INTERNATIONAL STANDARD

ISO/IEC 12247

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Information technology — 3,81 mm wide magnetic tape cartridge for information interchange — Helical scan recording — DDS format using 60 m and 90 m length tapes

Technologies de l'information — Cartouche de bande magnétique de 3,81 mm de large pour l'échange d'information — Enregistrement par balayage en spirale — Format DDS utilisant des bandes de 60 m et 90 m de long

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ISO/IEC 12247:1993(E)

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Foreword

ISO (the International Organization for Standardization) and IEC (thc 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 12247 was prepared by the European Computer Manufacturers Association (ECMA) (as Standard ECMA-170) 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, D, E, F, G, H and K form an integral part of this International Standard. Annexes B, C, J, L, M and N are for information only.

Introduction

ISO/IEC have produced a series of International Standards for cassettes and cartridges containing magnetic tapes of different width and characteristics. Of these, the following relate to helical scan recording.

ISO/IEC 10777:1991, *Information technology - 3,81 mm wide magnetic tape cartridge for information interchange - Helical scan recording - DDS format.*

ISO/IEC 11319:1993, *Information technology - 8 mm wide magnetic tape cartridge for information interchange - Helical scan recording.*

ISO/IEC 11321:1992, *Information technology - 3,81 wide magnetic tape cartridge for information interchange - Helical scan recording - DATA/DAT format.*

ISO/IEC 11557:1992, *Information technology - 3,81 wide magnetic tape cartridge for information interchange - Helical scan recording - DDS-DC format using 60 m and 90 m length tapes.*

ISO/IEC 12246:1993, *Information technology - 8 mm wide magnetic tape cartridge dual azimuth format for information interchange - Helical scan recording.*

ISO/IEC 12248:1993, *Information technology - 3,81 wide magnetic tape cartridge for information interchange - Helical scan recording - DATA/DAT-DC format using 60 m and 90 length tapes.*

This International Standard is a further International Standard for the same recorded format as given in ISO/IEC 10777, but which supports two types of cartridges. For Type A, the magnetic tape has a nominal thickness of 13 µm. For Type B, the magnetic tape has a nominal thickness of 9 µm. This International Standard also includes the specifications of the Media Recognition System, namely a striped splicing tape.

A companion International Standard ISO/IEC 11557 defines another data interchange specification for the same cartridges, but with a recorded format, namely DDS-DC, which enables data to be compressed by the drive before being recorded.

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Information technology - 3,81 mm wide magnetic tape cartridge for information interchange - Helical scan recording - DDS format using 60 m and 90 m length tapes

Section 1 - General

1 Scope

This International Standard specifies the physical and magnetic characteristics of a 3,81 mm wide magnetic tape cartridge to enable interchangeability of such cartridges. It also specifies the quality of the recorded signals, the recorded format and the recording method, thereby allowing data interchange between drives by means of such magnetic tape cartridges. The format used is known as Digital Data Storage (DDS).

This International Standard specifies two types of cartridge which, for the purpose of this International Standard, are referred to as Type A and Type B.

For Type A, the magnetic tape has a nominal thickness of 13 µm and a nominal length of up to 60,5 m.

For Type B, the magnetic tape has a nominal thickness of 9 µm and a nominal length of up to 92,0 m.

Information interchange between systems by means of this International Standard also requires the use, at a minimum, of a labelling and file structure and an interchange code which are agreed upon by the interchange parties. It is not within the scope of this International Standard to specify the labelling and file structure, or the interchange code.

2 Conformance

2.1 Magnetic tape cartridge

A tape cartridge shall be in conformance with this International Standard if it meets all mandatory requirements specified herein for either Type A or Type B. The tape requirements shall be satisfied throughout the extent of the tape. A recorded tape shall be either a Single Data Space Tape or a partitioned tape.

A claim of conformance shall state whether the optional feature for the Media Recognition System (MRS) is incorporated (see annex N).

2.2 Generating system

A system generating a magnetic tape cartridge for interchange shall be entitled to claim conformance with this International Standard if all recordings on the tape meet the mandatory requirements of this International Standard, and if either or both methods of appending and overwriting are implemented.

A claim of conformance shall state whether cartridges of Type A or Type B or both are supported. In addition a claim of conformance shall also state which of the following optional features are implemented and which are not:

- the performing of a Read-After-Write check and the recording of any necessary repeated frames,
- the recording of multiple representations of the same Basic Group,
- the generation of ECC3 Frames.

A claim of conformance shall also state the differences in its operation, if any, which depend upon the presence, or absence, of the MRS feature in the cartridge.

2.3 Receiving system

A system receiving a magnetic tape cartridge for interchange shall be entitled to claim conformance with this International Standard if it is able to handle any recording made on the tape according to this International Standard. In particular it shall be able:

- to recognize repeated frames and to make available to the user data and Separator Marks from only one of these frames,
- to recognize multiple representations of the same Basic Group and to make available to the user data and Separator Marks from only one of these representations,
- to update the System Log(s) if the Write-inhibit Hole state so permits,
- to recognize an ECC3 frame, and ignore it if the system is not capable of using ECC3 check bytes in a process of error correction.

A claim of conformance shall state whether or not the system is capable of using ECC3 check bytes in a process of error correction.

In addition a claim of conformance shall also state whether cartridges of Type A or Type B or both are supported.

A claim of conformance shall also state the differences in its operation, if any, which depend upon the presence, or absence, of the MRS feature in the cartridge.

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/R 527:1966, *Plastics - Determination of tensile properties.*

ISO 1302:1992, *Technical Drawings - Method of indicating surface texture.*

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

4 Definitions

For the purposes of this International Standard, the following definitions apply.

4.1 Absolute Frame Number (AFN): A sequence number, encoded in the frame.

4.2 Area ID: An identifier defining the area of the tape and specifying the types of frame written.

4.3 Automatic Track Finding (ATF): The method by which tracking is achieved.

4.4 Average Signal Amplitude: The average peak-to-peak value of the output signal from the read head at the fundamental frequency of the specified physical recording density over a minimum of 7,8 mm of track, exclusive of missing pulses.

4.5 azimuth: The angular deviation, in degrees, minutes and seconds of arc, made by the mean flux transition line with the line normal to the centreline of the recorded track.

4.6 back surface: The surface of the tape opposite to the magnetic coating which is used to record data.

4.7 byte: An ordered set of bits acted upon as a unit.

4.8 cartridge: A case containing magnetic tape stored on twin hubs.

4.9 Channel Bit: A bit after 8-10 transformation.

4.10 Data Format ID: An identifier specifying which data format is being used on the tape.

4.11 Early Warning Point (EWP): A point along the length of the tape at which warning is given of the approach, in the forward direction of tape motion, of the partition boundary or of the Physical End of Tape.

4.12 End of Data (EOD): The point on the tape at the end of the group which contains the last user data.

4.13 Error Correcting Code (ECC): A mathematical algorithm yielding check bytes used for the detection and correction of errors.

4.14 flux transition position: That point which exhibits maximum free-space flux density normal to the tape surface.

4.15 flux transition spacing: The distance along a track between successive flux transitions.

4.16 frame: A pair of adjacent tracks with azimuths of opposite polarity, in which the track with the positive azimuth precedes that with the negative azimuth.

4.17 Housekeeping Frame: A frame which contains no user data and which is identified as such by the values in the data fields therein.

4.18 Logical Beginning of Tape (LBOT): The point along the length of the tape where a recording of data for interchange commences.

4.19 magnetic tape: A tape which will accept and retain the magnetic signals intended for input, output and storage purposes on computers and associated equipment.

4.20 Master Standard Amplitude Calibration Tape: A pre-recorded tape on which the standard signal amplitudes have been recorded in the tracks of positive azimuth, 23,0 µm wide, at nominal track pitch, on an a.c.-erased tape.

NOTE 1 - The tape includes recordings made at 83,4 ftpmm, 333,6 ftpmm, 500,4 ftpmm, 1 001 ftpmm and 1 501 ftpmm.

NOTE 2 - The Master Standard Amplitude Calibration Tape has been established by Sony Corporation.

4.21 Master Standard Reference Tape: A tape selected as the standard for Reference Recording Field, Signal Amplitude, Resolution, Overwrite and Signal-to-Noise Ratio.

NOTE - The Master Standard Reference Tape has been established by Sony Corporation.

4.22 Optimum Recording Field: In the plot of Average Signal Amplitude against the recording field at the physical recording density of 3 002 ftpmm, the field that causes the maximum Average Signal Amplitude.

4.23 partition boundary: The point along the length of a magnetic tape at which partition 1 ends and partition 0 commences.

4.24 Physical Beginning of Tape (PBOT): The point where the leader tape is joined to the magnetic tape.

4.25 Physical End of Tape (PEOT): The point where the trailer tape is joined to the magnetic tape.

4.26 physical recording density: The number of recorded flux transitions per unit length of track, expressed in flux transitions per millimetre (ftpmm).

4.27 pre-recording condition: The recording levels above which a tape intended for interchange shall not previously have been recorded.

4.28 record: Related data treated as a unit of information.

4.29 Reference Recording Field: The Optimum Recording Field of the Master Standard Reference Tape.

4.30 Secondary Standard Amplitude Calibration Tape: A tape pre-recorded as defined for the Master Standard Amplitude Calibration Tape; the outputs are known and stated in relation to those of the Master Standard Amplitude Calibration Tape.

NOTE - Secondary Standard Amplitude Calibration Tapes can be ordered from Sony Corporation, Audio Device Business Department, Component Marketing Group, 4-10-18, Takanawa, Minato-ku, Tokyo 108, Japan, under Part Number TY-7000G until the year 2000. It is intended that these be used for calibrating tertiary reference tapes for use in routine calibration.

4.31 Secondary Standard Reference Tape: A tape the performance of which is known and stated in relation to that of the Master Standard Reference Tape.

NOTE - Secondary Standard Reference Tapes can be ordered from Sony Corporation, Major Customer Division, Magnetic Products Group, 6-7-35, Kitashinagawa, Shinagawa-ku, Tokyo 141, Japan, under Part Number RSD 1079 until the year 2000. It is intended that these be used for calibrating tertiary reference tapes for use in routine calibration.

4.32 Separator Mark: A Record containing no user data, which is used to separate data.

4.33 Standard Reference Amplitude: The Average Signal Amplitude from the tracks of positive azimuth of the Master Standard Amplitude Calibration Tape at a specified physical recording density.

4.34 Tape Reference Edge: The bottom edge of the tape when viewing the recording side of the tape, with the PEOT to the observer's right.

4.35 Test Recording Current: The current that produces the Reference Recording Field.

4.36 track: A diagonally positioned area on the tape along which a series of magnetic signals may be recorded.

4.37 Virtual End of Tape (VEOT): The point along the length of the magnetic tape within partition 1 which defines the end of the part of partition 1 which is usable for recording data for interchange.

5 Environment and safety

Unless otherwise stated, the conditions specified below refer to the ambient conditions of the air immediately surrounding the cartridge.

5.1 Testing environment

Unless otherwise stated tests and measurements made on the tape cartridge to check the requirements of this International Standard shall be carried out under the following conditions:

temperature	: 23 °C ± 2 °C
relative humidity	: 40 % to 60 %
conditioning period before testing	: 24 h

5.2 Operating environment

Cartridges used for data interchange shall be capable of operating under the following conditions:

temperature	: 5 °C to 45 °C
relative humidity	: 20 % to 80 %
wet bulb temperature	: 26 °C max.

There shall be no deposit of moisture on or in the cartridge.

Conditioning before operating:

If a cartridge has been exposed during storage and/or transportation to a condition outside the above values, before use the cartridge shall be conditioned in the operating environment for a time at least equal to the period during which it has been out of the operating environment, up to a maximum of 24 h.

NOTE - Rapid variations of temperature should be avoided.

5.3 Storage environment

For long-term or archival storage of cartridges the following conditions shall be observed:

temperature	: 5 °C to 32 °C
relative humidity	: 20 % to 60 %

wet bulb temperature : 26 °C max.

The stray magnetic field at any point on the tape shall not exceed 4 000 A/m. There shall be no deposit of moisture on or in the cartridge.

5.4 Transportation

Recommended limits for the environment to which a cartridge may be subjected during transportation, and the precautions to be taken to minimize the possibility of damage, are provided in annex J.

5.5 Safety

The cartridge and its components shall satisfy the requirements of IEC 950.

5.6 Flammability

The cartridge and its components shall be made from materials, which if ignited from a match flame, do not continue to burn in a still carbon dioxide atmosphere.

Section 2 - Requirements for the case

6 Dimensional and mechanical characteristics of the case

6.1 General

The case of the cartridge shall comprise:

- an upper half,
- a lower half,
- a slider movably mounted on the lower half,
- a lid pivotally mounted on the upper half.

In the drawings, using third angle projection, an embodiment of the cartridge is shown as an example.

Figure 1	is a perspective view of the cartridge seen from top.
Figure 2	is a perspective view of the cartridge seen from bottom.
Figure 3	is a partial view of the rear side.
Figure 4	is a schematic view showing the Reference Planes X, Y and Z.
Figure 5	shows the front side.
Figure 6	shows the top side with the lid in closed position.
Figure 7	shows the left side.
Figure 8	shows the top side with the lid in open position.
Figure 9	shows the left side with the lid in open position.
Figure 10	shows the bottom side with the lid and the slider in closed position.
Figure 11	shows the bottom side with the lid and the slider in open position.
Figure 12	is a view from the top of the inside of the lower half with the upper half removed.
Figure 13	is a view of the bottom half with the lid and the slider in open position.
Figure 14	is a view of the left side with the lid and the slider in open position.
Figure 15	is a top view of a hub.
Figure 16	is a side view of a hub with partial cross-section.
Figure 17	is a partial cross-section through a hub and both halves of the case showing the interface with the drive spindle.
Figure 18	shows at a larger scale the lid in the open position.
Figure 19, 20	show at a larger scale the functional relationship between the lid and the locking mechanism of the hubs.
Figure 21, 22	show the label areas on the top and the rear side.

The dimensions are referred to three orthogonal Reference Planes X, Y and Z (figure 4).