

INTERNATIONAL STANDARD

ISO/IEC 11557

First edition
1992-12-15

Information technology — 3,81 mm wide magnetic tape cartridge for information interchange — Helical scan recording — DDS-DC 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
hélicoïdal — Format DDS-DC utilisant des bandes de 60 m et 90 m de
long*



Reference number
ISO/IEC 11557:1992(E)

Contents	Page
Section 1 - General	1
1 Scope	1
2 Normative references	1
3 Conformance	2
3.1 Magnetic tape cartridge	2
3.2 Generating system	2
3.3 Receiving system	2
4 Definitions	3
4.1 Absolute Frame Number	3
4.2 Access Point	3
4.3 algorithm	3
4.4 Automatic Track Finding	3
4.5 Area ID	3
4.6 Average Signal Amplitude	3
4.7 azimuth	3
4.8 back surface	3
4.9 byte	3
4.10 cartridge	3
4.11 Channel Bit	3
4.12 Codeword	3
4.13 Data Format ID	3
4.14 Early Warning Point	3
4.15 End of Data	3
4.16 Entity	3
4.17 Error Correcting Code	4
4.18 flux transition position	4
4.19 flux transition spacing	4
4.20 frame	4
4.21 Housekeeping Frame	4
4.22 Logical Beginning of Tape	4
4.23 magnetic tape	4
4.24 Master Standard Amplitude Calibration Tape	4
4.25 Master Standard Reference Tape	4

4.26	Optimum Recording Field	4
4.27	Partition boundary	4
4.28	Physical Beginning of Tape	4
4.29	Physical End of Tape	4
4.30	physical recording density	4
4.31	pre-recording condition	4
4.32	processing	4
4.33	processed data	4
4.34	Processed Record	5
4.35	Processed Record Sequence	5
4.36	Record	5
4.37	Reference Recording Field	5
4.38	reprocessing	5
4.39	Secondary Standard Amplitude Calibration Tape	5
4.40	Secondary Standard Reference Tape	5
4.41	Separator Mark	5
4.42	Standard Reference Amplitude	5
4.43	Tape Reference Edge	5
4.44	Test Recording Current	5
4.45	track	5
4.46	Unprocessed Data	5
4.47	Unprocessed Record	5
4.48	Virtual End of Tape	5
5	Environment and safety	5
5.1	Testing environment	5
5.2	Operating environment	6
5.3	Storage environment	6
5.4	Transportation	6
5.5	Safety	6
5.6	Flammability	6
Section 2 - Requirements for the case		6
6	Dimensional and mechanical characteristics of the case	6
6.1	General	6
6.2	Overall dimensions (figures 6 and 7)	7
6.3	Loading grip (figure 6)	8
6.4	Holding areas (figure 6)	8
6.5	Notches of the lid (figures 5 and 8)	8
6.6	Lid dimensions (figures 6 to 8)	8
6.7	Optical detection of the beginning and end of tape (figures 9 and 12)	9
6.8	Bottom side (figures 10 and 11)	10
6.8.1	Locking mechanism of the slider	10
6.8.2	Access holes	10
6.8.3	Recognition, sub-datums, and write-inhibit holes	11
6.8.4	Datum holes	12
6.8.5	Access room for tape guides	13
6.8.6	Holes for accessing the hubs	13
6.8.7	Internal structure of the lower half (figure 12)	13

6.8.8	Light path (figure 12)	14
6.8.9	Support Areas (figure 13)	15
6.8.10	Datum Areas (figure 13)	15
6.8.11	Relationship between Support and Datum Areas and Reference Plane Z (figure 14)	15
6.9	Hubs (figures 15 and 16)	15
6.10	Leader and trailer attachment	16
6.11	Interface between the hubs and the drive spindles (figure 17)	16
6.12	Opening of the lid (figure 18)	16
6.13	Release of the hub locking mechanism (figures 19 and 20)	16
6.14	Label areas (figures 21 and 22)	17
Section 3 - Requirements for the unrecorded tape		28
7	Mechanical, physical and dimensional characteristics of the tape	28
7.1	Materials	28
7.2	Tape length	28
7.2.1	Length of magnetic tape	28
7.2.2	Length of leader and trailer tapes	28
7.3	Tape width	28
7.4	Discontinuities	28
7.5	Total thickness	28
7.6	Longitudinal curvature	28
7.7	Cupping	29
7.8	Coating adhesion	29
7.9	Layer-to-layer adhesion	30
7.10	Tensile strength	30
7.10.1	Breaking strength	30
7.10.2	Yield strength	30
7.11	Residual elongation	30
7.12	Electrical resistance of coated surfaces	30
7.13	Light transmittance of the tape	31
8	Magnetic recording characteristics	31
8.1	Optimum Recording Field	32
8.2	Signal Amplitude	32
8.3	Resolution	32
8.4	Overwrite	33
8.4.1	Physical recording densities of 750,6 ftpmm and 3 002 ftpmm	33
8.4.2	Physical recording densities of 83,4 ftpmm and 1 001 ftpmm	33
8.5	Ease of erasure	33
8.6	Tape quality	33
8.6.1	Missing pulses	33
8.6.2	Missing pulse zone	33
8.7	Signal-to-Noise Ratio (S/N) characteristic	34
Section 4 - Requirements for an interchanged tape		34
9	Format	34

9.1	General	34
9.2	Basic Groups	35
9.2.1	Entity	35
9.2.2	Group Information Table	37
9.2.3	Block Access Table (BAT)	39
9.3	Sub-Groups	42
9.3.1	G1 Sub-Group	42
9.3.2	G2 Sub-Group - randomizing	43
9.3.3	G3 Sub-Group	43
9.3.4	G4 Sub-Group	46
9.3.5	Main Data Block	49
9.4	Sub-Data Area	51
9.4.1	Pack item Number 1	51
9.4.2	Pack item Number 2	52
9.4.3	Pack item Number 3	53
9.4.4	Pack item Number 4	54
9.4.5	Pack item Number 5	55
9.4.6	Pack Item Number 6	56
9.4.7	Pack item Number 7	57
9.4.8	Pack item Number 8	58
9.4.9	Sub Data Block	58
10	Method of recording	62
10.1	Physical recording density	62
10.2	Long-term average bit cell length	62
10.3	Short-term average bit cell length	62
10.4	Rate of change	62
10.5	Bit shift	62
10.6	Read Signal Amplitude	62
10.7	Maximum recorded levels	62
11	Track geometry	62
11.1	Track configuration	62
11.2	Average track pitch	63
11.3	Variations of the track pitch	63
11.4	Track width	63
11.5	Track angle	64
11.6	Track edge linearity	64
11.7	Track length	64
11.8	Ideal tape centreline	64
11.9	Azimuth angles	64
12	Recording of blocks on the tape	64
12.1	Recorded Main Data Block	64
12.2	Recorded Sub Data Block	64
12.3	Margin Blocks, Preamble Blocks and Postamble Blocks	64
12.4	Spacer Blocks	64

13	Format of a track	65
13.1	Track capacity	65
13.2	Positioning accuracy	65
13.3	Tracking scheme	65
14	Layout of a Single Data Space tape	68
14.1	Device Area	68
14.2	Reference Area	69
14.3	Position tolerance band No. 1	69
14.4	System Area	69
14.5	Data Area	69
14.5.1	Vendor Group	70
14.5.2	Recorded Data Group	70
14.5.3	ECC3	70
14.5.4	Multiple recorded instances	71
14.5.5	Repeated frames	71
14.5.6	Appending and overwriting	72
14.6	EOD Area	74
14.7	Post-EOD Area	74
14.8	Early Warning Point - EWP	74
14.9	Initialization	74
15	Layout of Partitioned tape	75
15.1	Overall magnetic tape layout	75
15.1.1	Device Area	76
15.1.2	Partition 1	76
15.1.3	Partition 0	77
15.2	Area ID	77
15.3	System Area Pack Items No. 3 and No. 4	77
15.4	Empty partitions	77
15.5	Initialization of Partitioned tapes	77
16	Housekeeping frames	78
16.1	Amble Frames	78
16.2	System Log Frames	78
16.3	Tape Management Frames	78
Annexes		
A	Measurement of the light transmittance of the prisms	79
B	Recognition holes	81
C	Means to open lid	82
D	Measurement of light transmittance of tape and leaders	83
E	Measurement of Signal to Noise Ratio	86
F	Method for determining the Nominal and the Maximum Allowable Recorded Levels	87
G	Representation of 8-Bit bytes by 10-bit patterns	89

H - Measurement of bit shift	95
J - Recommendations for transportation	98
K - Method of measuring track edge linearity	99
L - Read-After-Write	100
M - Example of the content of a Basic Group No. 0	101
N - Registration of algorithms	102

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 JTC1. 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 11557 was prepared by the European Computer Manufacturers Association (as Standard ECMA-150) and was adopted, under a special "fast-track procedure", by Joint Technical Committee ISO/IEC JTC1, *Information technology*, in parallel with its approval by national bodies of ISO and IEC.

Annexes A,D to H and K form an integral part of this International Standard. Annexes B, C, J, L to N 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 Hewlett Packard Limited and the Sony 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

Hewlett-Packard Limited
Computer Peripherals Bristol
Filton Road
Stoke Gifford
Bristol BS12 6QZ
United Kingdom

Sony Corporation
Licensing and Trademark Division
6-7-35 Kitashinagawa
Shinagawa-ku
Tokyo 141
Japan

Introduction

This International Standard ISO/IEC 11557 incorporates all the specifications of ISO/IEC 10777, together with extensions and modifications which specify the additional features of the DDS-DC recorded format. The specifications of the tape, cartridge, recorded signal, recording method and most of the recorded format are identical with those in ISO/IEC 10777.

This International Standard specifies two types of tape cartridge. 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 .

It is not intended that this International Standard replace ISO/IEC 10777. Cartridges and drives which conform to ISO/IEC 10777 may, in addition, conform to this International Standard, but only if they support those features herein which are not in ISO/IEC 10777.

Information technology - 3,81 mm wide magnetic tape cartridge for information interchange - Helical scan recording - DDS-DC 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 signal, the recording method and the recorded format, thereby allowing data interchange between drives by means of such magnetic tape cartridges.

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 is nominally 13 μm thick and has a length of up to 60,5 m.

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

The recorded format, known as Digital Data Storage - Data Compression (DDS-DC), includes all the features of the DDS recorded format specified in ISO/IEC 10777, with additional features which support the recording of data which has been processed, by the generating system, after receipt from the host and prior to recording. Such features are intended for, but are not limited to, the support of one or more data compression Algorithms.

Information interchange between systems by means of this International Standard also requires the use, at a minimum, of a labelling and file structure, an interchange code and a Processing Algorithm 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, the interchange code or the Processing Algorithm.

2 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 Standards are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

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

ISO 1302:...²⁾, *Technical Drawings - Method of indicating surface texture on drawings.*

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

ISO/IEC 11576:...¹⁾, *Information technology - Procedure for the registration of algorithms for the lossless compression of data.*

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

¹⁾ To be published.

²⁾ Currently under revision.