

# INTERNATIONAL STANDARD

# ISO/IEC 15731

First edition  
1998-05-15

---

---

## **Information technology — 12,65 mm wide magnetic tape cassette for information interchange — Helical scan recording — DTF-1 format**

*Technologies de l'information — Cassette de bande magnétique de  
12,65 mm de large pour l'échange d'information — Enregistrement par  
balayage en spirale — Format DTF-1*



## Contents

<b>Section 1 - General</b>	<b>1</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Conformance</b>	<b>1</b>
2.1 Magnetic tape cassette	1
2.2 Generating system	1
2.3 Receiving system	1
<b>3 Normative references</b>	<b>1</b>
<b>4 Definitions</b>	<b>2</b>
4.1 Absolute block number	2
4.2 a.c. erase	2
4.3 algorithm	2
4.4 Append file	2
4.5 Append volume	2
4.6 Average Signal Amplitude (ASA)	2
4.7 azimuth	2
4.8 back surface	2
4.9 bit cell	2
4.10 block	2
4.11 Block Management Table (BMT)	2
4.12 byte	2
4.13 cassette	2
4.14 compressed data	2
4.15 Control Track	2
4.16 flux transition position	2
4.17 flux transition spacing	2
4.18 Logical track set ID	2
4.19 Logical volume	2
4.20 magnetic tape	2
4.21 Master Standard Reference Tape (MSRT)	2
4.22 physical recording density	2

© ISO/IEC 1998

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 the publisher.

ISO/IEC Copyright Office • Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

4.23 Reference Field (RF)	2
4.24 Secondary Standard Reference Tape (SSRT)	2
4.25 Standard Reference Amplitude (SRA)	2
4.26 Standard Reference Current (Ir)	3
4.27 Tape Reference Edge	3
4.28 Test Recording Current (TRC)	3
4.29 track	3
4.30 track angle	3
4.31 Track Set	3
4.32 Typical Field (TF)	3
4.33 Unique Identifier (UID)	3
4.34 word	3
<b>5 Conventions and notations</b>	<b>3</b>
5.1 Representation of numbers	3
5.2 Names	3
<b>6 Acronyms</b>	<b>3</b>
<b>7 Environment and safety</b>	<b>4</b>
7.1 Testing environment	4
7.2 Operating environment	4
7.3 Storage environment	4
7.4 Transportation	5
7.5 Safety	5
7.6 Flammability	5
<b>Section 2 - Requirements for the case</b>	<b>5</b>
<b>8 Dimensional and mechanical characteristics of the case</b>	<b>5</b>
8.1 General	5
8.2 Type S cassette	5
8.2.1 Overall dimensions	6
8.2.2 Holding areas	6
8.2.3 Window	6
8.2.4 Label areas	6
8.2.5 Datum areas and datum holes	7
8.2.6 Support areas	7
8.2.7 Guiding grooves	8
8.2.8 Recognition holes	9
8.2.9 Write-inhibit plug	10
8.2.10 Pre-positioning surface	11
8.2.11 Cassette lid	11
8.2.12 Cassette reel lock	12
8.2.13 Reel access holes	12
8.2.14 Reels	12
8.2.15 Position of the tape in the case	13
8.2.16 Tape path zone	14

8.2.17	Tape access cavity	14
8.3	Type L cassette	29
8.3.1	Overall dimensions	29
8.3.2	Holding areas	29
8.3.3	Window	30
8.3.4	Label areas	30
8.3.5	Datum areas and datum holes	30
8.3.6	Support areas	30
8.3.7	Guiding grooves	31
8.3.8	Recognition holes	32
8.3.9	Write-inhibit plug	33
8.3.10	Pre-positioning surface	34
8.3.11	Cassette lid	34
8.3.12	Cassette reel lock	35
8.3.13	Reel access holes	35
8.3.14	Reels	36
8.3.15	Position of the tape in the case	36
8.3.16	Tape path zone	37
8.3.17	Tape access cavity	38
8.3.18	Cavity for compatibility with Type S cassette	38
<b>Section 3 - Requirements for the unrecorded tape</b>		<b>53</b>
<b>9 Mechanical, physical and dimensional characteristics of the tape</b>		<b>53</b>
9.1	Materials	53
9.2	Tape length	54
9.3	Tape widths	54
9.4	Width and position of splicing tape	54
9.5	Discontinuity	54
9.6	Tape thickness	54
9.7	Longitudinal curvature	54
9.8	Out-of-plane distortions	54
9.9	Coating adhesion	55
9.10	Layer-to-layer adhesion	55
9.11	Tensile strength	55
9.11.1	Breaking strength	55
9.11.2	Yield strength	55
9.11.3	Strength of Splice	56
9.12	Residual elongation	56
9.13	Electrical resistance of the coated surfaces	56
9.14	Tape wind	56
<b>10 Magnetic recording characteristics</b>		<b>56</b>
10.1	Typical Field TF1	57
10.2	Average Signal Amplitude(ASA)	57
10.3	Resolution	57
10.4	Signal-to-noise ratio (S/N)	57

10.5 Ease of erasure	57
10.6 Tape quality	57
10.6.1 Missing pulses	57
10.6.2 Missing pulse zone	58
10.7 Inhibitor tape	58
<b>Section 4 - Requirements for an interchanged tape</b>	<b>59</b>
<b>11 Format for helical tracks</b>	<b>59</b>
11.1 General description of the write data path	59
11.2 Formation of a Logical Track Set	59
11.2.1 Types of information track sets	59
11.2.2 Generation of a Logical Track Set	61
11.2.3 Subcode data field	63
11.2.4 BMT	64
11.2.5 Data and information field definitions	65
11.3 Track Set information	69
11.3.1 Loading the Product Code Arrays	69
11.4 Product code array processing	71
11.4.1 Error correction method	71
11.4.2 Error correction coding for C1 Parity	71
11.5 Track assignments	73
11.5.1 Sectors	73
11.5.2 Sync Blocks	73
11.5.3 Track interleave	74
11.5.4 Track Sync Blocks	75
11.5.5 Byte interleave across Sync Blocks	76
11.5.6 Randomization	76
11.6 Formation of the contents of a helical track	77
11.6.1 Sector details (figure 50)	77
11.7 Channel bit coding (annex B)	79
11.7.1 General	79
11.7.2 Interleaved-NRZ1	79
<b>12 Track geometry</b>	<b>79</b>
12.1 General	79
12.2 Helically recorded tracks	79
12.2.1 Location of the tracks	79
12.2.2 Track width	80
12.2.3 Track angle	80
12.2.4 Track pitch	80
12.2.5 Location of elements in the helical track	81
12.2.6 Location of the Data Area Reference Point	81
12.2.7 Straightness of tracks	81
12.2.8 Azimuth angles	81
12.2.9 Tracking Pilot Signal (TPS)	81

12.2.10 Amplitude of servo signals	81
12.3 Longitudinal tracks geometry	81
12.3.1 Control Track	81
12.3.2 Time Code Track signals recording position	82
<b>13 Method of recording helical tracks</b>	<b>82</b>
13.1 Physical recording density	82
13.2 Record current optimization	82
13.3 Efficiency of erasure	82
<b>14 Method of recording longitudinal tracks</b>	<b>82</b>
14.1 Overview	82
14.2 Control Track	82
14.2.1 Signal	82
14.2.2 Polarity of magnetisation (figure 53)	82
14.2.3 Alignment	82
14.2.4 Read signal amplitude	83
14.2.5 Quality of the Control Track	83
14.3 Time Code Track	83
14.3.1 Method of recording the Time Code Track	83
14.3.2 Physical recording density	83
14.3.3 Bit shift	83
14.3.4 Read signal amplitude	84
14.3.5 Quality of the Time Code Track	84
14.4 Format for the Time Code Track	84
14.4.1 Count bits	84
14.4.2 Phase bit	84
14.4.3 Synchronizing pattern	84
14.4.4 Supplemental Data	84
14.4.5 Extent of Time Code	84
<b>Section 5 - Requirements for recorded information</b>	<b>84</b>
<b>15 Recorded information</b>	<b>84</b>
15.1 Recording area (figure 54)	84
15.2 Magnetic tape layout (figure 55)	85
15.2.1 Valid data areas	85
15.2.2 Invalid data areas	85
15.3 Physical TSID	85
15.3.1 Structure surrounding the VSIT area	87
15.3.2 Structure of the DIT area	87
15.3.3 Structure of the User Data Area	88
<b>Section 6 - Write operations</b>	<b>89</b>
<b>16 Write retry sequence</b>	<b>89</b>

<b>17 Append file operation</b>	<b>89</b>
17.1 Append volume	89
17.2 Append write	90
17.3 Overwrite	90
17.4 File extension	91
<b>Annexes</b>	
<b>A - Measurement of Signal-to-Noise Ratio</b>	<b>93</b>
<b>B - Representation 8/9 coding patterns</b>	<b>94</b>
<b>C - Recommendations for Transportation</b>	<b>98</b>
<b>D - Inhibitor Tape</b>	<b>99</b>

## 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. 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 15731 was prepared by ECMA (as Standard ECMA-248) 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, and B form an integral part of this International Standard. Annexes C and D are for information only.

ISO and IEC draw attention to the fact that it is claimed that compliance with this International Standard may involve the use of patents concerning the Master Standard Reference Tape and Secondary Standard Reference Tape given in clause 4.

ISO and IEC take no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured ISO and IEC that he is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO and IEC. Information may be obtained from:

Sony Corporation  
Contracts and Licensing Division  
Tokyo international  
P.O. Box 5100 Tokyo  
100-31 Japan

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights other than those identified above. ISO and IEC shall not be held responsible for identifying any or all such patent rights.



# Information technology — 12,65 mm wide magnetic tape cassette for information interchange — Helical scan recording — DTF-1 format

## Section 1 - General

### 1 Scope

This International Standard specifies the physical and magnetic characteristics of magnetic tape cassettes, using magnetic tape 12,65 mm wide so as to provide physical interchange of such cassettes between drives. It also specifies the quality of the recorded signals, the recording method and the recorded format, called Digital Tape Format-1 (DTF-1), thereby allowing data interchange between drives by means of such cassettes. The format supports variable length Logical Records, high speed search, and the use of a registered algorithm for data compression.

This International Standard specifies two sizes of cassette. For the purposes of this International Standard the larger cassette is referred to as Type L, and the smaller as Type S.

Together with a standard for volume and file structure, e.g. ISO 1001, this International Standard provides for full data interchange between data processing systems.

### 2 Conformance

#### 2.1 Magnetic tape cassette

A claim of conformance with this International Standard shall specify the Type of cassette. It shall be in conformance with this International Standard if

- the case meets all the requirements of clause 4 and clauses 6 to 10 for that Type
- the recording on the tape meets the requirements of clauses 11 to 17

#### 2.2 Generating system

A claim of conformance with this International Standard shall specify which Type(s) of cassette is (are) supported. A system generating a magnetic tape cassette for interchange shall be in conformance with this International Standard if all the recordings that it makes, meet the mandatory requirements of this International Standard. A claim of conformance with this International Standard shall state whether or not one, or more, registered algorithm(s) is (are) implemented and, if so, the registered number(s) of (all) the implemented algorithm(s).

#### 2.3 Receiving system

A claim of conformance with this International Standard shall specify which Type(s) of cassette is (are) supported. A system receiving a magnetic tape cassette 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, and a claim of conformance shall state whether or not one, or more, registered algorithm(s) is (are) implemented and, if so, the registered number(s) of (all) the implemented algorithm(s).

### 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 indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 527 (all parts),	<i>Plastics — Determination of tensile properties.</i>
ISO 1001:1986,	<i>Information processing — File structure and labelling of magnetic tapes for information interchange.</i>
ISO/IEC 11576:1994,	<i>Information technology — Procedure for the registration of algorithms for the lossless compression of data.</i>
IEC 950:1991,	<i>Safety of information technology equipment.</i>
JIS-B-7502,	<i>Characteristics of plastic goods.</i>
SMPTE timecode:	(C98.12 : time and control code for video and audio tape for 525/60 television system).