

JIS

JAPANESE INDUSTRIAL STANDARD

**File Structure and Labelling of
Flexible Disk Cartridges
for Information Interchange**

JIS X 0603—1988

Translated and Published

by

Japanese Standards Association

Printed in Japan

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

JAPANESE INDUSTRIAL STANDARD

J I S

File Structure and Labelling of
Flexible Disk Cartridges for
Information Interchange

X 0603-1988

1. Scope

This Japanese Industrial Standard specifies the file structure and labelling of the flexible disk cartridge used as the media of information interchange.

(1) This Standard specifies the following substance.

- (a) Recorded labels to identify files, file sections, and volume of flexible disk cartridge.
- (b) Basic characteristics of the records and blocks constituting the file.
- (c) The file structure.

Applicable Standards:

JIS X 0201-Code for Information Interchange

JIS X 0208-Code of the Japanese Graphic Character Set for Information Interchange

JIS X 6202-Track Format for 200 mm Flexible Disk Cartridges

JIS X 6213-Track Format for 130 mm High Density Flexible Disk Cartridges (13252 ftprad)

JIS X 6224-Track Format for 90 mm Flexible Disk Cartridges (13252 ftprad)

Corresponding International Standard:

ISO 7665 Information processing - File structure and labelling of flexible disk cartridges for information interchange

Reference Standards:

JIS X 0202-Code Extension Techniques for Use with the Code for Information Interchange

JIS X 6201-200 mm Flexible Disk Cartridge

JIS X 6211-130 mm Flexible Disk Cartridges

JIS X 6212-Track Format for 130 mm Flexible Disk Cartridges

JIS X 6223-90 mm Flexible Disk Cartridges (13262/15916 ftprad)

- (2) In this Standard, the following three levels of information interchange are established as demanded by the complexity of record types and record attributes to deal with.
- (a) The first level, termed Basic Interchange Level (B 1), in which it is possible to interchange data by using a minimum set of the facilities provided.
 - (b) The second level, termed Extended Interchange Level 1 (E 1), in which it is permitted to use blocks having a length greater than that of physical record and blocked fixed-length records in addition to the function on the basic interchange level.
 - (c) The third level, termed Extended Interchange Level 2 (E 2), in which it is permitted to use variable-length records and segmented records in addition to the function on the extended interchange level 1.

2. Conformance

A flexible disk cartridge conforms to this Standard when all interchange files and all labels recorded on it conform to the specifications of this Standard.

A statement of conformity shall identify the level or levels of interchange to which the contents of the flexible disk cartridge conform.

Further, the applicable flexible disk cartridge shall be in conformance with the medium specifications given in the cited Standards and reference Standards (JIS X 6202, JIS X 6213 and JIS X 6224).

3. Definitions

For the purpose of this Standard, the definitions of terms are classified into groups related to the physical data recording unit, the logical data recording unit, and the others as listed below.

3.1 Definitions Related to Physical Concept The principal definitions related to physical concept shall be as follows:

- (1) volume A dismountable physical unit of storage medium, for example a flexible disk cartridge.
- (2) cylinder number A pair of tracks, one on each side, having the same track number.

Remarks 1. The cylinder number shall be a two-digit number identical with the track number of the cylinder.

2. On flexible disk cartridges that are recording only on one side, cylinders comprise one track only.

- (3) track The part of a flexible disk cartridge that can be accessed by a single magnetic head that is stationary while the disk makes a complete revolution.
- (4) sector The part of the same track on a flexible disk cartridge that can be accessed by the magnetic head in the course of predetermined angular displacements of the disk.
- (5) physical record A fixed-length field containing the data of a sector.

3.2 Definitions Related to Logical Concept The principal definitions related to a logical concept shall be as follows:

- (1) file A named collection of information consisting of records pertaining to a single subject.
- (2) file section For a file recorded over more than one volume, the part of the file that is recorded in any one volume.
- (3) extent A set of physical records the addresses of which form a continuous ascending sequence.
- (4) block A group of bytes treated as a logical unit.
- (5) record Related data treated as a unit of information.
- (6) fixed-length record A record contained in a file in which all the records have the same length.
- (7) variable-length record A record contained in a file in which the records may have different lengths excluding segmented ones.
- (8) segmented record A record contained in a file in which each record consists of one or more consecutive record segments.
- (9) blocked An attribute of records and record segments that indicates that they may begin at a byte that is not the first byte of a block.

3.3 Other Definitions The other principal definitions shall be as follows:

- (1) formatting Writing the proper control information establishing the cylinders and designating addresses of physical records on the surfaces of the flexible disk.
- (2) initialization Writing of the Volume Label, the ERMAP Label, and any other information initially required to be on the flexible disk cartridge, prior to the commencement of general processing or use.
- (3) label A record that identifies, characterizes or delimits a volume, a file or a file section on that volume.
- (4) byte A string of eight binary digits operated upon as a unit.

- (5) natural order An ascending sequence of integers starting with the lowest allowed value and proceeding, in increments of one, to the highest allowed value.
- (6) physical record address A five-digit number in which the cylinder address provides the two most significant digits, the side number provides the next most significant digit, and the sector number provides the two least significant digits.

4. Arrangement of Labels and Files

4.1 Applicable Flexible Disk Cartridge The flexible disk cartridges that are the subject of this Standard are as given in Table 1.

Remark: The values of parameters, excluding the recording-type, should be specified in the relevant Standards of track format, and when the values specified as such differ from those given in Table 1, the values in the track format Standards shall be applied.

Table 1. Applicable Flexible Disk Cartridge

Name of parameter	200-mm flexible disk cartridge				130-mm flexible disk cartridge			90-mm flexible disk cartridge		
	Applicable track format Standard									
	JIS X 6202				JIS X 6213			JIS X 6224		
Recording type ⁽¹⁾ parameter	1	M			M			M		
Number-of-Sides ⁽²⁾ parameter	1	2			2			2		
Cylinder-Limit ⁽³⁾ parameter	74	74			74			74		
Index-Sector-Limit ⁽⁴⁾ parameter	26	26			26			26		
Data-Sector-Limit ⁽⁵⁾ parameter	26	26	15	8	26	15	8	26	15	8
Data-Physical-Record-Length ⁽⁶⁾ parameter	128	256	512	1 024	256	512	1 024	256	512	1 024
Track-Data-Capacity ⁽⁷⁾ parameter	3 328	6 656	7 680	8 192	6 656	7 680	8 192	6 656	7 680	8 192

Notes ⁽¹⁾ A parameter for uniquely identifying the recording type complied with by a flexible disk cartridge of the same physical size.

⁽²⁾ The number of sides of the flexible disk cartridge which can accommodate the records.

⁽³⁾ The specified minimum number of normal cylinders supposed to exist starting with cylinder 01 to the cylinder having the highest specified cylinder number.

⁽⁴⁾ The number of sectors usable on track 00 on side 0 or on track 00 on side 1. These numbers shall be the same on both sides.

- (⁵) The number of sectors usable on each individual track other than track 00 on side 0 or side 1.
- (⁶) The number of bytes in the data field of a data block on each individual track other than track 00 on side 0 or side 1.
- (⁷) The numerical product of the parameters "Data-Sector-Limits" and "Data-Physical-Record-Length".

Remark: As the flexible disk cartridge the value of recording-type of which is expressed by the letter "M", three kinds of combinations of "Data-Sector-Limit" and "Data-Physical-Record-Length" are permitted.

4.2 Number of Sides The requirements in this Standard for labels and files on side 0 apply to the flexible disk cartridges shown in Table 1. The requirements for labels and files on side 1 apply to those of which the value of "Number of Sides" in Table 1 is "2" and not to those of "1".

4.3 Organization of Space on Flexible Disk Cartridge The parameter Cylinder-Limit given in Table 1 is used to specify the organization of the recording space on a flexible disk cartridge.

The recording space available on a flexible disk cartridge shall be organized as prescribed below.

- (1) An index cylinder (cylinder 00) shall be reserved for descriptive information on the volume and the files recorded on the volume.
- (2) The cylinders having addresses ranging from 01 to Cylinder-Limit inclusive shall be used for files.

- Remarks
- 1. According to the medium Standards, a unique cylinder number is allotted to each individual cylinder. Two of these cylinders are intended to be used only when the volume contains one or more defective cylinders.
 - 2. Each non-defective cylinder possesses a unique cylinder address whereas a defective cylinders does not possess a cylinder address.
 - 3. Cylinder addressless are assigned consecutively to the non-defective cylinders in an ascending sequence of cylinder numbers.

4.4 Index Cylinder The index cylinder (cylinder 00) on a flexible disk cartridge shall be reserved for descriptive information about the volume and the files recorded on the volume.

The index cylinder on side 0 shall always be formatted with physical records having a length of 128 bytes.

Further, the index cylinder on side 1 shall be the physical record length of 256 bytes.

The allocation of sectors on the index cylinder shall be as given in Table 2.

Table 2. Allocation of Sectors on Index Cylinder

Side	Sector	Use
0	01 to 04	Reserved for system use
0	05	Reserved for Error Map Label (ERMAP)
0	06	Reserved for future standardization
0	07	Reserved for Volume Label (VOL 1)
0	08 to Index-sector-limit	Reserved for File Label (HDR 1)
1	01 to Index-sector-limit	Reserved for File Label (HDR 1)

4.4.1 Sectors Reserved for System Sectors 01 to 04 on side 0 shall be reserved for system use and shall be ignored in information interchange.

Their contents are not specified in this Standard but shall not be rewritten unless otherwise agreed upon by the parties concerned with the information interchange.

4.4.2 Sector Reserved for Future Standardization Sector 06 on side 0 is reserved for future standardization and shall be ignored in information interchange.

4.4.3 Sectors Reserved for Labels Labels on the cylinder shall all be records of the same length. A label shall be recorded within the first 128-byte positions of the physical record. Sector 05 on side 0 shall be reserved for Error Map Label (ERMAP) (see 6.6). Sector 07 on side 0 shall be reserved for Volume Label (VOL 1). Sectors 08 to Index-Sector-Limit on side 0 and sectors 01 to Index-Sector-Limit on side 1 shall be reserved for File labels (HDR 1). File labels shall be recorded on one file label per physical record to describe the files recorded on cylinders with addresses 01 to Cylinder-limit. The file labels may be recorded in any of the sectors reserved for them.

Unused sectors shall be deleted according to 8.2.

4.5 Contents of Cylinder with Addresses 01 to Cylinder-Limit Cylinders with addresses 01 to Cylinder-Limit shall contain either allocated space or unallocated available space.

These cylinders shall be formatted with physical records the length of which in data characters is prescribed by the parameter Data-Physical-Record Length in Table 1.

The number of the physical records to be recorded on side 0 and side 1 of each cylinder shall be the value of the parameter "data-sector-limit" in Table 1.

Each individual physical record shall either be allocated to an extent or unallocated. All physical records allocated to an extent shall lie within a range shown by beginning field and ending field of the extent in the File Label (HDR 1) contained in cylinder 00.

All physical records not so indicated shall be unallocated. A physical record shall not be allocated to more than one extent.

Date forming part of a file shall be recorded only within an extent.

The contents of all unallocated physical records shall not form part of any file and may be ignored in information interchange.

5. File Structure for Data Interchange

This clause specifies the structure for data interchange in terms of data blocks and data records and identifies the label fields defined for that purpose.

5.1 Blocks

5.1.1 Characteristics A block shall be a group of bytes treated as a logical unit and shall have the characteristics given below. The block referred to here means a logical entity and differs from those described in 8.1.

- (1) A block shall be recorded in all or part of a physical record, or over two or more physical records, excluding defective ones, the addresses of which form a consecutive ascending sequence.
- (2) A block shall begin at the first byte of a physical record.
- (3) A block may contain one or more complete records or record segments.

5.1.2 Block Length The length of a block shall be the number of bytes in the block. Within a file, all blocks shall have the same length. If the block length exceeds that of the physical record, the block length shall be an integer multiple of the physical record length.

The maximum length of a block that may be assigned on a flexible disk shall be equal to the total capacity of a data track ⁽⁸⁾.

The minimum length of a block shall be as follows:

- (1) 1 byte, when it contains a fixed-length record
- (2) 4 bytes, when it contains a variable-length record
- (3) 5 bytes, when it contains a segmented record

Note ⁽⁸⁾ This does not imply that a block must begin and end on the same track.

5.1.3 Unused Byte Positions If the block length is smaller than the physical record length, the unused space between the end of the block and the end of the physical record shall be filled with padding characters (NULs).

Remark: In all other cases, the end of a block coincides with the end of a physical record.

5.1.4 Relation to Extents Within each extent, the data within consecutive records, excluding defective physical records, shall be considered to be grouped into consecutive blocks.

The first block of an extent shall begin at the first non-defective physical record in the extent. A block shall be completely contained in one extent only.

5.2 Records

5.2.1 Characteristics A record shall be related data treated as a unit of information having the following characteristics:

- (1) A record may be recorded on all or part of one or more blocks.
- (2) Within each block, the data shall be considered to be grouped into consecutive records or record segments.
- (3) The first record or record segment of a block shall begin at the first byte of the block. Each successive record or record segment, if any, within the block shall begin at the byte immediately following the last byte of the preceding record or record segment.
- (4) The length of a record shall be the number of bytes of the record.
- (5) A non-segmented record or a record segment shall end in the block in which it begins.

5.2.2 Fixed-length Record A fixed-length record shall be a record contained in a file that is assigned to contain records that all have the same length. The minimum length of such a record shall be one byte and the maximum length shall be equal to the block length.

Fixed-length records shall be as follows:

- (1) **Unblocked Fixed-length Records** An unblocked fixed-length record shall be a record contained in a file in which each block contains only one record.
- (2) **Blocked Fixed-length Record** A blocked fixed-length record shall be a record contained in a file in which each block contains more than one record.
- (3) **Relation to Blocks** The first record of a block shall begin at the first byte of the block. The space between the end of the last record of a block and the end of the block shall be filled with NULs.

5.2.3 Variable-length Records A variable-length record shall be a record contained in a file that is assigned to contain records that may have different lengths.

A Record Control Word (RCW) shall be recorded as the first four bytes of the record. The RCW shall express the record length as a four-digit decimal number as specified in JIS X 0201, and these four bytes shall be included in the record length.

A maximum record length shall be assigned for a file. The assigned maximum record length shall not exceed the block length. The length of any record shall not exceed this assigned maximum record length.

The minimum length of a variable-length record shall be 4 bytes.

Variable-length records shall be as follows:

- (1) Unblocked Variable-length Records An unblocked variable-length record shall be a record contained in a file in which each block contains only one record.
- (2) Blocked Variable-length Records A blocked variable-length record shall be a record contained in a file in which each block may contain more than one record.
- (3) Relation to Blocks The first record of a block shall begin at the first byte of the block. The space between the end of the last record of a block and the end of the block shall be filled with NULs.

5.2.4 Segmented Records A segmented record shall be a record contained in a file that is that is assigned to contain records that may have different lengths and that may be recorded in several blocks of the same file.

That part of a segmented record that is recorded in one block is a record segment.

Only one record segment of a record shall be recorded in a block.

Successive record segments of the same record within the same file shall be recorded in successive blocks.

If one of record segments of the same record is recorded in the last block of a file section, the next record segment shall be recorded in the first block of a different file section.

One maximum record length shall be assigned to a file, and any record in the files shall not exceed this assigned maximum length. There is no limit to this assigned maximum record length (refer to 6.5.16).

Nor is there a limit to the number of segments forming a record.

10
X 0603-1988

A Segment Control Word (SCW) shall be recorded as the first 5 bytes of each record segment. The first byte of the SCW is called the segment indicator, and one of the numerals given below shall be assigned to it. These bytes shall be expressed by the codes as specified in JIS X 0201.

- Digit "0": when the record begins and ends in the record segment.
- Digit "1": when the record begins but does not end in this record segment.
- Digit "2": when the record neither begins nor ends in this record segment.
- Digit "3": when the record ends but does not begin in this record segment.

The record segment length includes the length of the SCW, and shall be expressed as a 4-digit decimal number recorded as the last 4 bytes of the SCW. The length of a record segment shall not be greater than the block length. The minimum length of a record segment shall be 5 bytes.

Segmented records shall be as follows:

- (1) Unblocked Segmented Records A file shall not contain unblocked segmented records.
- (2) Blocked Segmented Records A blocked segmented record shall be a record contained in a file in which a block may contain segments of more than one record.
- (3) Relation to Blocks The first record segment of a block shall begin at the first byte of the block. The space between the end of the last record segment of a block and the end of the block shall be filled with NULs.

5.2.5 Coded Representation of Data The characters in each record, excluding the record control word (RCW) and segment control word (SCW), and their representation shall comply with Japanese Industrial Standard that specifies the coded representation of character sets.

Remark: In each record excluding the record control word (RCW) and segment control word (SCW), noncharacter data may be recorded. The coding in this case shall comply with the relevant Standard, if any.

5.3 Files

5.3.1 Characteristics A file shall be a named collection of records having the following characteristics:

- (1) A file shall be recorded in all or part of a volume or recorded over more than one volume.
- (2) If a file is recorded over more than one volume, only one file section of that file shall be recorded in any one volume. Either all sections of a file shall be numbered consecutively starting with 01 or they shall all be unnumbered.