# INTERNATIONAL STANDARD

## ISO/IEC 16449

Second edition 2002-04-15

## Information technology — 80 mm DVD — Read-only disk

Technologies de l'information — Disque DVD de diamètre 80 mm — Disque DVD à lecture seule



#### 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 2002

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.ch
Web www.iso.ch

Printed in Switzerland

## **Contents**

Section	1 - General	1
1	Scope	1
2	Conformance	1
2.1 2.2 2.3	Optical Disk Generating system Receiving system	1 1 1
3	Normative reference	1
4	Terms and definitions	1
4.1 4.2 4.3 4.4 4.5 4.6 4.7 4.8 4.9 4.10 4.11 4.12 4.13 4.14 4.15 4.16 4.17 4.18 4.19 4.20	Adhesive layer Channel bit Clamping Zone Digital Sum Value (DSV) Disk Reference Plane Dual Layer disk Dummy substrate Entrance surface Optical disk Physical sector number Read-only disk Recorded layer Reed-Solomon code Reserved field Sector Single Layer disk Spacer Substrate Track Track Track pitch	
4.21 5	Zone Conventions and notations	3
5.1 5.2	Representation of numbers Names	
6	List of acronyms	3
7	General description of the disk	4
8	General requirements	5
8.1 8.1.1 8.1.2 8.1.3 8.1.4 8.2 8.3	Environments Test environment Operating environment Storage environment Transportation Safety requirements Flammability	
9	Reference measurement devices	6
9.1 9.2 9.3	Pick Up Head (PUH) Measurement conditions Normalized servo transfer function	5

## ISO/IEC 16449:2002(E)

9.4 9.5	Reference Servo for axial tracking Reference Servo for radial tracking	8 9
Section	2 - Dimensional, mechanical and physical characteristics of the disk	10
10	Dimensional characteristics	10
10.1 10.2 10.3 10.4 10.5 10.6	Overall dimensions First transition area Second transition area Clamping Zone Third transition area Information Zone	10 10 10 10 10 11
10.6.1 10.6.2 10.6.3 10.6.4	Sub-divisions of the Information Zone Track geometry Track modes Channel bit length	11 12 12 12
10.7 10.8 10.9	Rim area Remark on tolerances Runout	12 12 13
10.9.1 10.9.2	Axial runout Radial runout	13 13
10.10	Label	13
11	Mechanical parameters	13
11.1 11.2 11.3 11.4	Mass Moment of inertia Dynamic imbalance Sense of rotation	13 13 13 13
12	Optical parameters	13
12.1 12.2 12.3 12.4 12.5 12.6	Index of refraction Thickness of the transparent substrate Thickness of the spacer of Types C and D Angular deviation Birefringence of the transparent substrate Reflectivity	13 13 13 13 14 14
Section	3 - Operational Signals	17
13	High frequency signals (HF)	17
13.1 13.2 13.3 13.4	Modulated amplitude Signal asymmetry Cross-track signal Quality of signals	17 18 18 18
13.4.1 13.4.2 13.4.3	Jitter Random errors Defects	18 18 18
14	Servo signals	18
14.1 14.2	Differential phase tracking error signal Tangential push-pull signal	19 19
Section	4 - Data Format	21
15	General	21
16	Data Frames	21
16.1	Identification Data (ID)	21

## ISO/IEC 16449:2002(E)

16.2 16.3 16.4	ID Error Detection Code (IED) Copyright Management Information (CPR_MAI) Error Detection Code (EDC)	22 23 23
17	Scrambled Frames	23
18	ECC Blocks	24
19	Recording Frames	25
20	Modulation	26
21	Physical Sectors	27
22	Suppress control of the d.c. component	28
Section	5 - Format of the Information Zone(s)	29
23	General description of an Information Zone	29
24	Layout of the Information Zone	29
25	Physical Sector numbering	29
26	Lead-in Zone	31
26.1 26.2 26.3 26.4 26.5	Initial Zone Reference Code Zone Buffer Zone 1 Buffer Zone 2 Control Data Zone	32 32 32 32 32
26.5.1 26.5.2 26.5.3	Physical format information Disk manufacturing information Content provider information	33 34 34
27	Middle Zone	35
28	Lead-out Zone	35
Annexe	es es	
A (nor	A (normative) - Measurement of the angular deviation α	
B (nori	native) - Measurement of birefringence	38
C (nor	mative) - Measurement of the differential phase tracking error	40
D (nor	mative) - Measurement of light reflectance	44
E (nori	native) - Tapered cone for disk clamping	46
F (norr	native) - Measurement of jitter	47
G (nor	mative) - 8-to-16 Modulation with RLL (2,10) requirements	50
H (nor	mative) - Burst Cutting Area (BCA)	60
J (norn	native) - Source Identification Code (SID)	65
K (info	rmative) - Measurement of the thickness of the spacer of Dual Layer disks	68
L (info	(informative) - Note on the Reference Code	
M (info	ormative) - Maximum transfer rate	71
N (info	(informative) - Disk bonding	
P (info	(informative) - Transportation	

## **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 3.

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 International Standard 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 16449 was prepared by ECMA (as Standard ECMA-268) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, in parallel with its approval of national bodies of ISO and IEC.

This second edition cancels and replaces the first edition (ISO/IEC 16449:1999), which has been technically revised.

Annexes A to J form a normative part of this International Standard. Annexes K to P are for information only.

## Information technology — 80 mm DVD — Read-only disk

#### Section 1 - General

## 1 Scope

This International Standard specifies the mechanical, physical and optical characteristics of a 80 mm, read-only optical disk to enable the interchange of such disks. It specifies the quality of the recorded signals, the format of the data and the recording method, thereby allowing for information interchange by means of such disks. This disk is identified as DVD - Read-Only Disk.

This International Standard specifies

- four related but different Types of this disk (see clause 7),
- the conditions for conformance,
- the environments in which the disk is to be operated and stored,
- the mechanical and physical characteristics of the disk, so as to provide mechanical interchange between data processing systems,
- the format of the information on the disk, including the physical disposition of the tracks and sectors, the error correcting codes and the coding method used,
- the characteristics of the signals recorded on the disk, enabling data processing systems to read the data from the disk.

This International Standard provides for interchange of disks between 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

A claim of conformance shall specify the Type of the disk. An optical disk shall be in conformance with this International Standard if it meets the mandatory requirements specified for its Type.

### 2.2 Generating system

A generating system shall be in conformance with this International Standard if the optical disk it generates is in accordance with 2.1.

## 2.3 Receiving system

A receiving system shall be in conformance with this International Standard if it is able to handle all four Types of optical disk according to 2.1.

### **3** Normative reference

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

IEC 60950-1:2001, Information technology equipment – Safety – Part 1: General requirements