INTERNATIONAL STANDARD

**ISO/IEC 13346-2**

Second edition
1999-06-01

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

## Part 2:
Volume and boot block recognition

*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 2: Reconnaissance de volume et de «boot block»*

Reference number
ISO/IEC 13346-2:1999(E)

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale

## Contents

**1 Scope** ..... 1

**2 Parts references** ..... 1

**3 Part interface** ..... 1

**3.1 Input** ..... 1

**3.2 Output** ..... 1

**4 Conformance** ..... 1

**5 Definitions** ..... 2

**5.1 extent** ..... 2

**6 Notation** ..... 2

**7 Basic types** ..... 2

**8 Volume recognition** ..... 2

**8.1 Arrangement of data on a volume** ..... 2

**8.1.1 Sector numbers** ..... 2

**8.2 Volume recognition space** ..... 2

**8.3 Volume recognition area** ..... 2

**8.3.1 Volume recognition sequence** ..... 2

**8.4 Recording of descriptors** ..... 3

**9 Volume recognition structures** ..... 3

**9.1 Volume Structure Descriptor** ..... 3

**9.1.1 Structure Type (BP 0)** ..... 3

**9.1.2 Standard Identifier (BP 1)** ..... 3

**9.1.3 Structure Version (BP 6)** ..... 4

**9.1.4 Structure Data (BP 7)** ..... 4

© ISO/IEC 1999

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

ISO/IEC Copyright Office • Case postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

**9.2 Beginning Extended Area Descriptor** ..... 4
**9.2.1 Structure Type (BP 0)** ..... 4
**9.2.2 Standard Identifier (BP 1)** ..... 4
**9.2.3 Structure Version (BP 6)** ..... 4
**9.2.4 Structure Data (BP 7)** ..... 4
**9.3 Terminating Extended Area Descriptor** ..... 5
**9.3.1 Structure Type (BP 0)** ..... 5
**9.3.2 Standard Identifier (BP 1)** ..... 5
**9.3.3 Structure Version (BP 6)** ..... 5
**9.3.4 Structure Data (BP 7)** ..... 5
**9.4 Boot Descriptor** ..... 5
**9.4.1 Structure Type (BP 0)** ..... 6
**9.4.2 Standard Identifier (BP 1)** ..... 6
**9.4.3 Structure Version (BP 6)** ..... 6
**9.4.4 Reserved (BP 7)** ..... 6
**9.4.5 Architecture Type (BP 8)** ..... 6
**9.4.6 Boot Identifier (BP 40)** ..... 6
**9.4.7 Boot Extent Location (BP 72)** ..... 6
**9.4.8 Boot Extent Length (BP 76)** ..... 6
**9.4.9 Load Address (BP 80)** ..... 6
**9.4.10 Start Address (BP 88)** ..... 6
**9.4.11 Descriptor Creation Date and Time (BP 96)** ..... 6
**9.4.12 Flags (BP 108)** ..... 6
**9.4.13 Reserved (BP 110)** ..... 7
**9.4.14 Boot Use (BP 142)** ..... 7
**10 Levels of medium interchange** ..... 7
**10.1 Level 1** ..... 7
**10.2 Level 2** ..... 7
**11 Requirements for the description of systems** ..... 7
**12 Requirements for an originating system** ..... 8



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS
Not for Resale

**12.1 General** ..... **8**

**12.2 Optional access by user** ..... **8**

**12.2.1 Descriptors** ..... **8**

**13 Requirements for a receiving system** ..... **8**

**13.1 General** ..... **8**

**13.2 Optional access by user** ..... **8**

**13.2.1 Descriptors** ..... **8**

**Annex A** (informative) **Changes from ISO/IEC 13346-2:1995 to this second edition** ..... **9**



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

## 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 13346-2 was prepared by 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.

This second edition cancels and replaces the first edition (ISO/IEC 13346-2:1995), which has been technically revised.

ISO/IEC 13346 consists of the following parts, under the general title *Information technology — Volume and file structure of write-once and rewritable media using non-sequential recording for information interchange*:

— *Part 1: General*

— *Part 2: Volume and boot block recognition*

— *Part 3: Volume structure*

— *Part 4: File structure*

— *Part 5: Record structure*

Annex A of this part of ISO/IEC 13346 is for information only.



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

## 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.

--`,,```,,,,````-`-`,,`,,`,`,,`---



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

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

# Part 2:
Volume and boot block recognition

## 1 Scope

This part of ISO/IEC 13346 specifies a format and associated system requirements for volume and boot block recognition by specifying:

— volume recognition;

— boot descriptors intended for use to bring a system to a known state;

— levels of medium interchange;

— requirements for the processes which are provided within information processing systems, to enable information to be interchanged between different systems; for this purpose, this part of ISO/IEC 13346 specifies the functions to be provided within systems which are intended to originate or receive media which conform to this part of ISO/IEC 13346.

## 2 Parts references

See 1/2.

## 3 Part interface

This clause specifies the interface of this part of ISO/IEC 13346 to other standards or Parts.

### 3.1 Input

This part of ISO/IEC 13346 requires the specification of the following by another standard or Part.

— A standard for recording (see 1/5.10).

— The address of the initial sector in the volume (see 2/8.1.1).

— A volume recognition space (see 2/8.2).

### 3.2 Output

This part of ISO/IEC 13346 specifies the following which may be used by other standards or Parts.

— identification of certain standards (see 2/9.1.2) used to record information in the volume.

— information that may be used to bring a system to a known state.

## 4 Conformance

See 1/3.



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

# 5 Definitions

For the purposes of this part of ISO/IEC 13346, the definitions given in ISO/IEC 13346-1 (see 1/5), and the following definition apply.

## 5.1 extent

A set of sectors, the sector numbers of which form a continuous ascending sequence. The address, or location, of an extent is the number of the first sector in the sequence.

# 6 Notation

The notation of ISO/IEC 13346-1 (see 1/6) applies to this part of ISO/IEC 13346.

# 7 Basic types

The basic types of ISO/IEC 13346-1 (see 1/7) apply to this part of ISO/IEC 13346.

# 8 Volume recognition

## 8.1 Arrangement of data on a volume

### 8.1.1 Sector numbers

Each sector of a volume shall be identified by a unique sector number. Sector numbers shall be consecutive integers assigned in an ascending sequence, in the order of ascending physical address of the volume as specified in the relevant standard for recording (see 1/5.10). Sector number 0 shall be assigned to the initial sector of the volume as specified in 2/3.1.

## 8.2 Volume recognition space

A volume recognition space shall be a contiguous sequence of sectors. The bytes in the volume recognition space shall be numbered with consecutive integers assigned in ascending sequence. The numbering shall start from 0 which shall be assigned to the first byte of the first sector of the volume recognition space. The numbering shall continue through successive bytes of that sector and then through successive bytes of each successive sector, if any, of the volume recognition space.

## 8.3 Volume recognition area

A volume recognition area shall be recorded in the volume recognition space. A volume recognition area shall consist of a volume recognition sequence (see 2/8.3.1) recorded in consecutively numbered sectors starting with the first byte of the first sector that begins after byte number 32 767 of the volume recognition space. This part of ISO/IEC 13346 does not specify the interpretation of the information recorded in the volume recognition space other than in the volume recognition area of the volume recognition space.

### 8.3.1 Volume recognition sequence

A volume recognition sequence shall consist of a consecutively recorded sequence of one or more Volume Structure Descriptors (see 2/9.1) recorded according to the schema shown in figure 2/1.

Each Volume Structure Descriptor shall specify a standard or clause which shall specify the interpretation of the contents of the descriptor and the value of *n* (see figure 2/1).



--`,,```,,,,````-`-`,,`,,`,`,,`---
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

The first Volume Structure Descriptor of the sequence shall be recorded beginning at the first byte of the first sector of the volume recognition area in which it is recorded. Each successive Volume Structure Descriptor of the sequence shall be recorded beginning at the first byte of the sector with the next higher sector number than that of the last sector constituting the previous Volume Structure Descriptor of the sequence.

Note 1 - The volume recognition sequence is terminated by the first sector which is not a valid descriptor, rather than by an explicit descriptor. This sector might be an unrecorded or blank sector.

```
[volume recognition sequence]{
     <CD-ROM Volume Descriptor Set>0+1
     [Extended Area]{
               <Beginning Extended Area Descriptor> 1+
               { <Volume Structure Descriptor> | <Boot Descriptor> } n+
               <Terminating Extended Area Descriptor> 1+
     } 0+
}
```

**Figure 1 — Volume recognition sequence schema**

#### 8.3.1.1 CD-ROM Volume Descriptor Set

A CD-ROM Volume Descriptor Set shall be a set of consecutively recorded Volume Structure Descriptors whose Standard Identifier fields shall not contain “BEA01” and shall be interpreted according to ISO 9660.

### 8.4 Recording of descriptors

All the descriptors in this part of ISO/IEC 13346 shall be recorded so that the first byte of the descriptor coincides with the first byte of a sector. All space, if any, after the last byte of the descriptor up to the end of the sector containing the last byte of the descriptor is reserved for future standardisation and shall be recorded as all #00 bytes.

## 9 Volume recognition structures

### 9.1 Volume Structure Descriptor

The Volume Structure Descriptor shall be recorded in the format shown in figure 2/2.

| BP | Length | Name | Contents |
|---|---|---|---|
| 0 | 1 | Structure Type | `Uint8` (1/7.1.1) |
| 1 | 5 | Standard Identifier | bytes |
| 6 | 1 | Structure Version | `Uint8` (1/7.1.1) |
| 7 | 2 041 | Structure Data | bytes |

**Figure 2 — Generic Volume Structure Descriptor format**

#### 9.1.1 Structure Type (BP 0)

The number in this field shall specify the type of the Volume Structure Descriptor. The interpretation of the number shall be specified by the Standard or clause identified in the Standard Identifier field.

#### 9.1.2 Standard Identifier (BP 1)

This field shall specify the interpretation of the Volume Structure Descriptor as shown in figure 2/3.



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

| Identifier | Interpretation |
|---|---|
| “BEA01” | According to 2/9.2. |
| “BOOT2” | According to 2/9.4. |
| “CD001” | According to ISO 9660. |
| “CDW02” | According to ISO/IEC 13490. |
| “NSR02” | According to 3/9.1 of ISO/IEC 13346. |
| “NSR03” | According to 3/9.1 of ISO/IEC 13346. |
| “TEA01” | According to 2/9.3. |

**Figure 3 — Volume Structure Descriptor interpretation**

All other values are reserved for future standardisation.

#### 9.1.3 Structure Version (BP 6)

The number in this field shall specify the version of the Volume Structure Descriptor. The interpretation of the number shall be specified by the Standard or clause identified in the Standard Identifier field.

#### 9.1.4 Structure Data (BP 7)

The interpretation of this field shall be specified by the Standard or clause identified in the Standard Identifier field.

### 9.2 Beginning Extended Area Descriptor

The Beginning Extended Area Descriptor shall be recorded in the format shown in figure 2/4.

| BP | Length | Name | Contents |
|---|---|---|---|
| 0 | 1 | Structure Type | `Uint8` (1/7.1.1) = 0 |
| 1 | 5 | Standard Identifier | bytes = “BEA01” |
| 6 | 1 | Structure Version | `Uint8` (1/7.1.1) = 1 |
| 7 | 2 041 | Structure Data | #00 bytes |

**Figure 4 — Beginning Extended Area Descriptor format**

#### 9.2.1 Structure Type (BP 0)

This field shall specify 0.

#### 9.2.2 Standard Identifier (BP 1)

This field shall specify “BEA01”.

#### 9.2.3 Structure Version (BP 6)

This field shall specify the version of this descriptor. The value 1 shall indicate the structure of this part of ISO/IEC 13346.

#### 9.2.4 Structure Data (BP 7)

This field shall be reserved for future standardisation and all bytes shall be set to #00.



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

## 9.3 Terminating Extended Area Descriptor

The Terminating Extended Area Descriptor shall be recorded in the format shown in figure 2/5.

| BP | Length | Name | Contents |
|---|---|---|---|
| 0 | 1 | Structure Type | `Uint8` (1/7.1.1) = 0 |
| 1 | 5 | Standard Identifier | bytes = “TEA01” |
| 6 | 1 | Structure Version | `Uint8` (1/7.1.1) = 1 |
| 7 | 2 041 | Structure Data | #00 bytes |

**Figure 5 — Terminating Extended Area Descriptor format**

### 9.3.1 Structure Type (BP 0)

This field shall specify 0.

### 9.3.2 Standard Identifier (BP 1)

This field shall specify “TEA01”.

### 9.3.3 Structure Version (BP 6)

This field shall specify the version of this descriptor. The value 1 shall indicate the structure of this part of ISO/IEC 13346.

### 9.3.4 Structure Data (BP 7)

This field shall be reserved for future standardisation and all bytes shall be set to #00.

## 9.4 Boot Descriptor

The Boot Descriptor shall be recorded in the format shown in figure 2/6.

| BP | Length | Name | Contents |
|---|---|---|---|
| 0 | 1 | Structure Type | `Uint8` (1/7.1.1) = 0 |
| 1 | 5 | Standard Identifier | bytes = “BOOT2” |
| 6 | 1 | Structure Version | `Uint8` (1/7.1.1) = 1 |
| 7 | 1 | Reserved | #00 byte |
| 8 | 32 | Architecture Type | `regid` (1/7.4) |
| 40 | 32 | Boot Identifier | `regid` (1/7.4) |
| 72 | 4 | Boot Extent Location | `Uint32` (1/7.1.5) |
| 76 | 4 | Boot Extent Length | `Uint32` (1/7.1.5) |
| 80 | 8 | Load Address | `Uint64` (1/7.1.7) |
| 88 | 8 | Start Address | `Uint64` (1/7.1.7) |
| 96 | 12 | Descriptor Creation Date and Time | `timestamp` (1/7.3) |
| 108 | 2 | Flags | `Uint16` (1/7.1.3) |
| 110 | 32 | Reserved | #00 bytes |
| 142 | 1 906 | Boot Use | bytes |

**Figure 6 — Boot Descriptor format**

--`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

### 9.4.1 Structure Type (BP 0)

This field shall specify 0.

### 9.4.2 Standard Identifier (BP 1)

This field shall specify “BOOT2”.

### 9.4.3 Structure Version (BP 6)

This field shall specify the version of this descriptor. The value 1 shall indicate the structure of this part of ISO/IEC 13346.

### 9.4.4 Reserved (BP 7)

This field shall be reserved for future standardisation and shall be set to #00.

### 9.4.5 Architecture Type (BP 8)

This field shall specify an identification of a system which can recognise and act upon the contents of the Boot Identifier field. If this field contains all #00 bytes, no such system is identified.

### 9.4.6 Boot Identifier (BP 40)

This field shall specify an identification of an implementation which can recognise and act upon the contents of the Boot Extent Location, Boot Extent Length, Load Address, Start Address and Boot Use fields. If this field contains all #00 bytes, no such implementation is identified.

### 9.4.7 Boot Extent Location (BP 72)

This field shall specify the address of an extent of the volume containing boot information. If the Boot Extent Length field contains 0, then no boot extent is specified and this field shall contain 0.

Note 2 - If no boot extent is specified, the information needed to boot might be recorded in the Boot Use field.

### 9.4.8 Boot Extent Length (BP 76)

This field shall specify the length, in bytes, of the extent identified by the Boot Extent Location field.

### 9.4.9 Load Address (BP 80)

This field shall specify the memory address at which the information in the extent specified by the Boot Extent field should be copied.

### 9.4.10 Start Address (BP 88)

This field shall specify the memory address to which control should be transferred after the information specified by the Boot Extent field has been copied into memory.

### 9.4.11 Descriptor Creation Date and Time (BP 96)

This field shall specify the date and time of the day at which the information in this descriptor was recorded.

### 9.4.12 Flags (BP 108)

This field shall specify certain characteristics of the Boot Descriptor as shown in figure 2/7.



--`,,```,,,,````-`-`,,`,,`,`,,`---
Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

| Bit | Interpretation |
|---|---|
| 0 | Erase: For any Boot Descriptor with the same contents of the Architecture Type and Boot Identifier fields as this Boot Descriptor and recorded in any lower numbered sectors of the volume recognition sequence than the sectors that this Boot Descriptor is recorded in: if set to ZERO, shall mean that this Boot Descriptor overrides any such Boot Descriptor; if set to ONE, shall mean that any such Boot Descriptor (including this Boot Descriptor) shall be ignored. |
| 1-15 | Shall be reserved for future standardisation and all bits shall be set to ZERO. |

**Figure 7 — Boot Descriptor characteristics**

#### 9.4.13 Reserved (BP 110)

This field shall be reserved for future standardisation and all bytes shall be set to #00.

#### 9.4.14 Boot Use (BP 142)

This field shall be reserved for implementation use, and its contents are not specified by this part of ISO/IEC 13346.

Note 3 - The Boot Descriptor is designed to allow a generic boot program. Such a boot program would scan for Boot Descriptors with a matching Architecture Type (which might represent combinations of processor type and memory management), and after examining the Boot Identifier, which might encode the operating system type and options, present the user with a choice of operating systems to boot. As this part of ISO/IEC 13346 cannot mandate any specific implementation behaviour, the recommended interpretation of the Boot Descriptor, that is, read an extent of sectors from the volume into memory at a specified location and then transfer execution to another specified location, is optional.

## 10 Levels of medium interchange

This part of ISO/IEC 13346 specifies two levels of medium interchange. The level of a volume shall be that level specifying the most restrictions required to record the volume according to the specifications of this part of ISO/IEC 13346.

### 10.1 Level 1

At level 1, the following restriction shall apply:

— The Boot Identifier field of a Boot Descriptor shall be different from the Boot Identifier field of all other Boot Descriptors having identical contents of the Architecture Type field.

### 10.2 Level 2

At level 2, no restrictions shall apply.

## 11 Requirements for the description of systems

This part of ISO/IEC 13346 specifies that certain information shall be communicated between a user and an implementation. Each implementation that conforms to this part of ISO/IEC 13346 shall have a description that identifies the means by which the user may supply or obtain such information.

Note 4 - The specifics of the description and the means referred to above will vary from implementation to implementation. For example, an implementation might support two interfaces: a preferred, convenient interface which might vet user input, and a deprecated low level interface which allows any input specified by this part of ISO/IEC 13346.

--`,,```,,,,````-`-`,,`,,`,`,,`---



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

# 12 Requirements for an originating system

## 12.1 General

The implementation shall be capable of recording Beginning Extended Area Descriptors and Terminating Extended Area Descriptors as specified in this part of ISO/IEC 13346 on a volume.

## 12.2 Optional access by user

### 12.2.1 Descriptors

If the implementation is capable of recording a Volume Structure Descriptor with the value “CD001” or “CDW02” or “NSR02” in the Standard Identifier field, the implementation shall record the descriptor according to the Standard or 2/9.1.2.

# 13 Requirements for a receiving system

## 13.1 General

The implementation shall be capable of interpreting Beginning Extended Area Descriptors and Terminating Extended Area Descriptors as specified in this part of ISO/IEC 13346 on a volume.

## 13.2 Optional access by user

### 13.2.1 Descriptors

If the implementation is capable of interpreting a Volume Structure Descriptor with the value “CD001” or “CDW02” or “NSR02” or “NSR03” in the Standard Identifier field, the implementation shall interpret the descriptor according to the Standard or 2/9.1.2.



Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

# Annex A
(informative)

## Changes from ISO/IEC 13346-2:1995 to this second edition

— The NSR03 descriptor was added for recognition of media written to this version of this second edition of this part of ISO/IEC 13346.

-`,,```,,,,````-`-`,,`,,`,`,,`---

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS Not for Resale

© ISO/IEC

**ICS 35.220.20; 35.220.30**

Price based on 9 pages

Copyright International Organization for Standardization
Provided by IHS under license with ISO
No reproduction or networking permitted without license from IHS

Not for Resale