
**Information processing systems — Data
interchange on 90 mm (3,5 in) flexible disk
cartridges using modified frequency modulation
recording at 15 916 ftprad, on 80 tracks on each
side —**
STANDARD PREVIEW
(Part 2: standards.iteh.ai)
Track format

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*Systèmes de traitement de l'information — Échange de données sur cartouches à
disquette de 90 mm (3,5 in) utilisant un enregistrement à modulation de fréquence
modifiée à 15 916 ftprad sur 80 pistes sur chaque face —*

Partie 2: Schéma de piste



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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) together form a system for worldwide standardization as a whole. 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 approval before their acceptance as International Standards. They are approved in accordance with procedures requiring at least 75 % approval by the national bodies voting.

[ISO/IEC 9529-2:1989](https://standards.iso.org/iso/iec/9529-2:1989)

International Standard ISO/IEC 9529-2 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*.

Introduction

ISO/IEC 9529 specifies the characteristics of 90 mm (3,5 in) flexible disk cartridges recorded at 15 916 ftprad using modified frequency modulation recording, on 80 tracks on each side. ISO/IEC 9529-1 specifies the dimensional, physical and magnetic characteristics of the cartridge, so as to provide physical interchangeability between data processing systems.

ISO/IEC 9529-1 and ISO/IEC 9529-2, together with the labelling scheme specified in ISO 9293, provide for full data interchange between data processing systems.

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Information processing systems – Data interchange on 90 mm (3,5 in) flexible disk cartridges using modified frequency modulation recording at 15 916 ftprad, on 80 tracks on each side –

Part 2: Track format

1 Scope

This part of ISO/IEC 9529 specifies the track layout, the track format and the characteristics of the recorded signals.

NOTE - Numeric values in the SI and/or Imperial measurement system in this part of ISO/IEC 9529 may have been rounded off and therefore are consistent with, but not exactly equal to, each other. Either system may be used, but the two should be neither intermixed nor reconverted. The original design was made using SI units.

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2 Conformance

A 90 mm (3,5 in) flexible disk cartridge is in conformance with this Part of ISO/IEC 9529 if it meets all mandatory requirements specified herein.

A prerequisite for conformance with this part of ISO/IEC 9529 is conformance with ISO/IEC 9529-1.

3 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 9529. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 9529 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

- ISO 646:1983, *Information processing - ISO 7-bit coded character set for information interchange.*
- ISO 2022:1986, *Information processing - ISO 7-bit and 8-bit coded character sets - Code extension techniques.*
- ISO 4873:1986, *Information processing - ISO 8-bit code for information interchange - Structure and rules for implementation.*
- ISO 6429:1988, *Additional control functions for (7-bit and 8-bit coded) character-sets.*
- ISO 8859:1987 *Information processing - 8-bit single-byte coded graphic character sets.*
- ISO 9293:1987 *Information processing - Volume and file structure of flexible disk cartridges for information interchange.*

4 General requirements

4.1 Mode of recording

The mode of recording shall be Modified Frequency Modulation (MFM) for which the conditions are:

- a flux transition shall be written at the centre of each bit cell containing a ONE;
- a flux transition shall be written at each cell boundary between consecutive bit cells containing ZEROs.

An exception to this is defined in 4.12.

4.2 Track location tolerance of the recorded flexible disk cartridge

For the purposes of this part of ISO/IEC 9529 the nominal track locations specified in sub clause 9.2.3.1 of ISO/IEC 9529-1 require compensation for the actual temperature using the nominal value of the thermal coefficient of expansion specified in sub clause 8.2 of ISO/IEC 9529-1. Over the range of operating environment specified in sub clause 6.1.2 of ISO/IEC 9529-1, the centrelines of the recorded tracks shall be within $\pm 0,028$ mm ($\pm 0,001$ in) of these compensated nominal track locations.

4.3 Recording offset angle

At the instant of writing or reading a magnetic transition, the transition shall have an angle of

$$\theta = \arcsin \left(\frac{d}{Rn} \right) \pm 0^{\circ}18'$$

where Rn is the radius through that transition (see ISO/IEC 9529-1, 9.2.3.1).

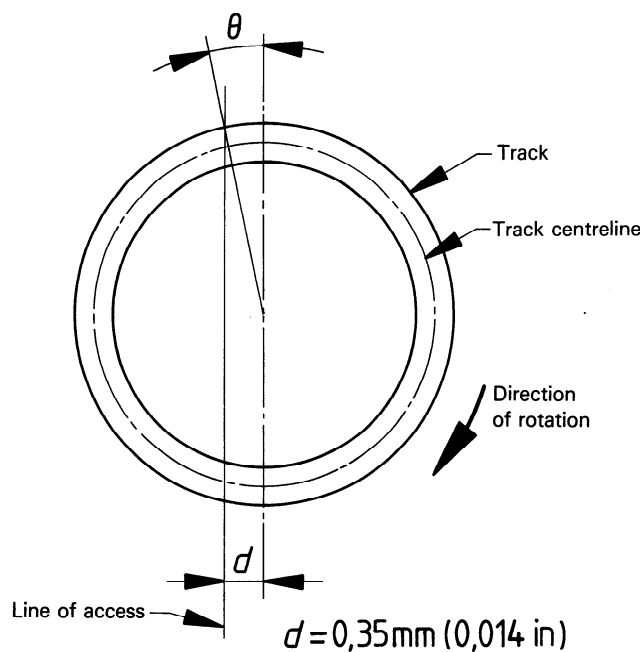


Figure 1

NOTE - As tracks may be written and overwritten at extremes of the tolerances given in 4.2 and 4.3, a band of old information may be left at one edge of the newly written data and would constitute unwanted noise when reading. It is therefore necessary to trim the edges of the tracks by erasure after writing.

4.4 Density of recording

4.4.1 The nominal density of recording shall be 15 916 ftprad. The resulting nominal bit cell length is 62,8 μ rad.

4.4.2 The long term average bit cell length shall be the average bit cell length measured over a sector. It shall be within $\pm 2,5\%$ of the nominal bit cell length.

4.4.3 The short term average bit cell length, referred to a particular bit cell, shall be the average of the lengths of the eight preceding bit cells. It shall be within $\pm 8\%$ of the long-term average bit cell length.

4.5 Flux transition spacing

The instantaneous spacings between flux transitions are influenced by the reading and writing process, the bit sequence (pulse crowding effects) and other factors. The locations of the transitions are defined as the locations of the peaks in the signal when reading (see annexes A and B).

4.5.1 The spacing between the flux transitions of a sequence of ONES shall be between 80% and 120% of the short-term average bit cell length.

4.5.2 The spacing between the flux transition for a ONE and that between two ZEROs preceding or following it shall be between 130% and 165% of the short-term average bit cell length.

4.5.3 The spacing between the flux transitions of two ONES surrounding a ZERO shall be between 185% and 225% of the short-term average bit cell length.

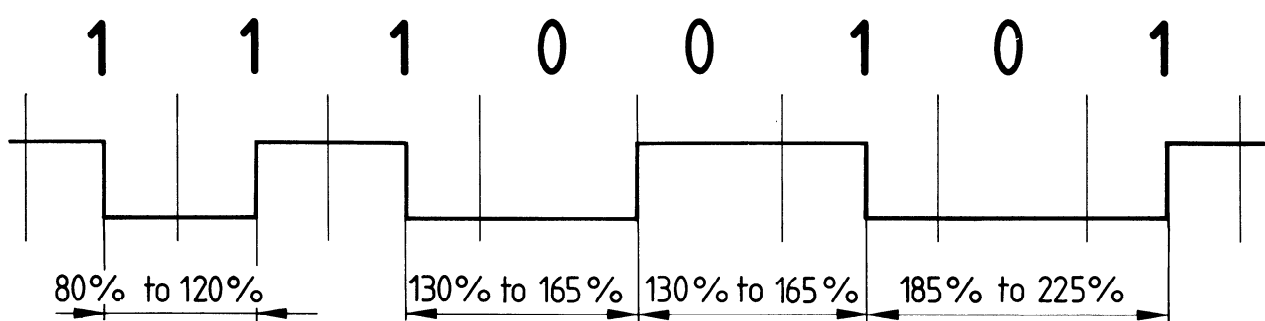


Figure 2

4.6 Average Signal Amplitude

For each side the Average Signal Amplitude on any track of the interchanged flexible disk cartridge shall be less than 160% of SRA_{1f} and more than 40% of SRA_{2f} (see 4.12 in ISO/IEC 9529-1).

4.7 Byte

A byte is a group of eight bit-positions, identified B1 to B8.

The bit in each position is a ZERO or a ONE.

4.8 Sector

All tracks shall be divided into 18 sectors of 512 bytes.

4.9 Cylinder

A pair of tracks, one on each side of the disk, having the same track number.

4.10 Cylinder number

The cylinder number shall be a two-digit number identical with the track number of the tracks of the cylinder.

4.11 Data capacity of a track

The data capacity of a track shall be 9216 bytes.

4.12 Hexadecimal notation

Hexadecimal notation shall be used hereafter to denote the following bytes:

(00)	for (B8 to B1) = 00000000
(01)	for (B8 to B1) = 00000001
(02)	for (B8 to B1) = 00000010
(4E)	for (B8 to B1) = 01001110
(FE)	for (B8 to B1) = 11111110
(FB)	for (B8 to B1) = 11111011
(A1)*	for (B8 to B1) = 10100001

In byte (A1)* the boundary transition between B3 and B4 is missing.

4.13 Error Detection Characters (EDC)

The two EDC bytes are hardware-generated by shifting serially the relevant bits, specified later for each part of the track, through a 16-bit shift register described by the generator polynomial:

$$X^{16} + X^{12} + X^5 + 1$$

(See also annex C).

5 Track layout

Formatting of a track shall commence with the occurrence of Index. Index shall occur within $\pm 440 \mu\text{s}$ of the instant at which reference line B (see 7.4.2.2 of ISO/IEC 9529-1) is parallel to the line of access.

During formatting the rotational speed of the disk shall be

- averaged Index to Index : $300 \text{ r/min} \pm 2\%$
- averaged over a sector : $300 \text{ r/min} \pm 2,5\%$

After formatting, there shall be 18 sectors on each track. The layout of each track shall be as shown in figure 3.

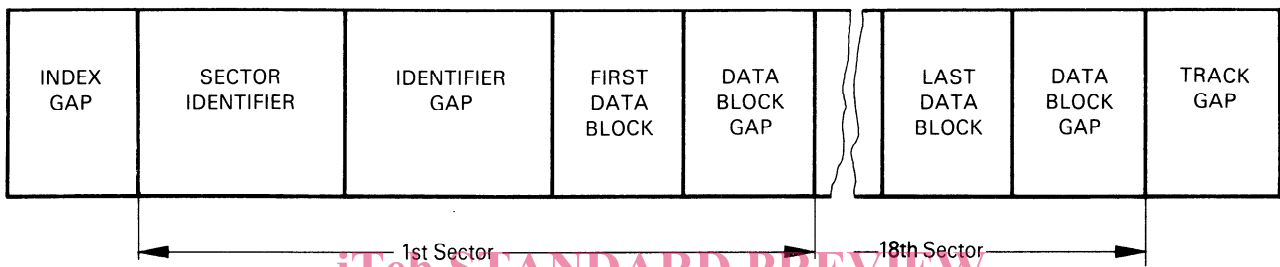


Figure 3
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5.1 Index Gap

At nominal density, this field shall comprise 146 bytes of unspecified content except that it shall not contain any (A1)*-bytes. Some of the first bytes may have become ill-defined due to overwriting.

5.2 Sector Identifier

The layout of this field shall be as shown in figure 4.

Sector identifier							
Identifier mark			Address identifier				
12 bytes (00)	3 bytes (A1)*	1 byte (FE)	Track address		S	1 byte (02)	EDC
			C 1 byte	Side 1 byte (00) or (01)	1 byte		2 bytes

Figure 4

5.2.1 Identifier Mark

This field shall comprise 16 bytes:

- 12 (00) -bytes
- 3 (A1)* -bytes
- 1 (FE) -byte