal shall be recorded on the **standard medium**.

Input signal level: **normal measuring level**

4.4.2 Standard output condition for the EUT

4.4.2.1 Analogue output condition

4.4.2.1.1 Voltage output and headphone output condition

Signal amplitude: 1/10 of **standard output signal amplitude**

Load impedance: **normal load impedance**

4.4.2.1.2 Power output condition

Signal amplitude: 1/10 of **maximum output amplitude**

Load impedance: **normal load impedance**

4.4.2.2 Digital output condition

The digital signal that is obtained from an analogue input signal shall be recorded on the **recording medium**.

Output signal level: $-20 \text{ dB}_{\text{FS}}$

4.4.3 Hardware condition

4.4.3.1 Standard medium setting

To prepare the measurement, test signals shall be recorded on the **standard medium**. These recorded signals are used for an input test signal.

The signal format and accuracies are specified in 4.6.1 of IEC 61606-1.

4.4.3.2 Other hardware settings

All settings shall be set according to the **factory setting** except for the settings, such as hardware volume control, necessary for certain specific measurements.