# International Standard 7665

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

## Information processing — File structure and labelling of flexible disk cartridges for information interchange

*Traitement de l'information — Structure des fichiers et étiquetage des cartouches à disquette pour l'échange d'information*

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.63

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processing, information interchange, flexible disks, files, data blocks, labelling, characteristics.

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Details concerning its use within the Federal Government are contained in Federal Information Processing Standards Publication 118, Flexible Disk Cartridge Labelling and File Structure for Information Interchange. For a complete list of the publications available in the Federal Information Processing Standards Series, write to the Standards Processing Coordinator (ADP), Institute for Computer Sciences and Technology, National Bureau of Standards, Gaithersburg, MD 20899.

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

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.

International Standard ISO 7665 was developed by Technical Committee ISO/TC 97, *Information processing systems*, and was circulated to the member bodies in October 1982.

It has been approved by the member bodies of the following countries :

| | | |
|---|---|---|
| Australia | Italy | Sweden |
| Belgium | Japan | Switzerland |
| Cuba | Mexico | United Kingdom |
| Egypt, Arab Rep. of | Netherlands | USA |
| Germany, F.R. | New Zealand | USSR |
| Hungary | Poland | |
| Ireland | Spain | |

No member body expressed disapproval of the document.



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# Contents

# Information processing — File structure and labelling of flexible disk cartridges for information interchange

## 1 Scope and field of application

This International Standard specifies requirements for the file structure and the labelling of flexible disk cartridges for the interchange of information between users of different information processing systems.

This International Standard specifies

a) recorded labels to identify files, file sections, and volumes of flexible disk cartridges;

b) basic characteristics of the blocks containing the records constituting the file;

c) the file structure.

This International Standard specifies three nested levels of interchange so that

a) at the first level, called BASIC INTERCHANGE (BI), it is possible to interchange data by using a minimum set of the facilities provided;

b) at the second level, called EXTENDED INTERCHANGE LEVEL 1 (E1), it is possible to interchange data using the minimum set together with blocks having a length greater than that of the physical records and with blocked fixed-length records;

c) at the third level, called EXTENDED INTERCHANGE LEVEL 2 (E2), it is possible to interchange data using the facilities of levels BI and E1 together with variable-length records and segmented records.

Annex A describes examples but does not form part of this standard.

Annex B gives disk parameter values derived from flexible disk data interchange standards, but does not form part of this standard.

## 2 Conformance

A flexible disk cartridge conforms to this International Standard when all interchange files and all labels recorded on it conform to the specifications of this International Standard. A statement of conformity shall identify the level or levels of interchange to which the contents of the flexible disk cartridge conform.

A prerequisite is conformance to the applicable flexible disk cartridge data interchange standards identified in this International Standard for the different types of flexible disks.

## 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 — 8-bit coded character set for information interchange.*

ISO 5654, *Information processing — Data interchange on* 200 mm (8 in) *flexible disk cartridges using two-frequency recording at* 13 262 ftprad *on one side —*

*Part 1: Dimensional, physical and magnetic characteristics.*

*Part 2: Track format.*

ISO 6596, *Information processing — Data interchange on* 130 mm (5.25 in) *flexible disk cartridges using two-frequency recording at* 7 958 ftprad *on one side —*

*Part 1: Dimensional, physical and magnetic charcteristics.*

*Part 2: Track format for* 1,9 tpmm (48 tpi). [1)]

ISO 7065, *Information processing — Data interchange on* 200 mm (8 in) *flexible disk cartridges using modified frequency modulation recording at* 13 262 ftprad *on two sides —*

*Part 1: Dimensional, physical and magnetic characteristics.*

*Part 2: Track format for* 1,9 tpmm (48 tpi). [1)]

ISO 7487, *Information processing — Data interchange on* 130 mm (5.25 in) *flexible disk cartridges using modified frequency modulation recording at* 7 958 ftprad *on two sides —*

*Part 1: Dimensional, physical and magnetic characteristics.* [1)]

*Part 2: Track format.* [1)]

1) At present at the stage of draft.

ECMA-59, *Data interchange on* 200 mm *flexible disk cartridges using two-frequency recording at* 13 262 ftprad *on both sides.*

ECMA-78, *Data interchange on* 130 mm *flexible disk cartridges using MFM recording at* 7 958 ftprad *on both sides, 3,8 tracks per millimetre.*

## 4 Definitions

For the purpose of this International Standard, the following definitions apply.

**4.1 block:** A group of characters treated as a logical unit.

**4.2 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.

**4.3 byte:** A string of eight binary digits operated upon as a unit.

**4.4 cylinder:** A pair of tracks, one on each side, having the same track number.

NOTES

1 The cylinder number is a two-digit number identical to the track number.

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

**4.5 extent:** A set of physical records the addresses of which form a continuous ascending sequence.

**4.6 file:** A named collection of information consisting of records pertaining to a single subject.

**4.7 file section:** For a file recorded over more than one volume, that part of the file that is recorded in any one volume.

**4.8 fixed-length record:** A record contained in a file in which all the records have the same length.

**4.9 formatting:** Writing the proper control information establishing the cylinders and designating addresses of physical records on the surfaces of the flexible disk.

**4.10 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.

**4.11 label:** A record that identifies, characterizes and/or delimits a volume, a file or a file section on that volume.

**4.12 natural order:** An ascending sequence of integers starting with the lowest allowed value and proceeding, in increments of one, to the highest allowed value.

**4.13 physical record:** A fixed-length field containing the data of a sector.

**4.14 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.

**4.15 record:** Related data treated as a unit of information.

**4.16 sector:** That part of a track on a flexible disk cartridge that can be accessed by the magnetic heads in the course of predetermined angular displacements of the disk.

**4.17 segmented record:** A record contained in a file in which each record consists of one or more consecutive record segments.

**4.18 track:** That part of a flexible disk that can be accessed by a single magnetic head that is stationary while the disk makes a complete revolution.

**4.19 variable-length record:** A record contained in a file in which the records may have different lengths.

**4.20 volume:** A dismountable physical unit of storage medium, for example a flexible disk cartridge.

## 5 Notation

### 5.1 Specification of label content

**5.1.1** In references to label contents throughout the following clauses of this International Standard, a notation is used with the significance shown in table 1.

**Table 1 — Notation**

| Notation | Significance |
|---|---|
| CP | Character position within the label |
| L | Length of the field in number of characters |
| a-character | Any of the characters complying with the requirements of 8.1 for use in labels |
| Digit(s) | Any digit(s) from 0 to 9 |

**5.1.2** With the exception of SPACE, a group of capital letters in the "content" column of a table specifying label contents indicates that the corresponding characters shall appear in the order given and in the corresponding character positions of the field specified (for example, VOL in CP 1 to 3 of the Volume

Label (see table 6)]. In the tables and throughout this International Standard, SPACE signifies the character coded in position 2/0 of ISO 646.

### 5.2 Label fields

Where the words of this International Standard are used to signify a specific label or label field (for example "Sector Sequence Indicator"), the words are printed with initial capitals throughout (except for prepositions).

## 6 Arrangement of labels and files

### 6.1 Applicability of this International Standard to identified types of flexible disk cartridge

The requirements of this International Standard are applicable to several types of flexible disk cartridge. Each type of cartridge is the subject of a separate data interchange standard. These standards are identified in table 3, together with the corresponding values of a parameter Recording-Type. The parameter Recording-Type is used in this International Standard to identify the data interchange standard to which the cartridge conforms, within the set of standards that apply to cartridges having the same physical dimensions.

Table 2 identifies those numerical parameters that characterize the differences, between the types of cartridge, that are significant for the requirements of this International Standard.

**Table 2 — Parameters for data interchange standards**

| |
|---|
| Number-Of-Sides |
| Cylinder-Limit |
| Index-Sector-Limit |
| Data-Sector-Limit |
| Data-Physical-Record-Length |
| Track-Data-Capacity |

The values of the parameters listed in table 2 shall be obtained from data interchange standards as specified below. The values applicable to the data interchange standards listed in table 3 are quoted in annex B.

Number-Of-Sides: The number of sides of the disk on which recorded tracks shall be present.

Cylinder-Limit: The specified minimum number of good cylinders that shall be present from cylinder 01 to the cylinder having the highest specified cylinder number.

Index-Sector-Limit: The number of usable sectors on Track 00, Side 0, or on Track 00, Side 1.

NOTE — These numbers shall be the same on both sides.

Data-Sector-Limit: The number of usable sectors on each track other than Track 00, on Side 0 or Side 1.

Data-Physical-Record-Length: The number of bytes in the Data Field of a Data Block on each track other than Track 00, on Side 0 or Side 1.

Track-Data-Capacity: The numerical product of the parameters Data-Sector-Limit and Data-Physical-Record-Length.

**Table 3 — Data interchange standards and parameter Recording-Type**

| Data interchange standard | Parameter Recording-Type |
|---|---|
| ISO 5654 | 1 |
| ECMA-59 | 2 |
| ISO 7065 | M |
| ISO 6596 | 1 |
| ISO 7487 | M |
| ECMA-78 | 3 |

### 6.2 Number of sides

Where this International Standard specifies requirements for labels and files on side 0, such requirements shall always apply.

Where this International Standard specifies requirements for labels and files on side 1, such requirements shall apply to those types of flexible disk cartridge for which the parameter Number-Of-Sides in table 2 has the value 2, and shall not apply to those types of flexible disk cartridge for which the parameter has the value 1.

### 6.3 Organization of space on a flexible disk cartridge

The parameter Cylinder-Limit, which is shown in table 2, is used to specify the organization of space on a flexible disk cartridge.

Available space on a flexible disk cartridge shall be organized in the following way:

a) An index cylinder (cylinder 00) shall be reserved for descriptive information about the volume, and the files recorded on the volume.

b) A number of cylinders, the addresses of which range from 01 to Cylinder-Limit inclusive, shall be available for files.

NOTE — According to the data interchange standards, a unique cylinder number is associated with each cylinder. Two of these cylinders are intended to be used only when the volume contains one or more defective cylinders.

Each non-defective cylinder possesses a unique cylinder address, but a defective cylinder does not possess a cylinder address.

Cylinder addresses are assigned consecutively to the non-defective cylinders, in ascending sequence of cylinder numbers.

### 6.4 Index cylinder (cylinder 00)

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 shall

always be formatted with physical records that have a length of 128 data characters on side 0. On side 1, the physical record length depends on the type of flexible disk cartridge.

The number of physical records that shall appear on both tracks of the index cylinder shall be the value of the parameter Index-Sector-Limit in table 2.

The allocation of sectors on the index cylinder shall be as shown in table 4.

Table 4 — Sectors on the index cylinder (cylinder 00)

| 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 (VOL1) |
| 0 | 08 to Index-Sector-Limit | reserved for File Labels (HDR1) |
| 1 | 01 to Index-Sector-Limit | |

#### 6.4.1 Sectors reserved for system use

Sectors 01 to 04 of side 0 shall be reserved for system use and shall be ignored in interchange. Their contents are not specified by this International Standard and shall not be overwritten, except if otherwise agreed by the sender and the recipient of the data.

#### 6.4.2 Sector reserved for future standardization

Sector 06 of side 0 is reserved for future standardization and shall be ignored in interchange.

#### 6.4.3 Sectors reserved for labels

Labels on the index cylinder shall be records that all have the same length. All labels shall be recorded within the first or only 128 character positions of the physical record. Sector 05 of side 0 shall be reserved for the Error Map Label (see 8.6). Sector 07 of side 0 shall be reserved for the Volume Label (VOL1). Sectors 08 to Index-Sector-Limit of side 0 and sectors 01 to Index-Sector-Limit of side 1 shall be reserved for File Labels (HDR1), one label per physical record, to describe the files recorded on cylinders with addresses 01 to Cylinder-Limit.

The File Labels may be recorded anywhere among the sectors reserved for them.

Unused sectors shall be deleted according to 10.2.

### 6.5 Contents of cylinders 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 shall be the value of the parameter Data-Physical-Record-Length in table 2. The number of such physical records that shall be recorded on side 0 and on side 1 of each cylinder shall be the value of the parameter Data-Sector-Limit in table 2.

Each physical record either shall be allocated to an extent, or shall be unallocated. All physical records allocated to an extent shall be identified by an HDR1 label 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.

Data that form 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 interchange.

## 7 File structure for data interchange

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

### 7.1 Blocks

#### 7.1.1 Characteristics

A block shall be a group of characters treated as a logical unit having the following characteristics:

a) A block shall be recorded in all or part of a physical record, or over several physical records the addresses of which form a consecutive ascending sequence. This sequence shall include only the addresses of those non-defective physical records that are recorded on the volume.

b) A block shall begin at the first byte of a physical record.

c) A block may contain one or more complete records or record segments.

NOTE — A block is a logical entity not to be confused with data block described in 10.1.

#### 7.1.2 Block length

The length of a block shall be the number of characters 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.

NOTE — This does not imply that a block must begin and end on the same track.

The minimum length of a block shall be

a) 1 character, when it contains a fixed-length record;

b) 4 characters, when it contains a variable-length record;

c) 5 characters, when it contains a segmented record.

### 7.1.3 Unused character 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 NULs.

NOTE — In all other cases, the end of a block coincides with the end of a physical record.

### 7.1.4 Relation to extents

Within each extent, the data within consecutive physical 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 byte of the first non-defective physical record in the extent. A block shall be completely contained in one extent only.

## 7.2 Records

### 7.2.1 Characteristics

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

a) A record may be recorded on all or part of one or more blocks.

b) Within each block, the data shall be considered to be grouped into consecutive records or record segments.

c) The first or only 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 character of the preceding record or record segment.

d) The length of a record shall be the number of characters of the record.

e) A fixed-length record, or a variable-length record, or a record segment shall end in the block in which it begins.

### 7.2.2 Fixed-length records

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 assigned length of a fixed-length record shall be one data character and the maximum assigned length shall be equal to the block length.

#### 7.2.2.1 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.

#### 7.2.2.2 Blocked fixed-length records

A blocked fixed-length record shall be a record contained in a file in which each block may contain more than one record.

#### 7.2.2.3 Relation to blocks

The first or only record of a block shall begin at the first byte of the block. The space between the end of the last or only record of a block and the end of a block shall be filled with NULs.

### 7.2.3 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 characters of the record. It shall express the record length as a four-digit decimal number coded according to ISO 646. These four characters shall be counted as part of the record length.

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

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

#### 7.2.3.1 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.

#### 7.2.3.2 Blocked variable-length records

A blocked variable-length record shall be a record contained in a file in which a block may contain more than one record.

#### 7.2.3.3 Relation to blocks

The first or only record of a block shall begin at the first byte of the block. The space between the end of the last or only record of a block and the end of a block shall be filled with NULs.

### 7.2.4 Segmented records

A segmented record shall be a record contained in a file that is assigned to contain records that may have different lengths and that may be recorded partly in one block and partly in one or more other blocks in the same file.

That part of a segmented record that is recorded in one block is a record segment. There shall be only one segment of the same record in a block.

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

Different segments of the same record shall only be recorded in different file sections if one of the segments is recorded in the last block of a file section, and the next segment of the record is recorded in the first block of another file section.

A maximum record length shall be assigned for a file. The length of any record in the file shall not exceed this assigned value. The assigned maximum record length is unbounded in that this International Standard specifies no limit to the number of record segments in a record.

A Segment Control Word (SCW) shall be recorded as the first five characters of each record segment. These characters shall be coded according to ISO 646.

The first character of the SCW is called the segment indicator. This shall have one of the values 0, 1, 2 or 3 as follows:

0 shall mean that the record begins and ends in this record segment;

1 shall mean that the record begins but does not end in this record segment;

2 shall mean that the record neither begins nor ends in this record segment;

3 shall mean that 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 four-digit decimal number recorded as the last four characters 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 five characters.

**7.2.4.1** Unblocked segmented records

A file shall not contain unblocked segmented records.

**7.2.4.2** 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.

**7.2.4.3** Relation to blocks

The first or only record segment of a block shall begin at the first byte of the block. The space between the end of the last or only record segment of a block and the end of the block shall be filled with NULs.

### 7.2.5 Coded representation of data

The characters in each record shall be interpreted according to the International Standards for the coded representation of character sets.

## 7.3 Files

### 7.3.1 Characteristics

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

a) A file shall be recorded in all or part of a volume, or over more than one volume.

b) 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.

c) Each file or file section that is recorded on a volume shall be contained within a single extent.

### 7.3.2 Relation to volumes

A volume may contain one or more complete files or file sections.

A volume shall not contain more than one section of the same file.

### 7.3.3 Relation to extents

If one or more consecutive blocks at the end of an extent are not used to contain any records of a file or file section, these blocks shall be assigned as unused and shall not form part of the file. Any data that is recorded within these unused blocks shall be ignored in interchange.

If all blocks in an extent are assigned as unused, the whole file or file section shall be ignored in interchange.

### 7.3.4 Consistency of file attributes between file sections

Within the set of File Labels (HDR1) for the different file sections of the same file, those label fields that have the same field name taken from those listed below shall contain the same characters:

a) File Identifier (CP 6 to 22).

b) Block Length (CP 23 to 27).

c) Record Format (CP 40).

d) Bypass Indicator (CP 41).

e) File Accessibility Indicator (CP 42).

f) Write Protect (CP 43).

g) Interchange Type (CP 44).

h) Record Length (CP 54 to 57).

j) Record Attribute (CP 63).

k) File Organization (CP 64).

## 7.4 File organization

**7.4.1** The file organization shall be sequential.

**7.4.2** In a sequential file, if the records are unblocked, no record shall appear in a block unless the preceding block

contains a record. If the records are blocked, no record or record segment shall appear in a block unless the preceding block contains insufficient space to accommodate the next record or record segment. These requirements shall not apply to the first record or record segment of the file section.

7.4.3 If the records are blocked, any character positions that follow the last record in the last used block shall be ignored in interchange.

### 7.5 Record formats and attributes permitted for interchange

Within a file for interchange, the records shall have one of the following combinations of format and attributes:

a) fixed-length, unblocked;

b) fixed-length, blocked;

c) variable-length, unblocked;

d) variable-length, blocked;

e) segmented, blocked.

### 7.6 Relevant fields for file structure

The following File Label (HDR1) fields are relevant for describing the file structure of the data to be interchanged:

CP 23 to 27: Block Length

CP 40 : Record Format

CP 54 to 57: Record Length

CP 63 : Record Attribute

CP 64 : File Organization

## 8 Format and contents of labels

### 8.1 Character set and coding

The characters in the labels shall be coded according to ISO 646.

The 57 characters used in the labels shall be those in the following positions of the International Reference Version (see table 5):

2/0 to 2/2

2/5 to 2/15

3/0 to 3/15

4/1 to 4/15

5/0 to 5/10

5/15

Table 5 — International Reference Version (see ISO 646) showing characters permitted in labels
(prohibited characters are shaded)

| b7 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
|---|---|---|---|---|---|---|---|---|
| b6 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 |
| b5 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| b4 b3 b2 b1 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 0 0 0 0 0 | NUL | DLE | SP | 0 | @ | P | ` | p |
| 0 0 0 1 1 | SOH | DC1 | ! | 1 | A | Q | a | q |
| 0 0 1 0 2 | STX | DC2 | " | 2 | B | R | b | r |
| 0 0 1 1 3 | ETX | DC3 | # | 3 | C | S | c | s |
| 0 1 0 0 4 | EOT | DC4 | ¤ | 4 | D | T | d | t |
| 0 1 0 1 5 | ENQ | NAK | % | 5 | E | U | e | u |
| 0 1 1 0 6 | ACK | SYN | & | 6 | F | V | f | v |
| 0 1 1 1 7 | BEL | ETB | ' | 7 | G | W | g | w |
| 1 0 0 0 8 | BS | CAN | ( | 8 | H | X | h | x |
| 1 0 0 1 9 | HT | EM | ) | 9 | I | Y | i | y |
| 1 0 1 0 10 | LF | SUB | * | : | J | Z | j | z |
| 1 0 1 1 11 | VT | ESC | + | ; | K | [ | k | { |
| 1 1 0 0 12 | FF | IS4 | , | < | L | \ | l | \| |
| 1 1 0 1 13 | CR | IS3 | - | = | M | ] | m | } |
| 1 1 1 0 14 | SO | IS2 | . | > | N | ^ | n | ~ |
| 1 1 1 1 15 | SI | IS1 | / | ? | O | _ | o | DEL |

### 8.2 Justification of characters

In the label fields, characters shall be justified as follows:

a) in each field the content of which is specified by this International Standard to be SPACEs or digits, digits shall be right-justified, and any remaining positions on the left shall be filled either only with zeros or only with SPACEs;

b) in other fields, characters shall be left-justified, and any remaining positions on the right shall be filled with SPACEs.

### 8.3 Labels

A volume shall contain a Volume Label (VOL1) and an Error Map Label (ERMAP). Each file or file section on the volume shall be identified through a File Label (HDR1). Each of these labels shall be recorded on cylinder 00 as a record with a length of 128 characters.

A label shall not be part of a file.

## 8.4 Volume Label (VOL1)

The Volume Label shall identify the volume, the owner, the accessibility conditions, the version of this International Standard which applies (see clause 2), and certain physical characteristics of the volume.

The contents of the Volume Label are shown in table 6 and further described and specified in 8.4.1 to 8.4.10.

### 8.4.1 Fields reserved for future standardization (CP 12 to 37, 52 to 71, 73 to 75, 79 and 81 to 128)

These fields shall be reserved for future standardization.

The characters in CP 12 to 37, 52 to 71, 73 to 75, and 79 shall be SPACEs. The characters in CP 81 to 128 shall be either all SPACEs or all NULs.

### 8.4.2 Label Identifier (CP 1 to 3)

This field shall specify the Label Identifier.

The characters in this field shall be VOL.

### 8.4.3 Label Number (CP 4)

This field shall specify the Label Number.

The character in this field shall be the digit 1.

### 8.4.4 Volume Identifier (CP 5 to 10)

This field shall specify an identification for the volume.

The characters in this field shall be a-characters.

The identifier shall be permanently assigned by the owner of the volume.

### 8.4.5 Volume Accessibility Indicator (CP 11)

This field shall specify whether there are restrictions under which the volume may be accessed.

The character in this field shall be an a-character.

| | |
|---|---|
| SPACE | shall mean that there is no access restriction to any file label or data on the volume. |
| Any other character | shall mean that there are particular qualifications for access to the volume, that are subject to agreement between the sender and the recipient of the data. |

If this field contains SPACE, the File Accessibility Indicator (HDR1, CP 42) in all File Header Labels shall also contain SPACE.

**Table 6 — Contents of the Volume Label**

| CP | Field name | L | Content |
|---|---|---|---|
| 1 to 3 | Label Identifier | 3 | VOL (see 8.4.2) |
| 4 | Label Number | 1 | 1 (see 8.4.3) |
| 5 to 10 | Volume Identifier | 6 | a-characters (see 8.4.4) |
| 11 | Volume Accessibility Indicator | 1 | a-character (see 8.4.5) |
| 12 to 37 | (Reserved for future standardization) | 26 | SPACEs (see 8.4.1) |
| 38 to 51 | Owner Identifier | 14 | a-characters (see 8.4.6) |
| 52 to 71 | (Reserved for future standardization) | 20 | SPACEs (see 8.4.1) |
| 72 | Recording-Type Indicator | 1 | a-character (see 8.4.7) |
| 73 to 75 | (Reserved for future standardization) | 3 | SPACEs (see 8.4.1) |
| 76 | Physical Record Length Identifier | 1 | SPACE or digit (see 8.4.8) |
| 77 to 78 | Sector Sequence Indicator | 2 | SPACEs or digits (see 8.4.9) |
| 79 | (Reserved for future standardization) | 1 | SPACE (see 8.4.1) |
| 80 | Label Standard Version | 1 | digit (see 8.4.10) |
| 81 to 128 | (Reserved for future standardization) | 48 | SPACEs or NULs (see 8.4.1) |

#### 8.4.6 Owner Identifier (CP 38 to 51)

This field shall specify the owner of the volume.

The characters in this field shall be a-characters.

#### 8.4.7 Recording-Type Indicator (CP 72)

This field shall specify the data interchange standard to which the volume conforms, from among the set of standards which are applicable to flexible disk cartridges having the same physical dimensions.

The character in this field shall be an a-character, and shall be either SPACE or the value of the parameter Recording-Type in table 3 that corresponds to the data interchange standard to which the flexible disk cartridge conforms.

SPACE or 1 shall mean that this volume conforms to one of the data interchange standards for which the value of the parameter Recording-Type is 1.

Any other character shall mean that this volume conforms to one of the data interchange standards for which the value of the parameter Recording-Type is the same as this character.

NOTE — The data interchange standard specifies the number of formatted surfaces of the volume and the number of cylinders available for use. This information is summarized in annex B by means of the parameters Number-Of-Sides and Cylinder-Limit.

#### 8.4.8 Physical Record Length Identifier (CP 76)

This field shall specify the length of all physical records on all cylinders other than cylinder 00.

The character in this field shall be SPACE or a digit.

SPACE shall mean that the length of all physical records is 128 bytes.

1 shall mean that the length of all physical records is 256 bytes.

2 shall mean that the length of all physical records is 512 bytes.

3 shall mean that the length of all physical records is 1 024 bytes.

#### 8.4.9 Sector Sequence Indicator (CP 77 to 78)

This field shall specify the sequence of the sectors on the tracks.

The characters in this field shall be SPACEs or digits.

SPACEs or 01 shall each mean that the sectors are in the natural order.

02 to 13 shall mean that the sectors are in one of the other 12 orders specified by ISO 5654 and ECMA-59.

#### 8.4.10 Label Standard Version (CP 80)

This field shall specify the version of this International Standard to which the volume conforms.

The character in this field shall be a digit.

3 shall indicate the present version of this International Standard.

### 8.5 File Label (HDR1)

The File Label shall identify the file, specify its location on the volume, and designate certain attributes of the file.

The contents of the File Label are shown in table 7 and are further described and specified in 8.5.1 to 8.5.22.

Table 7 — Contents of the File Label

| CP | Field name | L | Content |
|---|---|---|---|
| 1 to 3 | Label Identifier | 3 | HDR (see 8.5.2) |
| 4 | Label Number | 1 | 1 (see 8.5.3) |
| 5 | (Reserved for future standardization) | 1 | SPACE (see 8.5.1) |
| 6 to 22 | File Identifier | 17 | a-characters (see 8.5.4) |
| 23 to 27 | Block Length | 5 | digits (see 8.5.5) |
| 28 | (Reserved for future standardization) | 1 | SPACE (see 8.5.1) |
| 29 to 33 | Begin Extent | 5 | digits (see 8.5.6) |
| 34 | (Reserved for future standardization) | 1 | SPACE (see 8.5.1) |
| 35 to 39 | End Extent | 5 | digits (see 8.5.7) |
| 40 | Record Format | 1 | SPACE or F or V or S (see 8.5.8) |
| 41 | Bypass Indicator | 1 | SPACE or B (see 8.5.9) |
| 42 | File Accessibility Indicator | 1 | a-character (see 8.5.10) |
| 43 | Write Protect | 1 | SPACE or P (see 8.5.11) |
| 44 | Interchange Type | 1 | SPACE or capital letter or digit (see 8.5.12) |
| 45 | Multivolume Indicator | 1 | SPACE or C or L (see 8.5.13) |
| 46 to 47 | File Section Number | 2 | SPACEs or digits (see 8.5.14) |
| 48 to 53 | Creation Date | 6 | SPACEs or digits (see 8.5.15) |
| 54 to 57 | Record Length | 4 | SPACEs or digits (see 8.5.16) |
| 58 to 62 | Unused Positions Count | 5 | SPACEs or digits (see 8.5.17) |
| 63 | Record Attribute | 1 | SPACE or B (see 8.5.18) |
| 64 | File Organization | 1 | SPACE or S (see 8.5.19) |
| 65 to 66 | (Reserved for future standardization) | 2 | SPACEs (see 8.5.1) |
| 67 to 72 | Expiration Date | 6 | SPACEs or digits (see 8.5.20) |
| 73 | Verify/Copy Indicator | 1 | a-character (see 8.5.21) |
| 74 | (Reserved for future standardization) | 1 | SPACE (see 8.5.1) |
| 75 to 79 | End of Data | 5 | digits (see 8.5.22) |
| 80 | (Reserved for future standardization) | 1 | SPACE (see 8.5.1) |
| 81 to 128 | (Reserved for future standardization) | 48 | SPACEs or NULs (see 8.5.1) |

**8.5.1 Fields reserved for future standardization** (CP 5, 28, 34, 65, 66, 74 and 80 to 128)

These fields shall be reserved for future standardization.

The characters in CP 5, 28, 34, 65, 66, 74 and 80 shall be SPACEs. The characters in CP 81 to 128 shall be either all SPACEs or all NULs.

**8.5.2 Label Identifier** (CP 1 to 3)

This field shall specify the Label Identifier.

The characters in this field shall be HDR.

**8.5.3 Label Number** (CP 4)

This field shall specify the Label Number.

The character in this field shall be the digit 1.

**8.5.4 File Identifier** (CP 6 to 22)

This field shall specify the identifier of the file.

The characters in this field shall be a-characters. The File Identifier shall be assigned to the file by its originator at label creation time. There shall be no duplicate File Identifiers on the same volume.

**8.5.5 Block Length** (CP 23 to 27)

This field shall specify the number of characters per block.

The characters in this field shall be digits.

**8.5.6 Begin Extent** (CP 29 to 33)

This field shall specify the address of the first physical record of the extent.

The characters in this field shall be digits.

The first two digits shall specify the cylinder address (01 to Cylinder-Limit).

The third digit shall specify the side number (0 or 1).

The last two digits shall specify the sector number (01 to Data-Sector-Limit).

### 8.5.7 End Extent (CP 35 to 39)

This field shall specify the address of the last physical record of the extent.

The characters in this field shall be digits.

The first two digits shall specify the cylinder address (01 to Cylinder-Limit).

The third digit shall specify the side number (0 to 1).

The last two digits shall specify the sector number (01 to Data-Sector-Limit).

### 8.5.8 Record Format (CP 40)

This field shall specify the format of the records in the file.

The character in this field shall be SPACE, F, V or S.

| | |
|---|---|
| SPACE or F | shall mean that all records are fixed-length records. |
| V | shall mean that all records are variable-length records. |
| S | shall mean that all records are segmented records. |

### 8.5.9 Bypass Indicator (CP 41)

This field shall specify whether or not a file may be ignored in interchange.

The character in this field shall be SPACE or B.

| | |
|---|---|
| SPACE | shall mean that the file is intended for interchange. |
| B | shall mean that the file may be ignored for interchange. |

### 8.5.10 File Accessibility Indicator (CP 42)

This field shall specify whether or not there are particular conditions under which the file can be accessed.

The character in this field shall be an a-character.

| | |
|---|---|
| SPACE | shall mean that there is no access restriction. |
| Any other character | shall mean that there are particular qualifications for access to the file, which are subject to agreement between the sender and the recipient of the data. In this case, the Volume Accessibility Indicator (VOL 1, CP 11) shall not be SPACE. |

### 8.5.11 Write Protect (CP 43)

This field shall specify whether or not there is a protection against alteration of the file.

The character in this field shall be SPACE or P.

| | |
|---|---|
| SPACE | shall mean that there is no protection. |
| P | shall mean that the file is protected. |

### 8.5.12 Interchange Type (CP 44)

This field shall specify the set of attributes that the file possesses.

The character in this field shall be SPACE or a capital letter or a digit.

| | |
|---|---|
| SPACE | shall mean that the file is a BASIC INTERCHANGE file. |
| 1 | shall mean that the file is an EXTENDED INTERCHANGE LEVEL 1 (E1) file. |
| 2 | shall mean that the file is an EXTENDED INTERCHANGE LEVEL 2 (E2) file. |
| Any capital letter | shall mean that the file does not conform to any interchange level specified by this International Standard. |

### 8.5.13 Multivolume Indicator (CP 45)

This field shall specify whether the file is completely contained on the volume, is continued on another volume or finishes on this volume.

The character in this field shall be SPACE, C or L.

| | |
|---|---|
| SPACE | shall mean that the file is entirely contained in the volume. |
| C | shall mean that the file continues on another volume. |
| L | shall mean that the file ends, but does not begin, in the volume. |

### 8.5.14 File Section Number (CP 46 to 47)

This field shall specify the ordinal number of the file sections (starting with 01) in a multivolume file if they are consecutively numbered.

The characters in the field shall be SPACEs or digits.

| | |
|---|---|
| SPACEs | shall mean that the file sections are not numbered. |
| Digits | shall form this number (01 to 99). |

If the file is not a multivolume file, this field shall contain SPACEs or 01.

#### 8.5.15 Creation Date (CP 48 to 53)

This field shall specify the date of creation of the file section.

The characters in this field shall be SPACEs or digits.

SPACEs shall mean that the creation date is not significant.

The first two digits shall specify the two low-order digits of the year (00 to 99).

The next two digits shall specify the month (01 to 12).

The last two digits shall specify the day (01 to 31).

#### 8.5.16 Record Length (CP 54 to 57)

This field shall specify the maximum number of characters per record.

The characters in this field shall be SPACEs or digits.

SPACEs shall mean that the maximum record length is equal to the block length.

Digits shall specify the maximum number of characters per record.

If the Interchange Type field (HDR1, CP 44) contains a SPACE, the Record Length field shall contain either SPACEs or a number equal to that in the Block Length field (HDR1, CP 23 to 27).

If the Record Format field (HDR1, CP 40) contains a V, the number of characters specified by this field shall include the characters in the Record Control Word (RCW).

If the Record Format field (HDR1, CP 40) contains a S, the number of characters specified by this field shall not include the characters in the Segment Control Word(s), and a value of 0 shall mean that the record length may be greater than 9 999 characters.

#### 8.5.17 Unused Positions Count (CP 58 to 62)

This field shall be used with blocked records to specify the number of unused character positions in the block that immediately precedes the block identified by End of Data (HDR1, CP 75 to 79).

The characters in this field shall be SPACEs or digits.

SPACEs shall mean that there are no unused positions in the last block.

Digits shall specify the number of unused positions in the last block.

With unblocked records, this field shall contain only SPACEs or ZEROs.

#### 8.5.18 Record Attribute (CP 63)

This field shall specify whether the records of the file are blocked or unblocked.

The character in this field shall be SPACE or B.

SPACE shall mean that the records are unblocked.

B shall mean that the records are blocked.

#### 8.5.19 File Organization (CP 64)

This field shall specify the organization of the file.

The character in this field shall be SPACE or S.

SPACE or S shall mean that the file is organized sequentially.

#### 8.5.20 Expiration Date (CP 67 to 72)

This field shall specify if and when the data within the file section may be regarded as obsolete.

The characters in this field shall be SPACEs or digits.

SPACEs shall mean that the data may be regarded as obsolete.

999999 shall mean that the data shall not be regarded as obsolete.

Digits other than 999999 shall specify the earliest date at which the data may be regarded as obsolete.

The first two digits shall specify the two low-order digits of the year (00 to 99).

The next two digits shall specify the month (01 to 12).

The last two digits shall specify the day (01 to 31).

#### 8.5.21 Verify/Copy Indicator (CP 73)

This field shall specify whether verification procedures have been applied to the data of the file section, or whether the file section has been copied on another medium.

The character in this field shall be an a-character.

SPACE shall mean that this file section has not been verified or copied, or, alternatively, that this information is not relevant in interchange.

The use of any other character shall be a matter for agreement between the sender and the recipient of the data.

#### 8.5.22 End of Data (CP 75 to 79)

This field shall specify the address of the physical record containing the beginning of the next available unused block in the extent, if such a block exists.

The characters in this field shall be digits.

The first two digits shall specify the cylinder address (01 to Cylinder-Limit plus 1).

The third digit shall specify the side number (0 or 1).

The last two digits shall specify the sector number (01 to Data-Sector-Limit).

If this address is equal to that in the Begin Extent field (CP 29 to 33), this shall mean that no data are recorded in the extent.

If this address is higher than that in the End Extent field (CP 35 to 39), this shall mean that there are no unused blocks in the extent. In this situation only, a cylinder address equal to Cylinder-Limit plus 1 may occur.

### 8.6 Error Map Label (ERMAP)

The ERMAP label shall be used to identify up to two cylinders found defective during formatting.

The contents of the ERMAP label shall be as shown in table 8 and as further specified in 8.6.1 to 8.6.4.

#### 8.6.1 Fields reserved for future standardization (CP 6, 10, 14 to 128)

These fields shall be reserved for future standardization.

The characters in CP 6, 10 and 14 to 80 shall be SPACEs.

The characters in CP 81 to 128 shall be either all SPACEs or all NULs.

#### 8.6.2 Label Identifier (CP 1 to 5)

This field shall specify the ERMAP label.

The characters in this field shall be ERMAP.

#### 8.6.3 Defective Cylinder Identification 1 (CP 7 to 9)

This field shall specify the cylinder number of the only defective cylinder if one defective cylinder is present on the volume, or shall specify the number of the lowest-numbered defective cylinder if more than one defective cylinder is present on the volume.

The characters in this field shall be SPACEs or digits.

SPACEs shall mean that no defective cylinder has been encountered during formatting.

The first two digits shall specify the cylinder number (01 to Cylinder-Limit) of the first defective cylinder.

The third digit shall always be the digit 0.

#### 8.6.4 Defective Cylinder Identification 2 (CP 11 to 13)

This field shall specify the cylinder number of the higher-numbered defective cylinder, if two defective cylinders are present on the volume.

The characters in this field shall be SPACEs or digits.

SPACEs shall mean that there are not two defective cylinders on the volume (there may be one, if specified at CP 7 to 9).

The first two digits shall specify the cylinder number (02 to Cylinder-Limit plus 1) of the second defective cylinder.

The third digit shall always be the digit 0.

## 9 Initialization and processing of label fields

### 9.1 Volume Label (VOL1)

The Volume Label, once created, shall be preserved and shall not be changed unless authorized by the owner of the volume, and then only as prescribed by that owner. However, the contents of the fields of the VOL1 label shall not be overridden.

The Volume Label shall be created when the volume is initialized; the following fields shall be properly set during this process:

a) Label Identifier (CP 1 to 3).

b) Label Number (CP 4).

c) Recording-Type Indicator (CP 72).

Table 8 — Contents of ERMAP Label

| CP | Field name | L | Content |
|---|---|---|---|
| 1 to 5 | Label Identifier | 5 | ERMAP (see 8.6.2) |
| 6 | (Reserved for future standardization) | 1 | SPACE (see 8.6.1) |
| 7 to 9 | Defective Cylinder Identification 1 | 3 | SPACEs or digits (see 8.6.3) |
| 10 | (Reserved for future standardization) | 1 | SPACE (see 8.6.1) |
| 11 to 13 | Defective Cylinder Identification 2 | 3 | SPACEs or digits (see 8.6.4) |
| 14 to 80 | (Reserved for future standardization) | 67 | SPACEs (see 8.6.1) |
| 81 to 128 | (Reserved for future standardization) | 48 | SPACEs or NULs (see 8.6.1) |

d) Physical Record Length Identifier (CP 76).

e) Sector Sequence Indicator (CP 77 to 78);

f) Label Standard Version (CP 80).

Entry of other fields may be done either with the same initialization process or with a subsequent process, under control of a system operator and/or a special program.

The following fields shall be assigned by the installation or the user of the installation:

a) Volume Identifier (CP 5 to 10).

b) Volume Accessibility Indicator (CP 11).

c) Owner Identifier (CP 38 to 51).

### 9.2 File Label (HDR1)

A File Label, once created, shall be preserved, and shall not be changed unless authorized by the owner of the file, and then only as prescribed by the owner.

During reading of the flexible disk cartridge, the contents of the fields found in labels being processed may be overriden by using new characters obtained from other sources. The new characters may be supplied before the file is processed or after the processing has begun.

During initialization, all sectors intended to contain File Labels shall be deleted according to 10.2.

### 9.3 Error Map Label (ERMAP)

**9.3.1** The ERMAP Label, once created, shall be preserved and shall not be changed except in accordance with the requirements of 9.3.2.

**9.3.2** The ERMAP Label shall be created during initialization, after formatting. The ERMAP Label shall be initialized with the Label Identifier (CP 1 to 5) set to ERMAP, followed either by 123 SPACEs, or by 75 SPACEs and 48 NULs. In addition, the cylinder numbers of any defective cylinders (up to two) detected during a formatting operation shall be recorded as specified in 8.6.

## 10 Physical records

### 10.1 Structure of data blocks

In accordance with the data interchange standards listed in table 3, the data block of a sector comprises three fields:

a) Data Mark.

b) Data Field (see 4.13, physical record).

c) EDC (error detection characters).

#### 10.1.1 Data Mark

The format of the Data Mark depends on the mode of recording that is used on the volume.

The Data Mark shall have the format specified in the data interchange standard to which the volume conforms. More than one format of Data Mark may be present on the same volume.

Within each specified format of Data Mark one byte is specified to be either:

a) a bit combination which indicates that "the data is valid, and the whole Data Field can be read", or

b) a bit combination which indicates that "the first byte of the Data Field shall be interpreted according to ISO 7665".

The values identified in a) are here called a valid-data byte, and shall indicate that the data is valid and that the whole physical record can be read.

The values identified in b) are here called a flag byte, and shall indicate that the first byte of the physical record shall be interpreted according to 10.2 and 10.3.

#### 10.1.2 EDC

These two bytes shall be generated by hardware using the bytes of the data block starting with the last byte of the Data Mark and ending with the last byte of the physical record.

### 10.2 Deleted data

The data of a physical record shall be considered deleted if the last byte of the Data Mark is a flag byte and the first byte of the physical record contains the character D; the remaining bytes in that physical record shall be ignored in interchange. The EDC of such a data block shall be valid. This method of deletion shall be applied only to a physical record that is within cylinder 00.

### 10.3 Defective physical records

A physical record shall be considered defective if the last byte of the Data Mark is a flag byte and if its first byte contains the character F; the remaining bytes in that physical record shall be ignored in interchange.

The EDC of a data block containing a defective physical record may or may not be valid.

### 10.4 Handling of defective physical records

Distinction shall be made between defective physical records found when formatting a flexible disk cartridge, and physical records found defective during processing of data (writing or reading of a file), after the flexible disk was initialized. This International Standard specifies the following options for use while processing data.

If a defective physical record is encountered on cylinder 00, further processing shall be suspended.

When a defective physical record is encountered within a file, one of the following actions may be taken:

a) continue processing using sequential relocation;

b) suspend further processing of the offending file on this flexible disk cartridge.

#### 10.4.1 Sequential relocation

If a defective physical record is encountered when creating a file, a flag byte shall be entered as the last byte of the Data Mark and the character F shall be entered as the first byte of the physical record. The data intended for this physical record shall then be written in the next non-defective physical record in ascending physical record address sequence, if there are sufficient unused physical records in the extent to enable the whole of the block to be correctly written within the extent. If it is impossible to write a flag byte and F, such that they can be recognized on subsequent reading, or if there are not sufficient physical records to enable the block to be written within the extent, further processing of this file on this flexible disk cartridge shall be suspended.

NOTE — If the flag byte and F cannot be recognized on subsequent reading, the volume does not conform to the data interchange standard.

If a flag byte and F are encountered when reading a flexible disk cartridge, the desired data will be found in the next non-defective physical record as specified above. No further processing of the defective physical record is required.

#### 10.4.2 Suspension of processing of a file

If processing of a file is suspended during its creation because a defective physical record has been encountered, the file shall be terminated on this flexible disk cartridge with the last physical record of the block preceding the block in which the defective physical record occurred.

The block in which the defective physical record occurred shall be included among the unused blocks that are indicated in the File Header label. The file may then be continued on another volume.

NOTE — The terminating physical record specified in this sub-clause is the physical record preceding the defective physical record if the block length is less than or equal to the physical record length.

## 11 Levels of interchange

### 11.1 General

This International Standard specifies three levels of interchange called "BASIC INTERCHANGE", "EXTENDED INTERCHANGE LEVEL 1", and "EXTENDED INTERCHANGE LEVEL 2".

A single volume may contain files of different levels of interchange or files not conforming to any interchange level specified in this International Standard. Therefore, a volume may conform to more than one interchange level simultaneously, and shall always conform to the requirements of 11.5.

On a given flexible disk cartridge, all data shall be recorded according to one of the data interchange standards listed in table 3.

### 11.2 BASIC INTERCHANGE

A volume which conforms to the BASIC INTERCHANGE level shall contain one or more BASIC INTERCHANGE files.

A BASIC INTERCHANGE file shall be specified by SPACE on the Interchange Type field (HDR1, CP 44) and shall have the following attributes:

a) The file name shall be of not more than 8 characters.

b) The block length shall not exceed the physical record length.

c) All records shall be in fixed-length format.

d) All records shall have a length equal to the block length.

e) All records shall be unblocked.

If the volume conforms to ISO 7065, the parameter Data-Physical-Record-Length in table 2 shall take only the value 256, and the parameter Data-Sector-Limit shall take only the value 26.

The fields shown in table 9, having assumed values in BASIC INTERCHANGE, need not be checked.

Table 9 — Fields with assumed values in BASIC INTERCHANGE

| Field name | Assumed values | | |
|---|---|---|---|
| | Label | CP | Characters |
| Record Format | HDR1 | 40 | SPACE or F |
| Record Length | HDR1 | 54 to 57 | SPACE |
| Unused Positions Count | HDR1 | 58 to 62 | SPACE |
| Record Attribute | HDR1 | 63 | SPACE |

## 11.3 EXTENDED INTERCHANGE LEVEL 1

A volume which conforms to EXTENDED INTERCHANGE LEVEL 1 shall contain one or more EXTENDED INTERCHANGE LEVEL 1 files.

An EXTENDED INTERCHANGE LEVEL 1 file shall be specified by the digit 1 in the Interchange Type field (HDR1, CP 44) and shall have the following attributes:

a) The file name shall be of not more than 8 characters.

b) The block length shall not exceed the value of the parameter Track-Data-Capacity identified in table 2.

c) All records shall be in fixed-length format.

d) Records may be blocked or unblocked.

## 11.4 EXTENDED INTERCHANGE LEVEL 2

A volume which conforms to EXTENDED INTERCHANGE LEVEL 2 shall contain one or more EXTENDED INTERCHANGE LEVEL 2 files.

An EXTENDED INTERCHANGE LEVEL 2 file shall be specified by the digit 2 in the Interchange Type field (HDR1, CP 44) and shall have the following attributes:

a) The file name shall be of not more than 17 characters.

b) The block length shall not exceed the value of the parameter Track-Data-Capacity identified in table 2.

c) Records shall be in fixed-length, or in variable-length, or in segmented, format.

d) Records shall have one of the following combinations of format and attributes:

1) fixed-length, unblocked;
2) fixed-length, blocked;
3) variable-length, unblocked;
4) variable-length, blocked;
5) segmented, blocked.

## 11.5 Files not conforming to specified interchange levels

If a volume includes a file that does not conform to any of the interchange levels specified in this International Standard, the identifying label of the file shall have contents that conform to the requirements of 8.5 in the following fields:

a) Label Identifier (CP 1 to 3).

b) Label Number (CP 4).

c) Begin Extent (CP 29 to 33).

d) End Extent (CP 35 to 39).

e) Interchange Type (CP 44).

The contents of all other fields are not specified.

If a volume includes such a non-conforming file, character positions CP 14 to 128 in the ERMAP label may contain any characters.

# Annex A

# Examples

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

This annex describes examples of structuring data records and blocks on flexible disk cartitridges and the fields of the HDR1 Label defined for that purpose.

## A.1 Relevant fields for data format

The following fields in HDR1 are relevant for describing the data formats:

CP 23 to 27: Block Length

CP 40 : Record Format

CP 54 to 57: Record Length

CP 58 to 62: Unused Positions Count

CP 63 : Record Attribute

## A.2 Specific formats

### A.2.1 Unblocked records

These records are recorded as one and only one record per block, irrespective of the record length.

*Example 1*

A file containing fixed-length records of 120 characters is considered.

The label fields of interest will contain

Block Length : 120

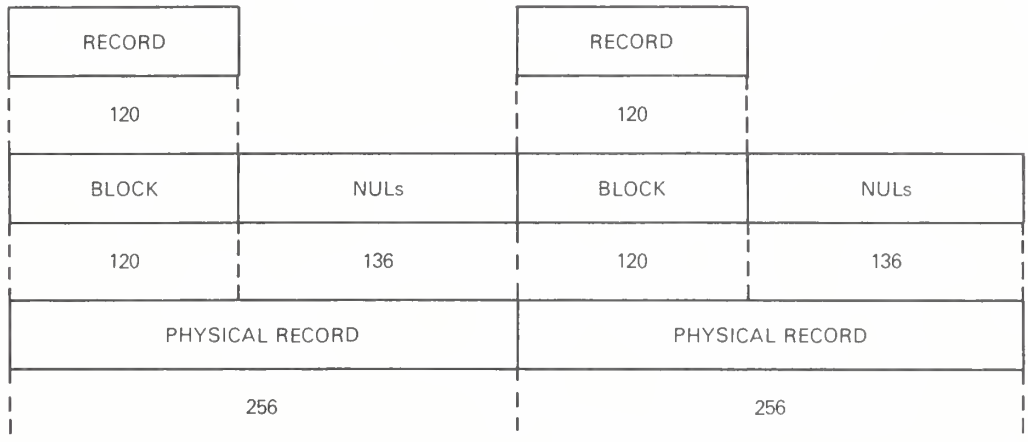
Record Format : SPACE or F

Record Length : SPACEs or 120

Unused Positions Count : SPACEs

Record Attribute : SPACE

For this file, each physical record would contain 120 data characters, followed by 136 padding characters (NULs).



*Example 2*

A file containing variable-length records with a maximum length of 500 characters is considered.

The label fields of interest will contain

Block Length : 512

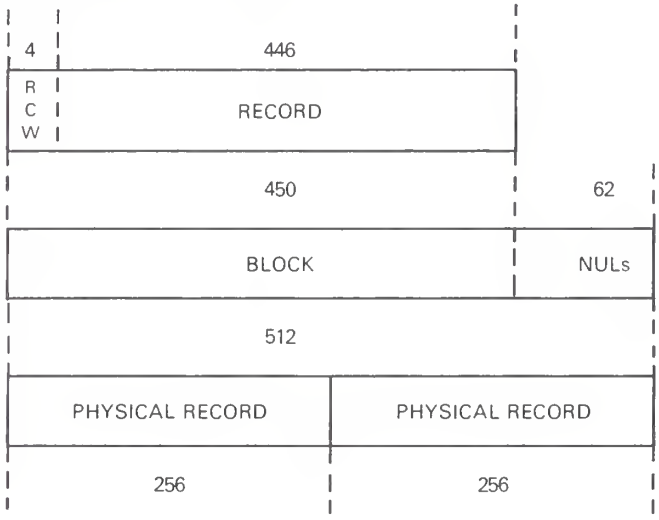
Record Format : V

Record Length : 500

Unused Positions Count : SPACEs

Record Attribute : SPACE

The record considered in the following example has a length of 450 characters.




For this file, every pair of physical records would contain a variable-length record, followed by padding characters (NULs) within the block.

### A.2.2 Blocked records

These records are recorded as one or more record per block, depending on the record lengths.

*Example 3*

A file containing fixed-length records of 60 characters that are blocked into blocks with a length of 240 characters is considered.

The label fields of interest will contain

Block Length : 240

Record Format : SPACE or F

Record Length : 60

Unused Positions Count : ZEROs or SPACEs or 60, or 120 or 180

Record Attribute : B

The contents of the Unused Positions Count field depend on the number of records written in the last block:

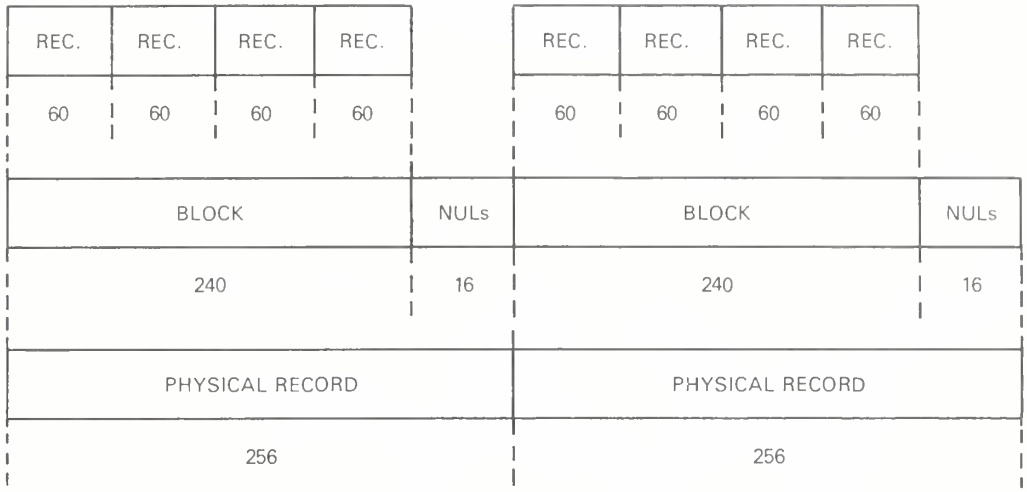
SPACEs or ZEROs mean a completely filled block of four records.

60 means a partly filled block with three records.

120 means a partly filled block with two records.

180 means a partly filled block with one record.

For this file, each physical record (except possibly the last one used) contains 240 data characters and 16 padding characters (NULs).




*Example 4*

A file containing variable-length records with a maximum length of 120 characters that are blocked into blocks with a length of 240 characters is considered. The last two blocks of the file are shown in the diagram below.

The label fields of interest will contain

Block Length : 240

Record Format : V

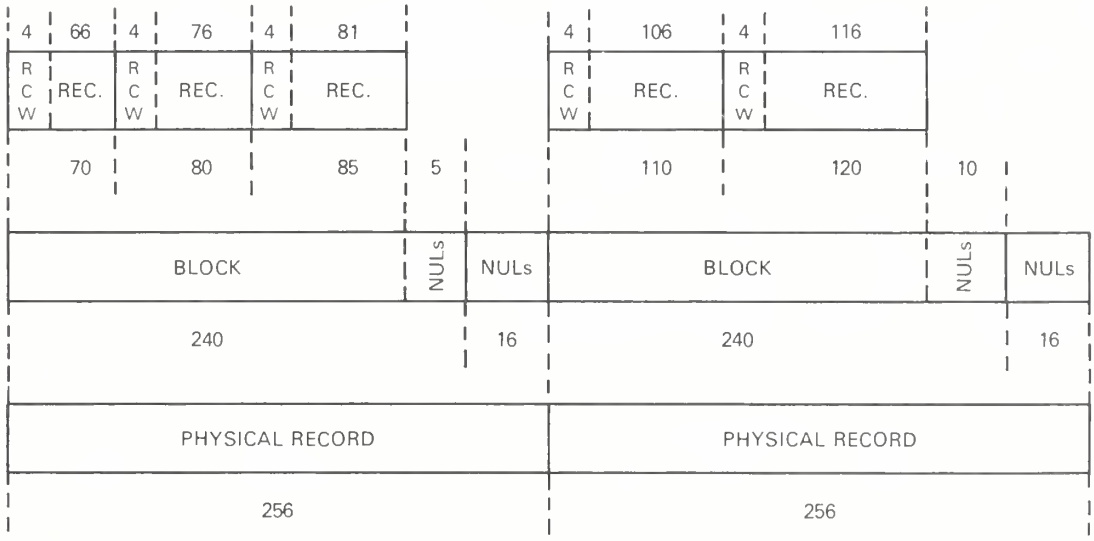
Record Length : 120

Unused Positions Count : 10

Record Attribute : B

The contents of the Unused Positions Count field specify the number of unused character positions in the last block written; these positions are filled with NULs.

For this file, each physical record contains variable-length records within blocks followed by padding characters (NULs) within the block and between the end of the block and the end of the physical records.



*Example 5*

A file containing segmented records with a maximum length of 400 characters and recorded across blocks with a length of 256 characters is considered. The last three blocks of the file are shown in the diagram below.

The label fields of interest will contain

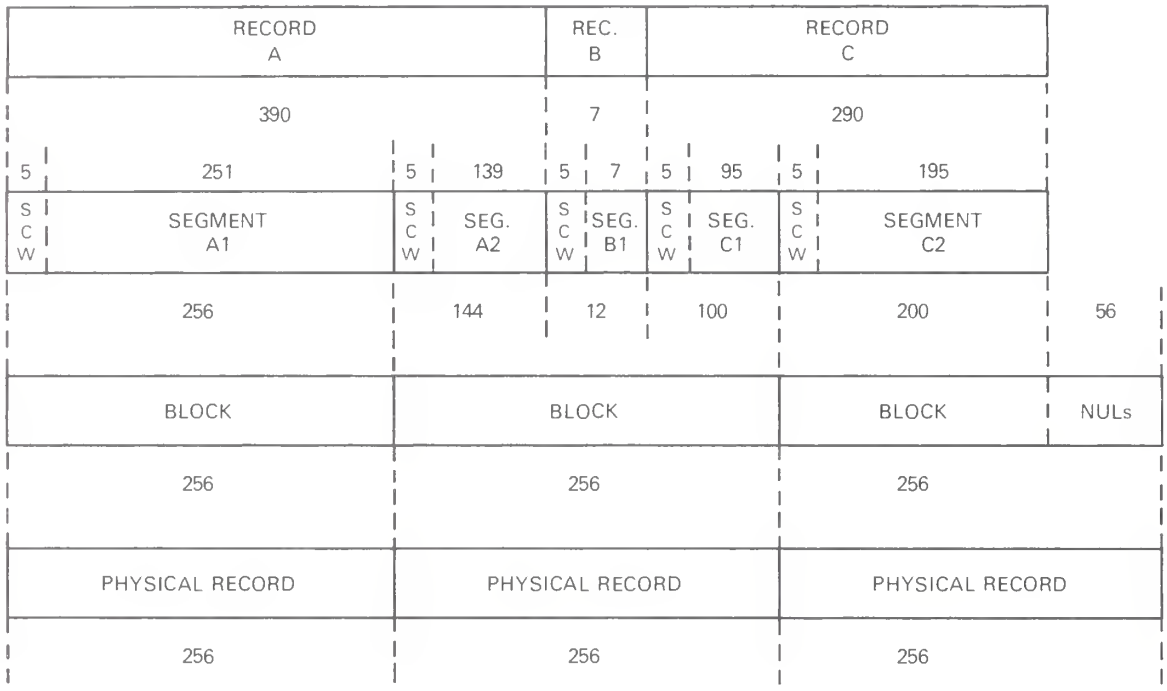
Block Length : 256

Record Format : S

Record Length : 400

Unused Positions Count : 56

Record Attribute : B




*Example 6*

A file containing segmented records with a maximum length of 8 000 characters and recorded across blocks with a length of 512 characters is considered. The last three blocks containing segments of the first record are shown in the diagram below. The first ten segments of the first record each have a length of 512 characters.

The label fields of interest will contain

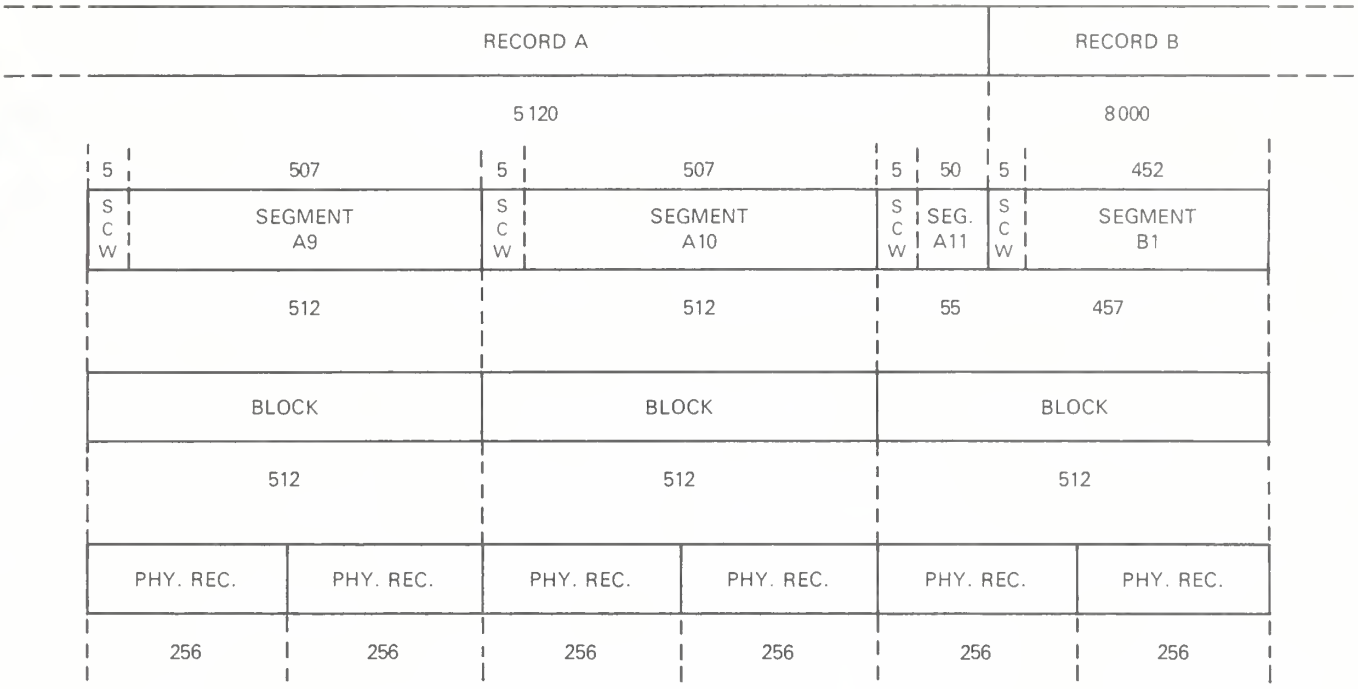
Block Length : 512

Record Format : S

Record Length : 8000

Unused Positions Count : depends on contents of last block in file

Record Attribute : B


RECORD A
RECORD B
5 120
8 000
5
507
SCW
SEGMENT A9
5
507
SCW
SEGMENT A10
5
50
SCW
SEG. A11
5
452
SCW
SEGMENT B1
512
512
55
457
BLOCK
BLOCK
BLOCK
512
512
512
PHY. REC.
PHY. REC.
PHY. REC.
PHY. REC.
PHY. REC.
PHY. REC.
256
256
256
256
256
256

# Annex B

## Data interchange standards and parameters

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

The values of the parameters listed in table 2 of this International Standard are quoted in table 10 for those data interchange standards that are listed in table 3. If any of the quoted values differs from the value obtained from the data interchange standard, then the latter value applies.

**Table 10 — Parameter values**

| Parameter | Parameter values | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 200 mm cartridge | | | | | 130 mm cartridge | | |
| | ISO 5654 | ECMA-59 | ISO 7065 | | | ISO 6596 | ISO 7487 | ECMA-78 |
| Number-Of-Sides | 1 | 2 | 2 | | | 1 | 2 | 2 |
| Cylinder-Limit | 74 | 74 | 74 | | | 32 | 37 | 77 |
| Index-Sector-Limit | 26 | 26 | 26 | | | 16 | 16 | 16 |
| Data-Sector-Limit | 26 | 26 | 26 | 15 | 8 | 9 | 16 | 16 |
| Data-Physical-Record-Length | 128 | 128 | 256 | 512 | 1 024 | 256 | 256 | 256 |
| Track-Data-Capacity | 3 328 | 3 328 | 6 656 | 7 680 | 8 192 | 2 304 | 4 096 | 4 096 |

NOTE — As shown in the above table, ISO 7065 specifies three alternative sets of values for the pair of parameters Data-Sector-Limit and Data-Physical-Record-Length.