INTERNATIONAL STANDARD

ISO/IEC 23651

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Information technology — 8 mm wide magnetic tape cartridge for information interchange — Helical scan recording — AIT-3 format

Technologies de l'information — Cartouche de bande magnétique de 8 mm *de large pour échange d'informations — Enregistrement par balayage en spirale — Format AIT-3*

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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.

ISO/IEC 23651 was prepared by ECMA (as ECMA-329) 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 — 8 mm wide magnetic tape cartridge for information interchange — Helical scan recording — AIT-3 format

Section 1 - General

1 Scope

This International Standard specifies the physical and magnetic characteristics of an 8 mm wide magnetic tape cartridge containing a memory chip to enable physical interchange of such cartridges between drives. It also specifies the quality of the recorded signals, the recording method and the recorded format - called Advanced Intelligent Tape No. 3 (AIT-3 format) - thereby allowing data interchange between drives by means of such magnetic tape cartridges.

This International Standard specifies two types of cartridge depending on the thickness of the magnetic tape contained in the case.

Information interchange between systems also requires, at a minimum, agreement between the interchange parties upon the interchange code(s) and the specifications of the structure and labelling of the information on the interchanged cartridge.

2 Conformance

2.1 Magnetic tape cartridge

A tape cartridge shall be in conformance with this International Standard if it meets all the mandatory requirements specified herein. The tape requirements shall be satisfied throughout the extent of the tape.

2.2 Generating drive

A drive generating a magnetic tape cartridge for interchange shall be in conformance with this International Standard if all recordings on the tape meet the mandatory requirements of this International Standard, and if either one or both methods of appending and overwriting are implemented. In addition, such a drive shall be able to record the System Log in the AIT Remote Memory In Cartridge (AIT RMIC).

A claim of conformance shall 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 generation of ECC3 Frames.

In addition a claim of conformance shall state

- whether or not one, or more, registered algorithm(s) are implemented within the system and are able to compress data received from the host prior to collecting the data into Basic Groups, and
- the registered identification number(s) of the implemented compression algorithm(s).

2.3 Receiving drive

A drive receiving a magnetic tape cartridge for interchange shall be in 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 read the System Log recorded in the AIT RMIC;
- be able to recognise repeated frames, and to make available to the host, data and Separator Marks from only one of these frames;
- be able to recognise multiple representations of the same Basic Group, and to make available to the host, data and Separator Marks from only one of these representations;
- be able to recognise an ECC3 frame, and ignore it if the system is not capable of using ECC3 check bytes in a process of error correction;
- be able to recognise processed data within an Entity, identify the algorithm used, and make its registered identification number available to the host;
- be able to make processed data available to the host.

In addition a claim of conformance shall state

- whether or not the system is capable of using ECC3 check bytes in a process of error correction;

– whether or not one or more de-compression algorithm(s) are implemented within the system, and are able to be applied to compressed data prior to making such data available to the host;

– the registered identification number(s) of the compression algorithm(s) for which a complementary de-compression algorithm is implemented.

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.

ISO 527 (all parts) — *Plastics — Determination of tensile properties*

ISO 1302:2002 — *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation*

ISO/IEC 11576:1994 — *Information technology — Procedure for the registration of algorithms for the lossless compression of data*

4 Terms and definitions

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

4.1 Absolute Frame Number (AFN)

A sequence number encoded in a Frame.

4.2 a.c. erase

A process of erasure using magnetic fields of decaying intensity.

4.3 Access

A read or write pass over a partition.

4.4 algorithm

A set of rules for transforming the logical representation of data.

4.5 Area ID

An identifier defining the area of the tape and specifying the types of Frame written.

4.6 Automatic Track Finding (ATF)

The method by which tracking is achieved.

4.7 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 20,0 mm of track, exclusive of missing pulses.

4.8 azimuth

The angular deviation made by the mean flux transition line with a line normal to the centreline of the recorded track.

4.9 back surface

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

4.10 byte

An ordered set of bits acted upon as a unit.

4.11 cartridge

A case containing magnetic tape stored on twin hubs.

4.12 Channel bit

The elements by which, after modulation, the binary values ZERO and ONE are represented on tape by different residual magnetism.

4.13 Codeword

A word generated by a compression algorithm. The number of bits in a Codeword is variable, and is not specified by this International Standard.

4.14 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.

4.15 End of Data (EOD)

The point on the tape at the end of the group which contains the last user data.

4.16 Entity

A unit of recorded data, comprising an Entity Header and a Record sequence.

4.17 Error Correcting Code (ECC)

A mathematical computation yielding check bytes used for the detection and correction of errors.

4.18 flux transition position

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

4.19 flux transition spacing

The distance along a track between successive flux transitions.

4.20 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.

4.21 Housekeeping Frame

A Frame which contains no user data and which is identified as such by the setting of the Data Fields therein.

4.22 Logical Beginning of Tape (LBOT)

The point along the length of the tape where a recording of data for interchange commences.

4.23 magnetic tape

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

4.24 Master Standard Amplitude Calibration Tape

A pre-recorded tape on which the standard signal amplitudes have been recorded in the tracks of positive and negative azimuth recorded at a track pitch of 5,5 µm, on an a.c. erased tape.

Note 1 - The tape includes recording at 1 718,2 ftpmm and 3 436,4 ftpmm.

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

4.25 Master Standard Reference Tape

A tape selected as the standard for the Reference Recording Field, Signal Amplitude, Resolution, Overwrite and Signal-to-Noise ratio.

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

4.26 Partition Boundary

The point along the length of a magnetic tape at which a Partition ends and the next Partition commences.

4.27 Physical Beginning of Tape (PBOT)

The point where the leader tape is joined to the magnetic tape.

4.28 Physical End of Tape (PEOT)

The point where the trailer tape is joined to the magnetic tape.

4.29 physical recording density

The number of recorded flux transitions per unit length of track, expressed in flux transitions per millimetre (ftpmm).

4.30 pre-recording condition

The recording levels above which a tape intended for interchange shall not previously have been recorded.

4.31 processing

The use of an algorithm to transform host data into Codewords.

4.32 processed data

A sequence of Codewords which results from the application of processing to data.

4.33 Processed Record

A sequence of Codewords which results from the application of processing to an Unprocessed Record.

4.34 record

Related data treated as a unit of information.

4.35 Reference Field

The Typical Field of the Master Standard Reference Tape.

4.36 Remote Memory In Cartridge (RMIC)

A chip within the case containing information about the cartridge and its recordings that is accessed by radio frequency communication.

4.37 Secondary Standard Amplitude Calibration Tape

A tape pre-recorded as specified for the Master Standard Amplitude Calibration Tape the outputs of which are related to those of the Master Standard Amplitude Calibration Tape by calibration factors.

Note - Secondary Standard Amplitude Calibration Tapes can be ordered under Part No. SSCT-AIT-3 from Sony Corporation, RME Company, Data Media Marketing Div. 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 141, Japan. In principle such Secondary Standard Amplitude Calibration Tapes will be available for a period of 10 years from the publication of the first Edition of this International Standard. However, by agreement between ECMA and Sony Corporation, this period can be shortened or extended to take into account the demand for such Secondary Standard Amplitude Calibration Tapes.

4.38 Secondary Standard Reference Tape

A tape the outputs of which are related to those of the Master Standard Reference Tape by calibration factors.

Note - Secondary Standard Reference Tapes can be ordered under Part No. SSRT-AIT-3 from Sony Corporation, RME Company, Data Media Marketing Div., 6-7-35 Kitashinagawa, Shinagawa-ku, Tokyo 141, Japan. In principle such Secondary Standard Reference Tapes will be available for a period of 10 years from the publication of the first Edition of this International Standard. However, by agreement between ECMA and Sony Corporation, this period can be shortened or extended to take into account the demand for such Secondary Standard Reference Tapes.

It is intended that these be used for calibrating tertiary reference tapes for use in routine calibration.

4.39 Separator Mark

A record containing no user data, which is used to separate data.

4.40 Standard Reference Amplitude (SRA)

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

4.41 Standard Reference Current

The current that produces the Reference Field.

4.42 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.

4.43 Test Recording Current

The current used to record an SRA. It is 1,5 times the Standard Reference Current.

4.44 track

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

4.45 Typical Field

In the plot of Average Signal Amplitude against the recording field at the physical recording density of 3 436,4 ftpmm, the minimum field that causes an Average Signal Amplitude equal to 90 % of the maximum Average Signal Amplitude.

4.46 unprocessed data

Data which has not been subjected to processing.

4.47 Unprocessed Record

A record of unprocessed data, comprising an integral number of bytes.

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. This implies that, for example, 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.

Letters and digits in parentheses represent numbers in hexadecimal notation.

Letters and digits in square parentheses represent numbers in BCD notation.

The setting of a bit is denoted by ZERO or ONE.

Bit patterns and numbers in binary notation are represented by strings of digits 0 and 1. Within such strings, x may be used to indicate that the setting of a bit is not specified within the string.

Bit patterns and numbers in binary notation are shown with the most significant bit to the left and the least significant bit to the right.

The most significant bit of an 8-bit byte is denoted by b_8 and the least significant by b_1.

5.2 Names

The names of basic elements, e.g. specific fields, are given with a capital initial letter.

6 Acronyms

AEWP	After Early Warning Point
AFN	Absolute Frame Number
ATF	Automatic Tracking Finding
BAT	Block Access Table
BCD	Binary Coded Decimal
ECC	Error Correcting Code
EOD	End of Data
EWP	Early Warning Point
GIT	Group Information Table
LBOT	Logical Beginning of Tape
LEOT	Logical End of Tape
LSB	Least Significant Byte
LF-ID	Logical Frame Identifier
MSB	Most Significant Byte
MSRT	Master Standard Reference Tape
PBOT	Physical Beginning of Tape
PEOT	Physical End of Tape
RAW	Read-After-Write
RMIC	Remote Memory In Cartridge
SNR	Signal-to-Noise Ratio
WORM	Write Once Read Many
msb	Most significant bit