
**Information technology — Data
interchange on 130 mm optical disk
cartridges — Capacity: 1 gigabyte per
cartridge**

*Technologies de l'information — Échange de données sur cartouches de
disque optique de diamètre 130 mm — Capacité: 1 gigabyte par
cartouche*

Contents

	Page
Section 1 - General	1
1 Scope	1
2 Conformance	1
2.1 Optical Disk Cartridges	1
2.2 Generating System	1
2.3 Receiving System	1
3 Normative references	2
4 Definitions	2
4.1 case	2
4.2 Cyclic Redundancy Check (CRC)	2
4.3 embossed mark	2
4.4 entrance surface	2
4.5 Error Correction Code (ECC)	2
4.6 field	2
4.7 format	2
4.8 groove	2
4.9 interleaving	2
4.10 Kerr rotation	2
4.11 land and groove	2
4.12 mark	2
4.13 optical disk	2
4.14 optical disk cartridge (ODC)	2
4.15 polarization	2
4.16 recording layer	2

© ISO/IEC 1993

All rights reserved. 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

4.17	Reed-Solomon code	2
4.18	rewritable optical disk	2
4.19	sector	2
4.20	substrate	2
4.21	track	3
4.22	write-once functionality	3
4.23	zone	3
5	Conventions and notations	3
5.1	Representation of numbers	3
5.2	Names	3
6	List of acronyms	3
7	General description of the optical disk cartridge	4
8	General requirements	4
8.1	Environments	4
8.1.1	Testing environment	4
8.1.2	Operating environment	4
8.1.3	Storage environment	5
8.1.4	Transportation	5
8.2	Temperature shock	5
8.3	Safety requirements	5
8.4	Flammability	5
9	Reference drive	5
9.1	Optical system	5
9.2	Optical beam	7
9.3	Read channels	7
9.4	Tracking	7
9.5	Rotation of the disk	7
Section 2 - Mechanical and physical characteristics		8
10	Dimensions and mechanical characteristics of the case	8
10.1	General	8
10.2	Case drawings	8
10.3	Sides, reference axes and reference planes	8
10.3.1	Relationship of Sides A and B	8
10.3.2	Reference axes and case reference planes	8

10.4	Materials	8
10.5	Mass	9
10.6	Overall dimensions	9
10.7	Location hole	9
10.8	Alignment hole	10
10.9	Surfaces on reference planes P	10
10.10	Insertion slots and detent features	11
10.11	Gripper slots	11
10.12	Write-inhibit holes	12
10.13	Media sensor holes	12
10.14	Head and motor window	13
10.15	Shutter	13
10.16	Slot for shutter opener	13
10.17	Shutter sensor notch	14
10.18	User label areas	14
11	Dimensional and physical characteristics of the disk	15
11.1	Dimensions of the disk	15
11.1.1	Outer diameter	15
11.1.2	Thickness	15
11.1.3	Clamping zone	15
11.1.4	Clearance zone	15
11.2	Mass	15
11.3	Moment of inertia	15
11.4	Imbalance	15
11.5	Axial deflection	15
11.6	Axial acceleration	15
11.7	Dynamic radial runout	15
11.8	Radial acceleration	16
11.9	Tilt	16
12	Drop test	16
13	Interface between disk and drive	16
13.1	Clamping technique	16
13.2	Dimensions of the hub	16
13.2.1	Outer diameter of the hub	16
13.2.2	Height of the hub	16
13.2.3	Diameter of the centre hole	16
13.2.4	Height of the top of the centre hole at diameter D_9	16

13.2.5	Centring length at diameter D_9	16
13.2.6	Chamfer at diameter D_9	17
13.2.7	Chamfer at diameter D_8	17
13.2.8	Outer diameter of the magnetizable ring	17
13.2.9	Inner diameter of the magnetizable ring	17
13.2.10	Thickness of the magnetizable material	17
13.2.11	Position of the top of the magnetizable ring relative to the disk reference plane	17
13.3	Magnetizable material	17
13.4	Clamping force	17
13.5	Capture cylinder for the hub	17
13.6	Disk position in the operating condition	18
14	Characteristics of the substrate	33
14.1	Index of refraction	33
14.2	Thickness	33
Section 3 - Format of information		33
15	Track geometry	33
15.1	Track shape	33
15.2	Direction of rotation	33
15.3	Track pitch	33
15.4	Track number	33
16	Track format	33
16.1	Formatted Zone	33
16.2	Control tracks	36
16.3	Control Track PEP Zone	37
16.3.1	Recording in the PEP Zone	37
16.3.2	Cross-track loss	37
16.3.3	Format of the tracks of the PEP Zone	38
16.4	Control Track SFP Zones	41
16.4.1	Duplicate of the PEP information	41
16.5	Media information	42
16.6	System Information	48
16.7	Unspecified content	49
16.8	Requirements for interchange of a user-recorded cartridge	49

16.8.1	Requirements for reading	49
16.8.2	Requirements for writing and erasing	49
17	Sector format	49
17.1	Sector Mark (SM)	51
17.2	VFO areas	52
17.3	Address Mark (AM)	52
17.4	ID and CRC	52
17.5	Postamble (PA)	53
17.6	Offset Detection Flag (ODF)	53
17.7	Gap	53
17.8	Flag	53
17.9	Auto Laser Power Control (ALPC)	53
17.10	Sync	53
17.11	Data field	53
17.11.1	User bytes	53
17.11.2	CRC and ECC	53
17.11.3	Bytes for control information	54
17.11.4	Last bytes of the Data field of the 512-byte sector format	54
17.11.5	Resync	54
17.12	Buffer	54
18	Recording code	54
19	Defect management	54
19.1	Media initialization	55
19.1.1	Media initialization with certification	55
19.1.2	Media initialization without certification	55
19.2	Write and read procedure	55
19.3	Layout of the User Zone	56
19.3.1	Disk Definition Structure (DDS)	57
19.3.2	Primary Defect List (PDL)	58
19.3.3	Secondary Defect List (SDL)	59
19.3.4	Zone Structure Table (ZST)	60
Section 4	Characteristics of embossed information	62
20	ZCAV format	62

20.1	Tracking	62
20.2	Characteristics of pre-recorded information	62
20.2.1	Groove-related signals	62
20.2.2	Properties of pre-recorded marks	63
20.2.3	Parameters of the read characteristics	64
Section 5	Characteristics of the recording layer	65
21	Characteristics of the recording layer	65
21.1	Test conditions	65
21.1.1	General	65
21.1.2	Read conditions	65
21.1.3	Write conditions	65
21.1.4	Erase conditions	66
21.2	Baseline reflectance	67
21.2.1	General	67
21.2.2	Actual value	67
21.2.3	Requirement	67
21.3	Magneto-optical recording in the User Zone	67
21.3.1	Resolution	67
21.3.2	Imbalance of magneto-optical signal	68
21.3.3	Figure of merit for magneto-optical signal	68
21.3.4	Narrow-band signal-to-noise ratio	68
21.3.5	Cross-talk ratio	69
21.3.6	Ease of erasure	69
Annexes		
A	Definition of write and erase pulse width	70
B	Measurement of figure of merit	71
C	Values to be implemented in future standards	72
D	Pointer fields	73
E	CRC for ID fields	74
F	Interleave, CRC, ECC, Resync for the Data field	75
G	Sector retirement guidelines	81
H	Office environment	82
J	Transportation	83

K - Requirements for interchange	84
L - SCSI Logical Block to Physical Sector Mapping	86
M - Derivation of the operating climatic environment	89
N - Air cleanliness class 100 000	93
P - Guidelines for using ODCs of Type W/O	95

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. 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.

International Standard ISO/IEC 13481 was prepared by the European Computer Manufacturers Association (as Standard ECMA-183) 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.

Annexes A, B, D, E, F, K, L and N form an integral part of this International Standard. Annexes C, G, H, J, M and P are for information only.

Patents

During the preparation of the ECMA standard, information was gathered on patents upon which application of the standard might depend. Relevant patents were identified as belonging to the MAXOPTIX Corporation. However, neither ECMA nor ISO/IEC can give authoritative or comprehensive information about evidence, validity or scope of patent and like rights. The patent holders have stated that licences will be granted under reasonable and non-discriminatory terms. Communications on this subject should be addressed to

MAXOPTIX CORPORATION
2520 Junction Avenue
SAN JOSE – CA 95 134
USA

Introduction

This International Standard specifies the characteristics of 130 mm Optical Disk Cartridges (ODC) with a capacity of 1 Gbyte per cartridge. This International Standard specifies two related but different implementations of such cartridges, viz.

Type R/W Provides for data to be written, read, and erased many times over the whole of both recording surfaces of the disk using the thermo-magnetic and magneto-optical effects.

Type WO Provides write once, read multiple functionality on the whole of both disk surfaces using the thermo-magnetic and magneto-optical effects.

Information technology - Data interchange on 130 mm optical disk cartridges - Capacity: 1 gigabyte per cartridge

Section 1 - General

1 Scope

This International Standard specifies the characteristics of 130 mm optical disk cartridges (ODCs) with a capacity of 1 Gigabyte per cartridge. It specifies two related, but different implementations of such cartridges:

Type R/W Provides for data to be written, read and erased many times over the whole of both recording surfaces of the disk using the thermo-magnetic and magneto-optical effects.

Type WO Provides write once, read multiple functionality on both disk surfaces using the thermo-magnetic and magneto-optical effects.

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, physical and dimensional characteristics of the case and of the cartridge, so as to provide mechanical interchangeability 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.

It also 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. Interchange involves the ability to write, read and erase data without introducing any error.

2 Conformance

2.1 Optical disk cartridges

An ODC claiming conformance with this International Standard shall specify its Type. It shall conform to this International Standard 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(s) is (are) supported. A system generating an ODC for interchange shall be entitled to claim conformance with this Standard if it meets all mandatory requirements of this Standard for the Type(s) specified.

2.3 Receiving system

A claim of conformance with this International Standard shall specify which Type(s) is (are) supported.

A system receiving an ODC for interchange shall be entitled to claim conformance with this International Standard if it is able to handle any recording made on the cartridge according to 2.1 on the Type(s) specified.

3 Normative references

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

ISO 683-13:1986, *Heat treatable steels, alloy steels and free-cutting steels - Part 13: Wrought stainless steels*.

IEC 950:1991, *Safety of information technology equipment, including electrical business equipment*.