SLOVENSKI STANDARD
SIST EN 29171-2:1997

01-december-1997

Information technology - 130 mm optical disk cartridge, write once, for information interchange - Part 2: Recording format (ISO/IEC 9171-2:1990)

Information technology - 130 mm optical disk cartridge, write once, for information interchange - Part 2: Recording format (ISO/IEC 9171-2:1990)

Informationstechnik - 130 mm Optische Plattenspeicher - Einmal beschreibbar, für den Informationsaustausch - Teil 2: Aufzeichnungsformat (ISO/IEC 9171-2:1990)

Technologies de l'information - Cartouche de disque optique de 130 mm, non-réinscriptible, pour l'échange d'information - Partie 2: Format d'enregistrement (ISO/IEC 9171-2:1990)

Ta slovenski standard je istoveten z: **EN 29171-2:1993**

ICS:

35.220.30	Optiļ ne shranjevalne naprave	Optical storage devices

SIST EN 29171-2:1997 **en**

EUROPEAN STANDARD

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EN 29171-2:1993

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Descriptors: Data processing, information interchange, document storage, optical disks, packing, data recording, recording tracks, data layout

English version

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This European Standard was approved by CEN on 1993-02-09. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

Ref. No. EN 29171-2:1993 E

Foreword

The Technical Board has decided to submit the International Standard

ISO/IEC 9171-2:1990 "Information technology - 130 mm optical disk cartridge, write once, for information interchange - Part 2: Recording format"

for formal vote.

The result of the formal vote was positive.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 1993, and conflicting national standards shall be withdrawn at the latest by September 1993.

In accordance with the Common CEN/CENELEC Rules, the following countries are bound to implement this European Standard:

Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of this European Standard is identical to the text of the International Standard ISO/IEC 9171-2:1990 without any modifications.

INTERNATIONAL STANDARD

ISO/IEC 9171-2

First edition
1990-12-15

Information technology — 130 mm optical disk cartridge, write once, for information interchange —

Part 2: Recording format

Technologies de l'information — Cartouche de disque optique de 130 mm, non-réinscriptible, pour l'échange d'information —
Partie 2: Format d'enregistrement

Reference number
ISO/IEC 9171-2 : 1990 (E)

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FOREWORD

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 9171-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

ISO/IEC 9171 consists of the following parts, under the general title: *Information technology — 130 mm optical disk cartridge, write once, for information interchange*:

Part 1: Unrecorded optical disk cartridge

Part 2: Recording format

Annexes B and C form an integral part of this of this part of ISO/IEC 9171. Annexes A and D are for information only.

INTRODUCTION

ISO/IEC 9171 specifies the characteristics of 130 mm optical disk cartridges (ODC) of the type providing for information to be written once and read many times.

ISO/IEC 9171-1 specifies

- definitions of the essential concepts;
- the environment in which the characteristics are to be tested;
- the environment in which the cartridge is to be operated and stored;
- the mechanical, physical and dimensional characteristics of the case and of the optical disk;
- the optical characteristics and the recording characteristics for recording the information once and for reading it many times, so as to provide physical interchangeability between data processing systems.

ISO/IEC 9171-1 and ISO/IEC 9171-2, together with a standard for volume and file structure, provide for full data interchange between data processing systems.

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Information technology — 130 mm optical disk cartridge, write once, for information interchange —

Part 2:
Recording format

1 Scope

This part of ISO/IEC 9171 specifies two formats for the physical disposition of the tracks and sectors, the error correction codes, the modulation methods used for recording and the quality of the recorded signals.

2 Conformance

An optical disk is in conformance with Part 2 of this International Standard if it meets all mandatory requirements of clause 4 and either those of clause 5 or those of clause 6.

A prerequisite for conformance with this part of ISO/IEC 9171 is conformance with ISO/IEC 9171-1.

3 Conventions and notations

The following conventions and notations apply in this part of ISO/IEC 9171.

a) In each field the information is recorded so that the most significant byte (byte 0) is recorded first. Within each byte the least significant bit is numbered bit 0, the most significant bit (i.e. bit 7 in an 8-bit byte) is recorded first. This order of recording applies also to the data input of the error-correcting codes, to the cyclic redundancy code, and to their code output.

b) Unless otherwise stated, numbers are expressed in binary notation. Where hexadecimal notation is used, the hexadecimal digits are shown between parentheses.

c) Bit combinations are shown with the most significant bit to the left.

d) Negative values are expressed in TWO's complement notation.

e) The setting of bits is denoted by ZERO and ONE.

f) The name of entities, e.g. specific tracks, fields, etc., is shown with a capital initial.

g) List of Acronyms

ALPC	Auto Laser Power Control
AM	Address Mark
CAV	Constant Angular Velocity
CRC	Cyclic Redundancy Check
DDS	Disk Definition Structure
DMP	Defect Management Pointers
DMT	Defect Management Track
ECC	Error Correction Code
ID	Identifier
ODC	Optical Disk Cartridge
ODF	Offset Detection Flag
PA	Postamble
PEP	Phase-Encoded Part
RLL (2,7)	Run Length Limited (Code)

R-S	Reed-Solomon (Code)
R-S/LDC	Reed-Solomon Long Distance Code
SFP	Standard Formatted Part
SM	Sector Mark
VFO	Variable Frequency Oscillator
4/15(Modulation)	Conversion table of 8-bit bytes to 15-Channel bit representation on the disk

4 Features common to both formats

4.1 Track Geometry

4.1.1 Track shape

Each track shall form a 360° turn of a continuous spiral.

4.1.2 Direction of rotation

The disk shall rotate counter-clockwise as viewed by the objective lens. The tracks shall spiral outward.

4.1.3 Track pitch

Except in the PEP Zone, the track pitch shall be:

For Format A : 1,60 µm ± 0,10 µm
For Format B : 1,50 µm ± 0,08 µm

4.1.4 Track number

Each track shall be identified by a track number.

Track 0 shall be located at radius 30,00 mm ± 0,10 mm.

The track numbers of tracks located at radii larger than that of track 0 shall be increased by 1 for each track.

The track numbers of tracks located at radii smaller than that of track 0 shall be negative and decrease by 1 for each track. Track-1 shall be identified by (FFFF).

4.2 Formatted Zone

The Formatted Zone shall extend from radius 27,00 mm to radius 61,00 mm and shall be divided as follows. The following dimensions are given as reference only and are nominal values.

- Reflective Zone	27,00 mm to 29,00 mm
- Control Track PEP Zone	29,00 mm to 29,50 mm
- Transition Zone For SFP	29,50 mm to 29,52 mm
- Inner Control Track SFP Zone	29,52 mm to 29,70 mm
- Inner Manufacturer Zone	29,70 mm to 30,00 mm
. Guard Band	29,70 mm to 29,80 mm
. Manufacturer Test Zone	29,80 mm to 29,90 mm
. Guard Band	29,90 mm to 30,00 mm
- User Zone	30,00 mm to 60,00 mm
- Outer Manufacturer Zone	60,00 mm to 60,15 mm
- Outer Control Track SFP Zone	60,15 mm to 60,50 mm
- Lead-Out Zone	60,50 mm to 61,00 mm

This part of ISO/IEC 9171 does not specify the format of the Reflective Zone, except that it shall have the same recording layer as the remainder of the Formatted Zone.

The Transition Zone For SFP is an area in which the format changes from the PEP Zone without servo information to a zone including servo information.

The Inner Manufacturer Zone is provided to allow the media manufacturer to perform tests on the disk, including write operations, in an area located away from recorded information. In this zone the information in the tracks from track-1 to track-8 is not specified by this part of ISO/IEC 9171 and shall be ignored in interchange, except when using format B where track-2 is used for defect management.

The purpose of the Guard Bands is to protect and buffer the areas that contain information from accidental damage when the area between the Guard Bands is used for testing or calibration of the optical system.

The User Zone shall start with track 0 and end with track N.

The Outer Manufacturer Zone shall comprise 95 tracks and shall begin one track after the last user track (track N, see bytes 384 and 385 of the SFP Zone). In this zone the information in the tracks from track (N + 1) to track (N + 8) is not specified by this part of ISO/IEC 9171 and shall be ignored in interchange.

The Outer Control Track SFP Zone shall begin at track N + 96 (see bytes 8 and 9 in the SFP Zone) and shall continue up to radius 60,5 mm.

The Lead-Out Zone is used for the manufacturing purposes and shall not be used for write, read or positioning purposes.

From radius 29,52 mm to radius 61,00 mm the Formatted Zone shall be provided with tracks containing servo and address information.

4.3 Control tracks

The three zones

- Control Track PEP Zone
- Inner Control Track SFP Zone
- Outer Control Track SFP Zone

shall be assigned for recording control track information.

The control track information shall be recorded in two different formats, the first format in the Control Track PEP Zone, and the second in the Inner and Outer Control Track SFP Zones.

The Control Track PEP Zone shall be recorded using low frequency phase-encoded modulation.

The Inner and Outer Control Track SFP Zones shall each consist of a band of tracks recorded by the same modulation method and format as is used in the User Zone.

4.4 Control Track PEP Zone

This zone shall not contain any servo information. All information in it shall be pre-recorded in phase-encoded modulation. The marks in all tracks of the PEP Zone shall be radially aligned, so as to allow information recovery from this zone without radial tracking being established by the drive.

4.4.1 Recording in the PEP Zone

In the PEP Zone there shall be 561 to 567 PEP bit cells per revolution. A PEP bit cell shall be 656 ± 1 Channel bits long. A PEP bit is recorded by writing marks in either the first or the second half of the cell.

A mark shall be nominally two Channel bits long and shall be separated from adjacent marks by a space of nominally two Channel bits.

A ZERO shall be represented by a change from marks to no marks at the centre of the cell and a ONE by a change from no marks to marks at this centre.

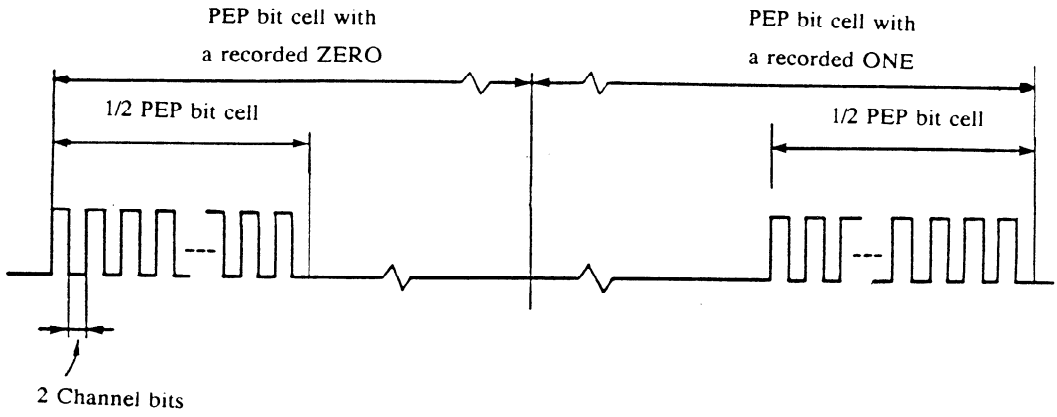

Figure 1 - Example of phase-encoded modulation in the PEP Zone

4.4.2 Cross-track loss

The density of tracks and the shape of marks in the PEP Zone shall be such that the cross-track loss shall meet the requirements:

$$\left(\frac{I_{mmax}}{I_{mmin}}\right) \leq 2,0$$

The signal I_m is the maximum amplitude in a group of three successive marks. I_{mmax} is the maximum value and I_{mmin} is the minimum value of I_m obtained over one revolution. I_{mmax} shall be greater than 0,4 I_o. The effect of defects shall be ignored.

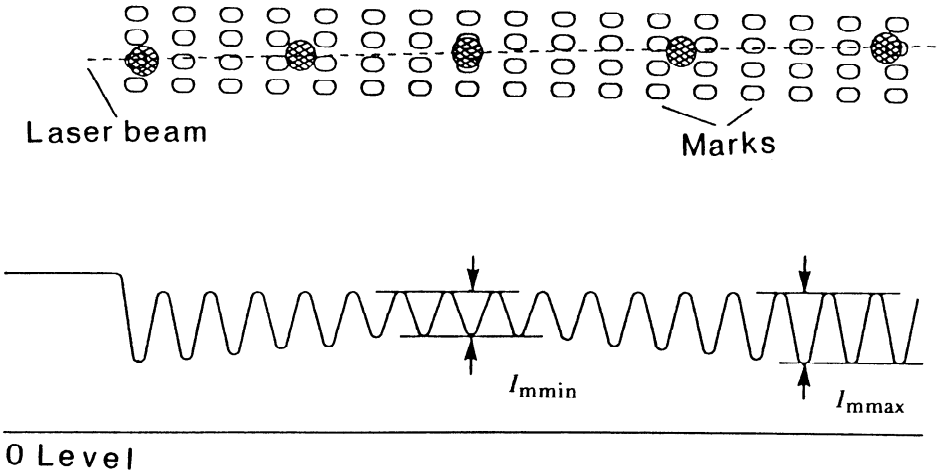

Figure 2 - Path of the laser beam crossing tracks, and the resulting PEP signals

4.4.3 Format of the tracks of the PEP Zone

Each track in the PEP Zone shall have three sectors as shown in figure 3. The numbers below the fields indicate the number of PEP bits in each field.

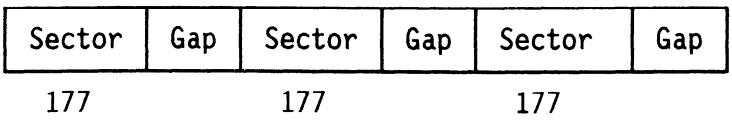

Figure 3 - Track format in the PEP Zone

The gaps between sectors shall be unrecorded areas having a length corresponding to 10 to 12 PEP bit cells.

4.4.3.1 Format of a sector

Each sector of 177 PEP bits shall have the following layout.

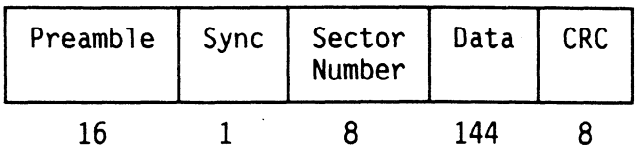

Figure 4 - Sector Format in the PEP Zone

4.4.3.1.1 Preamble

This field shall consist of 16 ZERO bits.

4.4.3.1.2 Sync

This field shall consist of 1 ONE bit.

4.4.3.1.3 Sector Number

This field shall consist of eight bits specifying the sector number in binary notation from 0 to 2.

4.4.3.1.4 Data

This field shall comprise 18 8-bit bytes numbered 0 to 17. These bytes shall specify the following.

Byte 0

Bit 7 — when set to ZERO shall mean Format A,
when set to ONE shall mean Format B.

Bits 6 to 4 — shall be set to 000 indicating a constant angular velocity (CAV).

Other settings of these bits are prohibited by this part of ISO/IEC 9171 (see also Annex A).

Bit 3 — shall be set to ZERO

Bits 2 to 0 — when set to 000 shall mean RLL (2,7) mark position modulation,
when set to 100 shall mean 4/15 modulation.

Other settings of these bits are prohibited by this part of ISO/IEC 9171.

Byte 1

Bit 7 — shall be set to ZERO