



**SLOVENSKI STANDARD**  
**SIST HD 337 S3:1999**

**01-julij-1999**

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**Analogue audio disk records and reproducing equipment (IEC 60098:1987)**

Analogue audio disk records and reproducing equipment

Analoge Schallplatten und -Abspielgeräte

Disques audio analogiques et appareils de lecture

**Ta slovenski standard je istoveten z: HD 337 S3:1989**

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**ANALOGUE AUDIO DISK RECORDS AND REPRODUCING  
 EQUIPMENT**

Disques audio analogiques et  
 appareils de lecture

Analoge Schallplatten und  
 -Abspielgeräte

**BODY OF THE HD**  
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The Harmonization Document consists of:

- IEC 98 (1987) ed 3; IEC/SC 60A, not appended

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This Harmonization Document was approved by CENELEC on 1989-08-01.

The English and French versions of this Harmonization Document are provided by the text of the IEC publication and the German version is the official translation of the IEC text.

According to the CENELEC Internal Regulations the CENELEC member National Committees are bound:

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to publish their new harmonized national standard by or before 1990-06-01

to withdraw all conflicting national standards by or before 1990-06-01.

Harmonized national standards are listed on the HD information sheet, which is available from the CENELEC National Committees or from the CENELEC Central Secretariat.

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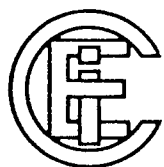
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**Analogue audio disk records and reproducing equipment**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## ANALOGUE AUDIO DISK RECORDS AND REPRODUCING EQUIPMENT

## 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 recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.
- 4) The IEC has not laid down any procedure concerning marking as an indication of approval and has no responsibility when an item of equipment is declared to comply with one of its recommendations.

## PREFACE

This standard has been prepared by Sub-Committee 60A: Sound recording, of IEC Technical Committee No. 60: Recording.

This third edition of IEC Publication 98 replaces the second edition published in 1964 and the First Supplement, Publication 98A, published in 1972.

The text of this standard is based on the following documents:

Six Months' Rule	Report on Voting
60A(CO)89	60A(CO)101

Full information on the voting for the approval of this standard can be found in the Voting Report indicated in the above table.

This standard should be read in conjunction with IEC Publication 38: Standard voltages, IEC Publication 65: Safety requirements for mains operated electronic and related apparatus for household and similar general use, IEC Publication 268-1: Sound system equipment, Part 1: General, IEC Publication 268-3: Sound system equipment, Part 3: Sound system amplifiers, IEC Publication 386: Method of measurement of speed fluctuations in sound recording and reproducing equipment, and IEC Publication 651: Sound level meters.

*The following IEC publications are quoted in this standard:*

- Publication Nos.
- 27: Letter symbols to be used in electrical technology.
  - 38 (1983): IEC standard voltages.
  - 50: International Electrotechnical Vocabulary (IEV).
  - 50 (806) (1975): Chapter 806: Recording and reproduction of sound and video.
  - 65 (1985): Safety requirements for mains operated electronic and related apparatus for household and similar general use.
  - 263 (1982): Scales and sizes for plotting frequency characteristics and polar diagrams.
  - 268-3 (1969): Sound system equipment, Part 3: Sound system amplifiers.

- 268-5 (1972): Part 5: Loudspeakers.  
386 (1972): Method of measurement of speed fluctuations in sound recording and reproducing equipment.  
417 (1973): Graphical symbols for use on equipment. Index, survey and compilation of the single sheets.  
581-3 (1978): High fidelity audio equipment and systems; Minimum performance requirements, Part 3: Record playing equipment and cartridges.  
651 (1979): Sound level meters.

*Other publications quoted:*

- ISO Standards 406 (1982): Technical drawings – Linear and angular tolerancing – Indications on drawings.  
1101 (1983): Technical drawings – Geometrical tolerancing – Tolerancing of form, orientation, location and run-out – Generalities, definitions, symbols, indications on drawings.

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## ANALOGUE AUDIO DISK RECORDS AND REPRODUCING EQUIPMENT

### 1. Scope

This standard applies to analogue audio disk records and the corresponding professional and domestic reproducing equipment. It excludes amplifiers and loudspeakers, methods of measurement for which can be found in IEC Publications 268-3 and 268-5 respectively. It also excludes all aspects of quality grading, which can be found in IEC Publication 581-3.

### 2. Object

This standard consists of three sections, the objects of which are as follows:

Section One lists all general information necessary to ensure correct interpretation of subsequent sections of this standard.

Section Two specifies the parameters which are necessary to ensure compatibility between analogue audio disk records and the corresponding reproducing equipment.

Section Three lists and defines the most important parameters affecting the performance of reproducing equipment, and establishes agreed methods of measurement for these parameters.

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### SECTION ONE - GENERAL

### 3. Definitions

The following definitions shall apply for the purposes of this standard. In cases where the definition appears in the International Electrotechnical Vocabulary (IEV) [IEC Publication 50], the appropriate reference is stated in brackets after the heading for the definition.

#### 3.1 *Monophonic record* (IEV 806-03-67)

A record which carries one channel of information in the form of lateral displacements of a spiral groove.

#### 3.2 *Stereophonic record* (IEV 806-03-68)

A record which carries two channels of information in the form of displacements of a single spiral groove in two mutually perpendicular directions.

#### 3.3 *Rated value*

Exact theoretical or target value of a given parameter.

#### 3.4 *Nominal value*

Approximate or abbreviated value of a given parameter.

### 3.5 Recorded velocity ( $v$ ) (modified IEC 806-04-56)

The alternating velocity imparted to a stylus tip of negligible dimensions fitted to a pickup head of negligible mechanical impedance when tracing the groove of a record rotating at rated angular velocity.

### 3.6 Reference recorded velocity ( $v_0$ )

A recorded velocity of specified magnitude at a specified frequency.

### 3.7 Recorded level (modified IEC 806-02-09)

Relationship between any recorded velocity ( $v$ ) and a reference recorded velocity ( $v_0$ ) expressed on a logarithmic scale as follows:

$$\text{Recorded level} = 20 \lg \left( \frac{v}{v_0} \right) \text{ dB}$$

### 3.8 Recording and reproducing chains

#### 3.8.1 Recording chain (IEC 806-01-05)

A chain for transmission of signals from the input of the system to and including the recording medium.

#### 3.8.2 Reproducing chain (IEC 806-01-09)

A chain for transmission of the signals from the recording medium to the output of the system.

### 3.9 Recording and reproducing characteristics

For ideal reproduction, the recording characteristic is the mirror image of the reproducing characteristic, so that constant level signals at various frequencies applied to the input of the recording chain shall result in constant level signals at the output of the reproducing chain.

For practical reproduction, in order to minimize the effects of mechanical imperfections in the reproducing chain, the rated reproducing characteristic is not the mirror image of the rated recording characteristic at low frequencies.

#### 3.9.1 Recording characteristic (modified IEC 806-02-11)

The recorded levels obtained, as a function of frequency, when constant level signals at various frequencies are applied to the input of a recording chain.

#### 3.9.2 Reproducing characteristic (modified IEC 806-02-14)

The reproduced (output) levels obtained, as a function of frequency, when constant recorded levels at various frequencies are applied to the input of a reproducing chain.

### 3.10 Plain groove (IEC 806-03-14)

Any length of groove which carries no recording.

### 3.11 Lead-in groove (modified IEC 806-03-16)

The length of plain groove that starts near the periphery of the record and the pitch of which is greater than the normal recording pitch.

### 3.12 *Recorded surface* (modified IEV 806-03-26)

The portion of the surface of a record on which the groove spacing is at normal recording pitch except on marker spaces, if any.

### 3.13 *Marker space* (IEV 806-03-29)

A portion of the recorded surface where the groove pitch has been increased to mark the separation of two successive bands of recording.

### 3.14 *Lead-out groove* (modified IEV 806-03-17)

The length of plain groove which succeeds the recorded surface, and the pitch of which is greater than the normal recording pitch.

### 3.15 *Finishing groove* (modified IEV 806-03-18)

The plain circular groove which succeeds the lead-out groove.

### 3.16 *Tracking force*

The static force between stationary record and reproducing stylus when in the playing position.

## 4. Units and symbols

Unless otherwise stated, the letter symbols for quantities and units are in accordance with IEC Publication 27.

## 5. Drawings

Unless otherwise stated, the drawings are given in accordance with IEC and ISO standards. Amongst the most important of these are ISO Standards 406 and 1101.

## 6. Scales for graphical presentation of data

### 6.1 *General*

Linear or logarithmic scales are recommended for graphical presentation. Linear decibel scales are equivalent to logarithmic scales. Other kinds of scale, such as double logarithmic, should be avoided. When using decibel scales, the zero reference should, if possible, be the rated value. In those cases, where each of the scales refers directly to physical units, it is recommended to avoid a combination of linear and logarithmic scales.

Where quantities represented by abscissae and ordinates are of the same kind, it is recommended that the same unit length be used for both.

Linear scales with remote zero point should be avoided as far as possible.

For further information see IEC Publication 263.

### 6.2 *Scales for frequency characteristics*

Graphs should be drawn with frequency in hertz as abscissae on a logarithmic scale, and the level expressed in decibels as ordinates on a linear scale.

The scale ratio should be such that the length representing one decade of frequency is the same as the length representing 25 dB or 50 dB difference in level. The preferred length per decade is 50 mm.

If the size of the graph is changed, the scale ratio should be left unaltered.

## SECTION TWO – COMPATIBILITY BETWEEN ANALOGUE AUDIO DISK RECORDS AND REPRODUCING EQUIPMENT

### 7. The disk

#### 7.1 Types of disk record

The following types of disk record shall be standard:

Type designation	Nominal diameter (cm)	Nominal speed (rev/min)
3033	30	33
2533	25	33
1733	17	33
3045	30	45
1745	17	45

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#### 7.2 Dimensions of disks

The dimensions for types 3033, 2533 and 3045 are shown in Figure 4, page 53.

The dimensions for types 1733 and 1745 are shown in Figure 5, page 55.

#### 7.3 Unbalance of disk

The centre of gravity of disks having a small centre hole shall lie within an 8 mm diameter circle concentric with the centre of the centre hole.

#### 7.4 Direction of rotation

The direction of rotation of the disk shall be clockwise when viewed from the side being reproduced.

#### 7.5 Direction of recording

The direction of recording shall be such that, on reproduction, the pickup shall travel as closely as possible along a straight line towards the centre of the disk.

#### 7.6 Speed of rotation

The speed of rotation during recording shall be within  $\pm 0.5\%$  of the rated recording speed, the rated recording speed being such as to give the intended musical pitch at one of the following rated reproducing speeds:

33 $\frac{1}{3}$  rev/min: for disk record types 3033, 2533 and 1733,

45 rev/min: for disk record types 3045 and 1745.

*Note.* – Verification of reproducing speed by means of stationary stroboscopic bars in countries employing 50 Hz electric supplies can be made at 45.11 rev/min only (see Sub-clause 14.2.1).

## 8. The groove

### 8.1 Direction of groove modulation

The stereophonic groove shall carry two channels of information. The two channels shall be recorded in such a manner that they can be reproduced by movements of a reproducing stylus tip in two directions at 90° to each other, and at 45° to a radial line through the stylus tip and the centre of the record; these movements shall be tangential to, or lie in a plane through the stylus tip and the record centre, inclined at an angle of 20+5° anticlockwise to the normal to the record surface through the stylus tip as viewed towards the record centre (vertical tracking angle). The resulting modulation shall be optimum for reproducing styli having a rake angle of between 0 and – 5° (see Figure 1, page 49).

The monophonic groove shall carry one channel of information. It shall be recorded on both groove walls in such a manner that it can be reproduced by lateral movements of a stylus tip as described above.

### 8.2 Arrangement of stereophonic channels

#### 8.2.1 Channel orientation

The right-hand channel, as viewed by the audience, shall be recorded on the outer groove wall, the left-hand channel on the inner groove wall.

#### 8.2.2 Channel phasing

The phasing of the two recorded signals shall be suitable for reproduction on two-channel equipment so connected that movement of the reproducing stylus tip along the radial line through stylus tip and disk centre (as with a monophonic record) produces in-phase sound pressures at the left and right-hand loudspeakers.

#### 8.2.3 Channel levels

The levels of the two recorded signals shall be suitable for reproduction on two-channel equipment, of identical channel gain, so connected that movement of the reproducing stylus along the radial line through the stylus tip and disk centre (as with a monophonic record) produces equal sound pressures at the left and right-hand loudspeakers.

#### 8.2.4 Channel polarity

The polarity of the two recorded signals should preferably be suitable for reproduction on two-channel equipment so connected that movement of the reproducing stylus tip along the radial line through stylus tip and disk centre in a direction away from the disk centre shall produce compression in front of the left and right-hand loudspeakers similar to that produced by the live programme source.

### 8.3 Groove dimensions

Instantaneous top width:	0.030 mm minimum
Bottom radius:	0.008 mm maximum
Included angle:	90 ± 5°