INTERNATIONAL STANDARD

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Information technology — Data interchange on 130 mm rewritable and write once read many ultra density optical (UDO) disk cartridges — Capacity: 30 Gbytes per cartridge (first generation)

Technologies de l'information — Échange de données sur cartouches de disques de 130 mm de diamètre, de densité ultra-optique (UDO), pour réécriture et pour «write once read many» — Capacité: 30 Go par cartouche (première génération)

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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 17345 was prepared by Ecma International (as ECMA-350) 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 130 mm rewritable and write once read many ultra density optical (UDO) disk cartridges — Capacity: 30 Gbytes per cartridge (first generation)

Section 1 — General

1 Scope

This International Standard specifies the mechanical, physical, and optical characteristics of a 130 mm optical disk cartridge (ODC) that employs thermo-optical Phase Change effects to enable data interchange between such disks.

This International Standard specifies two types:

- Type RW (rewritable) provides for data to be written, read and erased many times over the recording surfaces of the disk.
- Type WORM (write once read many) provides for data once written to be read a multiplicity of times. This type uses a write once read many times recording material. (Written marks cannot be erased and attempted modifications of the written marks are detectable.) Multisession (incremental write operations) recording may be performed on type WORM disks.

The disk is two-sided with a nominal capacity of 15,0 GB per side and the cartridge (two sides) provides a nominal capacity of 30,0 GB.

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 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 methods used;
- the characteristics of the embossed information on the disk;
- the thermo-optical characteristics of the disk, enabling processing systems to write data onto the disk; and
- 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

An ODC shall be in conformance with this International Standard if it meets all mandatory requirements specified therein.

A claim of conformance with this International Standard shall specify the type (RW or WORM) implemented.

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 in conformance with this International Standard if it meets the mandatory requirements of this International Standard for the type(s) supported.

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 in conformance with this International Standard if it is able to process any recording made on the cartridge according to 2.1 on the type(s) specified.

2.4 Compatibility statement

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

3 Normative references

The following referenced document is 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 (2002), *Safety of electronic equipment*

4 Terms and definitions

For the purposes of this document the following terms and definitions apply.

4.1
asymmetry
the deviation between the centre levels of signals generated by two distinct repeating mark and space length patterns

4.2
band
an annular area on the disk having a constant clock frequency

4.3
case
the housing for an optical disk that protects the disk and facilitates disk interchange

4.4
Case Reference Plane
a plane defined for each side of the case, to which the dimensions of the case are referred

4.5
Channel bit
the elements by which, after modulation, the binary values ZERO and ONE are represented by marks and spaces on the disk

4.6
Clamping Zone
the annular part of the disk within which the clamping force is applied by the clamping device

4.7
cover layer
a transparent layer of the disk through which the optical beam accesses the recording layer

4.8
Cyclic Redundancy Code (CRC)
a method for detecting errors in data

4.9
Data field
a subdivision of a sector intended for the recording of user data

4.10
Defect Management
a method for handling the defective areas on the disk

4.11
Disk Reference Plane
a plane defined by the perfectly flat annular surface of an ideal spindle onto which the Clamping Zone of the disk is clamped, and which is normal to the axis of rotation

4.12
entrance surface
the surface of the disk onto which the optical beam first impinges

4.13
Error Correction Code (ECC)
an error-detecting code designed to correct certain kinds of errors in data

4.14
field
a subdivision of a sector

4.15
format
the arrangement or layout of information on the disk

NOTE The annular area on the disk bearing the format is the Formatted Zone.

4.16
hub
the central feature on the disk, which interacts with the spindle of the disk drive to provide radial centring and the clamping force

4.17
interleaving
the process of allocating the physical sequence of units of data so as to render the data more immune to burst errors

4.18
land and groove
a trench-like feature of the disk, applied before the recording of any information, and used to define the track location

NOTE The land is located nearer to the entrance surface than the groove with which it is paired to form a Physical Track. Recording is performed on both the land and groove.

4.19
mark
a feature of the recording layer which takes the form of a pit, change in the reflectivity, or any other type or form that can be sensed by the optical system

NOTE The pattern of marks represents the data on the disk.

4.20
Mirror Area
an area in which there is no embossed information, neither preformatted headers or grooves

4.21
optical disk
a disk that will accept and retain information in the form of marks in a recording layer, that can be read with an optical beam

4.22
optical disk cartridge (ODC)
a device consisting of a case containing an optical disk

4.23
Phase Change
a physical effect by which the area of a recording layer irradiated by a laser beam is heated so as to change from an amorphous state to a crystalline state or vice versa

4.24
Physical Block Address (PBA)
a numbering system of the data sectors defined to constitute a uniquely addressable sector location to the recording system

4.25
Physical Track
one revolution (360°) of adjacent groove-land pair

4.26
read power
the optical power, incident at the entrance surface of the disk, used when reading

4.27
recording layer
a layer of the disk on, or in, which data is written during manufacture and/or use

NOTE The recording layer may actually consist of a multiple layer stack of different materials or composite materials.

4.28
Recording Track
one revolution (360°) of either a land feature or groove feature of the disk (Land Recording Track or Groove Recording Track) where recording may be performed

4.29
Reed-Solomon code
an error detection and/or correction code which is particularly suited to the correction of errors which occur in bursts or are strongly correlated

4.30
sector
the smallest addressable part of a track in the formatted area of the disk

4.31
space
the area between marks along the track

4.32
spindle
the part of the disk drive which contacts the disk and/or hub

4.33
substrate
a layer of the disk provided for mechanical support of the recording layer

4.34
track
a path which is followed by the focus of the optical beam during exactly one revolution of the disk

4.35
track pitch
the distance between Land Recording Track centrelines and adjacent Groove Recording Track centrelines, measured in the radial direction

4.36
User Area
the area of the disk intended for the recording of user data

4.37
wobble
a periodic radial deviation of the track (groove or land) from the average centreline that is used as a supplemental timing signal

4.38
write-inhibit hole
a hole in the case which, when detected by the drive to be open, inhibits write operations

4.39
zone
an annular area of the disk

5 Conventions and notations

5.1 Representation of numbers

A measured value is rounded off to the least significant digit of the corresponding specified value. For instance, it implies that a specified value of 1,26 with a positive tolerance of +0,01 and a negative tolerance of -0,02 allows a range of measured values from 1,235 to 1,275.

Numbers in decimal notations are represented by the digits 0 to 9.

Numbers in hexadecimal notation are represented by the hexadecimal digits 0 to 9 and A to F in parentheses.

The setting of bits is denoted by ZERO and ONE.

Numbers in binary notations and bit patterns are represented by strings of digits 0 and 1, with the most significant bit shown to the left.

Negative values of numbers in binary notation are given as Two's complement.