International Standard 6596/2

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Information processing — Data interchange on 130 mm (5.25 in) flexible disk cartridges using two-frequency recording at 7 958 ftprad, 1,9 tpmm (48 tpi), on one side — Part 2 : Track format

Traitement de l'information — Échange de données sur cartouches à disquette de 130 mm (5,25) in) *utilisant un enregistrement à deux fréquences à* 7 958 ftprad, 1,9 tpmm (48 tpi), *sur une face — Partie 2 : Schéma de piste*

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6596/2 was prepared by Technical Committee ISO/TC 97, *Information processing systems*.

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Information processing — Data interchange on 130 mm (5.25 in) flexible disk cartridges using two-frequency recording at 7 958 ftprad, 1,9 tpmm (48 tpi), on one side — Part 2: Track format

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0 Introduction

ISO 6596 specifies the characteristics of data interchange on 130 mm (5.25 in) flexible disk cartridges using two-frequency recording at 7 958 ftprad, 1,9 tpmm (48 tpi), on one side.

ISO 6596/1 specifies the dimensional, physical, and magnetic characteristics of the cartridge so as to provide physical interchangeability between data processing systems.

Together with the labelling scheme specified in ISO 7665, ISO 6596/1 and ISO 6596/2 provide for full data interchange between data processing systems.

1 Scope and field of application

This part of ISO 6596 specifies the magnetic characteristics, the track layout, and a track format to be used on a 130 mm (5.25 in) flexible disk cartridge, recorded at 7 958 ftprad on one side using two-frequency recording at a track density of 1,9 tracks per millimetre (tpmm) [48 tracks per inch (tpi)], which is intended for data interchange between data processing systems.

NOTE — Numeric values in the SI and/or Imperial measurement system in this International Standard 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 re-converted. The original design for this part of ISO 6596 was made using SI units.

2 Conformance

A flexible disk cartridge shall be in conformance with ISO 6596 when it meets all the requirements of parts 1 and 2 of ISO 6596.

3 References

ISO 646, *Information processing — ISO 7-bit coded character set for information interchange.*

ISO 2022, *Information processing — ISO 7-bit and 8-bit coded character sets — Code extension techniques.*

ISO 4873, *Information processing — ISO 8-bit code for information interchange — Structure and rules for implementation.*

ISO 6596/1, *Information processing — Data interchange on* 130 mm (5.25 in) *flexible disk cartridges using two-frequency recording at* 7 958 ftprad, 1,9 tpmm (48 tpi), *on one side — Part 1: Dimensional, physical and magnetic characteristics.*

ISO 7665, *Information processing — File structure and labelling of flexible disk cartridges for information interchange.*

4 General requirements

4.1 Mode of recording

The mode of recording shall be two-frequency where the start of every bit cell is a clock flux transition. A ONE is represented by a data flux transition between two clock flux transitions. Exceptions to this are defined in 4.10.

4.2 Track location tolerance of the recorded flexible disk cartridge

The centrelines of the recorded tracks shall be within ± 0,085 mm (± 0.003 3 in) of the nominal positions over the range of operating environment specified in ISO 6596/1. This tolerance corresponds to twice the standard deviation.

4.3 Recording offset angle

At the instant of writing or reading a magnetic transition, the transition may have an angle of 0° ± 18′ with the radius. This tolerance corresponds to twice the standard deviation.

4.4 Density of recording

4.4.1 The nominal density of recording shall be 7 958 ftprad. The resulting nominal spacing between two clock flux transitions, the nominal bit cell length, is 251 µrad.

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 ± 3,5 % 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 preceding eight bit cells. It shall be within ± 8 % of the long-term average bit cell length.

4.5 Flux transition spacing (see figure 1)

The instantaneous spacing between flux transitions may be influenced by the reading and writing process, the bit sequence recorded (pulse crowding effects), and other factors. The locations of the transitions are defined as the locations of the peaks in the signal when reading. Tests should be carried out using a peak-sensing amplifier (see annex C).

4.5.1 The spacing between two clock flux transitions surrounding a data flux transition or between two data flux transitions surrounding a clock flux transition shall be between 90 % and 140 % of the nominal bit cell length.

4.5.2 The spacing between two clock flux transitions not surrounding a data flux transition or between two data flux transitions surrounding a missing clock flux transition shall be between 60 % and 110 % of the nominal bit cell length.

4.5.3 The spacing between a data flux transition and the preceding clock flux transition (when not missing) or between a clock flux transition and the preceding data flux transition (when not missing) shall be between 45 % and 70 % of the nominal bit cell length.

4.6 Average signal amplitude

The average signal amplitude on any non-defective track (see ISO 6596/1) of the interchanged flexible disk shall be less than 160 % of the standard reference amplitude for track 00 and more than 40 % of the standard reference amplitude for track 34.

4.7 Byte

A byte is a group of eight bit-positions, identified B1 to B8, with B8 the most significant and recorded first.

The bit in each position shall be a ZERO or a ONE.

4.8 Sector

Track 00 is divided into 16 sectors. All other tracks are divided into 9 sectors.

4.9 Data capacity of a track

The data capacity of track 00 shall be 2 048 bytes. The data capacity of all other tracks shall be 2 304 bytes.

4.10 Hexadecimal notation

Hexadecimal notation shall be used to denote the following bytes:

(00) for (B8 to B1) = 00000000
(01) for (B8 to B1) = 00000001
(FF) for (B8 to B1) = 11111111
(FE)* for (B8 to B1) = 11111110

where the clock transitions of B6, B5 and B4 are missing

(FB)* for (B8 to B1) = 11111011

where the clock transitions of B6, B5 and B4 are missing

(F8)* for (B8 to B1) = 11111000

where the clock transitions of B6, B5 and B4 are missing

4.11 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 B.)

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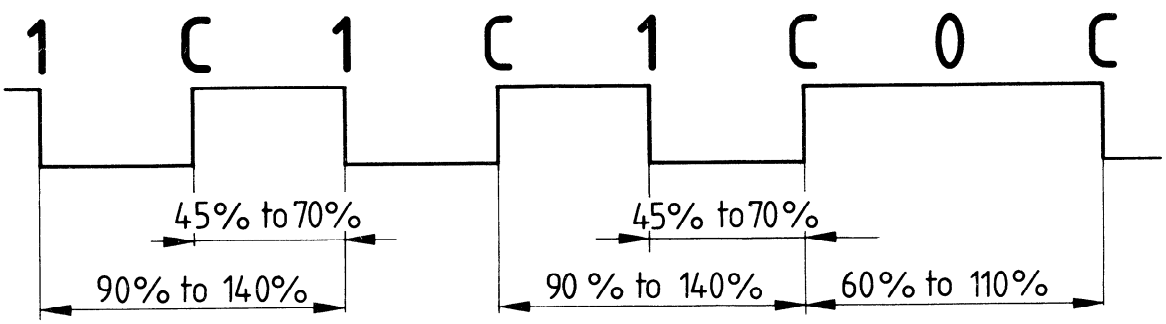

Figure 1

5 Track layout after the first formatting for track 00

After the first formatting, there shall be 16 usable sectors on the track. The track layout shall be as shown in figure 2.

5.1 Index gap

At nominal density, this field shall comprise 16 (FF)-bytes. Writing the index gap is started when the index window is detected. Any of the first 8 bytes may be ill-defined due to over-writing.

5.2 Sector identifier

This field shall be as given in table 1.

Table 1

Identifier mark		Address identifier				
6 bytes (00)	1 byte (FE)*	T 1 byte (00)	1 byte (00)	S 1 byte	1 byte (00)	EDC 2 bytes

5.2.1 Identifier mark

This field shall comprise 7 bytes

6 (00)-bytes
1 (FE)*-byte

5.2.2 Address identifier

This field shall comprise 6 bytes.

5.2.2.1 Track address (T)

The track address is the first byte of the address identifier. It shall always be a (00)-byte.

5.2.2.2 2nd byte of the address identifier

The 2nd byte shall be always a (00)-byte.

5.2.2.3 Sector number (S)

The 3rd byte shall specify in binary notation the sector number from 01 for the 1st sector to 16 for the last sector.

The 16 sectors shall be recorded in the natural order

1, 2, 3, ..., 15, 16

5.2.2.4 4th byte of the address identifier

The 4th byte shall always be a (00)-byte.

5.2.2.5 EDC

These two bytes shall be generated as defined in 4.11 using the bytes of the sector identifier starting with the (FE)*-byte (see 5.2.1) of the identifier mark and ending with the 4th byte (see 5.2.2.4) of the address identifier.

5.3 Identifier gap

This field shall comprise 11 initially recorded (FF)-bytes.

5.4 Data block

This field shall be as given in table 2.

Table 2

Data mark		Data field	EDC
6 bytes (00)	1 byte (FB)*	128 bytes	2 bytes

5.4.1 Data mark

This field shall comprise

6 (00)-bytes
1 (FB)*-byte

5.4.2 Data field

This field shall comprise 128 bytes. No requirements are implied beyond the correct EDC for the content of this field (see also 7.3.2.4.2).

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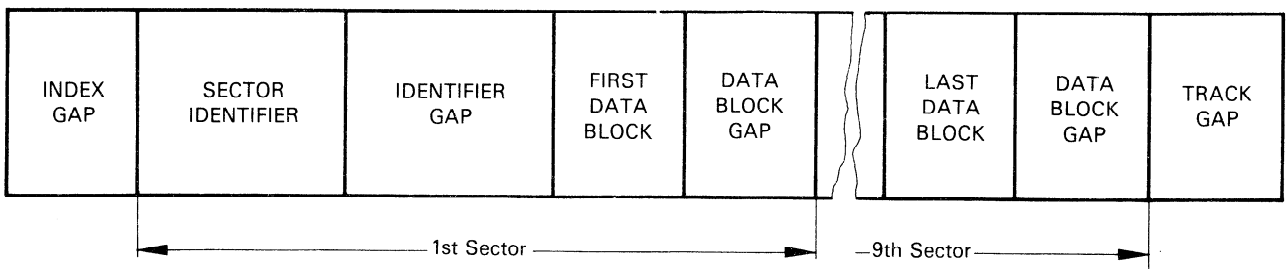

Figure 2

5.4.3 EDC

These two bytes shall be generated as defined in 4.11 using the bytes of the data block starting with the 7th byte of the data mark (see 5.4.1) and ending with the last byte of the data field (see 5.4.2).

5.5 Data block gap

This field shall comprise 27 initially recorded (FF)-bytes. It is recorded after each data block and it precedes the following sector identifier. After the last data block, it precedes the track gap.

5.6 Track gap

This field shall follow the data block gap on the 16th sector. (FF)-bytes are written until the index window is detected, unless it has been detected during writing of the last data block gap, in which case there shall be no track gap. At nominal density it shall comprise 101 (FF)-bytes, which may have become ill-defined due to the overwriting process.

6 Track layout after the first formatting for tracks 01-34

After the first formatting, there shall be 9 usable sectors on each track. The track layout shall be as shown in figure 3.

6.1 Index gap

At nominal density, this field shall comprise 16 (FF)-bytes. Writing of the index gap is started when the index window is detected. Any of the first 8 bytes may be ill-defined due to overwriting.

6.2 Sector identifier

This field shall be as given in table 3.

Table 3

Identifier mark		Address identifier				
6 bytes (00)	1 byte (FE)*	T 1 byte	1 byte (00)	S 1 byte	1 byte (01)	EDC 2 bytes

6.2.1 Identifier mark

This field shall comprise 7 bytes

6 (00)-bytes
1 (FE)*-byte

6.2.2 Address identifier

This field shall comprise 6 bytes.

6.2.2.1 Track address (T)

The track address is the first byte of the address identifier. It shall represent in binary notation the track address from 01 for the outermost track to 32 for the innermost track.

6.2.2.2 2nd byte of the address identifier

The 2nd byte shall always be a (00)-byte.

6.2.2.3 Sector number (S)

The 3rd byte shall specify in binary notation the sector number from 01 for the 1st sector to 09 for the last sector.

The nine sectors shall be recorded in the natural order

1, 2, 3, ..., 8, 9

6.2.2.4 4th byte of the address identifier

The 4th byte shall always be a (01)-byte.

6.2.2.5 EDC

These two bytes shall be generated as defined in 4.11 using the bytes of the sector identifier starting with the (FE)*-byte (see 6.2.1) of the identifier mark and ending with the 4th byte (see 6.2.2.4) of the address identifier.

6.3 Identifier gap

This field shall comprise 11 initially recorded (FF)-bytes.

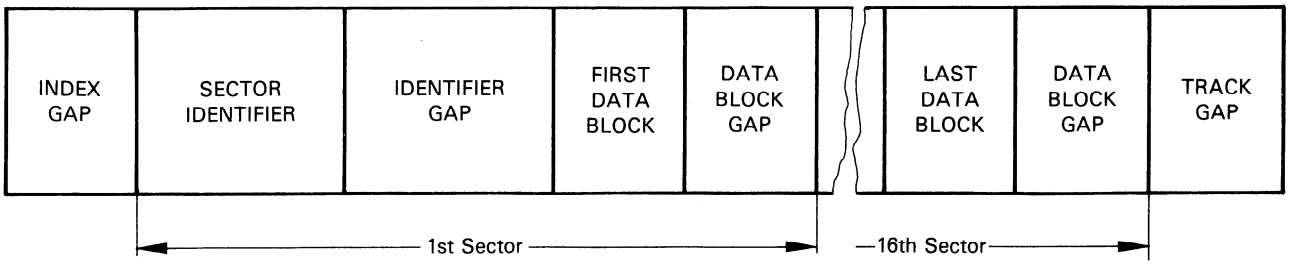

Figure 3

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6.4 Data block

This field shall be as given in table 4.

Table 4

Data mark		Data field	EDC
6 bytes (00)	1 byte (FB)*	256 bytes	2 bytes

6.4.1 Data mark

This field shall comprise

6 (00)-bytes
1 (FB)*-byte

6.4.2 Data field

This field shall comprise 256 bytes. No requirements are implied beyond the correct EDC for the content of this field (see also 7.3.2.4.2).

6.4.3 EDC

These two bytes shall be generated as defined in 4.11 using the bytes of the data block starting with the 7th byte of the data mark (see 6.4.1) and ending with the last byte of the data field (see 6.4.2).

6.5 Data block gap

This field shall comprise 38 initially recorded (FF)-bytes. It is recorded after each data block and it precedes the following sector identifier. After the last data block it precedes the track gap.

6.6 Track gap

This field shall follow the data block gap of the 9th sector. (FF)-bytes are written until the index window is detected, unless it has been detected during writing of the last data block gap, in which case there shall be no track gap. At nominal density it shall comprise 166 (FF)-bytes, which may have become ill-defined due to the overwriting process.

7 Track layout of a recorded flexible disk for data interchange

7.1 Representation of characters

Characters shall be represented by means of the 7-bit coded character set (see ISO 646) and, where required, by its 7-bit or 8-bit extensions (see ISO 2022) or by means of the 8-bit coded character set (see ISO 4873).

Each 7-bit coded character shall be recorded in bit-positions B7 to B1 of a byte; bit position B8 shall be recorded with bit ZERO.

The relationship shall be as shown in figure 4.

Each 8-bit coded character shall be recorder in bit-positions B8 to B1 of a byte.

The relationship shall be as shown in figure 5.

7.2 Good and bad tracks

A good track is a track which has been formatted according to 7.3.

A bad track is a track which has been handled according to 7.4.

Track 00 shall always be a good track.

There shall be at least 32 good tracks from track 01 to track 34.

7.3 Track layout of good tracks

References to clause 5 are for track 00.

References to clause 6 are for all other tracks.

7.3.1 Index gap

Description: see 5.1 and 6.1.

7.3.2 Sector identifier

7.3.2.1 Identifier mark

Description: see 5.2.1 and 6.2.1.

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Figure 4

Bits of the 7-bit combination	0	b7	b6	b5	b4	b3	b2	b1
Bit-positions in the byte	B8	B7	B6	B5	B4	B3	B2	B1

Figure 5

Bits of the 8-bit combination	b8	b7	b6	b5	b4	b3	b2	b1
Bit-positions in the byte	B8	B7	B6	B5	B4	B3	B2	B1

7.3.2.2 Address identifier

This field shall comprise 6 bytes.

7.3.2.2.1 Track address (T)

This field shall specify in binary notation the track address from 00 for the outermost to 32 for innermost track.

NOTE — A unique track number is associated with each track. Two of these tracks are intended for use only when there are one or two defective tracks. Each good track possesses a unique track address; a defective track does not possess a track address. Track addresses are assigned consecutively to the good tracks in the ascending sequence of track numbers.

7.3.2.2.2 2nd byte of the address identifier

The 2nd byte shall always be a (00)-byte.

7.3.2.2.3 Sector number (S)

Description : see 5.2.2.3 and 6.2.2.3.

7.3.2.2.4 4th byte of the address identifier

Description : see 5.2.2.4 and 6.2.2.4.

7.3.2.2.5 EDC

Description : see 5.2.2.5 and 6.2.2.5.

7.3.2.3 Identifier gap

Description : see 5.3 and 6.3. These bytes may have become ill-defined due to the overwriting process.

7.3.2.4 Data block

7.3.2.4.1 Data mark

This field shall comprise

6 (00)-bytes
1 byte

The 7th byte shall be :

(FB)* indicating that the data is valid and that the whole data field can be read;

(F8)* indicating that the first byte of the data field shall be interpreted according to ISO 7665.

7.3.2.4.2 Data field

This field shall comprise 128 bytes on track 00 and 256 bytes on all other tracks. If it comprises less than the prescribed number of data bytes, the remaining positions shall be filled with (00)-bytes.

Data fields in track 00 are reserved for operating system use, including labelling.

7.3.2.4.3 EDC

Description : see 5.4.3 and 6.4.3.

If the 7th byte of the data mark is (F8)* and the 1st character of the data field is CAPITAL LETTER F, the EDC may or may not be correct, as the sector contains a defective area. If the 1st character is CAPITAL LETTER D, then the EDC shall be correct.

On track 00, only CAPITAL LETTER D is allowed.

7.3.2.5 Data block gap

This field is recorded after each data block and it precedes the following sector identifier. After the last data block, it precedes the track gap.

It comprises initially 27 (FF)-bytes on track 00 and 38 (FF)-bytes on all other tracks. These bytes may have become ill-defined due to the overwriting process.

7.3.2.6 Track gap

Description : see 5.6 and 6.6.

7.4 Layout of a bad track

7.4.1 Contents of the fields

The fields of a bad track should have the following contents.

7.4.1.1 Index gap

This field should comprise 16 (FF)-bytes.

7.4.1.2 Sector identifier

This field should comprise an identifier mark and an address identifier.

7.4.1.2.1 Identifier mark

This field should comprise 7 bytes

6 (00)-bytes
1 (FE)*-byte

7.4.1.2.2 Address identifier

This field should comprise 6 bytes

4 (FF)-bytes
2 EDC-bytes

These two EDC-bytes shall be generated as defined in 4.11 using the bytes of the sector identifier starting with the

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(FE)*-byte (see 5.2.1 and 6.2.1) of the identifier mark and ending with the above 4 (FF)-bytes.

7.4.1.3 Identifier gap

This field should comprise 11 (FF)-bytes.

7.4.1.4 Data block

7.4.1.4.1 Data mark

This field should comprise 7 bytes

6 (00)-bytes
1 byte

The 7th byte should be

(FB)* indicating that the data field is valid;

or (F8)* indicating that the data field is defective (see 7.3.2.4.3).

7.4.1.4.2 Data block

This field should comprise 256 (00) or (FF)-bytes.

7.4.1.4.3 EDC

Description : see 5.4.3, 6.4.3 and 7.3.2.4.3.

7.4.1.5 Data block gap

This field should comprise 38 (FF)-bytes.

7.4.1.6 Track gap

Description : see 6.6.

7.4.2 Requirements for tracks

Each bad track shall have at least one of its 9 sector identifiers with the content specified in 7.4.1.2. If this condition is not satisfied, the cartridge shall be rejected. All other fields of these tracks may be ill-defined.

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Annex A
Use of additional tracks

(This annex does not form part of the standard.)

ISO 6596 specifies the requirements for those tracks used for full data interchange, i.e., tracks 00 to 34. Additionally, tracks 35 to 39 may be used for purposes not requiring full data interchange. Dimension l_7 is sufficient to give access to 40 tracks.

For these applications, the text of the following clauses of ISO 6596/1 and ISO 6596/2 shall read:

ISO 6596/1

8.1.1 Number of tracks

There shall be 40 discrete concentric tracks in the recording area (6.3.4).

In the following two sub-clauses, the figure 34 shall be replaced by 39:

8.1.3.1 Nominal locations

8.1.4 Track number

ISO 6596/2

In the following sub-clauses, the figure 32 shall be replaced by 37:

6.2.2.1 Track address (T)

7.3.2.2.1 Track address (T)

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