

INTERNATIONAL STANDARD



3413

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Information processing — Recorded magnetic tapes for interchange instrumentation applications — Standard tape speeds and track configurations

Traitement de l'information — Bandes magnétiques enregistrées pour l'enregistrement de mesures — Normalisation des vitesses de bande et des dispositions des pistes

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3413 was drawn up by Technical Committee ISO/TC 97, *Computers and information processing*, and circulated to the Member Bodies in August 1974.

It has been approved by the Member Bodies of the following countries :

Australia	Germany	Spain
Belgium	Hungary	Switzerland
Bulgaria	Japan	Turkey
Canada	New Zealand	United Kingdom
Czechoslovakia	Portugal	U.S.A.
France	Romania	U.S.S.R.

No Member Body expressed disapproval of the document.

ISO/TC 97/SC 12 is concerned with the preparation of International Standards in the field of magnetic tape for instrumentation applications. The programme of work envisages an inter-related series of International Standards concerning I) Reels, II) Unrecorded magnetic tape, III) Recorded magnetic tape and IV) Recording methods. This International Standard forms part of that series and should be read accordingly.

STANDARDS PUBLISHED AND IN PREPARATION

ISO/R 1858, *General purpose hubs and reels with 76 mm (3 in) centrehole, for magnetic tape used in interchange instrumentation applications.*

ISO 1859, *Information processing — Unrecorded magnetic tapes for interchange instrumentation applications — General dimensional requirements.*

ISO 1860, *Information processing — Precision reels for magnetic tape for interchange instrumentation applications.*

ISO 2690, *Unrecorded magnetic tapes for instrumentation applications — Physical properties and test methods.*

ISO 3485, *Magnetic tape for instrumentation applications — Standardization of analogue modes of recording.¹⁾*

ISO . . ., *Interchange practices and test methods for unrecorded instrumentation magnetic tape.*

ISO . . ., *Interchange practices and test methods for recorded magnetic tape.*

1) At present at the stage of draft.

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Information processing – Recorded magnetic tapes for interchange instrumentation applications – Standard tape speeds and track configurations

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies standard tape speeds and track configurations to allow maximum interchange of instrumentation magnetic tape records.

NOTE – See annex for definition of terms and symbols.

2 TAPE SPEEDS

The standard tape speeds for instrumentation magnetic tape recorders shall be 2,38 cm/s (15/16 in/s); 4,76 cm/s (1 7/8 in/s); 9,52 cm/s (3 3/4 in/s); 19,05 cm/s (7 1/2 in/s); 38,1 cm/s (15 in/s); 76,2 cm/s (30 in/s); 152,4 cm/s (60 in/s); and 304,8 cm/s (120 in/s).

3 TAPE WIDTHS

Standard tape widths are specified in the table below, which is an excerpt from ISO 1859.

Standard widths	
mm	in
6,3 ⁰ / _{-0,06}	0.248 ⁰ / _{-0.0025}
12,70 ⁰ / _{-0,10}	0.500 ⁰ / _{-0.004}
25,40 ⁰ / _{-0,10}	1.000 ⁰ / _{-0.004}
50,80 ⁰ / _{-0,10}	2.000 ⁰ / _{-0.004}

4 TRACK GEOMETRY : DIMENSIONS – RECORDED TAPE FORMAT (see figure 1)

4.1 4 Tracks in line on 6,3 mm (1/4 in) wide tape

Track width (*W*)

0,64 ± 0,05 mm (0.025 ± 0.002 in)

Track spacing (*D*)

1,78 mm (0.070 in)

Track location (reference edge to track 1 centreline) (*G*)

0,43 ± 0,05 mm (0.017 ± 0.002 in)

Track spacing tolerance (ΔH_n)

± 0,05 mm (± 0.002 in)

Track number (*H_n*)

	mm	in
<i>H</i> ₁	0	0
<i>H</i> ₂	1,78	0.070
<i>H</i> ₃	3,56	0.140
<i>H</i> ₄	5,34	0.210

NOTE – The simultaneous applications of the tolerances quoted shall not result in the centreline of track 4 being closer to the edge of the tape than 0,35 mm (0.014 in).

4.2 7 Tracks interlaced on 6,3 mm (1/4 in) wide tape

Track width (*W*)

0,64 ± 0,03 mm (0.025 ± 0.001 in)

Track spacing (*D*)

0,89 mm (0.035 in)

Data spacing (*S*)

38,10 ± 0,03 mm (1.5 ± 0.001 in) for fixed heads

38,10 ± 0,05 mm (1.5 ± 0.002 in) for adjustable heads

Edge margin, minimum (*M_m*)

0,025 mm (0.001 in)

Track location (reference edge to track 1 centreline) (*G*)

0,43 ± 0,04 mm (0.017 ± 0.001 5 in)

Track spacing tolerance (ΔH_n)

± 0,04 mm (± 0.001 5 in)

Track number (*H_n*)

	mm	in
<i>H₁</i>	0	0
<i>H₂</i>	0,89	0.035
<i>H₃</i>	1,78	0.070
<i>H₄</i>	2,67	0.105
<i>H₅</i>	3,56	0.140
<i>H₆</i>	4,45	0.175
<i>H₇</i>	5,34	0.210

4.3 7 Tracks interlaced on 12,7 mm (1/2 in) wide tape

Track width (*W*)

1,27 ± 0,13 mm (0.050 ± 0.005 in)

Track spacing (*D*)

1,78 mm (0.070 in)

Data spacing (*S*)

38,10 ± 0,03 mm (1.500 ± 0.001 in) for fixed heads

38,10 ± 0,05 mm (1.500 ± 0.002 in) for adjustable heads

Edge margin, minimum (*M_m*)

0,14 mm (0.006 in)

Track location (reference edge to track 1 centreline) (*G*)

1,02 ± 0,05 mm (0.040 ± 0.002 in)

Track spacing tolerance (ΔH_n)

± 0,05 mm (± 0.002 in)

Track number (*H_n*)

	mm	in
<i>H₁</i>	0	0
<i>H₂</i>	1,78	0.070
<i>H₃</i>	3,56	0.140
<i>H₄</i>	5,34	0.210
<i>H₅</i>	7,12	0.280
<i>H₆</i>	8,90	0.350
<i>H₇</i>	10,68	0.420

NOTE — Track numbers 1, 3, 5 and 7 occupy the same nominal positions as the four tracks defined in 4.1.

4.4 14 Tracks interlaced on 12,7 mm (1/2 in) wide tapeTrack width (W) $0,64 \pm 0,03$ mm (0.025 ± 0.001 in)Track spacing (D) $0,89$ mm (0.035 in)Data spacing (S) $38,10 \pm 0,03$ mm (1.500 ± 0.001 in) for fixed heads $38,10 \pm 0,05$ mm (1.500 ± 0.002 in) for adjustable headsEdge margin, minimum (M_m) $0,13$ mm (0.005 in)Track location (reference edge to track 1 centreline) (G) $0,50 \pm 0,04$ mm (0.020 ± 0.001 5 in)Track spacing tolerance (ΔH_n) $\pm 0,04$ mm (± 0.001 5 in)Track number (H_n)

	mm	in
H_1	0	0
H_2	0,89	0.035
H_3	1,78	0.070
H_4	2,67	0.105
H_5	3,56	0.140
H_6	4,45	0.175
H_7	5,34	0.210
H_8	6,23	0.245
H_9	7,12	0.280
H_{10}	8,01	0.315
H_{11}	8,90	0.350
H_{12}	9,79	0.385
H_{13}	10,68	0.420
H_{14}	11,57	0.455

4.5 21 Tracks interlaced on 12,7 mm (1/2 in) wide tapeTrack width (W) $0,46 \pm 0,03$ mm (0.018 ± 0.001 in)Track spacing (D) $0,585$ mm (0.023 in)Data spacing (S) $38,10 \pm 0,03$ mm (1.500 ± 0.001 in) for fixed heads $38,10 \pm 0,05$ mm (1.500 ± 0.002 in) for adjustable headsEdge margin, minimum (M_m) $0,17$ mm (0.007 in)Track location (reference edge to track 1 centre line) (G) $0,44 \pm 0,04$ mm (0.017 ± 0.001 5 in)Track spacing tolerance (ΔH_n) $\pm 0,03$ mm (± 0.001 in)Track number (H_n)

	mm	in
H_1	0	0
H_2	0,585	0.023
H_3	1,170	0.046
H_4	1,755	0.069
H_5	2,340	0.092
H_6	2,925	0.115
H_7	3,510	0.138
H_8	4,095	0.161
H_9	4,680	0.184
H_{10}	5,265	0.207
H_{11}	5,850	0.230
H_{12}	6,435	0.253
H_{13}	7,020	0.276
H_{14}	7,605	0.299
H_{15}	8,190	0.322
H_{16}	8,775	0.346
H_{17}	9,360	0.368
H_{18}	9,945	0.391
H_{19}	10,530	0.414
H_{20}	11,115	0.437
H_{21}	11,700	0.460

4.6 14 Tracks interlaced on 25,4 mm (1 in) wide tape

Track width (*W*)

1,27 ± 0,13 mm (0.050 ± 0.005 in)

Track spacing (*D*)

1,78 mm (0.070 in)

Data spacing (*S*)

38,10 ± 0,03 mm (1.500 ± 0.001 in) for fixed heads

38,10 ± 0,05 mm (1.500 ± 0.002 in) for adjustable heads

Edge margin, minimum (*M_m*)

0,28 mm (0.011 in)

Track location (reference edge to track 1 centreline) (*G*)

1,12 ± 0,05 mm (0.044 ± 0.002 in)

Track spacing tolerance (ΔH_n)

± 0,05 mm (± 0.002 in)

Track number (*H_n*)

	mm	in
<i>H₁</i>	0	0
<i>H₂</i>	1,78	0.070
<i>H₃</i>	3,56	0.140
<i>H₄</i>	5,34	0.210
<i>H₅</i>	7,12	0.280
<i>H₆</i>	8,90	0.350
<i>H₇</i>	10,68	0.420
<i>H₈</i>	12,46	0.490
<i>H₉</i>	14,24	0.560
<i>H₁₀</i>	16,02	0.630
<i>H₁₁</i>	17,80	0.700
<i>H₁₂</i>	19,58	0.770
<i>H₁₃</i>	21,36	0.840
<i>H₁₄</i>	23,14	0.910

4.7 28 Tracks interlaced on 25,4 mm (1 in) wide tape

Track width (*W*)

0,64 ± 0,03 mm (0.025 ± 0.001 in)

Track spacing (*D*)

0,89 mm (0.035 in)

Data spacing (*S*)

38,10 ± 0,03 mm (1.500 ± 0.001 in) for fixed heads

38,10 ± 0,05 mm (1.500 ± 0.002 in) for adjustable heads

Edge margin, minimum (*M_m*)

0,22 mm (0.009 in)

Track location (reference edge to track 1 centreline) (*G*)

0,66 ± 0,04 mm (0.026 ± 0.001 5 in)

Track spacing tolerance (ΔH_n)

± 0,04 mm (± 0.001 5 in)

Track number (*H_n*)

	mm	in
<i>H₁</i>	0	0
<i>H₂</i>	0,89	0.035
<i>H₃</i>	1,78	0.070
<i>H₄</i>	2,67	0.105
<i>H₅</i>	3,56	0.140
<i>H₆</i>	4,45	0.175
<i>H₇</i>	5,34	0.210
<i>H₈</i>	6,23	0.245
<i>H₉</i>	7,12	0.280
<i>H₁₀</i>	8,01	0.315
<i>H₁₁</i>	8,90	0.350
<i>H₁₂</i>	9,79	0.385
<i>H₁₃</i>	10,68	0.420
<i>H₁₄</i>	11,57	0.455
<i>H₁₅</i>	12,46	0.490
<i>H₁₆</i>	13,35	0.525
<i>H₁₇</i>	14,24	0.560
<i>H₁₈</i>	15,13	0.595
<i>H₁₉</i>	16,02	0.630
<i>H₂₀</i>	16,91	0.665
<i>H₂₁</i>	17,80	0.700
<i>H₂₂</i>	18,69	0.735
<i>H₂₃</i>	19,58	0.770
<i>H₂₄</i>	20,47	0.805
<i>H₂₅</i>	21,36	0.840
<i>H₂₆</i>	22,25	0.875
<i>H₂₇</i>	23,14	0.910
<i>H₂₈</i>	24,03	0.945

4.8 42 Tracks interlaced on 25,4 mm (1 in) wide tape

Track number (H_n)Track width (W) $0,46 \pm 0,03$ mm (0.018 ± 0.001 in)Track spacing (D) $0,585$ mm (0.023 in)Data spacing (S) $38,10 \pm 0,03$ mm (1.500 ± 0.001 in) for fixed heads $38,10 \pm 0,05$ mm (1.500 ± 0.002 in) for adjustable headsEdge margin, minimum (M_m) $0,32$ mm (0.012 in)Track location (reference edge to track 1 centreline) (G) $0,70 \pm 0,04$ mm (0.0275 ± 0.0015 in)Track spacing tolerance (ΔH_n) $\pm 0,03$ mm (0.001 in)

mm

in

H_1	0	0
H_2	0,585	0.023
H_3	1,170	0.046
H_4	1,755	0.069
H_5	2,340	0.092
H_6	2,925	0.115
H_7	3,510	0.138
H_8	4,095	0.161
H_9	4,680	0.184
H_{10}	5,265	0.207
H_{11}	5,850	0.230
H_{12}	6,435	0.253
H_{13}	7,020	0.276
H_{14}	7,605	0.299
H_{15}	8,190	0.322
H_{16}	8,775	0.345
H_{17}	9,360	0.368
H_{18}	9,945	0.391
H_{19}	10,530	0.414
H_{20}	11,115	0.437
H_{21}	11,700	0.460
H_{22}	12,285	0.483
H_{23}	12,870	0.506
H_{24}	13,455	0.529
H_{25}	14,040	0.552
H_{26}	14,625	0.575
H_{27}	15,210	0.598
H_{28}	15,795	0.621
H_{29}	16,380	0.644
H_{30}	16,965	0.667
H_{31}	17,550	0.690
H_{32}	18,135	0.713
H_{33}	18,720	0.736
H_{34}	19,305	0.759
H_{35}	19,890	0.782
H_{36}	20,475	0.805
H_{37}	21,060	0.828
H_{38}	21,645	0.851
H_{39}	22,230	0.874
H_{40}	22,815	0.897
H_{41}	23,400	0.920
H_{42}	23,985	0.943

5 HEAD AND SYSTEM REQUIREMENTS

NOTE — The effective tape speed throughout a reel (in the absence of tape-derived servo speed control) shall be within $\pm 0,5\%$ of the standard speed; tape speed errors being defined as departures from the standard occurring at frequencies below 0,5 Hz.

5.1 Data scatter

Data scatter shall not be greater than $2,5\text{ }\mu\text{m}$ ($100\text{ }\mu\text{in}$). It is the responsibility of an equipment manufacturer to decide whether or not data scatter may be equated to gap scatter.

5.2 Data azimuth (static)

Data azimuth (static) shall be within $\pm 0,3\text{ mrad}$ ($\pm 1'$ of arc). It is the responsibility of an equipment manufacturer to decide whether or not data azimuth (static) may be equated to head azimuth.

5.3 Individual track data azimuth difference

The maximum signal loss due to individual track data azimuth difference shall be no greater than 1 dB (excluding

reproduce head error) at the shortest wavelength for the equipment under test.

5.4 Head polarity

5.4.1 Record head

Each record head winding shall be connected to its respective amplifier in such a manner that a positive-going NRZ step with respect to system ground, at the amplifier input, will result in the generation of a specific magnetic pattern on tape passing the record head in the normal direction of tape motion.

The resulting magnetic pattern shall consist of a polarity sequence of south-north, north-south.

5.4.2 Reproduce head

Each reproduce head winding shall be connected to its respective amplifier in such a manner that of tape exhibiting a south-north, north-south magnetic pattern will produce a positive-going pulse, with respect to system ground, at the output of the reproduce amplifier.

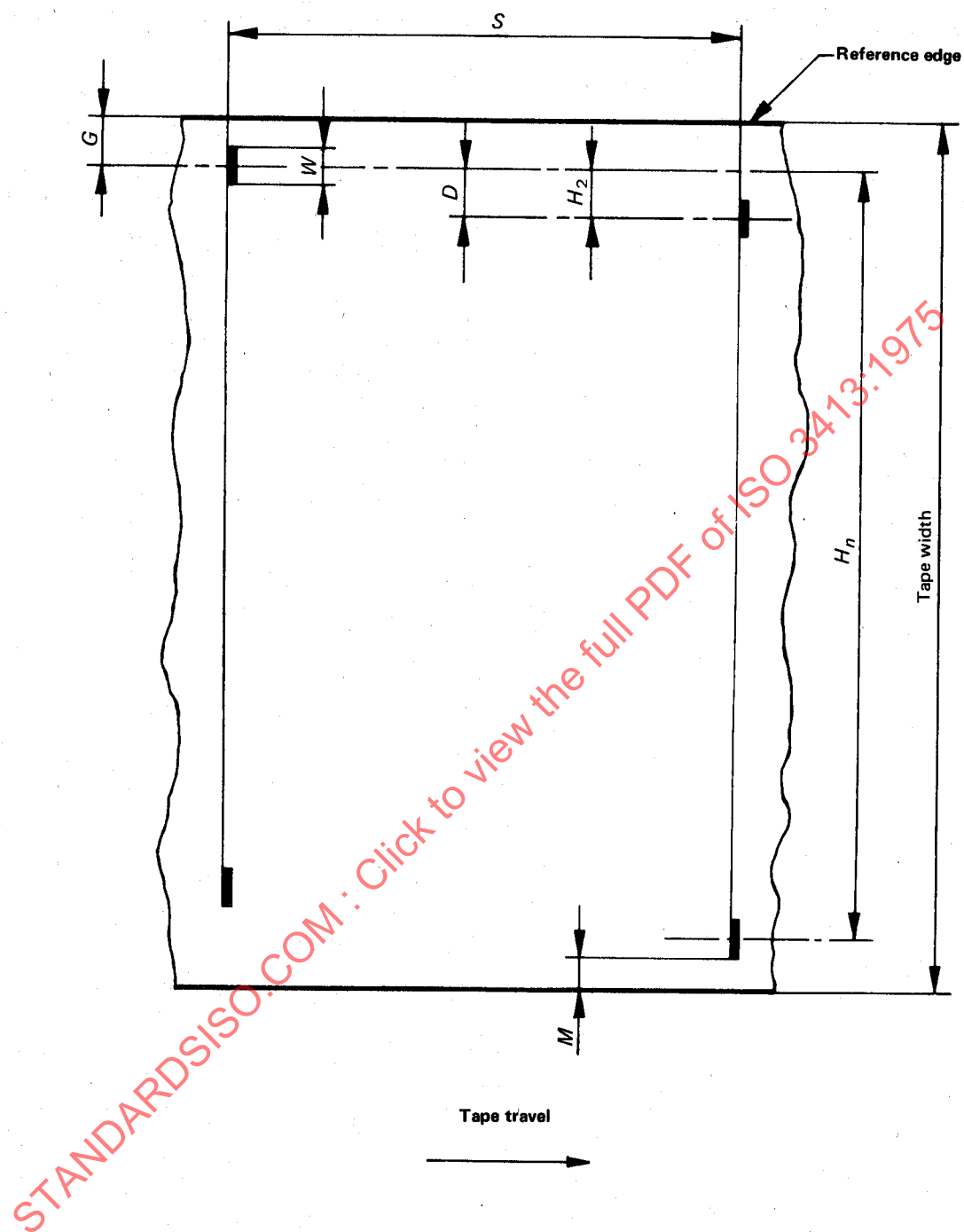


FIGURE 1 — Recorded tape format, magnetic surface side

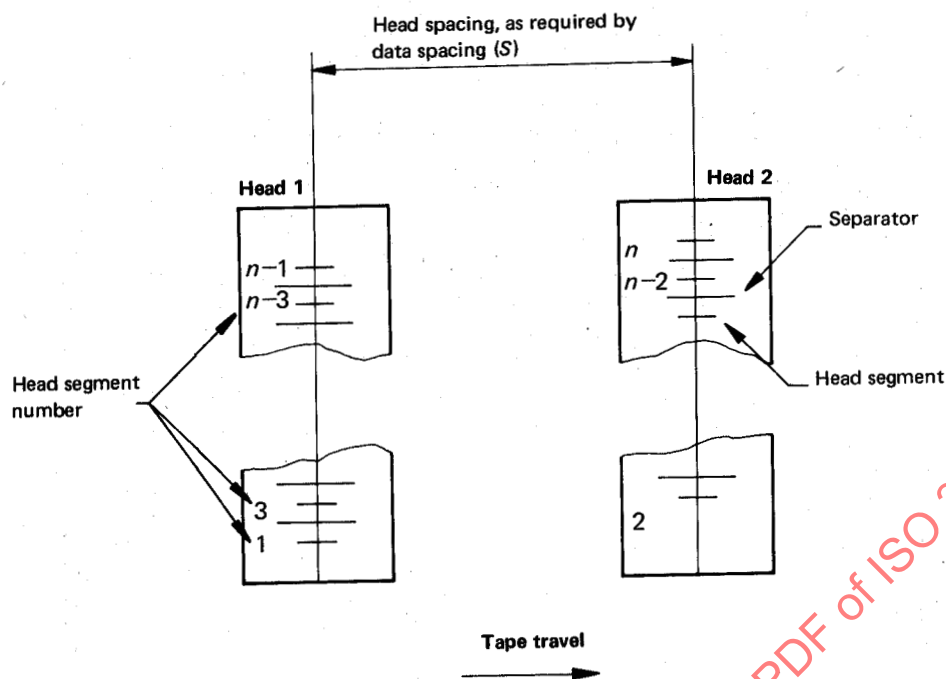


FIGURE 2 – Heads interlaced, n -track system

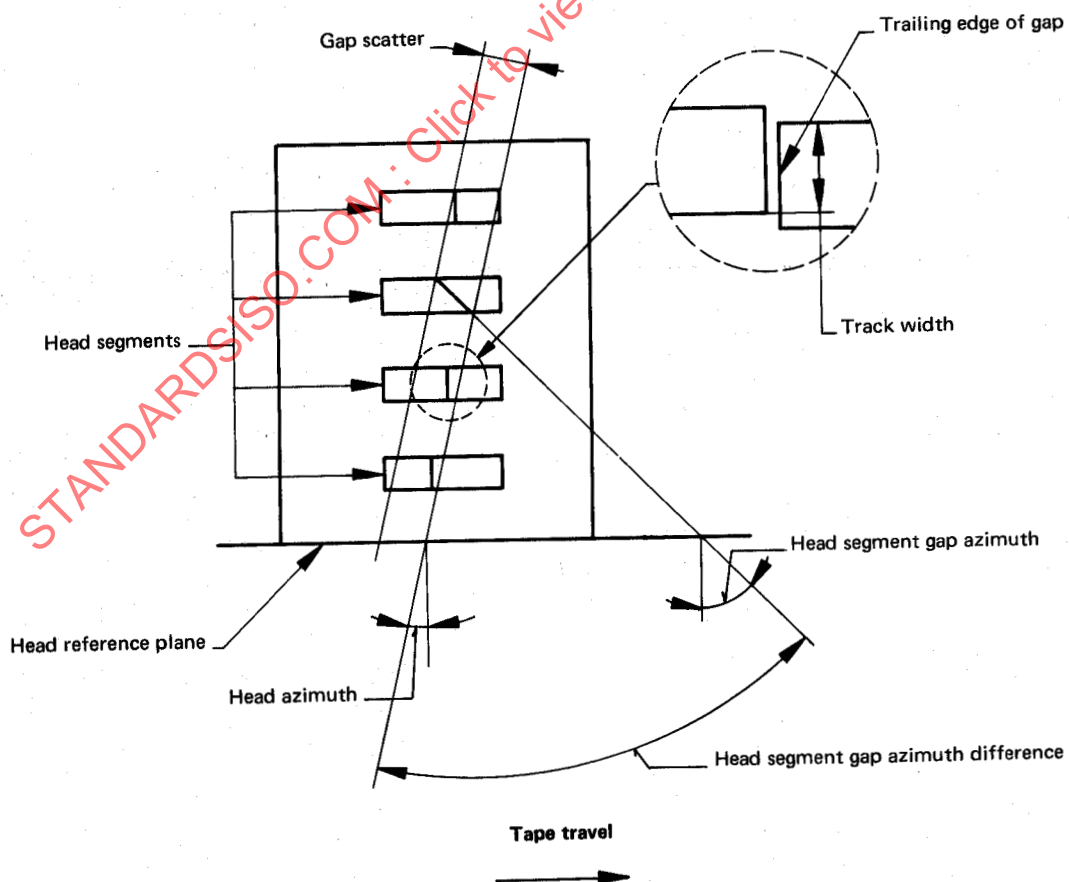


FIGURE 3 – Head mechanical parameters