

# INTERNATIONAL STANDARD

# ISO/IEC 17913

First edition  
2000-06-15

---

---

## Information technology — 12,7 mm 128-track magnetic tape cartridge for information interchange — Parallel serpentine format

*Technologies de l'information — Cartouches de bande magnétique de  
12,7 mm, 128 pistes pour l'échange d'information — Format serpentant  
parallèle*

---

---

Reference number  
ISO/IEC 17913:2000(E)



**PDF disclaimer**

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

© ISO/IEC 2000

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 either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 734 10 79  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
Web [www.iso.ch](http://www.iso.ch)

Printed in Switzerland

<b>Contents</b>		Page
<b>Section 1 - General</b>		<b>1</b>
<b>1</b>	Scope	<b>1</b>
<b>2</b>	Conformance	<b>1</b>
<b>2.1</b>	Magnetic tape cartridge	<b>1</b>
<b>2.2</b>	Generating system	<b>1</b>
<b>2.3</b>	Receiving system	<b>1</b>
<b>3</b>	Normative references	<b>1</b>
<b>4</b>	Definitions	<b>1</b>
<b>4.1</b>	algorithm	<b>1</b>
<b>4.2</b>	anhysteretic erase	<b>1</b>
<b>4.3</b>	average signal amplitude	<b>2</b>
<b>4.4</b>	azimuth	<b>2</b>
<b>4.5</b>	back surface	<b>2</b>
<b>4.6</b>	beginning of partition (BOP)	<b>2</b>
<b>4.7</b>	beginning of tape (BOT)	<b>2</b>
<b>4.8</b>	cartridge	<b>2</b>
<b>4.9</b>	cyclic redundancy check (CRC) character	<b>2</b>
<b>4.10</b>	end of tape (EOT)	<b>2</b>
<b>4.11</b>	error-correcting code (ECC)	<b>2</b>
<b>4.12</b>	error-detecting code (EDC)	<b>2</b>
<b>4.13</b>	File Mark	<b>2</b>
<b>4.14</b>	flux transition position	<b>2</b>
<b>4.15</b>	flux transition spacing	<b>2</b>
<b>4.16</b>	half-wrap	<b>2</b>
<b>4.17</b>	logical block	<b>2</b>
<b>4.18</b>	logical forward	<b>2</b>
<b>4.19</b>	logical reverse	<b>2</b>
<b>4.20</b>	magnetic tape	<b>2</b>
<b>4.21</b>	mark tach count	<b>2</b>
<b>4.22</b>	Master Standard Reference Tape	<b>2</b>
<b>4.23</b>	physical recording density	<b>2</b>
<b>4.24</b>	pre-record condition	<b>2</b>
<b>4.25</b>	recorded element	<b>2</b>
<b>4.26</b>	Reference Field	<b>2</b>
<b>4.27</b>	resync character	<b>2</b>
<b>4.28</b>	SDM set	<b>2</b>
<b>4.29</b>	Secondary Standard Reference Tape (SSRT)	<b>2</b>
<b>4.30</b>	servo track	<b>3</b>
<b>4.31</b>	Standard Reference Amplitude (SRA)	<b>3</b>
<b>4.32</b>	Standard Reference Current ( $I_r$ )	<b>3</b>
<b>4.33</b>	Test Recording Current ( $I_m$ )	<b>3</b>
<b>4.34</b>	track	<b>3</b>
<b>4.35</b>	track group	<b>3</b>
<b>4.36</b>	trailer	<b>3</b>
<b>4.37</b>	Typical Field	<b>3</b>
<b>4.38</b>	write equalisation	<b>3</b>

5	Conventions and notations	3
5.1	Representation of numbers	3
5.2	Dimensions	3
5.3	Names	3
5.4	Acronyms	3
6	Environment and safety	4
6.1	Cartridge and tape testing environment	4
6.2	Cartridge operating environment	4
6.3	Cartridge storage environment	4
6.4	Safety	5
6.4.1	Safeness	5
6.4.2	Flammability	5
6.5	Transportation	5
<b>Section 2 - Requirements for the unrecorded tape</b>		<b>5</b>
7	Mechanical and electrical requirements	5
7.1	Material	5
7.2	Tape length	5
7.3	Width	5
7.4	Total thickness	5
7.5	Base material thickness	5
7.6	Discontinuity	5
7.7	Longitudinal curvature	5
7.7.1	Requirement	5
7.7.2	Procedure	5
7.8	Out-of-Plane distortions	5
7.9	Cupping	6
7.9.1	Requirement	6
7.9.2	Procedure	6
7.10	Coefficient of dynamic friction	6
7.10.1	Requirements	6
7.10.2	Procedure	6
7.11	Coating adhesion	7
7.12	Layer-to-layer adhesion	7
7.12.1	Requirements	7
7.12.2	Procedure	7
7.13	Electrical resistance	8
7.13.1	Requirement	8
7.13.2	Procedure	8
7.14	Abrasivity	9
7.15	Friction characteristics after stress	9
7.15.1	Requirements	9
7.15.2	Procedure	9
7.16	Surface roughness	9
7.16.1	Requirement	9
7.16.2	Procedure	9
7.17	Inhibitor tape	10

<b>8</b>	Magnetic recording characteristics	<b>10</b>
<b>8.1</b>	Typical Field	<b>10</b>
<b>8.2</b>	Signal amplitude	<b>10</b>
<b>8.3</b>	Resolution	<b>10</b>
<b>8.4</b>	Broad-band signal-to-noise ratio (BBSNR)	<b>10</b>
<b>8.4.1</b>	Requirement	<b>10</b>
<b>8.4.2</b>	Procedure	<b>10</b>
<b>9</b>	Tape quality	<b>11</b>
<b>9.1</b>	Missing pulse	<b>11</b>
<b>9.1.1</b>	Requirement	<b>11</b>
<b>9.1.2</b>	Procedure	<b>11</b>
<b>9.2</b>	Coincident missing pulse	<b>11</b>
<b>9.2.1</b>	Requirement	<b>11</b>
<b>9.2.2</b>	Procedure	<b>11</b>
<b>9.3</b>	Missing pulse density	<b>12</b>
<b>9.3.1</b>	Requirement	<b>12</b>
<b>9.3.2</b>	Procedure	<b>12</b>
<b>9.4</b>	Tape durability	<b>12</b>
<b>Section 3 - Mechanical specifications of the tape cartridge</b>		<b>12</b>
<b>10</b>	General	<b>12</b>
<b>10.1</b>	Overall dimensions	<b>13</b>
<b>10.2</b>	Write-inhibit mechanism	<b>13</b>
<b>10.3</b>	Label areas of the rear side	<b>13</b>
<b>10.4</b>	Label area on the top side	<b>14</b>
<b>10.5</b>	Case opening	<b>14</b>
<b>10.6</b>	Locating notches	<b>14</b>
<b>10.7</b>	Locating areas	<b>15</b>
<b>10.8</b>	Inside configuration of the case around the case opening	<b>15</b>
<b>10.9</b>	Other external dimensions of the case	<b>15</b>
<b>10.10</b>	Central window	<b>15</b>
<b>10.11</b>	Stacking ribs	<b>16</b>
<b>10.12</b>	Recessed area	<b>16</b>
<b>10.13</b>	Flexibility of the case	<b>16</b>
<b>10.13.1</b>	Requirements	<b>16</b>
<b>10.13.2</b>	Procedure	<b>17</b>
<b>10.14</b>	Tape reel	<b>17</b>
<b>10.14.1</b>	Locking mechanism	<b>17</b>
<b>10.14.2</b>	Axis of rotation of the reel	<b>17</b>
<b>10.14.3</b>	Metallic insert	<b>17</b>
<b>10.14.4</b>	Toothed rim	<b>17</b>
<b>10.14.5</b>	Hub of the reel	<b>18</b>
<b>10.14.6</b>	Relative positions	<b>18</b>
<b>10.14.7</b>	Characteristics of the toothed rim	<b>19</b>
<b>10.15</b>	Leader block	<b>19</b>
<b>10.16</b>	Attachment of the tape to the leader block	<b>20</b>
<b>10.17</b>	Latching mechanism	<b>20</b>
<b>10.18</b>	Tape wind	<b>20</b>
<b>10.19</b>	Wind tension	<b>20</b>
<b>10.20</b>	Circumference of the tape reel	<b>20</b>
<b>10.21</b>	Moment of inertia	<b>21</b>
<b>10.22</b>	Material	<b>21</b>

10.23	Cartridge identification notches	21
10.24	Finger slot	21
<b>Section 4 - Requirements for an interchanged tape</b>		<b>31</b>
11	Method of recording	31
11.1	Physical recording density	31
11.2	Bit cell length	31
11.3	Average bit cell length	31
11.3.1	Long-term average RLL bit cell length	31
11.3.2	Short-term average RLL bit cell length	31
11.4	Rate of change of the short-term average RLL bit cell length	31
11.5	Bit shift	31
11.6	Total character skew	31
11.7	Missing zero-crossing zones	32
11.8	Coincident missing zero-crossing zones	32
12	Servo tracks	32
12.1	Locations of the servo tracks	32
12.2	Physical width of the servo tracks	33
12.3	Format of the servo tracks	33
12.4	Servo requirements	34
12.4.1	Servo amplitude	34
12.4.2	Servo azimuth	34
12.4.3	Servo errors	34
12.4.4	Servo edge spacing	35
12.5	Procedure	35
13	Data track format	35
13.1	Number of data tracks	35
13.2	Track positions	35
13.3	Track width	37
13.4	Data azimuth	37
13.5	Half-wraps	37
14	Tape format	37
14.1	General	37
14.2	Recording area	37
14.3	Tach count	39
14.4	Physical blocks	39
14.5	Servo acquisition region	40
14.6	Volume control region	40
14.7	Data region	40
14.8	Data entities	40
15	Packet format	42
15.1	Packet header	43
15.2	Packet data	45
15.3	Packet trailer	45
16	Device blocks	45
16.1	Data device blocks	45
16.2	Mark device blocks	45
16.3	File Mark	45
16.4	Void mark	46
16.5	Beginning of half-wrap mark	46
16.6	End of half-wrap mark	46
16.7	BOP mark	46

<b>16.8</b>	EOD mark	<b>46</b>
<b>16.9</b>	SDM mark	<b>46</b>
<b>16.10</b>	FID mark	<b>47</b>
<b>16.11</b>	DBM mark	<b>48</b>
<b>16.11.1</b>	DBM general information packet	<b>48</b>
<b>16.11.2</b>	DBM wrap region packet	<b>49</b>
<b>16.11.3</b>	DBM partitions packet	<b>49</b>
<b>16.11.4</b>	DBM servo demark packet	<b>50</b>
<b>16.11.5</b>	DBM File Mark packet	<b>50</b>
<b>16.12</b>	SARS mark	<b>51</b>
<b>16.13</b>	DBM checked out mark	<b>51</b>
<b>16.14</b>	DBM valid mark	<b>51</b>
<b>17</b>	Device block format	<b>51</b>
<b>17.1</b>	Device block header	<b>51</b>
<b>17.1.1</b>	Device block control	<b>52</b>
<b>17.1.2</b>	Device block sequence control	<b>54</b>
<b>17.1.3</b>	Vendor identification code	<b>54</b>
<b>17.2</b>	Device block data	<b>54</b>
<b>17.3</b>	Device block trailer	<b>54</b>
<b>18</b>	ECC	<b>54</b>
<b>18.1</b>	CRC	<b>54</b>
<b>18.2</b>	Code block	<b>55</b>
<b>18.3</b>	ECC encoded code block	<b>55</b>
<b>18.4</b>	Codeword correction code generation	<b>56</b>
<b>18.5</b>	MIE pointer code generation	<b>57</b>
<b>18.6</b>	ECC encoded interleave unit	<b>57</b>
<b>18.7</b>	Short error correction code generation	<b>57</b>
<b>19</b>	Recording of bytes on tape	<b>59</b>
<b>19.1</b>	Synchronisation format	<b>59</b>
<b>19.2</b>	Interblock gap formatting	<b>62</b>
<b>19.3</b>	RLL byte translation	<b>63</b>
<b>19.4</b>	Write equalisation bit translation	<b>63</b>
<b>19.5</b>	Writing bits on tape	<b>63</b>
<b>Annexes</b>		
<b>A</b>	Tape abrasivity measurement procedure	<b>64</b>
<b>B</b>	Media type label	<b>66</b>
<b>C</b>	Measurement of bit shift	<b>70</b>
<b>D</b>	Vendor Identification Code	<b>72</b>
<b>E</b>	Recommendations for transportation	<b>73</b>
<b>F</b>	Inhibitor tape	<b>74</b>
<b>G</b>	Tape durability	<b>75</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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

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

International Standard ISO/IEC 117913 was prepared by ECMA (as ECMA-278) 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, B, C and D form a normative part of this International Standard. Annexes E to G are for information only.



# Information technology — 12,7 mm 128-track magnetic tape cartridge for information interchange — Parallel serpentine format

## Section 1 - General

### 1 Scope

This International Standard specifies the physical and magnetic characteristics of a magnetic tape cartridge, using a magnetic tape 12,7 mm wide, so as to provide physical interchange of such cartridges between drives. It also specifies the quality of the recorded signals, the recording method and the recorded format known as Parallel Serpentine, thereby allowing data interchange between drives by means of such cartridges. The format supports variable length Logical Records, high speed search, and the use of the algorithm for data compression specified in International Standard ISO/IEC 15200.

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

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

### 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 system

A generating system shall be in conformance with this International Standard if it generates a tape according to 2.1.

#### 2.3 Receiving system

A receiving system shall be in conformance with this International Standard if it can read all tapes according to 2.1.

### 3 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 1001: 1986, *Information processing — File structure and labelling of magnetic tapes for information interchange*.

IEC 60950:1999, *Safety of information technology equipment*.

ISO/IEC 15200:1996, *Information technology— Adaptive Lossless Data Compression algorithm (ALDC)*.

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

ISO/IEC 646:1991, *Information technology — ISO 7-bit coded character set for information interchange*.

ISO 683-13:1986, *Heat-treatable steels, alloy steels and free-cutting steels — Part 13: Wrought stainless steels*.

ANSI MH10.8M-1993, *Materials Handling — Unit Loads and Transport Packages — Bar Code Symbols*.