

INTERNATIONAL STANDARD

ISO/IEC 17346

First edition
2005-02-01

Information technology — Data interchange on 90 mm optical disk cartridges — Capacity: 1,3 Gbytes per cartridge

*Technologies de l'information — Échange de données sur cartouches
de disque optique de 90 mm — Capacité: 1,3 Go par cartouche*

Reference number
ISO/IEC 17346:2005(E)



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2005

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 either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	viii
Section 1 — General	1
1 Scope.....	1
2 Conformance	1
2.1 Optical Disk Cartridge (ODC).....	1
2.2 Generating system.....	1
2.3 Receiving system	1
2.4 Compatibility statement	2
3 Normative references	2
4 Terms and definitions.....	2
5 Conventions and notations.....	5
5.1 Representation of numbers	5
5.2 Names.....	5
6 List of acronyms	5
7 General description of the optical disk cartridge	6
8 General requirements	6
8.1 Environments	6
8.1.1 Testing environment.....	6
8.1.2 Operating environment.....	6
8.1.3 Storage environment	7
8.1.4 Transportation.....	7
8.2 Temperature shock.....	7
8.3 Safety requirements.....	7
8.4 Flammability	7
9 Reference Drive.....	8
9.1 Optical system.....	8
9.2 Optical beam.....	9
9.3 Read channels.....	10
9.4 Tracking	10
9.5 Rotation of the disk.....	10
Section 2 — Mechanical and physical characteristics.....	11
10 Dimensional and physical characteristics of the case	11
10.1 General description of the case (see Figure 2).....	11
10.2 Reference planes of the case	11
10.3 Dimensions of the case	11
10.3.1 Overall dimensions (see Figure 3)	11
10.3.2 Location hole (see Figure 3)	12
10.3.3 Alignment hole (see Figure 3).....	12
10.3.4 Reference surfaces (see Figure 4)	12
10.3.5 Detents (see Figure 5).....	13
10.3.6 Functional Areas (see Figure 6)	13
10.3.7 Spindle and head windows (see Figure 7).....	14
10.3.8 Shutter (see Figure 8)	15
10.3.9 Path for shutter opener and shutter sensor notch (see Figure 9)	15
10.3.10 Mis-insert protections (see Figure 10).....	16
10.3.11 Gripper slots (see Figure 11)	16

10.3.12	Label area (see Figure 12)	17
10.4	Mechanical characteristics	17
10.4.1	Material	17
10.4.2	Mass	17
10.4.3	Edge distortion	17
10.4.4	Compliance	17
10.4.5	Shutter opening force	17
11	Dimensional, mechanical and physical characteristics of the disk	29
11.1	General description of the disk	29
11.2	Reference axis and plane of the disk	29
11.3	Dimensions of the disk (see Figure 13)	29
11.3.1	Hub dimensions (see Figure 13)	29
11.3.2	Clamping zone (see Figure 13)	30
11.4	Mechanical characteristics	30
11.4.1	Material	30
11.4.2	Mass	30
11.4.3	Moment of inertia	30
11.4.4	Imbalance	30
11.4.5	Axial deflection	30
11.4.6	Axial acceleration	31
11.4.7	Radial runout	31
11.4.8	Radial acceleration	32
11.4.9	Tilt	32
11.5	Optical Characteristics	32
11.5.1	Index of refraction	32
11.5.2	Thickness of the substrate	32
11.5.3	Birefringence	32
11.5.4	Vertical Birefringence	33
11.5.5	Reflectance	33
12	Interface between cartridge and drive	33
12.1	Clamping method	33
12.2	Clamping force	33
12.3	Capture cylinder (see Figure 14)	34
12.4	Disk position in operating condition (see Figure 14)	34
Section 3 — Format of information		36
13	Geometry of physical tracks	36
13.1	Physical track shape	36
13.2	Direction of track spiral	36
13.3	Physical track pitch	36
14	Track format	36
14.1	Logical Track number	36
14.2	Logical Track layout	36
14.3	Clock frequencies and periods	36
14.4	Radial alignment	37
14.5	Sector number	37
15	Sector format	37
15.1	Sector layout	37
15.2	Sector Mark (SM)	38
15.3	VFO fields	39
15.4	Address Mark (AM)	40
15.5	ID fields	40
15.6	Postambles (PA)	41
15.7	Gap	41
15.8	Sync	41
15.9	Data field	41
15.9.1	User data bytes	42
15.9.2	CRC and ECC bytes	42

15.9.3	Resync bytes	42
15.10	Buffer field	42
16	Recording code	42
17	Format of the Information Zone	43
17.1	General description of the Information Zone	43
17.2	Division of the Information Zone	43
17.2.1	Initial Zone	43
17.2.2	Buffer Zones	43
17.2.3	Test Zones	43
17.2.4	Control Zone	44
17.2.5	Data Zone	45
18	Format of the Data Zone	45
18.1	Buffer tracks and Test tracks in the Data Zone	45
18.2	Defect Management Areas (DMAs)	45
18.3	Disk Definition Structure (DDS)	48
18.4	Partitioning	49
19	Defect management	50
19.1	Initialization of the disk	50
19.2	Certification	50
19.2.1	Slipping Algorithm	50
19.2.2	Linear Replacement Algorithm	50
19.3	Disks not certified	51
19.4	Write procedure	51
19.5	Primary Defect List (PDL)	51
19.6	Secondary Defect List (SDL)	51
Section 4 — Characteristics of embossed information		53
20	Method of testing	53
20.1	Environment	53
20.2	Use of the Reference Drive	53
20.2.1	Optics and mechanics	53
20.2.2	Read power	53
20.2.3	Read channels	53
20.2.4	Tracking	53
20.3	Definition of signals	53
21	Signals from grooves	54
21.1	Divided push-pull signal	54
21.2	Phase depth	55
21.3	Track location	55
22	Signals from Headers	55
22.1	Sector Mark	55
22.2	VFO1 and VFO2	55
22.3	Address Mark, ID field and Postamble	56
22.4	Timing jitter	56
22.5	Asymmetry	56
23	Signals from embossed Recording fields	56
23.1	Signal amplitude	56
23.2	Timing jitter	56
Section 5 — Characteristics of the recording layer and user data		58
24	Method of testing	58
24.1	Environment	58
24.2	Reference Drive	58
24.2.1	Optics and mechanics	58
24.2.2	Read power	58
24.2.3	Read magnetic field	58

24.2.4	Read channel	58
24.2.5	Tracking.....	58
24.2.6	Signal detection for testing purposes.....	59
24.3	Write conditions	59
24.3.1	Write pulse and power	59
24.3.2	Write magnetic field	61
24.3.3	2T and 4T pulse power determination.....	61
24.3.4	Media power sensitivity	61
24.4	Erase conditions.....	62
24.4.1	Erase power	62
24.4.2	Erase magnetic field	62
24.5	Definition of signals	62
25	Magneto-optical characteristics	62
25.1	Figure of merit	62
25.2	Imbalance of the magneto-optical signal.....	62
25.3	Magneto-optical signals obtained from the embossed Headers.....	63
26	Write characteristics	63
26.1	Resolution	63
26.2	Narrow-band signal-to-noise ratio (NBSNR)	63
26.3	Cross-talk ratio	64
26.3.1	Rewritable track test method	64
26.4	Timing jitter	64
26.5	Media thermal interaction.....	65
27	Erase power determination	65
Section 6 — Characteristics of user data		66
28	Method of testing.....	66
28.1	Environment.....	66
28.2	Reference Drive	66
28.2.1	Optics and mechanics	66
28.2.2	Read conditions.....	66
28.2.3	Read amplifiers	66
28.2.4	Mark Quality	66
28.2.5	Channel bit clock.....	67
28.2.6	Binary-to-digital converters	67
28.2.7	Error correction	67
28.2.8	Tracking.....	67
29	Minimum quality of a sector.....	67
29.1	Headers	67
29.1.1	Sector Mark	67
29.1.2	ID fields.....	67
29.2	User-written data	67
29.2.1	Recording field	67
29.2.2	Byte errors	67
29.2.3	Timing jitter	68
30	Data interchange requirements	68
30.1	Tracking.....	68
30.2	User-written data	68
30.3	Quality of disk.....	68
Annex A (normative) Edge distortion test.....		69
Annex B (normative) Compliance test.....		70
Annex C (normative) CRC for ID fields		72
Annex D (normative) Interleave, CRC, ECC, Resync for the data field		73
Annex E (normative) Contents of the Control Zone.....		77

Annex F (normative) Determination of the Resync patterns	83
Annex G (normative) Measurement of the figure of merit	88
Annex H (normative) Read Channel for measuring NBSNR and jitter	89
Annex I (normative) Implementation Independent Mark Quality Determination (IIMQD) for the interchange of recorded media	92
Annex J (normative) Air cleanliness class 100 000	93
Annex K (normative) Position of the cartridge relative to the reference planes	94
Annex L (normative) Relaxation by zones of the requirements for signals	95
Annex M (normative) Test method for measuring the adsorbent force of the hub	96
Annex N (informative) Track deviation measurement	98
Annex O (informative) Derivation of the operating climatic environment	101
Annex P (informative) Transportation	106
Annex Q (informative) Office environment	107
Annex R (informative) Values to be implemented in existing and future standards	108
Annex S (informative) Measurement of the vertical birefringence of the substrate	109
Annex T (informative) Sector retirement guidelines	111
Annex U (informative) Laser power calibration for evaluation of media power sensitivity	112

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 17346 was prepared by Ecma International (as ECMA-351) 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.

Information technology — Data interchange on 90 mm optical disk cartridges — Capacity: 1,3 Gbytes per cartridge

Section 1 — General

1 Scope

This International Standard defines the characteristics of 90 mm Optical Disk Cartridges (ODC) with a capacity of 1,3 GB per cartridge. It specifies only Type R/W for 2 048-byte sectors of such cartridges.

Type R/W provides for data to be written, read and erased many times over the entire recording surface of the disk using the thermo-magnetic and magneto-optical effects. It is also referred to as "fully rewritable". This International Standard provides for 2 048-byte sectors only. All sectors on a disk are of the same size.

This International Standard specifies:

- the conditions for conformance testing and the Reference Drive;
- the environments in which the cartridges are to be operated and stored;
- the mechanical and physical characteristics of the cartridge, so as to provide mechanical interchange ability between data processing systems;
- the format of the information on the disk, both embossed and user-written; including the physical disposition of the tracks and sectors, the error correction codes, and the modulation method used;
- the characteristics of the embossed information on the disk;
- the magneto-optical characteristics of the disk, enabling processing systems to write data onto the disk;
- the minimum quality of user-written data on the disk, enabling data processing systems to read data from the disk.

This International Standard provides for interchange between optical disk drives. Together with a standard for volume and file structure, it provides for full data interchange between data processing systems.

2 Conformance

2.1 Optical Disk Cartridge (ODC)

A claim of conformance with this International Standard shall specify the Type of the ODC. It shall be in conformance if it meets all mandatory requirements specified herein for that Type.

2.2 Generating system

A claim of conformance with this International Standard shall specify which Type is supported. A system generating an ODC for interchange shall be in conformance with this International Standard if it meets the mandatory requirements of this International Standard for the Type specified.

2.3 Receiving system

A claim of conformance with this International Standard shall specify which Type is supported. A system receiving an ODC for interchange shall be in conformance with this International Standard if it is able to process any recording made on the cartridge in accordance with 2.1 on the Type specified.

2.4 Compatibility statement

A claim of conformance with this International Standard shall include a statement listing any other International Standard supported by the system for which conformance is claimed. This statement shall specify the number of the Standard(s), the ODC type(s) supported (where appropriate) and whether support includes reading or both reading and writing.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ECMA-287, *Safety of electronic equipment (2002)*