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**Information technology — Volume and file
structure of write-once and rewritable
media using non-sequential recording for
information interchange —**

(Part 1:

General

[ISO/IEC 13346-1:1995](https://standards.iso.org/iso/iec/13346-1:1995)

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*Technologies de l'information — Structure de volume et de fichier de
moyens d'écriture unique et de réécriture utilisant un enregistrement non
séquentiel pour l'échange d'information —*

Partie 1: Généralités



Reference number
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Contents	Page
1 Scope.....	1
2 Parts references	1
3 Conformance.....	1
3.1 Conformance of a medium.....	1
3.2 Conformance of an information processing system.....	1
4 Normative references.....	1
5 Definitions.....	2
5.1 application.....	2
5.2 byte.....	2
5.3 descriptor.....	2
5.4 file.....	2
5.5 implementation.....	2
5.6 originating system	2
5.7 receiving system	2
5.8 record.....	2
5.9 sector.....	2
5.10 standard for recording.....	3
5.11 user.....	3
5.12 volume.....	3
5.13 volume set	3
6 Notation	3
6.1 Numerical notation	3
6.1.1 Decimal notation	3
6.1.2 Hexadecimal notation	3
6.2 Bit fields.....	3
6.3 Descriptor formats	3
6.4 Character strings	4
6.5 Arithmetic notation	4
6.6 Descriptor sequence schema	4
6.7 Other notations.....	5
7 Basic types.....	5
7.1 Numerical values.....	5

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7.1.1 8-bit unsigned numerical values	6
7.1.2 8-bit signed numerical values	6
7.1.3 16-bit unsigned numerical values	6
7.1.4 16-bit signed numerical values	6
7.1.5 32-bit unsigned numerical values	6
7.1.6 32-bit signed numerical values	6
7.1.7 64-bit unsigned numerical values	6
7.2 Character sets and coding	6
7.2.1 Character set specification	7
7.2.2 CS0 character set	7
7.2.3 CS1 character set	8
7.2.4 CS2 character set	8
7.2.5 CS3 character set	8
7.2.6 CS4 character set	8
7.2.7 CS5 character set	8
7.2.8 CS6 character set	8
7.2.9 CS7 character set	8
7.2.10 CS8 character set	9
7.2.11 List of character sets	9
7.2.12 Fixed-length character fields	9
7.3 Timestamp	9
7.3.1 Type and Time Zone (RBP 0)	10
7.3.2 Year (RBP 2)	10
7.3.3 Month (RBP 4)	10
7.3.4 Day (RBP 5)	10
7.3.5 Hour (RBP 6)	10
7.3.6 Minute (RBP 7)	10
7.3.7 Second (RBP 8)	11
7.3.8 Centiseconds (RBP 9)	11
7.3.9 Hundreds of Microseconds (RBP 10)	11
7.3.10 Microseconds (RBP 11)	11
7.4 Entity identifier	11
7.4.1 Flags (RBP 0)	11
7.4.2 Identifier (RBP 1)	11
7.4.3 Identifier Suffix (RBP 24)	12

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Foreword

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

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

International Standard ISO/IEC 13346 was prepared by the European Association for Standardizing Information and Communication Systems, ECMA, (as Standard ECMA-167) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval by National Bodies of ISO and IEC.

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Introduction

ISO/IEC 13346 is a volume and file structure standard for interchanging files and as such, it is a peer to existing volume and file structure standards such as ISO 9293 and ISO 9660. It is rather different from those standards in at least two important ways. Firstly, it offers much more functionality, mainly because of user needs for increased character set support and for more powerful file system features. Secondly, it acknowledges the separate concerns of booting, volume structure and file system structure. Rather than bundling these different functions together, ISO/IEC 13346 carefully segregates these functions into separate parts and describes in detail how those parts fit together. It is expected that future volume and file structure standards will fit into this framework, rather than building other distinct and incompatible formats.

ISO/IEC 13346 is published in five Parts. Part 1 - general - specifies references, definitions, notations and basic structures used in the other four Parts. Part 2 - volume and boot block recognition - specifies formats and system requirements for recognising the volume structures on a medium and booting from a medium. Part 3 - volume structure - specifies how to record various volume-related entities such as volumes, volume sets and logical volumes. Part 4 - file structure - specifies how to record and interpret files, both file data and file attributes, and file hierarchies within logical volumes. Part 5 - record structure - specifies how to record and interpret file data encoded as records.

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Information technology - Volume and file structure of write-once and rewritable media using non-sequential recording for information interchange -

Part 1: General

1 Scope

ISO/IEC 13346 specifies a format and associated system requirements for volume and boot block recognition, volume structure, file structure and record structure for the interchange of information on media between users of information processing systems.

The media shall be recorded as if the recording of sectors may be done in any order.

NOTE 1 - The medium is not restricted to being of only one type; the type of medium may be either write once, or read only, or rewritable, or a combination of these types.

ISO/IEC 13346 consists of the following five Parts:

Part 1: General

Part 2: Volume and Boot Block Recognition

Part 3: Volume Structure

Part 4: File Structure

Part 5: Record Structure

Annex A - ICB Strategies, is part of Part 4.

Part 1 specifies references, definitions, notation and basic structures that apply to the other four Parts.

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2 Parts references

The first digit of a reference within ISO/IEC 13346 identifies the Part, e.g. 2/5 refers to clause 5 in Part 2, and figure 4/3 refers to figure 3 in Part 4.

3 Conformance

3.1 Conformance of a medium

A medium shall be in conformance with ISO/IEC 13346 when it conforms to a standard for recording (see 1/5.10) and information recorded on sectors of the medium conform to the specifications of Part 1 and one or more of Parts 2, 3, 4 and 5. A statement of conformance shall identify the sectors of the medium on which information is recorded according to the specifications of ISO/IEC 13346, and the Parts and the levels of medium interchange (see 2/10, 3/10.10, and 4/15) to which the contents of those sectors of the medium conform.

3.2 Conformance of an information processing system

An information processing system shall be in conformance with ISO/IEC 13346 if it meets the requirements specified in Part 1 and one or more of Parts 2, 3, 4 and 5 either for an originating system (see 2/12, 3/13, 4/17 and 5/11) or for a receiving system (see 2/13, 3/14, 4/18 and 5/12) or for both types of system. A statement of conformance shall identify the Parts, and the levels of the requirements for each of those Parts, which can be met by the system.

4 Normative references

The following International Standards contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 13346. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO/IEC 13346 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/IEC 646:1991, *Information technology - ISO 7-bit code character set for information interchange.*

ISO/IEC 2022:1994, *Information technology - Character code structure and extension techniques.*

ISO/IEC 6429:1992, *Information technology - Control functions for coded character sets.*

ISO 8859-1:1987, *Information processing - 8-bit single-byte coded graphic character sets - Part 1: Latin alphabet No. 1.*

ISO/IEC 9293:1994, *Information technology - Volume and file structure of disk cartridges for information interchange.*

ISO 9660: 1988, *Information processing - Volume and file structure of CD-ROM for information interchange.*

ISO/IEC 9945-1:1990, *Information technology - Portable Operating System Interface (POSIX) - Part 1: System Application Program Interface (API) [C Language].*

ISO/IEC 10646-1:1993, *Information technology - Universal Multiple Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane.*

ISO/IEC 13490-1:1995, *Information technology - Volume and file structure of read-only and write-once compact disk media for information interchange - Part 1: General.*

ISO/IEC 13490-2:1995, *Information technology - Volume and file structure of read-only and write-once compact disk media for information interchange - Part 2: Volume and file structure.*

ISO/IEC 13800^{b)}, *Information technology - Procedure for the registration of identifiers and attributes for volume and file structure*

ITU-T Recommendation V.41, *Code-Independent Error-Control System.*

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5 Definitions

For the purposes of ISO/IEC 13346, the following definitions apply.

5.1 application: A program that processes the contents of a file, and may also process selected attribute data relating to the file or to the volume(s) on which the file is recorded.

5.2 byte: A string of eight binary digits operated upon as a unit. If the standard for recording (see 1/5.10) specifies that the container for the recording of a byte has more than eight bits, in ISO/IEC 13346 a byte shall be recorded in the least significant eight bits of the container with the remaining bits of the container set to ZERO.

5.3 descriptor: A structure containing descriptive information about a volume or a file.

5.4 file: A collection of information.

5.5 implementation: A set of processes which enable an information processing system to behave as an originating system, or as a receiving system, or as both types of system.

5.6 originating system: An information processing system which can create a set of files on a volume set for the purpose of data interchange with another system.

5.7 receiving system: An information processing system which can read a set of files from a volume set which has been created by another system for the purpose of data interchange.

5.8 record: A sequence of bytes treated as a unit of information.

5.9 sector: The data field of the smallest addressable part of the medium that can be accessed independently of other addressable parts of the medium.

^{b)} To be published

5.10 standard for recording: A standard that specifies the recording method and the addressing method for the information recorded on a medium. The specifications of the standard for recording that are relevant for ISO/IEC 13346 are:

- a unique address for each sector;
- the length of each sector;
- the means for determining whether a sector is read-only, write-once, or rewritable;
- for media where sectors may only be recorded once, a means for detecting whether each sector has not yet been recorded;
- whether sectors may require preprocessing prior to recording.

The standard for recording used in conjunction with ISO/IEC 13346 is subject to agreement between the originator and recipient of the medium.

5.11 user: A person or other entity (for example, an application) that causes the invocation of the services provided by an implementation.

5.12 volume: A sector address space as specified in the relevant standard for recording.

NOTE 2 - A medium usually has a single set of sector addresses, and is therefore a single volume. A medium may have a separate set of addresses for each side of the medium, and is therefore two volumes.

5.13 volume set: A collection of one or more volumes with identical volume set identification.

6 Notation

The following notation is used in ISO/IEC 13346:

[ISO/IEC 13346-1:1995](https://standards.iteh.ai/catalog/standards/sist/06a88558-1b7a-4e3a-9c7a-e7773da52e59/iso-iec-13346-1-1995)

6.1 Numerical notation <https://standards.iteh.ai/catalog/standards/sist/06a88558-1b7a-4e3a-9c7a-e7773da52e59/iso-iec-13346-1-1995>

6.1.1 Decimal notation

Numbers in decimal notation are represented by decimal digits.

6.1.2 Hexadecimal notation

Numbers in hexadecimal notation are represented as a sequence of one or more hexadecimal digits prefixed by “#”:

hexadecimal digit	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
decimal value	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

6.2 Bit fields

Certain fields containing an integral value, or parts of fields containing an integral value, are intended to be interpreted as an array of bits. This array of bits shall be referred to as a bit field.

Bit positions within an n bit field are numbered such that the least significant bit is numbered 0 and the most significant bit is numbered $n-1$.

6.3 Descriptor formats

Descriptor formats shall be specified by a figure specifying the location, length, name and contents of each field. The interpretation of each field shall be given in the prose associated with the figure.

Byte position	Length in bytes	Name	Contents
0	4	Data Length (=D_L)	Uint32 (1/7.1.5)
4	32	Application Identifier	regid (1/7.4)
36	4	Reserved	#00 bytes
40	2	Type	Int16 (1/7.1.4) =57
42	D_L	Implementation Use	bytes
[D_L+42]	*	Padding	#00 bytes

Figure 1 - Example descriptor format

The descriptor specified by figure 1/1 has six fields:

- The Data Length field shall be a 32-bit unsigned integer recorded according to 1/7.1.5 in byte positions 0 to 3 of the descriptor. The value of this field may be referred to as D_L.
- The Application Identifier field shall be a 32 byte field specifying an identification of an application recorded according to 1/7.4 in byte positions 4 to 35 of the descriptor.
- The Reserved field shall be 4 bytes, each with the value #00, recorded in byte positions 36 to 39 of the descriptor.
- The Type field shall be the number 57 as a 16-bit signed integer recorded according to 1/7.1.4 in byte positions 40 to 41 of the descriptor.
- The Implementation Use field shall be D_L bytes recorded in byte positions 42 to (D_L+41), where D_L is the value recorded in the Data Length field of this descriptor. A symbolic length referred to in a descriptor shall either be defined within that descriptor or be described in the interpretation of the field it is used in. The specification of the interpretation for this field might state that the interpretation of those bytes is not specified by ISO/IEC 13346, or could specify some specific interpretation for those bytes.
- The Padding field shall be a variable length field, as indicated by the asterisk "*", of bytes, each with a value of #00. The specification of the interpretation for the field shall specify the length of the field.

6.4 Character strings

A value for a sequence of bytes may be specified by a quoted sequence of characters, encoded according to the International Reference Version of ISO/IEC 646. For example, "Sheep" shall represent the bytes #53, #68, #65, #65, #70.

6.5 Arithmetic notation

The notation $ip(x)$ shall mean the integer part of x .

The notation $rem(a,b)$ shall mean $a - b \times ip(a/b)$, where a and b are integers.

6.6 Schema

The notation specified by this clause, hereafter referred to as schema, specifies the format of a structure, or sequence of structures, by construction. White space is unimportant. A structure shall be a sequence of terms. A term shall be either a name enclosed by $\langle \rangle$ or a structure definition enclosed by $\{ \}$. A term may be given a name *label* by preceding the term with $[\text{label}]$. A term may be suffixed by one of the repetition operators in figure 1/2.

Operator	Interpretation
$n + m$	n to m occurrences inclusive
n^+	n or more occurrences
n	n occurrences exactly

Figure 2 - Repetition operators

The expression *term1* | *term2* means either *term1* or *term2* shall appear at this place in the sequence.

Names shall be resolved in one of the following three ways:

- the name is that of a descriptor or term defined in ISO/IEC 13346
- the name has been defined in this structure definition using the [] notation
- the name will be defined in the prose associated with the structure definition

If a term is followed by a clause enclosed in (), it shall refer to only those objects specified by the term for which the clause is true.

These operators shall be applied in increasing order of precedence with the | operator having lowest precedence:

| repetition operator [] ()

As an example, the schema shown in figure 1/3, specifies that the term Set means zero or more Groups, where a Group is a sequence of two or more Group Headers, followed by a Group Element, which is one of three alternatives (one or two Type-1 Descriptors, or a single Type-2 Descriptor whose length is even, or one or more Type-3 Descriptors), followed by one or more Group Trailers.

```
[Set]{
  [Group]{
    <Group Header> 2+
    [Group Element]{
      <Type-1 Descriptor> 1+2
      | <Type-2 Descriptor>(descriptor length is even)
      | <Type-3 Descriptor> 1+
    }
    <Group Trailer> 1+
  } 0+
}
```

Figure 3 - Example schema

6.7 Other notations

Various other notations used in ISO/IEC 13346 are specified in figure 1/4.

Notation	Interpretation
BP	Byte position within a descriptor, starting with 0
RBP	Relative byte position within a descriptor, starting with 0
ZERO	A single bit with the value 0
ONE	A single bit with the value 1

Figure 4 - Other notations

7 Basic types

The following basic types are used in ISO/IEC 13346.

7.1 Numerical values

The recording format of a numerical value represented in binary notation by an *n*-bit number shall be denoted by a type name of *Intn* or *Uintn* where