

Implementation of
ISO/IEC 11319:1993

Information technology — 8 mm wide magnetic tape cartridge for information interchange — Helical scan recording

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- ICI Imagedata
- Institution of Electrical Engineers
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National foreword

This British Standard reproduces verbatim ISO/IEC 11319:1993 and implements it as the UK national standard.

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- aid enquirers to understand the text;
- present to the responsible international committee any enquiries on interpretation, or proposals for change, and keep UK interests informed;
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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the ISO/IEC title page, pages ii to viii, pages 1 to 53 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

**Information technology — 8 mm wide
magnetic tape cartridge for information
interchange — Helical scan recording**

*Technologies de l'information — Cartouche pour bande magnétique de
8 mm de large pour l'échange d'information — Enregistrement par
balayage hélicoïdal*



Reference number
ISO/IEC 11319:1993(E)

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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. 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 11319 was prepared by the European Computer Manufacturers Association (as Standard ECMA-145) and was adopted, under a special “fast-track procedure”, by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Sub-Committee 11, *Flexible magnetic media for digital data interchange*, in parallel with its approval by national bodies of ISO and IEC.

Annex A, Annex B and Annex C form an integral part of this International Standard. Annex D and Annex E are for information only.

Section 1. General

1 Scope

This International Standard specifies the physical and magnetic characteristics of an 8 mm wide magnetic tape cartridge to enable interchangeability of such cartridges. It also provides a format and recording method, thus allowing, together with ISO 1001 for Magnetic Tape Labelling, full data interchange by means of such magnetic tape cartridges.

2 Conformance

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

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

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

ISO 1302:1978, *Technical drawings — Method of indicating surface texture on drawings*.

IEC 950:1990, *Safety of Information Technology Equipment, including Electrical Business Equipment*.

4 Definitions

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

4.1

AC erase

a process of erasure utilizing alternating fields of decaying level

4.2

average signal amplitude

the average peak-to-peak value of the signal output of the read head measured over a minimum of 1,40 mm, exclusive of missing pulses

4.3

azimuth

the angular deviation, in degrees of arc, of the recorded flux transitions on a track from the line normal to the track centreline

4.4

back surface

the surface of the tape opposite to the magnetic coating used to record data

4.5

bit cell

a distance along the track allocated for the recording of a Channel bit

4.6

byte

an ordered set of bits acted upon as a unit

4.7

cartridge

a case containing magnetic tape stored on twin reels

4.8

cyclic redundancy check (CRC) character

a character used for error detection

4.9

error correcting code (ECC)

a mathematical procedure yielding bytes used for the detection and correction of errors

4.10

flux transition position

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

4.11

flux transition spacing

the distance along a track between successive flux transitions

4.12

magnetic tape

a tape that accepts and retains magnetic signals intended for input, output, and storage of data for information processing

4.13

master standard reference tape

a tape selected as the standard for amplitude, Typical Field and Resolution

NOTE 1 The Master Standard Reference Tape has been established by the SONY Corporation.

4.14

physical beginning of tape (PBOT)

the transition from the tape leader to the opaque area of the splice by which the translucent leader tape is joined to the magnetic tape

4.15

physical end of tape (PEOT)

the transition from the opaque area of the splice to the translucent trailer tape

4.16

physical recording density

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

4.17

secondary reference amplitude

the Average Signal Amplitude from the Secondary Standard Reference Tape when it is recorded with the Test Recording Current at 2 126 ftpmm

4.18

secondary reference field

the Typical Field of the Secondary Standard Reference Tape

4.19

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 2 Secondary Standard Reference Tapes can be ordered under the Part Number RSE-5001, until the year 2001, from the Sony Corporation, Magnetic Product Group, Data Media Sales Division, 6-7-35 Kitashinagawa, Shinagawa-ku, TOKYO 141, Japan. It is intended that these be used for calibrating tertiary reference tapes for use in routine calibration.

4.20

standard reference current (Ir)

the current that produces the Secondary Reference Field

4.21**tape reference edge**

the lower edge of the tape when the magnetic coating is facing the observer and the supply reel is to the observer's right

4.22**test recording current**

the current that is 1,5 times the Standard Reference Current

4.23**tone**

a signal recorded at 98 ftpmm

4.24**track**

a diagonally positioned area on the tape along which a series of magnetic transitions may be recorded

4.25**typical field**

in the plot of the Average Signal Amplitude against the recording field at the physical recording density of 2 126 ftpmm, the minimum field that causes an Average Signal Amplitude equal to 90 % of the maximum Average Signal Amplitude

5 Environment and safety

The conditions specified below refer to ambient conditions immediately surrounding the cartridge. Cartridges exposed to environments outside these limits may still be able to function usefully; however, such exposure may cause permanent damage.

5.1 Testing environment

Unless otherwise specified, tests and measurements made on the 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 3 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 D.

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 consist of

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

In the drawings, an embodiment of the cartridge is shown as an example.

- | | |
|-----------|--|
| Figure 1 | is a perspective view of the cartridge seen from the top. |
| Figure 2 | is a perspective view of the cartridge seen from the bottom. |
| Figure 3 | shows the top side with the lid closed using third angle projection. |
| Figure 4 | shows the bottom side, datum and support areas. |
| Figure 5 | shows the bottom side with the lid removed. |
| Figure 6 | shows the enlarged view of the datum and recognition holes. |
| Figure 7 | shows the cross-sections through the light path holes, the recognition holes and the write-inhibit hole. |
| Figure 8 | shows details of the lid when closed, rotating and open. |
| Figure 9 | shows the details of the lid release insertion channel. |
| Figure 10 | shows the lid lock release requirements. |
| Figure 11 | shows the reel lock release requirements. |
| Figure 12 | shows the reel unlock force direction. |
| Figure 13 | shows the lid release force direction. |
| Figure 14 | shows the lid opening force direction. |
| Figure 15 | shows the light path and light window. |
| Figure 16 | shows the internal tape path and light path. |
| Figure 17 | shows the cartridge reel and a cross-section view of the cartridge reel. |
| Figure 18 | shows the cross-section view of the cartridge reel interface with the drive spindle. |
| Figure 19 | shows the tape access cavity clearance requirements. |

The dimensions are referred to three orthogonal Reference Planes X, Y and Z.

6.2 Overall dimension (Figure 3)

The overall dimensions of the case with the lid in the closed position shall be

$$\begin{aligned}L_1 &= 62,5 \text{ mm} \pm 0,3 \text{ mm} \\L_2 &= 95,0 \text{ mm} \pm 0,2 \text{ mm} \\L_3 &= 15,0 \text{ mm} \pm 0,2 \text{ mm}\end{aligned}$$

The distance from the rear side to plane X shall be

$$L_4 = 47,35 \text{ mm} \pm 0,15 \text{ mm}$$

The distance from the right side to plane Y shall be

$$L_5 = 13,0 \text{ mm} \pm 0,1 \text{ mm}$$

6.3 Holding areas

The holding areas, shown hatched in Figure 3, shall be the areas along which the cartridge shall be held down when inserted in the drive. Their position and dimensions shall be

$$L_6 = 12,0 \text{ mm max.}$$

$$L_7 = 3,0 \text{ mm min.}$$

6.4 Cartridge insertion

The cartridge shall have asymmetrical features to prevent insertion in the drive in other than the correct orientation. These consist of a channel, a recess and an incline.

The channel (Figure 3 and Figure 9) shall provide for an unobstructed path, when the lid is closed and locked, to unlock the lid. The dimensions shall be

$$L_8 = 79,7 \text{ mm} \pm 0,2 \text{ mm}$$

$$L_9 = 1,0 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{10} = 0,7 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{11} = 1,0 \text{ mm min.}$$

$$L_{12} = 1,2 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{13} = 0,8 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{14} = 1,2 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{15} = 0,5 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{16} = 1,5 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{17} = 1,0 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{18} = 3,8 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{19} = 0,2 \text{ mm} \pm 0,2 \text{ mm}$$

$$L_{20} = 2,3 \text{ mm min.}$$

$$L_{21} = 2,5 \text{ mm} \pm 0,2 \text{ mm}$$

The recess dimensions (Figure 3 and Figure 5) shall be

$$L_{22} = 7,5 \text{ mm max.}$$

$$L_{23} = 11,0 \text{ mm} \pm 0,2 \text{ mm}$$

$$L_{24} = 1,5 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{25} = 1,5 \text{ mm} \pm 0,1 \text{ mm}$$

The incline (Figure 8) is part of the lid structure and the dimensions shall be

$$L_{26} = 7,7 \text{ mm} \begin{matrix} + 0,0 \\ - 2,5 \end{matrix} \text{ mm}$$

$$L_{27} = 0,55 \text{ mm} \begin{matrix} + 0,05 \\ - 0,10 \end{matrix} \text{ mm}$$

$$A_1 = 17,5^\circ \pm 4,0^\circ$$

6.5 Window (Figure 1)

A window may be provided on the top side so that a part of the reel is visible. The window, if provided, shall not extend beyond the height of the cartridge.

6.6 Loading grips (Figure 3)

The cartridge shall have loading grips for automatic loading into a drive.

The dimensions and positions of the loading grips shall be

$$L_{28} = 39,35 \text{ mm} \pm 0,20 \text{ mm}$$

$$L_{29} = 1,5 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{30} = 5,0 \text{ mm} \pm 0,3 \text{ mm}$$

$$L_{31} = 2,0 \text{ mm} \pm 0,2 \text{ mm}$$

$$A_2 = 90^\circ \pm 5^\circ$$

6.7 Label areas (Figure 3)

A portion of the rear side of the cartridge and a portion of the top side of the cartridge may be used for labels. The rear side area provides for readability of the label when it is stacked or inserted into the drive. The position and the size of the labels shall not interfere with the operation or clearance requirements of the cartridge component parts.

The area used for labels on the top side shall not extend beyond the inner edge of the holding areas defined by L_6 and L_7 .

The position and dimensions of the rear side label area shall be

$$L_{32} = 0,5 \text{ mm min.}$$

$$L_{33} = 1,5 \text{ mm min.}$$

$$L_{34} = 80,0 \text{ mm max.}$$

The depth of the label depression shall be 0,3 mm max.

6.8 Datum areas and datum holes (Figure 4, Figure 5 and Figure 6)

The annular datum areas A, B and C shall lie in plane Z. They determine the vertical position of the cartridge in the drive. Each shall have a diameter D_1 equal to $6,0 \text{ mm} \pm 0,1 \text{ mm}$ and be concentric with the respective datum hole.

The centres of datum holes A and B lie in plane X.

The centre of the circular datum hole A shall be at the intersection of planes X and Y (see Figure 5).

The distance from the centre of datum hole B to plane Y (see Figure 4) shall be

$$L_{35} = 68,0 \text{ mm} \pm 0,1 \text{ mm}$$

The distance from the centre of the circular datum hole C to plane Y (see Figure 6) shall be

$$L_{36} = 10,20 \text{ mm} \pm 0,05 \text{ mm}$$

The distance from the centre of datum hole D to plane Y (see Figure 6) shall be

$$L_{37} = 79,2 \text{ mm} \pm 0,1 \text{ mm}$$

The distance from the centres of datum holes C and D to plane X (see Figure 5) shall be

$$L_{38} = 36,35 \text{ mm} \pm 0,08 \text{ mm}$$

The diameter of datum hole A and datum hole C shall be $3,00 \text{ mm} \begin{smallmatrix} + 0,05 \\ - 0,00 \end{smallmatrix}$ mm. The dimensions of datum hole A and datum hole C shall be

$$L_{39} = 1,2 \text{ mm} \begin{smallmatrix} + 1,0 \\ - 0,0 \end{smallmatrix} \text{ mm}$$

$$L_{40} = 2,6 \text{ mm min.}$$

$$L_{41} = 1,5 \text{ mm min.}$$

$$L_{42} = 4,0 \text{ mm min.}$$

$$L_{43} = 0,3 \text{ mm max.}$$

$$A_3 = 45^\circ \pm 1^\circ$$

The dimensions of datum hole B and datum hole D shall be

$$L_{39} = 1,2 \text{ mm} \begin{smallmatrix} + 1,0 \\ - 0,0 \end{smallmatrix} \text{ mm}$$

$$\begin{aligned}
 L_{40} &= 2,6 \text{ mm min.} \\
 L_{41} &= 1,5 \text{ mm min.} \\
 L_{42} &= 4,0 \text{ mm min.} \\
 L_{43} &= 0,3 \text{ mm max.} \\
 L_{44} &= 3,00 \text{ mm } \begin{matrix} + 0,05 \\ - 0,00 \end{matrix} \text{ mm} \\
 L_{45} &= 3,5 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{46} &= 3,00 \text{ mm } \pm 0,05 \text{ mm} \\
 A_3 &= 45^\circ \pm 1^\circ \\
 R_1 &= 1,7 \text{ mm min.}
 \end{aligned}$$

6.9 Support areas

The cartridge support areas are shown shaded in Figure 4. Support areas A, B and C shall be coplanar with datum areas A, B and C, respectively, within $\pm 0,1$ mm. Support area D shall be coplanar with datum plane Z within $\pm 0,15$ mm.

The areas within L_{49} of the edge of the cartridge shall be recessed from the support areas.

The dimensions and positions of the support areas shall be

$$\begin{aligned}
 L_{35} &= 68,0 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{47} &= 10,0 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{48} &= 11,0 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{49} &= 0,5 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{50} &= 7,0 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{51} &= 30,0 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{52} &= 5,5 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{53} &= 64,5 \text{ mm } \pm 0,2 \text{ mm}
 \end{aligned}$$

6.10 Recognition holes (Figure 5, Figure 6 and Figure 7)

There shall be 5 recognition holes numbered 1 to 5 as shown in Figure 6.

Their positions shall be defined by

$$\begin{aligned}
 L_{54} &= 43,35 \text{ mm } \pm 0,15 \text{ mm} \\
 L_{55} &= 3,7 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{56} &= 2,3 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{57} &= 6,4 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{58} &= 3,7 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{59} &= 2,3 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{60} &= 6,4 \text{ mm } \pm 0,1 \text{ mm} \\
 L_{61} &= 79,0 \text{ mm } \pm 0,2 \text{ mm}
 \end{aligned}$$

All recognition holes shall have the cross-section F-F shown in Figure 7 and shall have a diameter of $3,0 \text{ mm } \pm 0,1 \text{ mm}$

$$\begin{aligned}
 L_{62} &= 1,2 \text{ mm } \begin{matrix} + 0,3 \\ - 0,1 \end{matrix} \text{ mm} \\
 L_{63} &= 5,0 \text{ mm min.}
 \end{aligned}$$

One of the cross-sections shows a recognition hole closed by a plug, the other shows the plug punched out. These plugs shall withstand an applied force of 0,5 N max without being punched out.

This International Standard prescribes the following states of these holes.

- Recognition hole 1 shall be closed.
- Recognition hole 2 shall be closed for tape of 13 μm nominal thickness.

— Recognition hole 2 shall be open for tape of 10 µm nominal thickness.

— Recognition holes 3, 4 and 5 shall be closed.

6.11 Write-inhibit Hole (Figure 6 and Figure 7)

The position and dimension of the Write-inhibit Hole shall be defined by

$$L_{55} = 3,7 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{62} = 1,2 \text{ mm} \begin{matrix} +0,3 \\ -0,1 \end{matrix} \text{ mm}$$

$$L_{63} = 5,0 \text{ mm min.}$$

$$L_{64} = 10,0 \text{ mm} \pm 0,1 \text{ mm}$$

The diameter of the hole shall be $3,0 \text{ mm} \pm 0,1 \text{ mm}$

When the Write-inhibit Hole is open, recording on the tape is inhibited. When it is closed, recording is enabled.

The case may have a movable element allowing the Write-inhibit Hole to be opened or closed. If present, this element shall be such that the state of the Write-inhibit Hole shall be visible (see Figure 3 as an example). The Write-inhibit hole closure shall be constructed to withstand a force of 0,5 N. The force required to open or close the Write-inhibit Hole shall be between 1 N and 15 N.

6.12 Pre-positioning surfaces (Figure 3 and Figure 5)

These surfaces determine the position of the cartridge in the Y direction when inserted into the drive loading slot.

The dimensions of the pre-positioning surfaces shall be

$$L_{25} = 1,5 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{65} = 2,4 \text{ mm} \begin{matrix} +0,0 \\ -0,1 \end{matrix} \text{ mm}$$

$$L_{66} = 2,4 \text{ mm} \begin{matrix} +0,0 \\ -0,1 \end{matrix} \text{ mm}$$

$$L_{67} = 1,0 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{68} = 69,0 \text{ mm} \pm 0,2 \text{ mm}$$

$$L_{69} = 14,65 \text{ mm} \pm 0,10 \text{ mm}$$

$$L_{70} = 13,15 \text{ mm} \pm 0,10 \text{ mm}$$

$$A_4 = 45^\circ \pm 1^\circ$$

6.13 Cartridge lid (Figure 3 and Figure 8)

The cartridge shall include a lid for protection of the tape during handling, storage and transportation. The lid consists of two parts, the main part and an auxiliary part.

The main part rotates around axis A (see Figure 8) which is fixed relative to the case.

The location of axis A shall be defined by L_{27} and

$$L_{71} = 7,5 \text{ mm} \pm 0,1 \text{ mm}$$

The auxiliary part rotates around axis B which is fixed relative to the main part of the lid and moves with it. When the lid is in the closed position, the location of axis B shall be defined by

$$L_{72} = 7,0 \text{ mm} \pm 0,1 \text{ mm}$$

$$L_{73} = 10,1 \text{ mm} \pm 0,1 \text{ mm}$$

The rotation of the auxiliary part is controlled, by a cam at each end, to give the path indicated in Figure 8.

When the lid is completely open, neither part shall extend above a plane located L_{77} above and parallel to plane Z.

$$L_{74} = 14,8 \text{ mm min.}$$

$$L_{75} = 11,5 \text{ mm} \pm 0,2 \text{ mm}$$

$$L_{76} = 1,2 \text{ mm} \pm 0,1 \text{ mm}$$