

Videodisks

Methods of measurement for parameters

The European Standard EN 61106 : 1993 has the status of a
British Standard

Vidéodisques
Méthodes de mesure des paramètres

Videoplatten
Meßverfahren der Eigenschaften

UDC 621.397.456 : 621.317.083

Cooperating organizations

The European Committee for Electrotechnical Standardization (CENELEC), under whose supervision this European Standard was prepared, comprises the national committees of the following countries.

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Belgium	Luxembourg
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Greece	Sweden
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National foreword

This British Standard has been prepared under the direction of the Electronic Equipment Standards Policy Committee and is the English language version of EN 61106 : 1993 *Videodisks — Methods of measurement for parameters*, published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC 1106 : 1993, published by the International Electrotechnical Commission (IEC).

References to page numbers in the text relate to the IEC page numbers in brackets at the bottom of each page.

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Videodisks — Methods of measurements for parameters (IEC 1106 : 1993)

Vidéodisques — Méthodes de mesure des
paramètres
(CEI 1106 : 1993)

Videoplatten —
Meßverfahren der Eigenschaften
(CEI 1106 : 1993)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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CENELEC

European Committee for Electrotechnical Standardization
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Documents

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Foreword

The text of document 60B(CO)134, as prepared by Sub-Committee 60B: Video recording of IEC Technical Committee 60: Recording, was submitted to the IEC-CENELEC parallel vote in August 1991.

The reference document was approved by CENELEC as EN 61106 on 6 July 1993.

The following dates were fixed:

- latest date of publication
of an identical national
standard (dop) 1994-07-01
- latest date of withdrawal
of conflicting national
standards (dow) 1994-07-01

Annexes designated 'normative' are part of the body of the standard. In this standard, annexes A, B, C, D, E, F, G, H, J, K, L, M, N, P, Q, R, S, T, U and ZA are normative.

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INTRODUCTION

Two videodisk systems are covered by the IEC publications quoted in clause 2. In order to play back these two types of videodisks it is necessary to use an optical pick-up device for the optical system and a capacitance pick-up device for the capacitance system. These videodisks are characterized by mechanical, electrical and optical parameters for which measuring methods are unknown.

VIDEODISKS – METHODS OF MEASUREMENT FOR PARAMETERS

1 Scope

This International Standard collects the different typical parameters for videodisks described in IEC 844, 845, 856 and 857 and proposes a method of measurement for each.

Some of these parameters can be measured by well known methods existing in every laboratory, whilst other parameters need specific equipment described in the annexes.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 844: 1988, *Pre-recorded capacitance grooveless videodisk system. 50 Hz/625 lines – PAL, on Type VHD*

IEC 845: 1988, *Pre-recorded capacitance grooveless videodisk system. 60 Hz/525 lines – NTSC, on Type VHD*

IEC 856: 1986, *Pre-recorded optical reflective videodisk system. «Laser vision» 50 Hz/625 lines – PAL*

IEC 857: 1986, *Pre-recorded optical reflective videodisk system. «Laser vision» 60 Hz/525 lines – M/NTSC*

3 List of parameters and their applications

		Applies to	Classification (note 2)
3.1 Mechanical parameters			
3.1.1	Thickness of protective transparent layer	LV, (note 1)	(3)
3.1.2	Thickness of disk areas	LV, VHD	(1)
3.1.3	Outer radius of disk	LV, VHD	(1)
3.1.4	Diameter of center hole	LV, VHD	(1)
3.1.5	Concentricity of disk assembled from two single disks	LV	(1)
3.1.6	Inside diameter of label	LV	(1)
3.1.7	Outside diameter of label	LV	(1)

For the notes, see page 13.

	Applies to	Classification (note 2)
3.1.8	Rotation speed	
3.1.8.1	Angular velocity of CAV* disk	LV, VHD (3)
3.1.8.2	Linear velocity of CLV** disk	LV (3)
3.1.8.3	Angular acceleration for CLV disk	LV (3)
3.1.9	Mass of the disk	LV (1)
3.1.10	Maximum unbalance force	LV, VHD (1)
3.1.11	Starting radius lead-in tracks	LV, VHD (1)
3.1.12	Starting radius programme area	LV, VHD (1)
3.1.13	End radius programme area and starting position of lead-out tracks	LV, VHD (1)
3.1.14	Minimum number of programme tracks	LV (1)
3.1.15	Length of lead-out tracks	LV (1)
3.1.16	Inner radius programme end signal area	VHD (1)
3.1.17	Track pitch	LV, VHD (3)
3.1.18	Width and depth of information track	VHD (3)
3.1.19	Width and depth of pilot signal track	VHD (3)
3.1.20	Vertical deviation of programme tracks during playback	
3.1.20.1	Maximum distance from reference plane	LV, VHD (3)
3.1.20.2	Maximum vertical acceleration	LV, VHD (3)
3.1.20.3	Maximum vertical deviation	LV, VHD (3)
3.1.20.4	Maximum velocity	LV (3)
3.1.21	Maximum static deflection of disk	LV, VHD (1)
3.1.22	Radial deviation of programme tracks during playback	LV, VHD (1)
3.1.22.1	Maximum deviation during one revolution	LV, VHD (3)
3.1.22.2	Maximum radial deviation	LV, VHD (3)
3.1.22.3	Maximum radial acceleration	LV, VHD (3)
3.1.23	Tangential deviation of programme tracks	
3.1.23.1	Maximum time base error	LV, VHD (3)
3.1.23.2	Shift between two adjacent tracks	LV, VHD (3)
3.1.24	Disk case	VHD (1)

* Constant Angular Velocity.

** Constant Linear Velocity.

Note 2, see page 13.

		Applies to	Classification (note 2)
3.2	Disk material parameters		
3.2.1	Refractive index	LV	(1)
3.2.2	Birefringence of transparent disk	LV	(3)
3.2.3	Reflectivity	LV	(1)
3.2.4	Surface resistivity	VHD	(2)
3.3	Recorded parameters		
3.3.1	Audio subcarrier amplitude and EFM (note 3) amplitude	LV, VHD	(1)
3.3.2	Audio subcarrier frequencies, channels 1 and 2	LV, VHD	(1)
3.3.3	Audio subcarrier frequency maximum deviation	LV, VHD	(1)
3.3.4	Video signal standards (visual check), color burst, VIRS (note 3), ITS (note 3), address signals	LV, VHD	(1)
3.3.5	Maximum video level	LV, VHD	(1)
3.3.6	Blanking level frequency	LV, VHD	(1)
3.3.7	Main carrier deviation	LV, VHD	(1)
3.3.8	Pilot frequency	VHD	(1)
3.3.9	Pre-emphasis audio and video		
3.3.9.1	Pre-emphasis audio	LV, VHD	(1)
3.3.9.2	Pre-emphasis video	LV, VHD	(1)
3.3.10	Digital data encoding format correctness	LV, VHD	(1)
3.4	Operation signals		
3.4.1	Radial signal		
3.4.1.1	Radial modulation index	LV	(3)
3.4.1.2	Radial reflection index	LV	(3)
3.4.1.3	Radial signal to error ratio	LV	(3)
3.4.2	Push-pull tracking signal		
3.4.2.1	Magnitude	LV	(3)
3.4.2.2	Noise	LV	(3)
3.4.3	Tangential signal		
3.4.3.1	Drop outs	LV, VHD	(3)
3.4.3.2	Signal to noise ratio	LV	(3)
3.4.4	High frequency modulation index	LV	(3)

NOTES

- 1 LV Laser vision
- 2 (1) Parameters which can be measured by conventional techniques.
(2) Parameters for which specific methods exist with an IEC definition.
(3) Parameters of videodisk technology which need specific attention.
- 3 EFM Eight to Fourteen Modulation.
VIRS Vertical Interval Reference Signal.
ITS International Test Signal.

4 Standard atmospheric conditions for testing

Measurements and mechanical checks shall be carried out at any combination of temperature, humidity and air pressure within the following limits unless otherwise specified for certain parameters in IEC 844, 845, 856 and 857:

Ambient temperature: 15 °C to 35 °C;
Relative humidity: 45 % to 75 %;
Air pressure: 86 kPa to 106 kPa.

Samples shall be conditioned in the testing environment for 24 h before testing.

Table 1 – Measuring items

Parameters		LV	VHD
3.1 Mechanical parameters			
3.1.1	Thickness of protective transparent layer	Annex A	—
3.1.2	Thickness of disk areas	A disk may be measured with sufficient accuracy by means of general measuring instruments such as a dial gauge, thickness gauge, caliper, and plug gauge	
3.1.3	Outer radius of disk		
3.1.4	Diameter of centre hole		
3.1.5	Concentricity of disk assembled from two single disks		—
3.1.6	Inside diameter of label		
3.1.7	Outside diameter of label		
3.1.8	Rotation speed		
3.1.8.1	Angular velocity of CAV disk	Annex B	
3.1.8.2	Linear velocity of CLV disk		—
3.1.8.3	Angular acceleration for CLV disk	Conventional method	—
3.1.9	Mass of the disk	A disk shall be measured on a dynamic balancing machine with a specified rotation speed	
3.1.10	Maximum unbalance force		
3.1.11	Starting radius lead-in tracks	Annex C	
3.1.12	Starting radius programme area		
3.1.13	End radius programme area and starting position of lead-out tracks		
3.1.14	Minimum number of programme tracks		—
3.1.15	Length of lead-out tracks		
3.1.16	Inner radius programme end signal	—	Annex C

Table 1 (continued)

Parameters		LV	VHD
3.1.17	Track pitch	Optical microscope (measure mean track pitch)	
3.1.18	Width and depth of information track	—	Annex D
3.1.19	Width and depth of pilot signal track		
3.1.20	Vertical deviation of programme tracks during playback		
3.1.20.1	Maximum distance from reference plane	Annex F	Annex E
3.1.20.2	Maximum vertical acceleration		—
3.1.20.3	Maximum vertical deviation		
3.1.20.4	Maximum velocity		
3.1.21	Maximum static deflection of disk	Mechanical method	
3.1.22	Radial deviation of programme tracks during playback		
3.1.22.1	Maximum deviation during one revolution	Annex H	Annex G
3.1.22.2	Maximum radial deviation		
3.1.22.3	Maximum radial acceleration		
3.1.23	Tangential deviation of programme tracks	Annex K	Annex J
3.1.23.1	Maximum time base error	Special test disk will be required for this measurement. Conventional disk under consideration.	
3.1.23.2	Shift between two adjacent tracks		
3.1.24	Disk case	—	Conventional method
3.2 Disk material parameters			
3.2.1	Refractive index	Conventional method	—
3.2.2	Birefringence of transparent disk	Annex L	—
3.2.3	Reflectivity	Conventional method	—
3.2.4	Surface resistivity	—	IEC 93

Table 1 (concluded)

Parameters		LV	VHD
3.3 Recorded parameters		Optical microscope (measure mean track pitch)	
3.3.1	Audio subcarrier amplitude and EFM amplitude	Annex M	
3.3.2	Audio subcarrier frequencies, channels 1 and 2	Annex N	
3.3.3	Audio subcarrier frequency maximum deviation	Special test disk will be required for this measurement	
3.3.4	Video signal standards (visual check), color burst, VIRS, ITS, address signals	Verify the location of each test signal by use of waveform monitor	—
3.3.5	Maximum video level	Annex P	
3.3.6	Blanking level frequency	Annex Q	
3.3.7	Main carrier deviation	Annex R	
3.3.8	Pilot frequency	—	Under consideration
3.3.9	Pre-emphasis audio and video		
3.3.9.1	Pre-emphasis audio	Annex S	
3.3.9.2	Pre-emphasis video	Annex T	Under consideration
3.3.10	Digital data encoding format correctness	Digital data can be measured on a waveform monitor or video monitor at vertical blanking time interval	
3.4 Operation signals			
3.4.1	Radial signal		
3.4.1.1	Radial modulation index	Annex U	—
3.4.1.2	Radial reflection index		
3.4.1.3	Radial signal to error ratio		
3.4.2	Push-pull tracking signal		
3.4.2.1	Magnitude	Annex U	—
3.4.2.2	Noise		
3.4.3	Tangential signal		
3.4.3.1	Drop outs	Annex U	
3.4.3.2	Signal to noise ratio		—
3.4.4	High frequency modulation index		

Annex A (normative)

Thickness of protective transparent layer

A.1 Application

This measuring method shall be applied.

Parameter	Applies to	
3.1.1 Thickness of protective transparent layer	LV	—

A.2 Measuring apparatus

Microscope.

A.3 Measurement

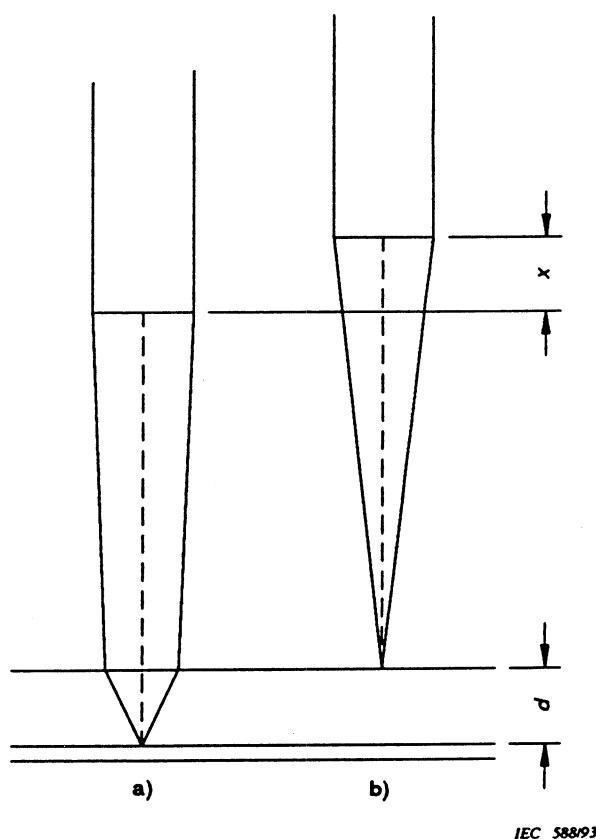
The difference between the positions (a) and (b) of the microscope objective (see figure A.1) is x .

(a) The microscope is focused on the information layer.

(b) The microscope is focused on the surface of the transparent layer.

The refractive index of the disk material is n .

The thickness of the transparent layer is $d = x/n$.



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Figure A.1 – Measuring method

Annex B (normative)

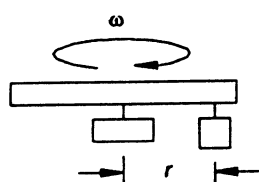
Rotation speed

B.1 Application

This measuring method shall be applied.

Parameters	Applies to	
3.1.8.1 Angular velocity of CAV disk	LV	VHD
3.1.8.2 Linear velocity of CLV disk	LV	—
3.1.8.3 Angular acceleration of CLV disk	LV	—

B.2 Measuring apparatus



Modified videodisk player
Optical stylus or standard pick-up radius r (m)

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ω is the progressive average over one revolution (rad/s).

The measuring equipment is a modified videodisk player provided with an indication of the motor angular velocity ω in radians per second and with an indication of the distance r , in metres from the optical stylus or standard pick-up to the geometric centre of the centre hole.

These parameters and their time dependent changes give the possibility of recording the angular velocity of a CAV disk, the linear velocity of a CLV disk, and the angular acceleration of a CLV disk at any radius of the disk.

When a modified videodisk player delivers a coloured picture to a TV set, the spindle motor has the correct angular velocity

$$\omega = 2\pi f$$

where f is the frequency.

B.3 Measurement

B.3.1 (3.1.8.1) Angular velocity of CAV disk

Frequency	LV	VHD
NTSC	29,97 Hz	14,985 Hz
PAL	25 Hz	12,5 Hz

B.3.2 (3.1.8.2) Linear velocity of CLV disk (for LV)

$$v = \omega \times r$$

B.3.3 (3.1.8.3) Angular acceleration of CLV disk (for LV)

$$\alpha = \frac{d\omega}{dt}$$

Annex C (normative)

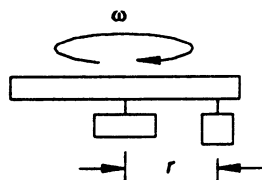
Track position and number

C.1 Application

This measuring method shall be applied.

Parameters	Applies to	
3.1.11 Starting radius lead-in tracks	LV	VHD
3.1.12 Starting radius programme area	LV	VHD
3.1.13 End radius programme area	LV	VHD
3.1.14 Minimum number of programme tracks	LV	—
3.1.15 Length of lead-out tracks	LV	—
3.1.16 Inner radius programme end signal	—	VHD

C.2 Measuring apparatus



Modified videodisk player
Optical stylus or standard pick-up radius r (m)

IEC 589/93

The measuring equipment is a modified videodisk player provided with an indication of the distance r , in metres, from the optical stylus or standard pick-up to the geometric centre of the centre hole.

The signal from the video output is fed into a video waveform monitor.

C.3 Measurement

C.3.1 (3.1.11) Starting radius lead-in tracks

When the lead-in code is present for the first time in the vertical interval control and address signals, the average radius of this track (r , in metres) gives the start position of the lead-in tracks.

C.3.2 (3.1.12) Starting radius programme area

When the picture or time code is present for the first time in the control and address signals, the average radius of this track (r , in metres) gives the starting radius of the programme area.