

Helical-scan compressed digital video cassette recording system using 6,35mm magnetic tape — Forum D-7

The European Standard EN 62071:2001 has the status of a
British Standard

ICS 33.160.40

National foreword

This British Standard is the official English language version of EN 62071:2001. It is identical with IEC 62071:2000.

The UK participation in its preparation was entrusted by Technical Committee EPL/100, Audio, video and multimedia systems and equipment, to Subcommittee EPL/100/2, Recording, which has the responsibility to:

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**Helical-scan compressed digital video cassette recording system
using 6,35 mm magnetic tape -
Format D-7
(IEC 62071:2000)**

Système de magnétoscope numérique
à cassette à balayage hélicoïdal
à signal compressé utilisant la bande
magnétique de 6,35 mm -
Format D-7
(CEI 62071:2000)

Videokassettensystem mit komprimierter
digitaler Schrägspuraufzeichnung
auf Magnetband 6,35 mm -
Format D-7
(IEC 62071:2000)

This European Standard was approved by CENELEC on 2000-11-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

The text of document 100B/271/FDIS, future edition 1 of IEC 62071, prepared by SC 100B, Audio, video and multimedia information storage systems, of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 62071 on 2000-11-01.

The following dates were fixed:

- | | | |
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with the EN have to be withdrawn | (dow) | 2003-11-01 |

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A to E and ZA are normative and annex F is informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62071:2000 was approved by CENELEC as a European Standard without any modification.

CONTENTS

Clause	Page
1 General.....	9
1.1 Scope	9
1.2 Normative references	9
1.3 Symbols and abbreviations.....	10
1.4 Environment and test conditions.....	11
1.5 Reference tapes	11
1.6 Calibration tapes.....	11
2 Video cassette	12
2.1 Mechanical parameters	12
2.2 Video tape specification	39
3 Helical recordings	40
3.1 Tape speed.....	40
3.2 Sectors	40
3.3 Record location and dimensions.....	40
3.4 Helical track record tolerance zones.....	40
3.5 Relative positions of recorded information	40
3.6 Gap azimuth	46
3.7 Transport and scanner	46
4 Programme track data.....	48
4.1 General	48
4.2 ITI sector	60
4.3 Audio sector.....	70
4.4 Video sector.....	75
4.5 Subcode sector.....	79
4.6 Edit gap	83
5 Audio processing	84
5.1 Introduction.....	84
5.2 Encoding mode	84
5.3 Audio shuffling	85
5.4 Audio auxiliary data (AAUX)	86
5.5 Error correction code addition	89
6 Video processing	91
6.1 Introduction.....	91
6.2 Video structure	91
6.3 DCT processing	103
6.4 Quantization	105
6.5 Variable length coding (VLC).....	108
6.6 Arrangement of a compressed macro block.....	108
6.7 Arrangement of a video segment.....	112
6.8 Intraframe deshuffling	114
6.9 Video auxiliary data (VAUX)	117
6.10 Error correction code addition	120

Clause	Page
7 Subcode processing.....	121
7.1 Introduction.....	121
7.2 Subcode data.....	121
7.3 Error correction code addition	124
8 Longitudinal tracks	125
8.1 Control track	125
8.2 Cue track	126
9 Interface	127
9.1 Introduction.....	127
9.2 Data structure	127
Annex A (normative) Tape tension	141
Annex B (normative) Cross-tape track measurement technique.....	142
Annex C (normative) Track pattern during insert editing	145
Annex D (normative) Frequency characteristics of the F_0 track.....	146
Annex E (normative) Digital filter	147
Annex F (informative) Small cassette adapter	148
Figure 1 – Top and side views of the M cassette	14
Figure 2 – Top and side views of the L cassette	15
Figure 3 – Internal structure and tape path for the M cassette	16
Figure 4 – Internal structure and tape path for the L cassette	17
Figure 5 – Datum area and support area for the M cassette	18
Figure 6 – Datum area and support area for the L cassette	19
Figure 7 – Bottom view of the M cassette.....	20
Figure 8 – Bottom view of the L cassette.....	21
Figure 9 – Contact area of the ID board for the M cassette.....	24
Figure 10 – Contact area of the ID board for the L cassette.....	25
Figure 11 – Light path and leader/trailer tape for the M cassette	26
Figure 12 – Light path and leader/trailer tape for the L cassette	27
Figure 13 – Reels for the M cassette	29
Figure 14 – Reels for the L cassette	30
Figure 15 – Reel lock and release for the M cassette	31
Figure 16 – Reel lock and release for the L cassette	32
Figure 17 – Lid lock and release for the M cassette.....	33
Figure 18 – Lid lock and release for the L cassette	34
Figure 19a – Movement of inner lid	35
Figure 19 – Space of the M cassette for the VTR loading mechanism.....	35
Figure 20a – Movement of inner lid.....	36
Figure 20 – Space of the L cassette for the VTR loading mechanism	36
Figure 21 – Lid for the M cassette.....	37
Figure 22 – Lid for the L cassette.....	38
Figure 23 – Location and dimensions of recorded tracks	41

	Page
Figure 24 – Location of the cue and control track recording	42
Figure 25 – Location and dimensions of the tolerance zone of the helical track recording	45
Figure 26 – Possible scanner configuration and tape wrap	47
Figure 27 – Possible recording system configuration with digital interface port	49
Figure 28 – Sector arrangement on helical track	50
Figure 29 – Frame and tracks (525/60 system)	50
Figure 30 – Frame and tracks (625/50 system)	50
Figure 31 – Frequency characteristics of tracks	53
Figure 32 – Modulation for the audio sector	55
Figure 33 – Modulation for the video sector	56
Figure 34 – Modulation for the subcode sector	57
Figure 35 – Possible block diagram for signal processing	58
Figure 36 – Bit stream before interleaved NRZI modulation	59
Figure 37 – Precoding	59
Figure 38 – Structure of the ITI sector	61
Figure 39 – Structure of sync block of the TIA	68
Figure 40 – Structure of the audio sector	71
Figure 41 – Structure of sync blocks in the audio sector	71
Figure 42 – Structure of the video sector	75
Figure 43 – Structure of sync blocks in the video sector	77
Figure 44 – Structure of the subcode sector	80
Figure 45 – Structure of sync blocks in the subcode sector	161
Figure 46 – Sample for audio data bytes conversion	85
Figure 47 – Arrangement of AAUX packs in audio auxiliary data	86
Figure 48 – Data and inner parity of a data sync block	90
Figure 49 – Data and outer parity of a data sync block for the audio sector	90
Figure 50 – Transmitting samples for the 525/60 system	93
Figure 51 – Transmitting samples for the 625/50 system	94
Figure 52 – DCT block and pixel coordinate	96
Figure 53 – Rightmost DCT block in the colour-difference signal	96
Figure 54 – DCT block arrangement	97
Figure 55 – Macro block and DCT blocks	97
Figure 56 – Super blocks and macro blocks in one television frame for the 525/60 system	98
Figure 57 – Super blocks and macro blocks in one television frame for the 625/50 system	99
Figure 58 – Macro block order in a super block for the 525/60 system	101
Figure 59 – Macro block order in a super block for the 625/50 system	101
Figure 60 – Output order of a weighted DCT block	106

	Page
Figure 61 – Area numbers	107
Figure 62 – Arrangement of a compressed macro block	109
Figure 63 – Arrangement of a video segment after the bit rate reduction	115
Figure 64 – Video error code	115
Figure 65 – Relation between the compressed macro block number and the data sync block.....	116
Figure 66 – Arrangement of VAUX packs in VAUX sync blocks	117
Figure 67 – Data and outer parity of a data sync block for the video sector.....	121
Figure 68 – Arrangement of subcode data	122
Figure 69 – Bit assignment for subcode data and parity	124
Figure 70 – Recorded control record of waveform timing (525/60 system)	126
Figure 71 – Recorded control record of waveform timing (625/50 system)	126
Figure 72 – Data structure for transmission.....	128
Figure 73 – Transmission order of a DIF block in a DIF sequence	129
Figure 74 – Data in the subcode section	133
Figure 75 – Data in the VAUX section	134
Figure 76 – Data in the audio section.....	137
Figure 77 – Data in the video section	140
Figure B.1 – Cross-tape measurement technique.....	144
Figure B.2 – Correction factors (actual tape speed, tension)	144
Figure B.3 – Track location error plot (example).....	144
Figure C.1 – Typical track pattern during insert editing	145
Figure D.1 – Frequency characteristics of the F_0 track	146
Figure E.1 – Template for insertion loss frequency characteristic	147
Figure E.2 – Passband ripple tolerance.....	147
Figure F.1 – Top and side view of the adapter.....	148
Figure F.2 – Bottom view of the adapter.....	149
Figure F.3 – Datum and support areas of the adapter	150
Figure F.4 – Lid lock and release mechanism of the adapter	151
Figure F.5 – Lid opening mechanism	152
Figure F.6 – Light path of the adapter	152
Table 1 – Mechanical tolerances.....	12
Table 2 – Tape length and recording times of M and L cassettes.....	25
Table 3 – Identification board for the M cassette	22
Table 4 – Identification board for the L cassette	22
Table 5 – Length of leader/trailer tape	23
Table 6 – Reel spring force.....	28
Table 7 – Recording location and dimensions (525/60 system).....	43

	Page
Table 8 – Recording location and dimensions (625/50 system).....	44
Table 9 – Parameters for a possible scanner design	46
Table 10 – Frame and servo information (525/60 system)	51
Table 11 – Frame and servo information (625/50 system)	52
Table 12 – Bit stream of ITI preamble for track F_0	62
Table 13 – Bit stream of ITI preamble for track F_1	63
Table 14 – Bit stream of ITI preamble for track F_2	64
Table 15 – Bit stream of the SSA for track F_0	65
Table 16 – Bit stream of the SSA for track F_1	66
Table 17 – Bit stream of the SSA for track F_2	67
Table 18 – Application ID of track information	68
Table 19 – Pilot frame	68
Table 20 – Bit stream of the TIA for track F_0	68
Table 21 – Bit stream of the TIA for track F_1	68
Table 22 – Bit stream of the TIA for track F_2	69
Table 23 – Bit stream of ITI postamble for track F_0	69
Table 24 – Bit stream of ITI postamble for track F_1	69
Table 25 – Bit stream of ITI postamble for track F_2	70
Table 26 – ID0 in the audio sector	72
Table 27 – Audio application ID	72
Table 28 – Track pair number.....	73
Table 29 – Bit assignment of ID codewords	74
Table 30 – ID data in the video sector.....	78
Table 31 – Video application ID	79
Table 32 – ID data in the subcode sector	161
Table 33 – Subcode application ID.....	81
Table 34 – AAUX data	87
Table 35 – Mapping of an AAUX source pack	87
Table 36 – Mapping of an AAUX source control pack	88
Table 37 – Construction of video signal sampling (4:2:2).....	92
Table 38 – Class number and DCT block	106
Table 39 – Example of classification for reference	106
Table 40 – Quantization step	107
Table 41 – Length of codewords	109
Table 42 – Codewords of variable length coding	110
Table 43 – Definition of the STA	111
Table 44 – Codewords of the QNO	111
Table 45 – VAUX data	118
Table 46 – Mapping of a VAUX source pack	118
Table 47 – Mapping of a VAUX source control pack	119
Table 48 – Mapping of a subcode pack	122

	Page
Table 49 – Mapping of a time code pack	123
Table 50 – Mapping of a binary group pack	124
Table 51 – ID data in a DIF block	130
Table 52 – DIF block type	130
Table 53 – DIF sequence number (525/60 system)	131
Table 54 – DIF sequence number (625/50 system)	131
Table 55 – DIF block number	131
Table 56 – Data in the header section	132
Table 57 – DIF blocks and subcode sync blocks	133
Table 58 – DIF blocks and VAUX data sync blocks	135
Table 59 – Mapping of a VAUX source pack for interface	135
Table 60 – Mapping of a VAUX source control pack for interface	136
Table 61 – DIF blocks and audio data sync blocks	137
Table 62 – Mapping of an AAUX source pack for interface	138
Table 63 – Mapping of an AAUX source control pack for interface	138
Table 64 – DIF blocks and compressed macro block	140
Table B.1 – Nomenclature and calculation of track location error	143

HELICAL-SCAN COMPRESSED DIGITAL VIDEO CASSETTE RECORDING SYSTEM USING 6,35 mm MAGNETIC TAPE – FORMAT D-7

1 General

1.1 Scope

This International Standard specifies the content, format and recording method of the data blocks containing video, audio and associated data which form the helical records on 6,35 mm tape in cassettes, as specified in SMPTE 306M.

In addition, this standard specifies the content, format and recording method for longitudinal cue and control tracks.

One video channel and two independent audio channels are recorded in the digital format. Each of these channels is designed to be capable of independent editing.

The video channel records and reproduces a component television signal in the 525-line system with a frame frequency of 29,97 Hz (hereinafter referred to as 525/60 system) and the 625-line system with a frame frequency of 25,00 Hz (hereinafter referred to as the 625/50 system).

Prior to recording, the digital video signal is compressed to a DV based 25 Mb/s bit stream, as specified in SMPTE 314M.

1.2 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 IEC and ISO maintain registers of currently valid International Standards.

IEC 61834-1:1998, *Recording – Helical-scan digital video cassette recording system using 6,35 mm magnetic tape for consumer use (525/60, 625/50, 1125/60 and 1250/50 systems) – Part 1: General specifications*

IEC 61834-2:1998, *Recording – Helical-scan digital video cassette recording system using 6,35 mm magnetic tape for consumer use (525/60, 625/50, 1125/60 and 1250/50 systems) – Part 2: SD format for 525/60 and 625/50 systems*

SMPTE 12M: *Television, audio and film – Time and control code*

ITU-R BT.470-6:1998, *Conventional television systems*

ITU-R BT.601-5:1995, *Studio encoding parameters of digital television for standard 4:3 and wide-screen 16:9 aspect ratios*

1.3 Symbols and abbreviations

AAUX	Audio auxiliary data
AP1	Audio application ID
AP2	Video application ID
AP3	Subcode application ID
APT	Track application ID
Arb	Arbitrary
ASA	AUX source pack
ASC	AAUX source control pack
B/W	Black-and-white flag
CGMS	Copy generation management system
DBN	DIF block number
DCT	Discrete cosine transform
DIF	Digital interface
DSF	DIF sequence flag
ECC	Error correction code
EFC	Emphasis channel flag
EOB	End of block
IDP	ID parity
ITI	Initial track information
LF	Locked mode flag
PF	Pilot frame
QNO	Quantization number
QU	Quantization
Res	Reserved for future use
SMP	Sampling frequency
SSA	Start sync area
SSYB	Subcode sync block number
STA	Status of the compressed macro block
Syb	Sync block number
TF	Transmitting flag
TIA	Track information area
Trp	Track pair number
VAUX	Video auxiliary data
VLC	Variable length coding
VS	VAUX source pack
VSC	VAUX source control pack
VSM	Vibrating sample magnetometer

1.4 Environment and test conditions

Tests and measurements made on the system to check conformity with the requirements of this standard shall be carried out under the following conditions:

- Temperature: $20\text{ °C} \pm 1\text{ °C}$
- Relative humidity: $(50 \pm 2)\%$
- Barometric pressure: from 86 kPa to 106 kPa
- Tape conditioning: not less than 24 h
- Center tape tension: $0,09\text{ N} \pm 0,02\text{ N}$ (see annex A)

1.5 Reference tapes

Blank tape to be used for calibration recordings may be purchased from the following manufacturer ¹⁾:

Company

Matsushita Electric Industrial Co., Ltd.

Audio and Video Systems Division

2 15, Matsuba cho, Kadoma city,

Osaka 571 Japan

TEL.: +81 6 901 1161

FAX.: +81 6 905 4048

TLX.: +81 6 529 4690

Part number

TBA

1.6 Calibration tapes

Manufacturers of video tape recorders designed for this format specification may sell calibration tapes meeting the following requirements.

1.6.1 Record locations and dimensions

Tolerances shown in table 5 or table 6 will be reduced by 50 %.

1.6.2 Calibration signals

Two sets of signals shall be recorded on the calibration tape:

a) A series of conventional test signals

Video : 100 % colour bars

Audio: 1 kHz tone at 20 dB below full level

Cue: 1 kHz tone at reference level

10 kHz tone at reference level

b) A signal of constant recorded frequency (i.e. half the Nyquist frequency) only with tracks of field 0, segment 0 for the purpose of mechanical alignment

¹⁾ This information is given for the convenience of users of this International Standard and does not constitute an endorsement by the IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

1.6.3 Purchase

The calibration tape may be purchased from the following manufacturer¹⁾:

Company

Matsushita Electric Industrial Co., Ltd.
 Audio and Video Systems Division
 2 15, Matsuba cho, Kadoma city,
 Osaka 571 Japan.
 TEL.: +81-6 901 1161
 FAX.: +81-6 905 4048
 TLX.: +81-6 529 4690

Part number

- for 525/60 system
- Conventional test: TBA
 - Mechanical alignment: TBA
- for 625/50 system
- Conventional test: TBA
 - Mechanical alignment: TBA

2 Video cassette

2.1 Mechanical parameters

2.1.1 General specifications

2.2.2.1 The dimensions of the two cassettes used for recording shall be in accordance with figures 1 to 22.

2.1.1.2 The general tolerances for dimensions, except those for which tolerances are otherwise specified, shall be as indicated in table 1.

Table 1 – Mechanical tolerances

Length mm		Tolerance
over	to	mm
0	30	±0,1
30	50	±0,15
50		±0,2
Angle		±1,0°

2.1.1.3 The two sizes of cassettes shall be identified as:

- Medium: M
- Large: L

NOTE Annex F shows the adaptor size for the small cassette which is specified in IEC 61834-1.

¹⁾ This information is given for the convenience of users of this International Standard and does not constitute an endorsement by the IEC of the product named. Equivalent products may be used if they can be shown to lead to the same results.

2.1.1.4 Tape length and record times for the two cassette sizes shall be as given in table 2.

Table 2 – Tape length and recording times of M and L cassettes

Tape Cassette	D-7 record times min	Length m
M	12	27^{+1}_0
	24	51^{+1}_0
	33	70^{+1}_0
	46	96^{+1}_0
	66	137^{+1}_0
L	34	72^{+1}_0
	66	137^{+1}_0
	94	194^{+1}_0
	126	259^{+2}_0

2.1.1.5 The magnetic coating on the tape shall face out of the cassette, as specified in figures 3 and 4.

2.1.2 Datum plane

2.1.2.1 Datum plane Z is determined by datum areas A, B and C, as specified in figures 5 and 6.

2.1.2.2 Datum plane X shall be orthogonal to datum plane Z and shall run through the center of datum hole (A) and datum hole (B), as specified in figures 7 and 8.

2.1.2.3 Datum plane Y shall be orthogonal to both datum plane X and datum plane Z and shall run through the center of datum hole (A), as specified in figures 7 and 8.

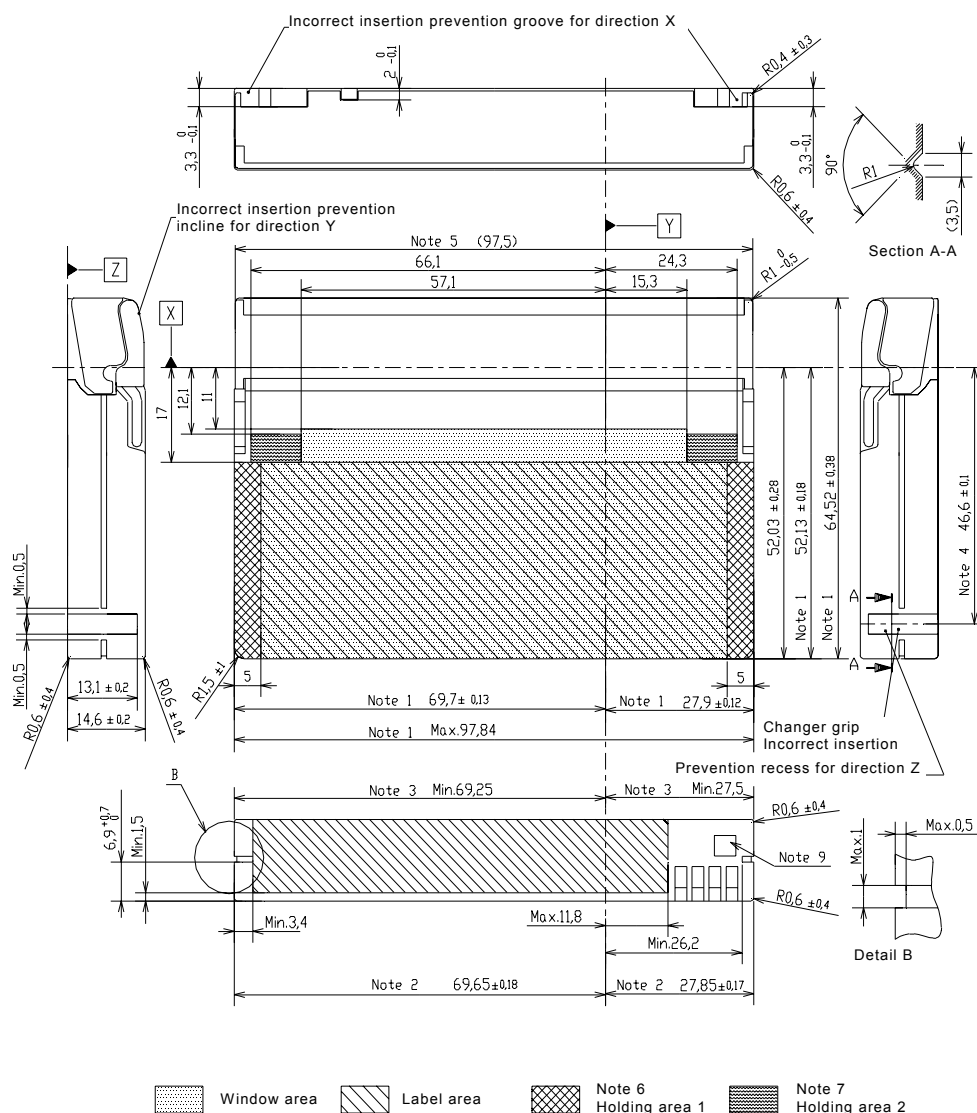
2.1.3 Window and labels

2.1.3.1 Window and label areas shall be as specified in figures 1 and 2.

2.1.3.2 Labels attached to the cassette shall not extend beyond the external dimensions, as shown in figures 1 and 2.

2.1.3.3 Labels shall not interfere with the ID board or accidental erasure prevention hole for users or manufacturers.

2.1.3.4 Labels shall not interfere with the hub drive and support mechanism.



IEC 1908/2000

Dimensions in millimetres

NOTE 1 Maximum outside dimension of the shells.

NOTE 2 The tolerance applies to the region up to 6,7 mm from datum plane Z.

NOTE 3 The dimension applies to the upper half.

NOTE 4 The tolerance applies to the region up to 6,7 mm from datum plane Z. The general tolerance applies beyond 6,7 mm.

NOTE 5 The lid width shall be smaller than the shell width.

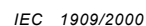
NOTE 6 The cassette shall be held in the recorder/player within the area indicated.

NOTE 7 When the lid is open, a portion of this area may not be available for the cassette holding mechanism (see figure 19).

NOTE 8 The surface roughness of holding areas 1 and 2 shall not exceed 40 μm Rmax.

NOTE 9 The indication of the accidental erasure prevention shall be placed in this area (see figure 9 for the accidental erasure prevention dimensions).

Figure 1 – Top and side views of the M cassette



Dimensions in millimetres

NOTE 1 Maximum outside dimension of the shells.

NOTE 2 The tolerance applies to the region up to 6,7 mm from datum plane Z.

NOTE 3 The dimension applies to the upper half.

NOTE 4 The tolerance applies to the region up to 6,7 mm from datum plane Z. The general tolerance applies beyond 6,7 mm.

NOTE 5 The lid width shall be smaller than the shell width.

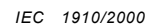
NOTE 6 The cassette shall be held in the recorder/player within the area indicated.

NOTE 7 When the lid is open, a portion of this area may not be available for the cassette holding mechanism (see figure 20).

NOTE 8 The surface roughness of holding areas 1 and 2 shall not exceed 40 μm Rmax.

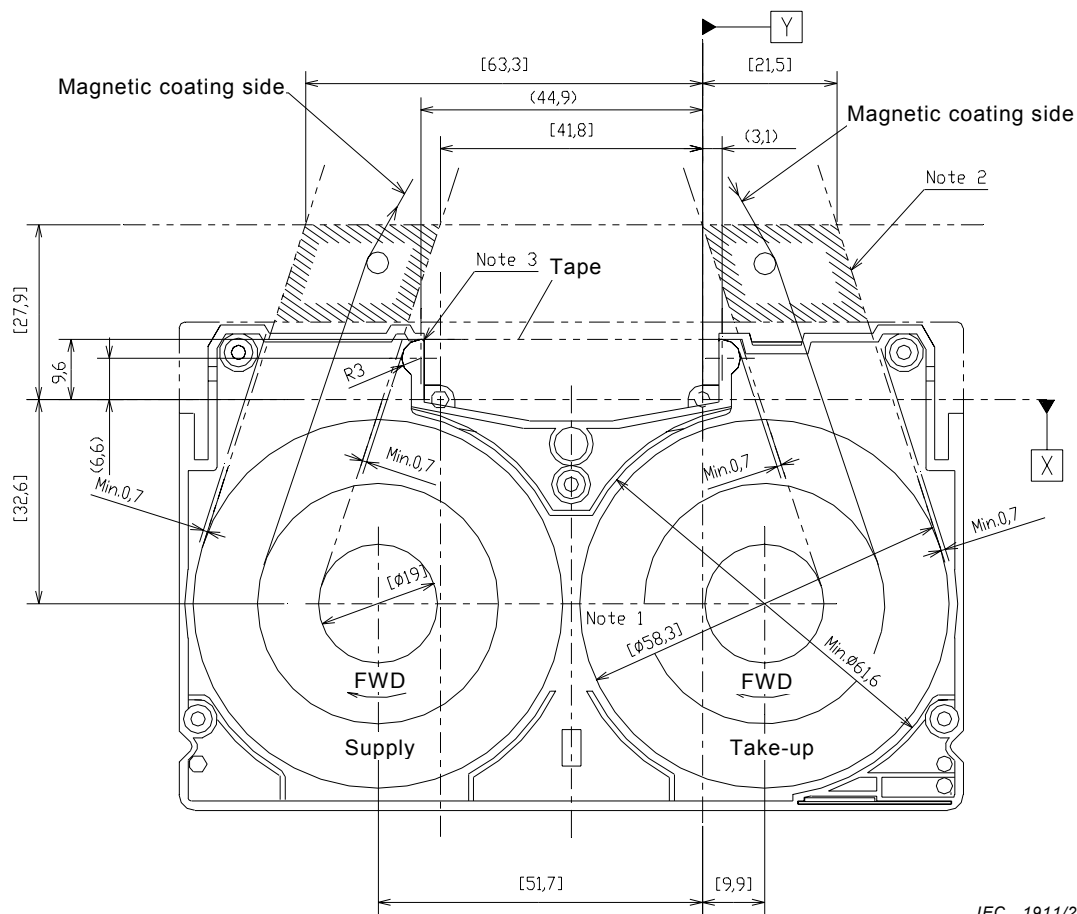
NOTE 9 The indication of the accidental erasure prevention shall be placed in this area (see figure 10 for the accidental erasure prevention dimensions).

Figure 2 – Top and side views of the L cassette



NOTE 3 The corner shall be rounded.

Figure 3 – Internal structure and tape path for the M cassette



IEC 1911/2000

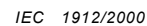
Dimensions in millimetres

NOTE 1 Dimensions in brackets derived from a packed tape diameter of 58,3 mm indicate area normally occupied by the tape path.

NOTE 2 The first guidepost shall be within the tape path area as indicated.

NOTE 3 The corner shall be rounded.

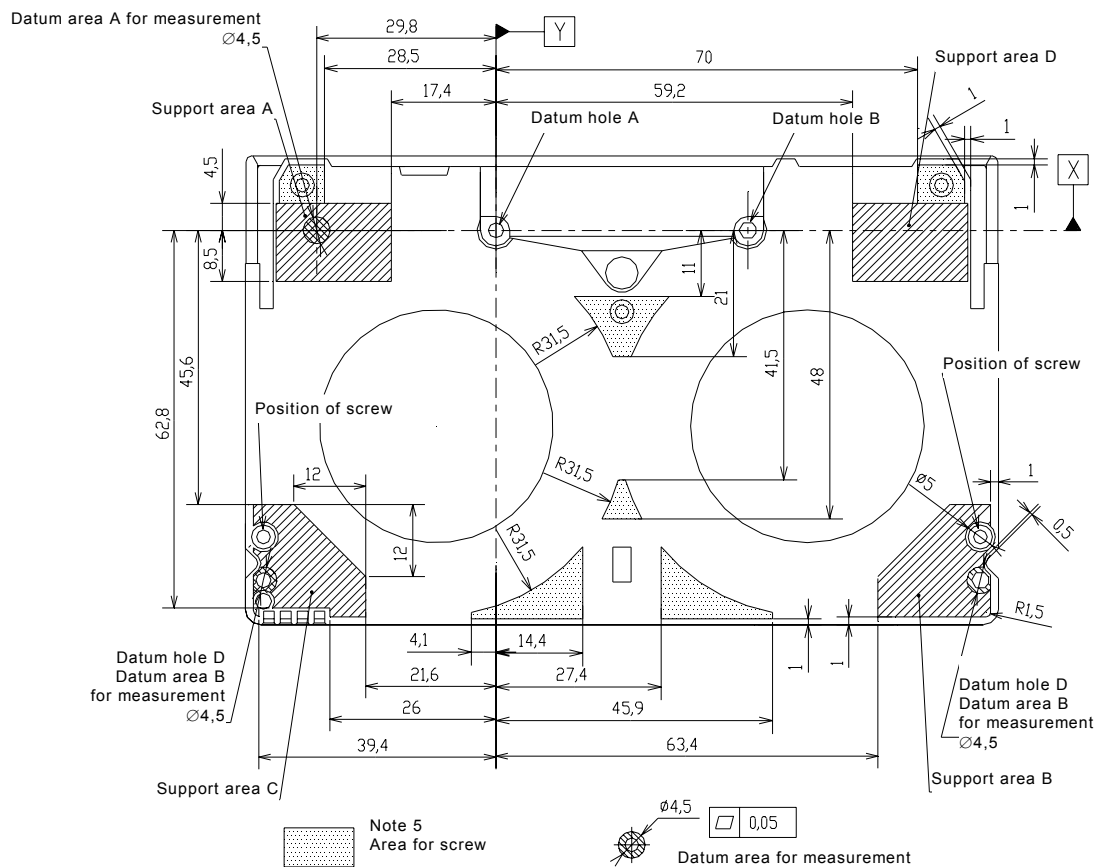
Figure 4 – Internal structure and tape path for the L cassette



Dimensions in millimetres

NOTE 5 The screw holes, if required, shall be located within the area indicated.

Figure 5 – Datum area and support area for the M cassette



IEC 1913/2000

Dimensions in millimetres

NOTE 1 Support areas A, B and C shall be coplanar with datum plane Z within $\pm 0,15$ mm.

NOTE 2 Support area D shall be coplanar with datum plane Z within $\pm 0,2$ mm.

NOTE 3 Datum areas may be used as support areas.

NOTE 4 Unless specified otherwise, datum areas and support areas exclude 0,5 mm around holes and edges with the exception of datum holes.

NOTE 5 The screw holes, if required, shall be located within the area indicated.

Figure 6 – Datum area and support area for the L cassette

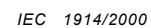
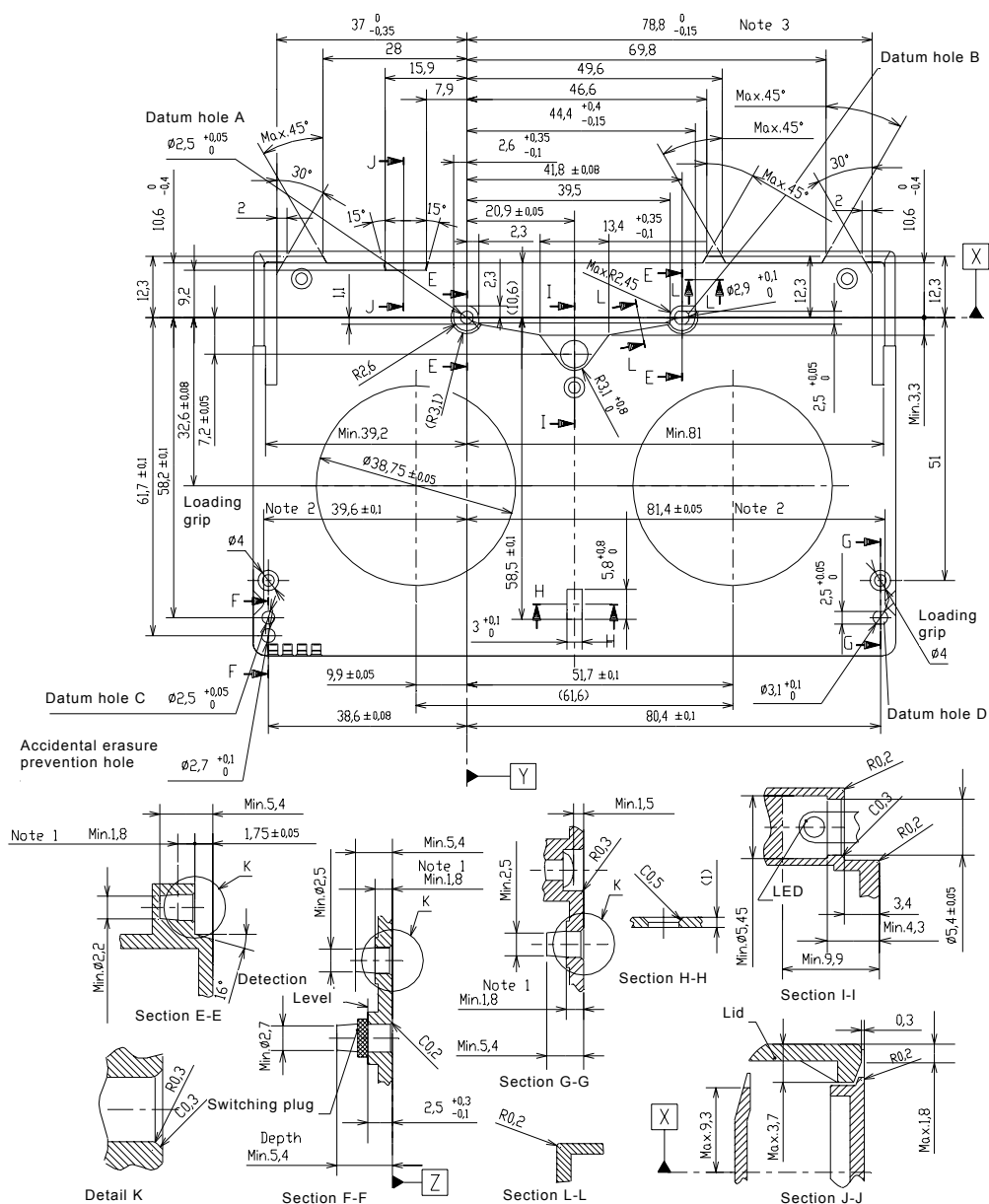


Figure 7 – Bottom view of the M cassette



IEC 1915/2000

Dimensions in millimetres

- NOTE 1 Datum holes A, B, C and D shall maintain their respective dimensions through the depth of 1,8 mm.
- NOTE 2 The tolerance applies to the region up to 6,7 mm from datum plane Z.
- NOTE 3 The tolerance applies to the region up to 4,1 mm from datum plane Z.

Figure 8 – Bottom view of the L cassette

2.1.4 Accidental erasure prevention hole

The dimensions and location of the accidental erasure prevention hole, detailed in figures 7 to 10, shall be defined as follows:

- open: total record lock out (audio, video, cue, time code and control track)
- closed: possible to record.

2.1.5 Identification board

2.1.5.1 The dimensions and location of the identification board shall be as given in figures 9 and 10.

2.1.5.2 The electrical characteristics shall be as given in tables 3 and 4, under the following conditions:

- each contact force of the connector shall be within 0,25 N to 0,4 N;
- each contact resistance of the connector shall be less than 0,5 Ω . The contact resistance shall be measured when any value of d.c. current between 50 μ A to 300 mA is applied;
- each contact impedance of the connector shall be less than 1,0 Ω . The contact impedance shall be measured when a.c. current of 10 mA at 4 MHz is applied.

Table 3 – Identification board for the M cassette

Contact number	Identification		Resistance to common ground Ω
1	Tape thickness	8,8 μ m	More than 500 k (open)
		Reserved	Reserved
2	Tape type	MP	More than 500 k (open)
		Reserved	Reserved
3	Tape grade	Standard	More than 500 k (open)
		Reserved	Reserved
4	Common ground (GND)		

Table 4 – Identification board for the L cassette

Contact number	Identification		Resistance to common ground Ω
1	Tape thickness	8,8 μ m	1,8 k $\pm$ 5 %
		Reserved	Reserved
2	Tape type	MP	Less than 2 (short)
		Reserved	Reserved
3	Tape grade	Standard	6,8 k $\pm$ 5 %
		Reserved	Reserved
4	Common ground (GND)		

2.1.6 Leader/trailer tape

2.1.6.1 The light path shall be as specified in figures 11 and 12.

2.1.6.2 The cassette shall include leader/trailer tape. When attached to the hub, the length between the splice point and the clamping point on the reel hub shall be as specified in table 5 and figures 11 and 12.

Table 5 – Length of leader/trailer tape

Cassette size	Length mm
M	75 ± 10
L	80 ± 10

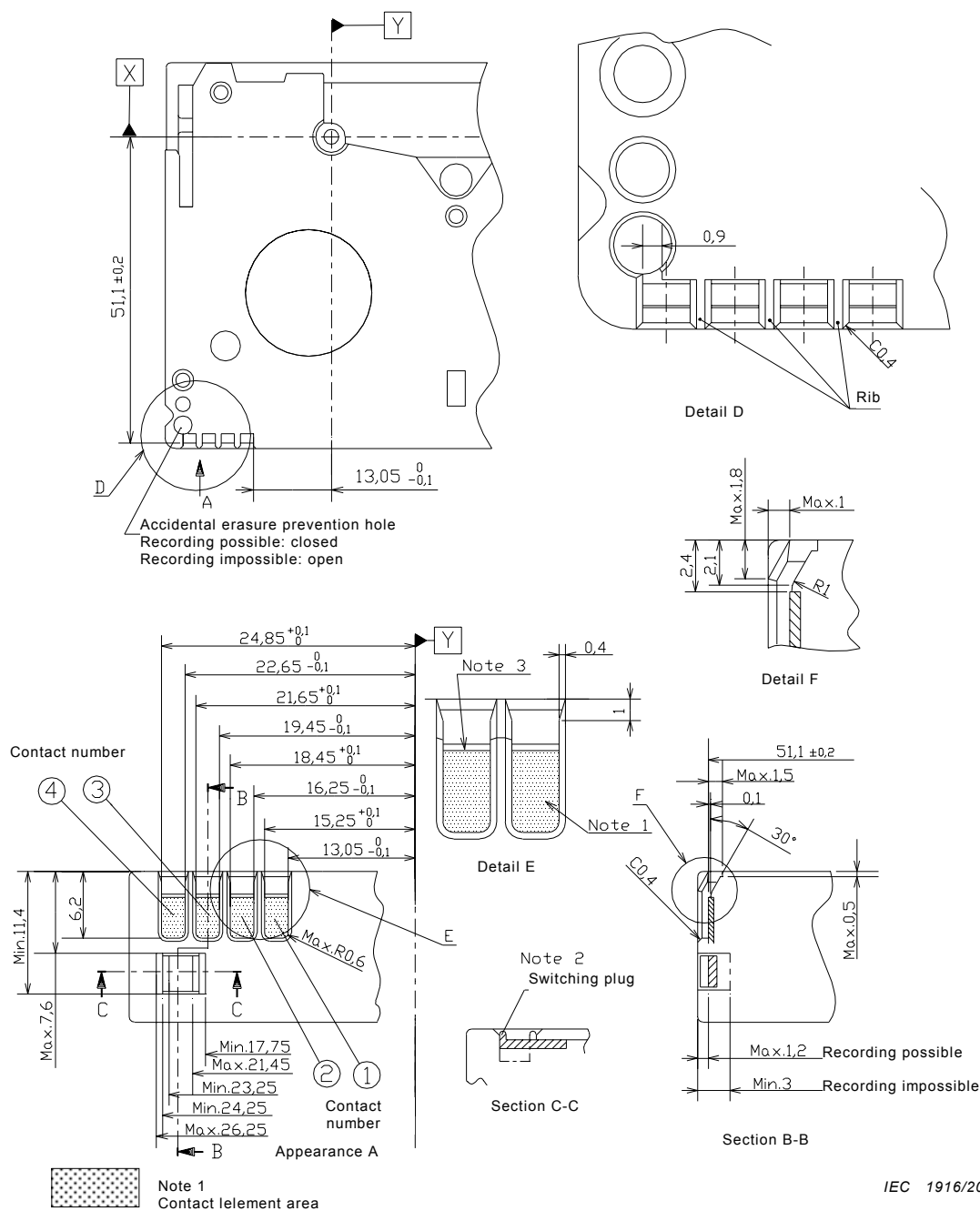
2.1.6.3 The leader/trailer tape material shall be polyester or equivalent, having a transmissivity of at least 65 % when measured with an 800 nm to 1 000 nm light source.

2.1.6.4 When attached to the hub, the leader/trailer tape shall not separate when subjected to a force of 4 N or less.

2.1.6.5 The width of the leader/trailer tape shall be $6,35^{0}_{-0,05}$ mm.

2.1.6.6 The thickness of the leader/trailer tape shall be 15^{0}_{-3} µm.

The splicing tape used to attach the leader/trailer tape shall be applied to the non-magnetic coated side.

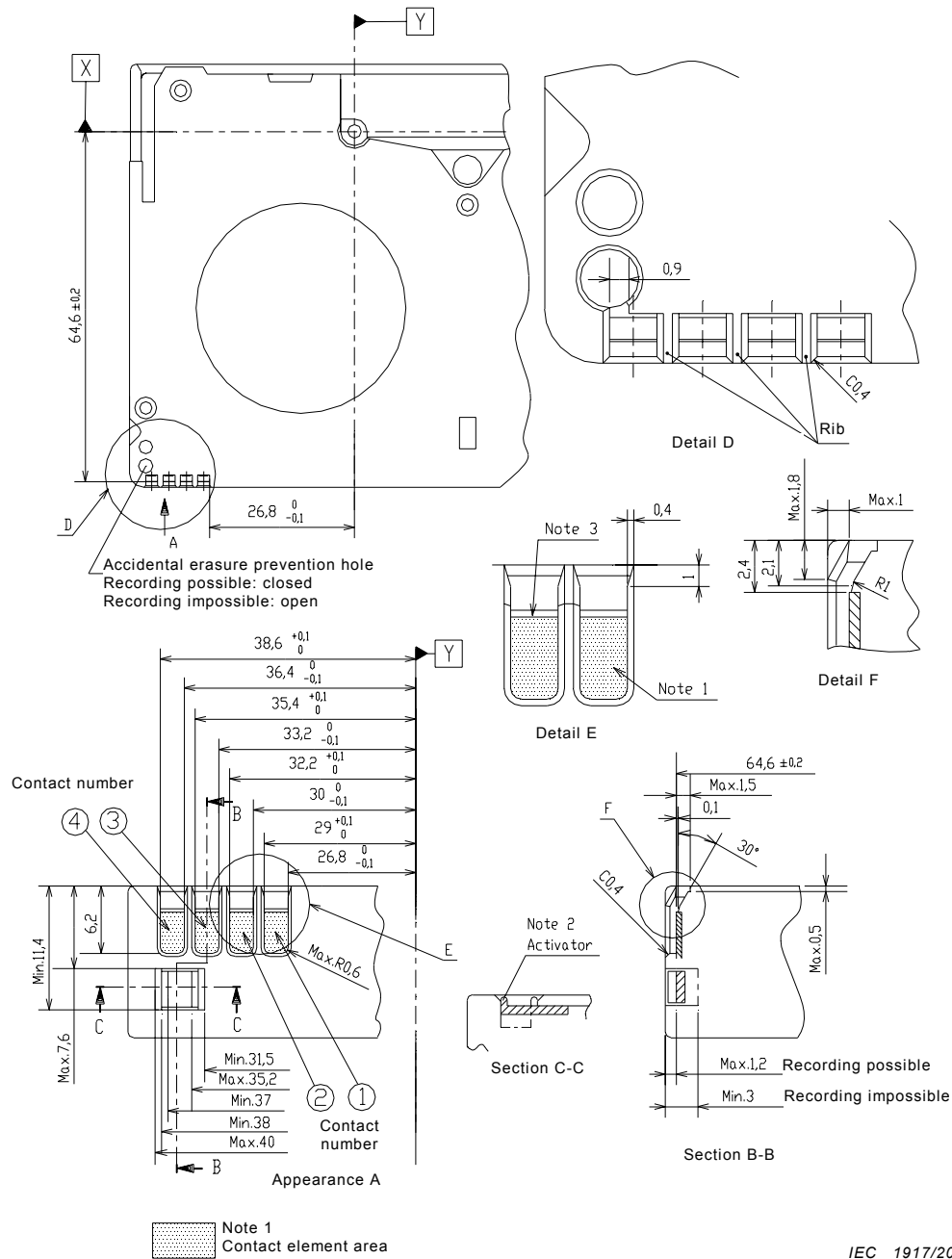


NOTE 1 The contact element shall be located within the area indicated.

NOTE 2 The activator shall not exceed the cassette surface.

NOTE 3 The spacing between the contact element and the shell shall not exceed 0,3 mm.

Figure 9 – Contact area of the ID board for the M cassette



IEC 1917/2000

Dimensions in millimetres

- NOTE 1 The contact element shall be located within the area indicated.
- NOTE 2 The activator shall not exceed the cassette surface.
- NOTE 3 The spacing between the contact element and the shell shall not exceed 0,3 mm.

Figure 10 – Contact area of the ID board for the L cassette

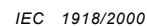
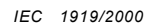


Figure 11 – Light path and leader/trailer tape for the M cassette



Dimensions in millimetres

NOTE 1 The light path, as shown, shall be unobstructed when the lid is open beyond 85°.

NOTE 2 The light path aperture shall have a 2,0 mm minimum diameter hole, but shall not exceed a 2,9 mm² area.

Figure 12 – Light path and leader/trailer tape for the L cassette

2.1.7 Reels

2.1.7.1 The dimensions of the reels and the relationship between the reels and reel tables shall be as specified in figures 13 and 14.

2.1.7.2 The reels shall be locked automatically when the cassette is removed from the recorder/player. The number and shape of the teeth as well as the locking mechanism shall be as specified in figures 15 and 16.

2.1.7.3 When a cassette is inserted into the recorder/player, the reels shall be unlocked automatically as specified in figures 15 and 16. The force needed to release the reel lock shall be less than 1,2 N.

2.1.7.4 The reels shall be held in position by a reel spring with a force as shown in table 6, when the height of the reel table support is $0,7 \text{ mm} \pm 0,25 \text{ mm}$ from datum plane Z, as shown in figures 13 to 14.

Table 6 – Reel spring force

Cassette size	Force N
M	$0,9 \pm 0,25$
L	$0,9 \pm 0,25$

2.1.8 Lid

2.1.8.1 The lid shall be unlocked and opened by the recorder/player when the cassette is inserted.

2.1.8.1.1 The lid shall be unlocked by a force of less than 0,2 N exerted upon each release member, as specified in figures 17 and 18.

2.1.8.1.2 The inner door shall be lifted by the recorder/player to the position shown in figures 19 and 20.

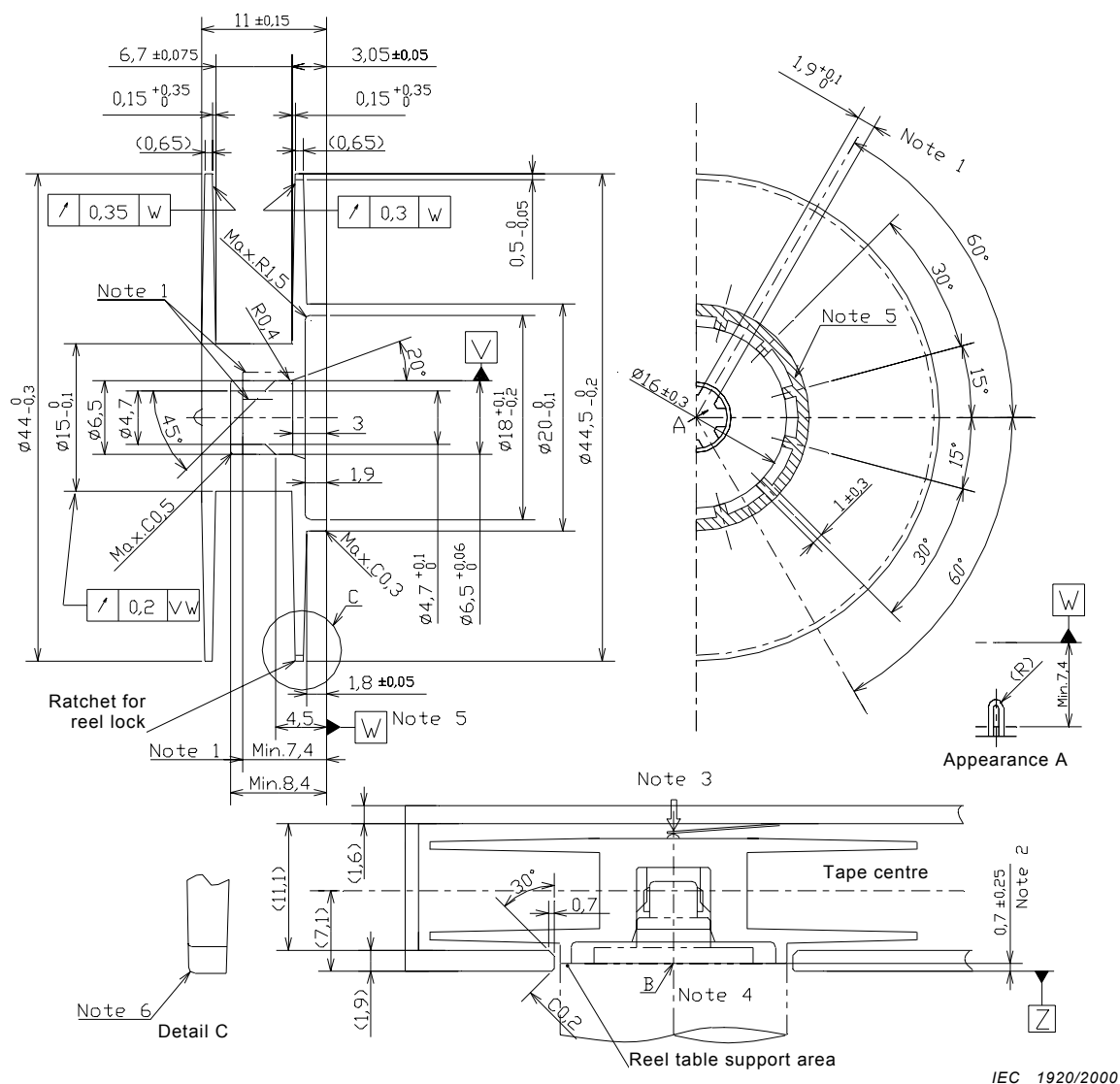
2.1.8.1.3 The outer door shall be lifted by the recorder/player to the position shown in figures 21 and 22.

2.1.8.2 The minimum space of cassettes for the video tape recording loading mechanism shall be as shown in figures 19 and 20. The shaded area of figures 19 and 20 is intended to indicate to VTR manufacturers the area available for loading (threading) the tape. Note that the dimensions defining this space are not the cassette dimensions.

2.1.8.3 When open, the outer door shall not exceed 19,6 mm with respect to datum plane Z, as specified in figures 21 and 22.

2.1.8.4 When the cassette is removed from the recorder/player, the lid shall lock automatically.

2.1.8.5 The maximum force to open the lid shall be less than 1 N up to the 19,6 mm height defined in figures 21 and 22.



IEC 1920/2000

Dimensions in millimetres

NOTE 1 All dimensioned tolerances for the reel drive holes shall be maintained through the depth of 7,4 mm.

NOTE 2 Height of the reel table.

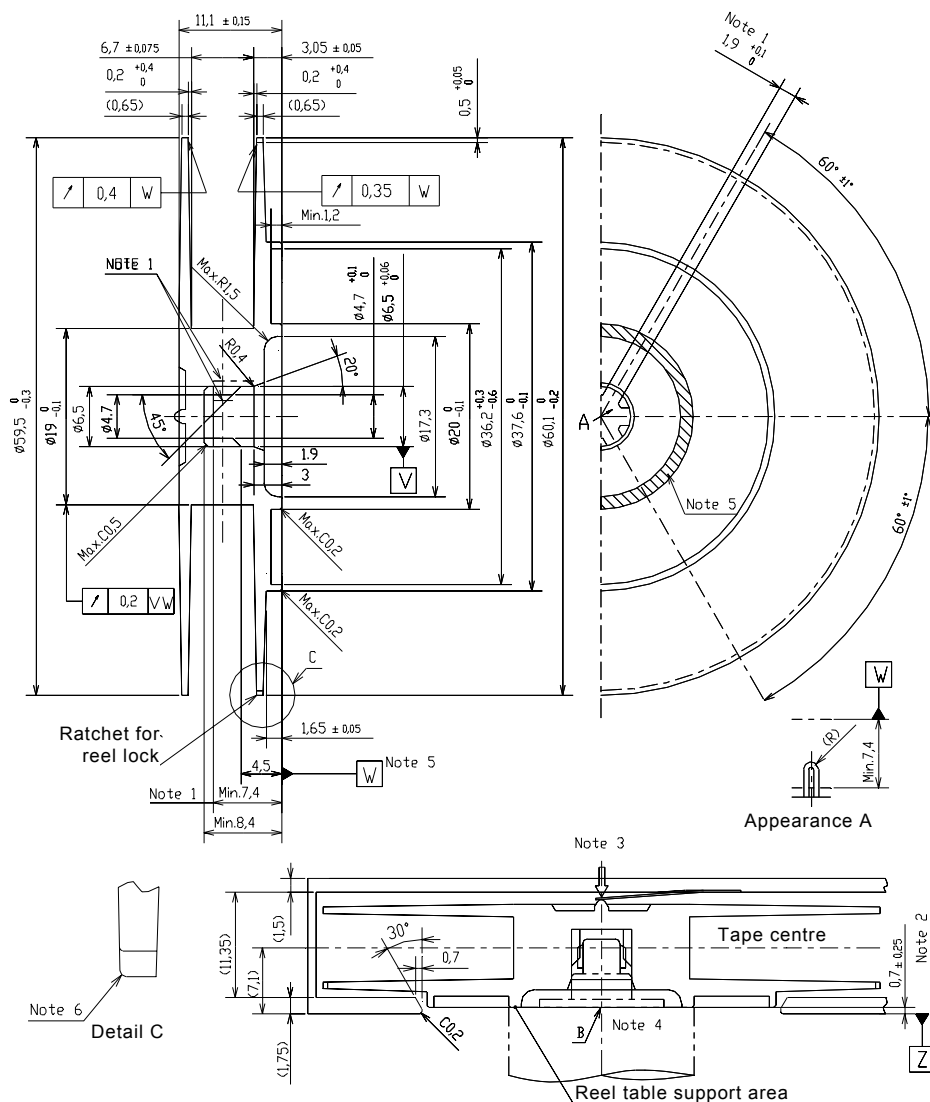
NOTE 3 The reel spring pressure force shall be within a force range of 0,65 N to 1,15 N when the height of the reel table support area is 0,7 mm ± 0,25 mm from datum plane Z.

NOTE 4 The flange of the reel shall not contact with the shell of the cassette when the height of the reel table is 0,7 mm ± 0,25 mm from datum plane Z and the reel table is inclined by 30 min.

NOTE 5 Datum plane W shall be defined by the circular area as indicated.

NOTE 6 The serration of the reel flange shall not contain sharp edges.

Figure 13 – Reels for the M cassette



IEC 1921/2000

Dimensions in millimetres

NOTE 1 All dimensioned tolerances for the reel drive holes shall be maintained through the depth of 7,4 mm.

NOTE 2 Height of the reel table.

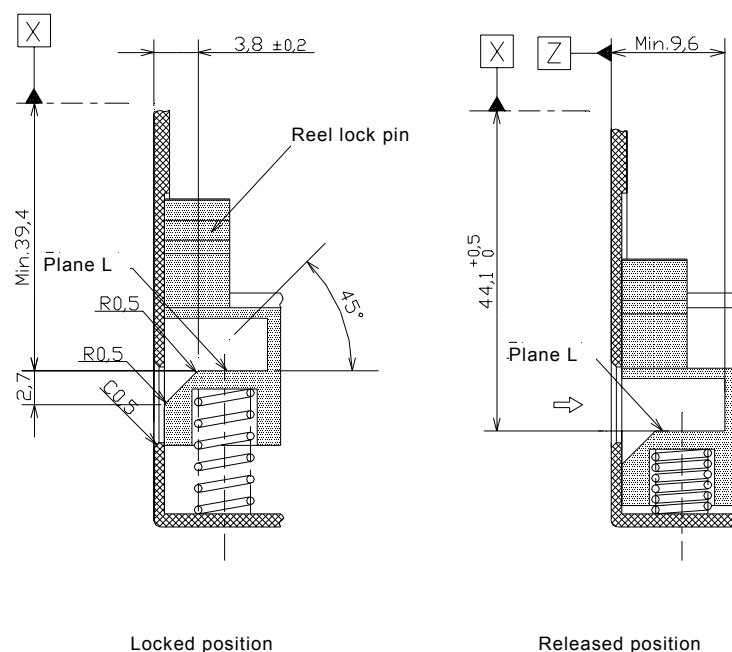
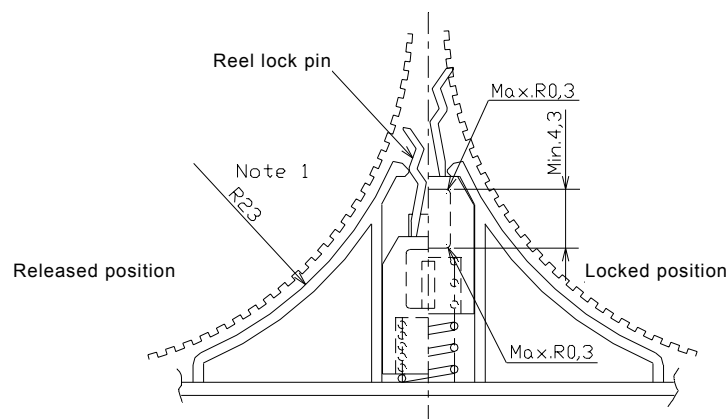
NOTE 3 The reel spring pressure force shall be within a force range of 0,65 N to 1,15 N when the height of the reel table support area is 0,7 mm ± 0,25 mm from datum plane Z.

NOTE 4 The flange of the reel shall not contact with the shell of the cassette when the height of the reel table is 0,7 mm ± 0,25 mm from datum plane Z and the reel table is inclined by 30 min.

NOTE 5 Datum plane W shall be defined by the circular area as indicated.

NOTE 6 The serration of the reel flange shall not contain sharp edges.

Figure 14 – Reels for the L cassette

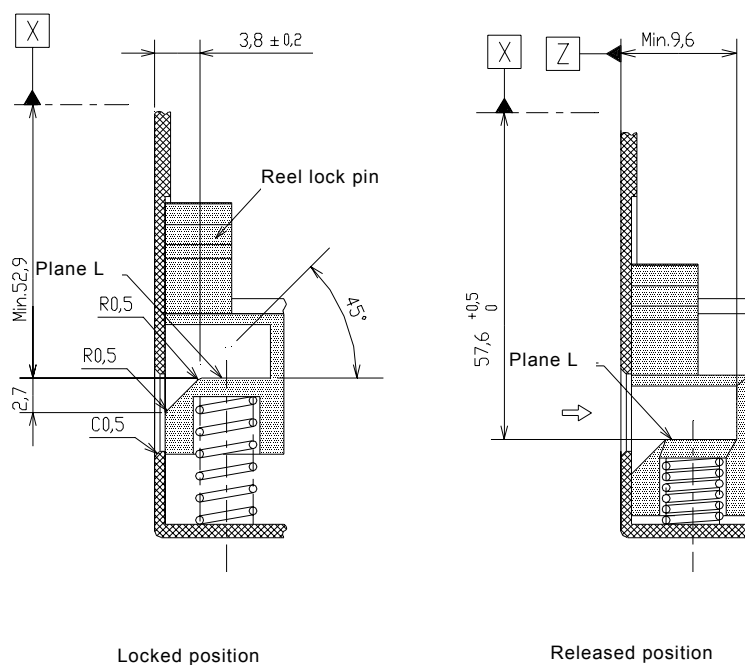
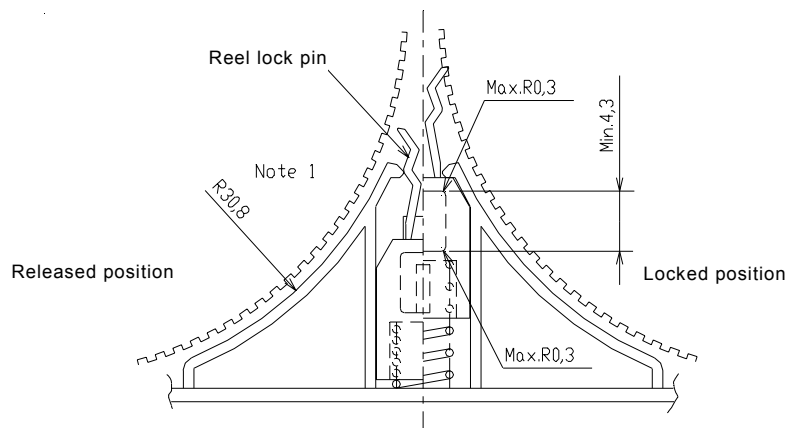


IEC 1922/2000

Dimensions in millimetres

NOTE The engaging point of the reel lock pin, when disengaged and plane L of the reel lock located 44,1 mm from datum plane X shall be clear of the 23 mm radius circle.

Figure 15 – Reel lock and release for the M cassette

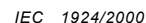


IEC 1923/2000

Dimensions in millimetres

NOTE The engaging point of the reel lock pin, when disengaged and plane L of the reel lock located 57,6 mm from datum plane X shall be clear of the 30,8 mm radius circle.

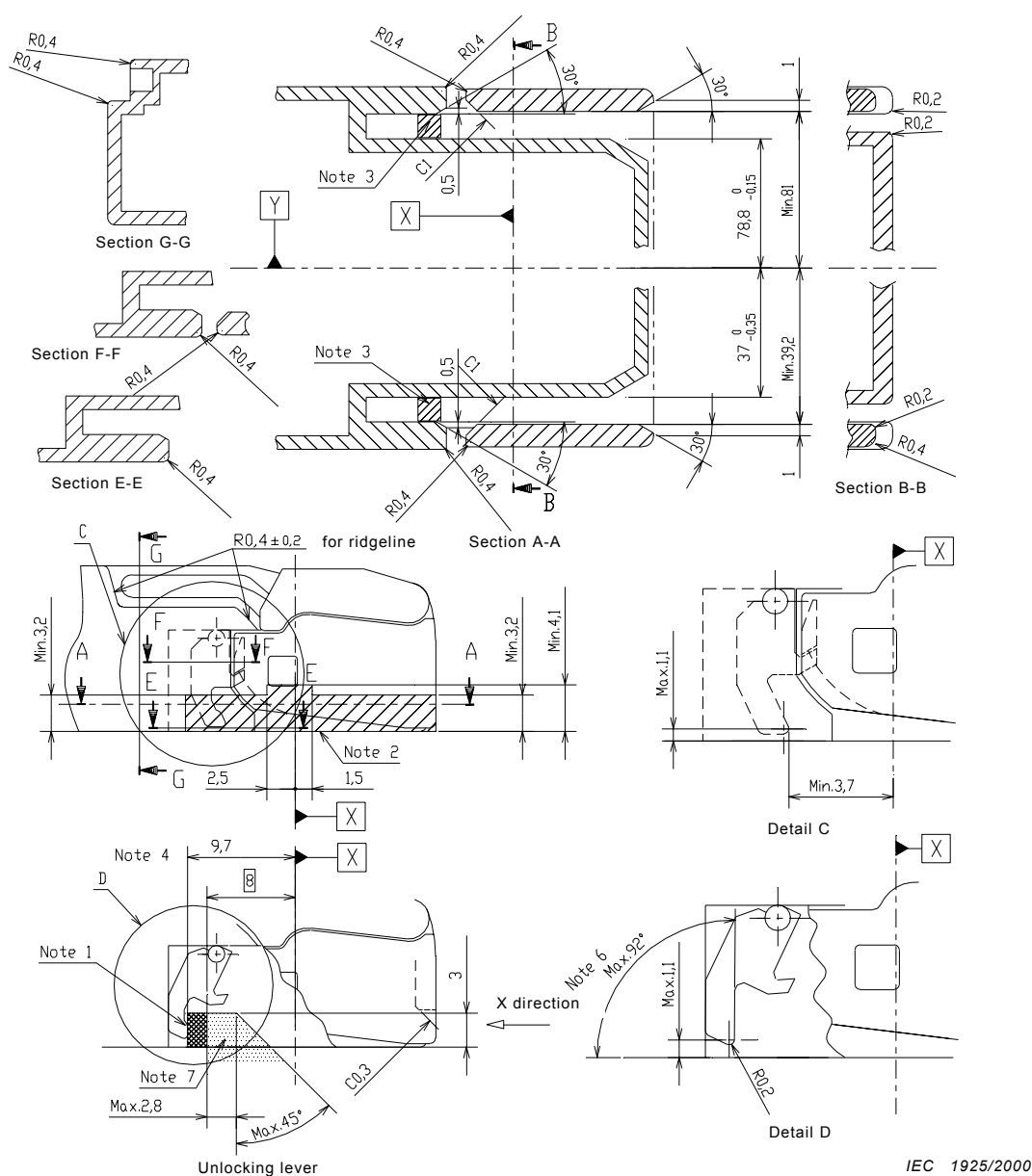
Figure 16 – Reel lock and release for the L cassette



Dimensions in millimetres

- NOTE 1 When the unlocking lever is in the cross-hatched area, the lid locks shall be released.
- NOTE 2 Lid lock unlocking lever insertion area.
- NOTE 3 The cassette shall be provided with lid locks on the take-up side and the supply side.
- NOTE 4 The lid lock levers shall be stopped within $8,9 \text{ mm} \pm 0,2 \text{ mm}$, as indicated.
- NOTE 5 The loading mechanism shall be provided with unlocking levers for the lid locks on both sides.
- NOTE 6 The angle shall be effective to a height $3,2 \text{ mm min.}$ from the bottom of the cassette.
- NOTE 7 The unlocking lever shall be contained within the indicated area.
- NOTE 8 The lid lock shall not extend beyond the bottom of the cassette in any position.

Figure 17 – Lid lock and release for the M cassette



Dimensions in millimetres

- NOTE 1 When the unlocking lever is in the cross-hatched area, the lid locks shall be released.
- NOTE 2 Lid lock unlocking lever insertion area.
- NOTE 3 The cassette shall be provided with lid locks on the take-up side and the supply side.
- NOTE 4 The lid lock levers shall be stopped within $9,7 \text{ mm} \pm 0,2 \text{ mm}$, as indicated.
- NOTE 5 The loading mechanism shall be provided with unlocking levers for the lid locks on both sides.
- NOTE 6 The angle shall be effective to a height $3,2 \text{ mm}$ min. from the bottom of the cassette.
- NOTE 7 The unlocking lever shall be contained within the indicated area.
- NOTE 8 The lid lock shall not extend beyond the bottom of the cassette in any position.

Figure 18 – Lid lock and release for the L cassette

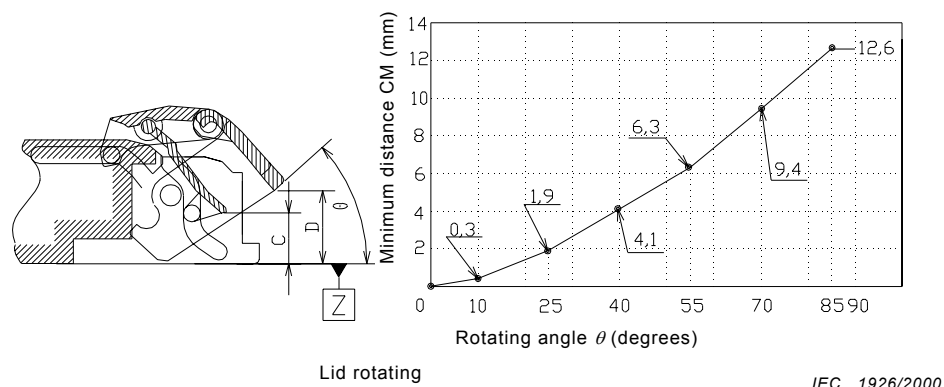
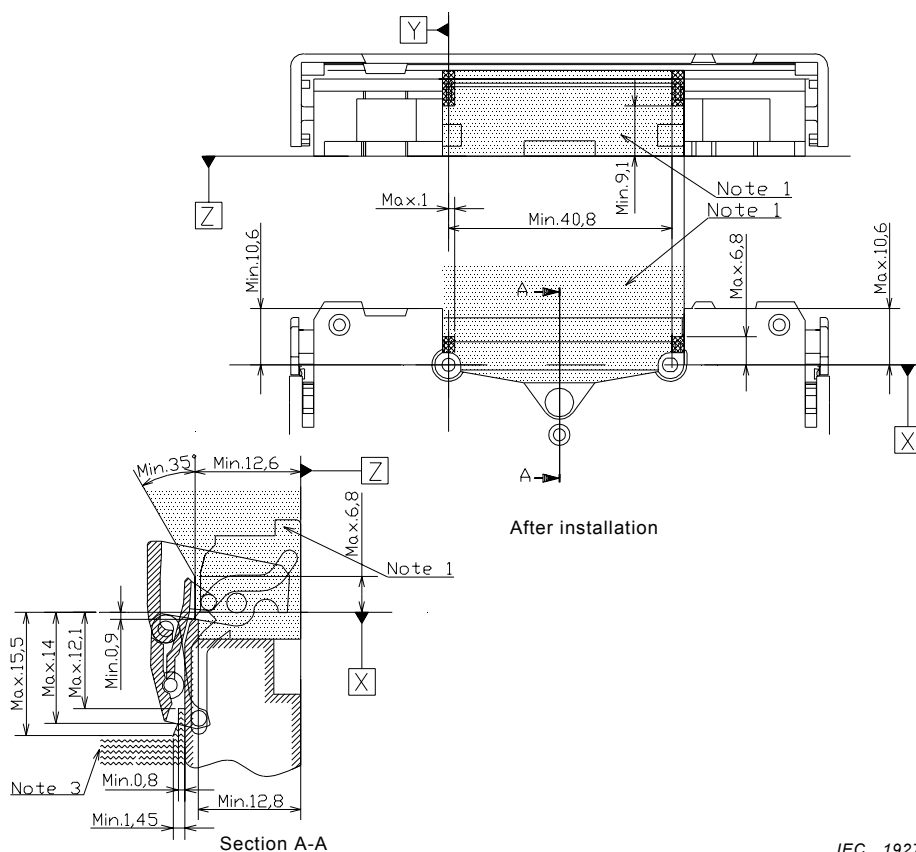


Figure 19a – Movement of inner lid



Dimensions in millimetres

NOTE 1 Area available for tape loading mechanism when the lid is open between 85° and 90°. All cross-hatched areas are excluded.

NOTE 2 Distance C between the inner lid and datum plane Z shall be more than the minimum distance CM defined in figure 19a. Distance D shall be more than distance C when the rotating angle is 15° or more.

NOTE 3 Defines the space available for the cassette holding mechanism while the lid is in motion (see note 7 in figure 1).

Figure 19 – Space of the M cassette for the VTR loading mechanism

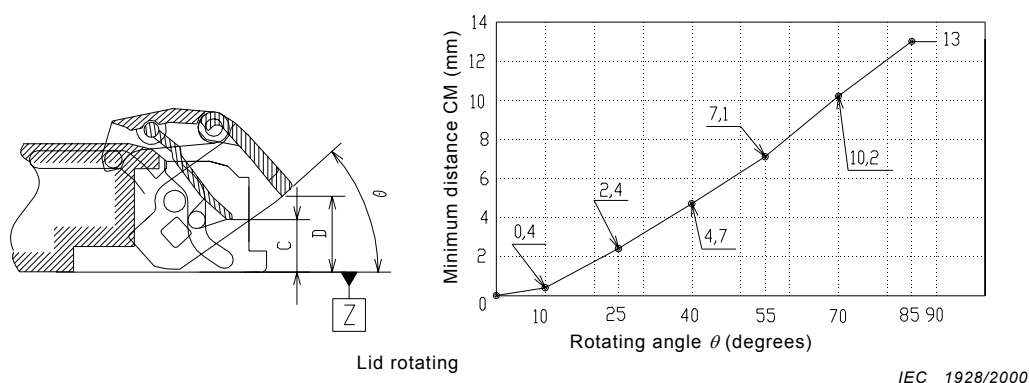
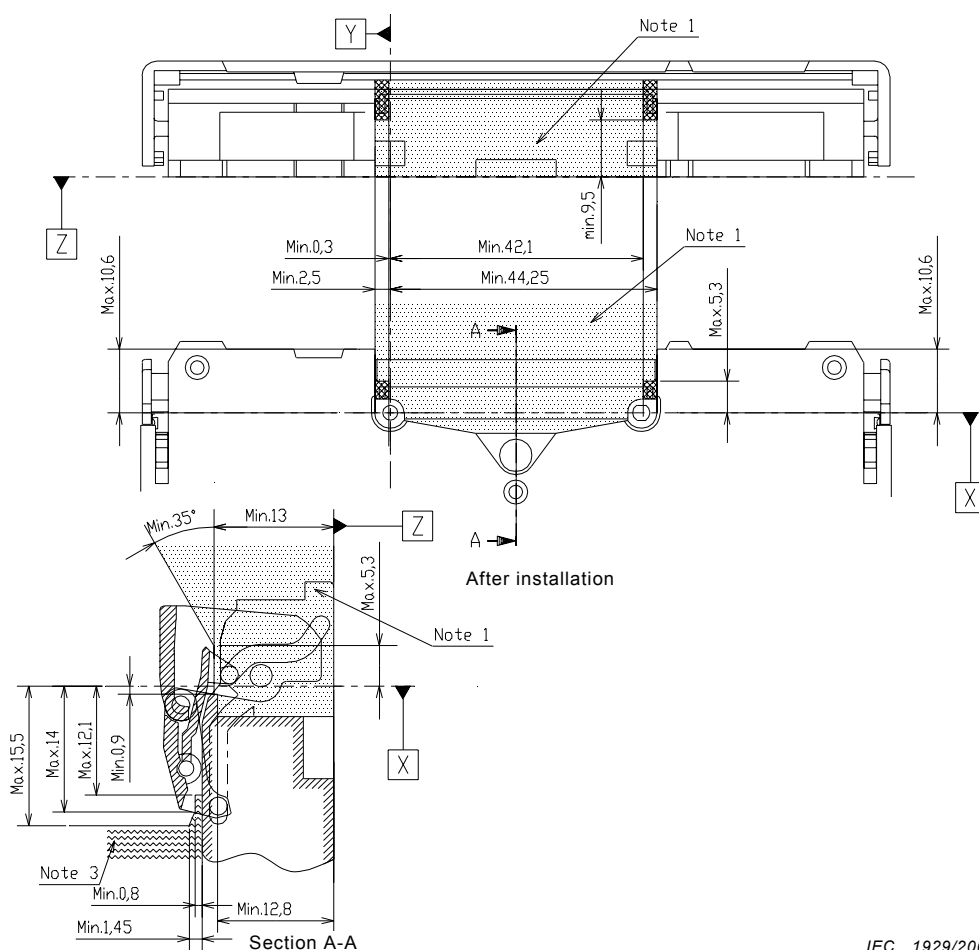


Figure 20a – Movement of inner lid



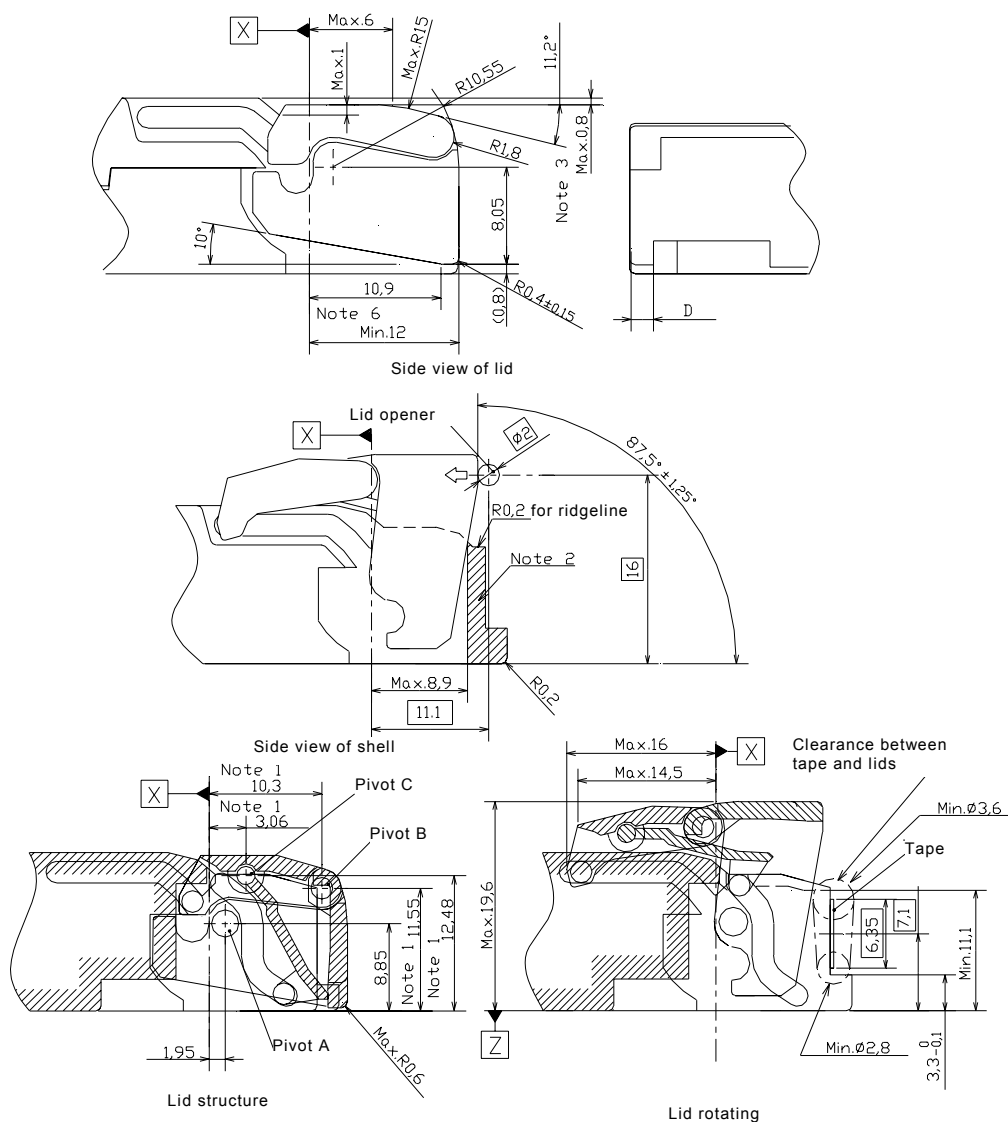
Dimensions in millimetres

NOTE 1 Area available for tape loading mechanism when the lid is open between 85° and 90°. All cross-hatched areas are excluded.

NOTE 2 Distance C between the inner lid and datum plane Z shall be more than the minimum distance CM defined in figure 20a. Distance D shall be more than distance C when the rotating angle is 15° or more.

NOTE 3 Defines the space available for the cassette holding mechanism while the lid is in motion (see note 7 in figure 2).

Figure 20 – Space of the L cassette for the VTR loading mechanism

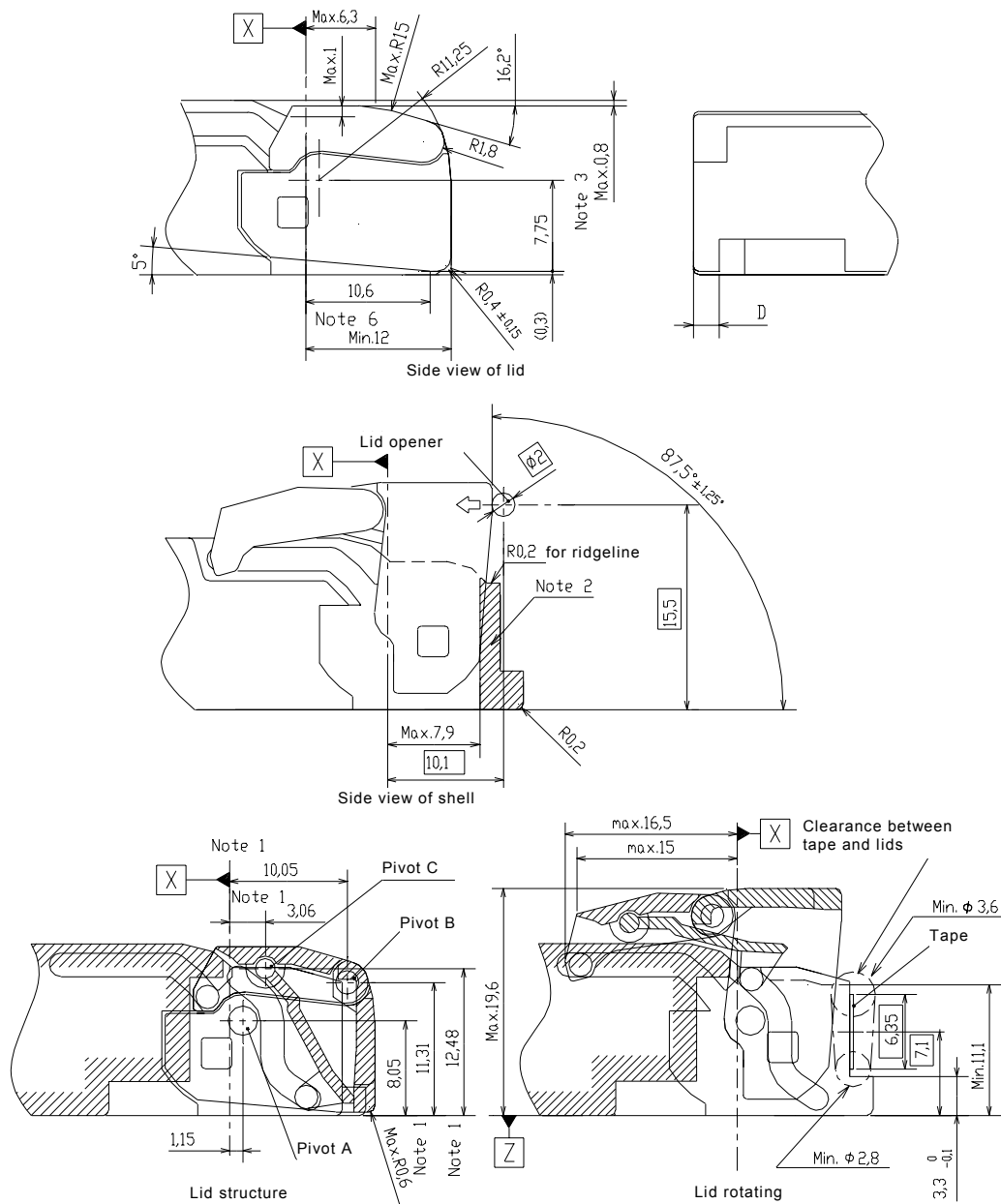


IEC 1930/2000

Dimensions in millimetres

- NOTE 1 Recommended value for design.
- NOTE 2 The difference in level between both shells shall not exceed a distance of 0,2 mm in this area.
- NOTE 3 The height of the lid shall not exceed the height of the shell.
- NOTE 4 The recorder/player shall be provided with a lid opener on the take-up side of the cassette.
- NOTE 5 The lid lock shall not extend beyond the bottom of the cassette in any position.
- NOTE 6 The dimension applies to the lid side piece, indicated as D.

Figure 21 – Lid for the M cassette



IEC 1931/2000

Dimensions in millimetres

- NOTE 1 Recommended value for design.
- NOTE 2 The difference in level between both shells shall not exceed a distance of 0,2 mm in this area.
- NOTE 3 The height of the lid shall not exceed the height of the shell.
- NOTE 4 The recorder/player shall be provided with a lid opener on the take-up side of the cassette.
- NOTE 5 The lid lock shall not extend beyond the bottom of the cassette in any position.
- NOTE 6 The dimension applies to the lid side piece, indicated as D.

Figure 22 – Lid for the L cassette

2.2 Video tape specification

2.2.1 Base

The base material shall be polyester or equivalent.

2.2.2 Width

The tape width shall be 6,350 mm $\pm$ 0,005 mm.

The tape, covered with glass, is measured without tension at a minimum of five different positions along the tape using a calibrated comparator having an accuracy of 0,001 mm (1 μ m). The tape width shall be within the aforementioned specification at any measuring position.

2.2.3 Width fluctuation

Tape width fluctuation shall not exceed 5 μ m peak-to-peak. The measurement of tape width fluctuation shall be taken over a tape length of 900 mm. The tape width fluctuation shall be within the aforementioned specification at each of ten equally spaced points in the 900 mm span.

2.2.4 Reference edge straightness

The reference edge straightness maximum deviation is 6 μ m peak-to-peak. Edge straightness fluctuation is measured at the edge of a moving tape guided by three guides having contact on the same edge and having a distance of 85 mm from the first to the second guide and 85 mm from the second to the third guide. Edge measurements are averaged over 10 m length and are made 5 mm from the midpoint between the first and second guide towards the first guide.

2.2.5 Tape thickness

The total tape thickness shall be 8,8 $^{0}_{-0,8}$ μ m.

2.2.6 Transmissivity

Transmissivity shall be less than 5 %, measured over the range of wavelengths 800 nm to 1 000 nm.

2.2.7 Offset yield strength

The offset yield strength shall be greater than 3 N. The force to produce 0,2 % elongation of a 1 000 mm test sample with a pull rate of 10 mm per minute shall be used to confirm the offset yield strength. The line beginning at 0,2 % elongation parallel to the initial tangential slope is drawn and then read at the point of intersection of the line and the stress-strain curve.

2.2.8 Magnetic coating

The magnetic layer of the tape shall consist of a coating of metal particles or equivalent.

2.2.9 Coating coercivity

The magnetic coating coercivity shall be a class 2 300 (approximately 2 300 Oe/184 000 A/m), with an applied field of 10 000 Oe/800 000 A/m measured by a VSM.

3 Helical recordings

3.1 Tape speed

The tape speed shall be 33,8201 mm/s for the 525/60 system and 33,8539 mm/s for the 625/50 system. The tolerance shall be $\pm 0,2\%$.

3.2 Sectors

Each recorded track contains an ITI sector, an audio sector, a video sector and a subcode sector.

3.3 Record location and dimensions

3.3.1 The record location and dimensions for continuous recording shall be as specified in figures 23 and 24 and table 7 (525/60 system) or table 8 (625/50 system). In recording, sector locations on each helical track shall be contained within the tolerance specified in figure 23 and table 7 (525/60 system) or table 8 (625/50 system).

3.3.2 The reference edge of the tape for dimensions specified in this standard shall be the lower edge as shown in figure 23. The magnetic coating, with the direction of tape travel as shown in figure 23, is on the side facing the observer.

3.3.3 As indicated in figure 23, this standard anticipates a zero guard band between recorded tracks and the nominal record head width shall be equal to the track pitch of 18 μm . The scanner head configuration should be chosen such that the recorded track widths are contained within the limits of 16 μm to 20 μm .

3.3.4 The format requires flying erasure for recording. In insert editing, this standard provides a guard band of $3\ \mu\text{m} \pm 1,5\ \mu\text{m}$ between the previously recorded track and the inserted track at editing points only. A typical track pattern for insert editing is shown in figure C.1.

3.4 Helical track record tolerance zones

The center of two consecutive tracks starting at the first track in each video frame shall be contained within the pattern of the two tolerance zones established in figure 25. Each zone is defined by two parallel lines which are inclined at an angle of $9,1784^\circ$ basic with respect to the tape reference edge. The centerlines of each zone shall be spaced apart 18,0 μm basic. The width of zone 1 shall be 3 μm and the width of zone 2 shall be 5 μm . These zones are established to contain track angle errors, track straightness errors and vertical head offset tolerance (the measuring technique is shown in annex B).

3.5 Relative positions of recorded information

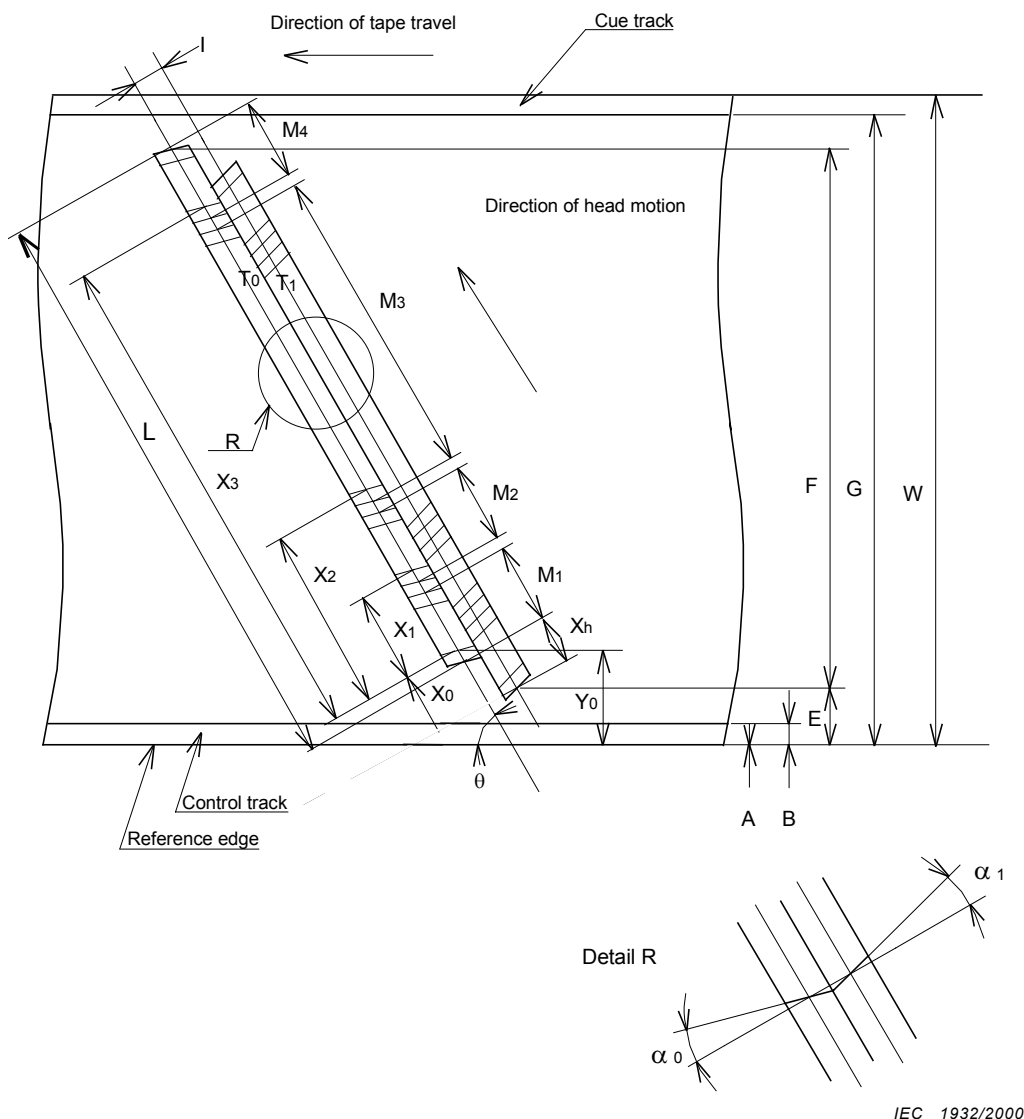
3.5.1 Relative positions of longitudinal tracks

Audio, video, control track and cue track with information intended to be time-coincident shall be positioned as shown in figures 23 and 24.

3.5.2 Programme area reference point

The programme area reference point is determined by the intersection of a line parallel to the reference edge of the tape at a distance Y_0 from the reference edge and the centreline of track 0 in each ITI sector (see figures 23 and 24).

The end of the preamble and beginning of SSA in the ITI sector shall be recorded at the programme area reference point, and the tolerance of dimension X_0 . The locations are shown in figures 23 and 24; dimensions X_0 and Y_0 are specified in tables 7 and 8. The relationship between sectors and contents of each sector is specified in clause 6.



NOTE 1 M_1 is an ITI sector.

NOTE 2 M_2 is an audio sector.

NOTE 3 M_3 is a video sector.

NOTE 4 M_4 is a subcode sector.

NOTE 5 Tracks viewed from magnetic coating side.

NOTE 6 Dimensions X_1 to X_3 are determined by the programme reference point as defined in figure 24.

Figure 23 – Location and dimensions of recorded tracks

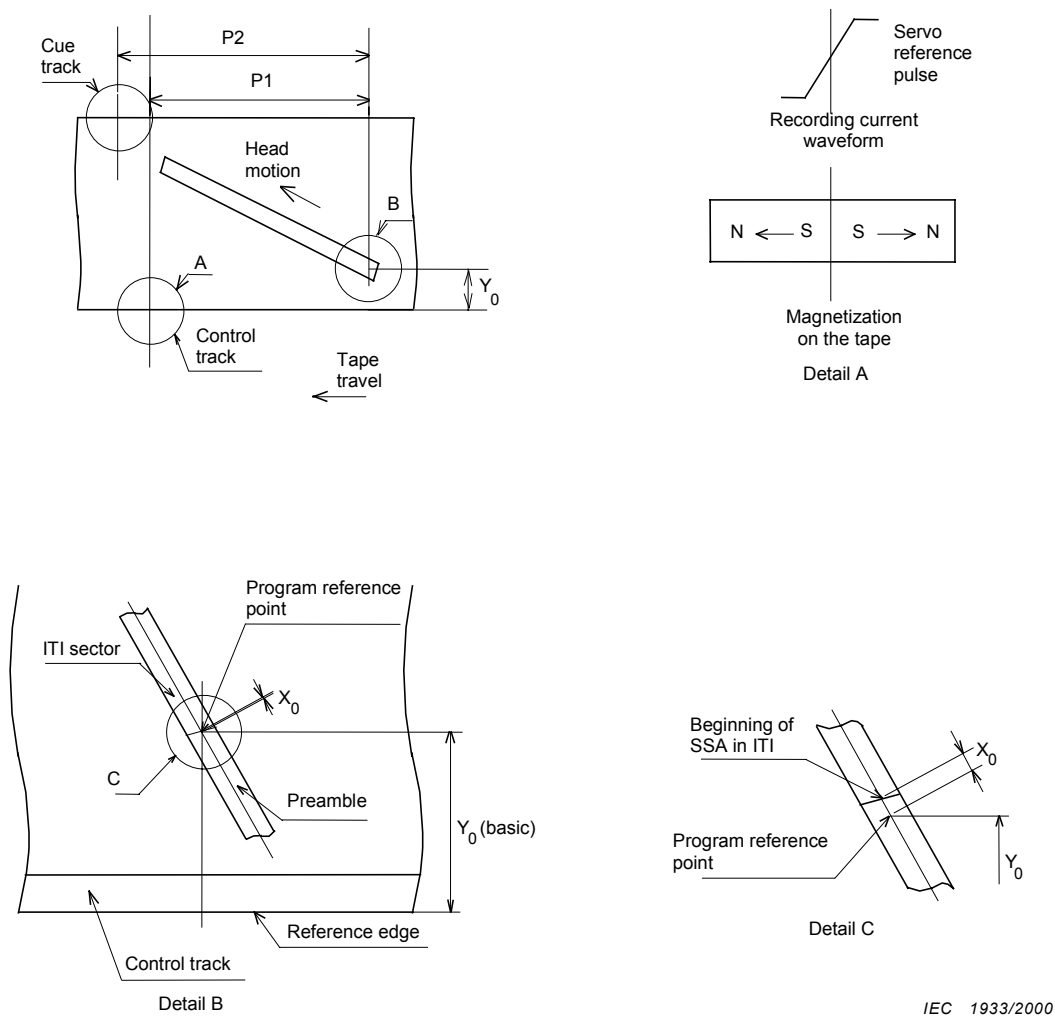


Figure 24 – Location of the cue and control track recording

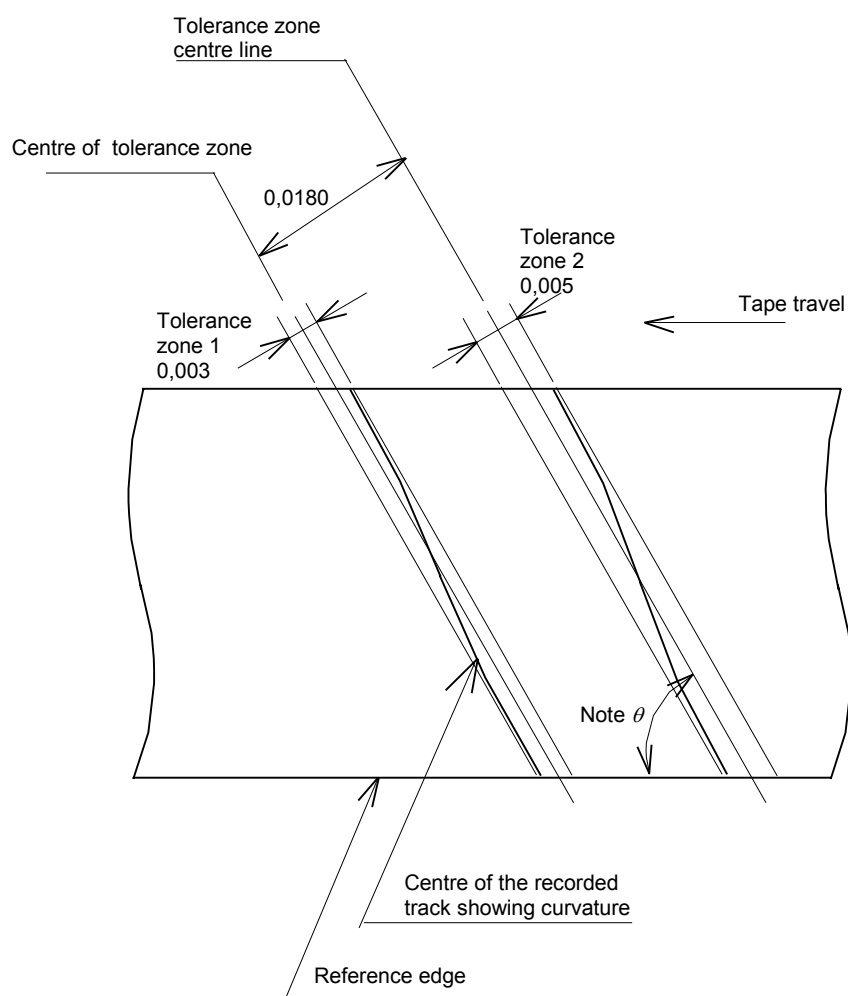
Table 7 – Recording location and dimensions (525/60 system)

Dimensions		Dimensions in millimetres	
		Nominal	Tolerance
A	Control track lower edge	0	Basic
B	Control track upper edge	0,400	$\pm 0,050$
E	Programme area lower edge	0,560	Derived
F	Programme area width	5,24	Derived
G	Cue track lower edge	6,000	$\pm 0,050$
I	Helical track pitch	0,018	Reference
L	Total length of helical track	32,842	Derived
M ₁	Length of ITI sector with postamble and preamble	0,876	Derived
M ₂	Length of audio sector with postamble and preamble	2,810	Derived
M ₃	Length of video sector with postamble and preamble	27,548	Derived
M ₄	Length of subcode sector with postamble and preamble	0,906	Derived
P ₁	Control track reference pulse to programme reference point (see figure 24)	67,500	$\pm 0,030$
P ₂	Cue signal, start of code word of cue to programme reference point (see figure 24)	69,900	$\pm 0,300$
W	Tape width	6,350	$\pm 0,005$
X ₀	Location of beginning of SSA in ITI sector	0	$\pm 0,050$
X ₁	Location of start of audio data sync blocks	0,809	$\pm 0,050$
X ₂	Location of start of video data sync blocks	3,790	$\pm 0,050$
X ₃	Location of start of subcode data sync blocks	31,885	$\pm 0,050$
X _h	Head stagger and inline tolerance	0,111	$\pm 0,021$
Y ₀	Programme track reference point	0,615	Basic
θ	Track angle	9,1784°	Basic
α_0	Azimuth angle (track 0)	19,97°	$\pm 0,150^\circ$
α_1	Azimuth angle (track 1)	20,03°	$\pm 0,150^\circ$
NOTE The measurements shall be made under the conditions specified in 1.4. The measurements shall be corrected to account for the actual tape speed (see figures B.1 and B.2).			

Table 8 – Recording location and dimensions (625/50 system)

Dimensions in millimetres

Dimensions		Nominal	Tolerance
A	Control track lower edge	0	Basic
B	Control track upper edge	0,400	$\pm 0,050$
E	Programme area lower edge	0,560	Derived
F	Programme area width	5,240	Derived
G	Cue track lower edge	6,000	$\pm 0,050$
I	Helical track pitch	0,018	Reference
L	Total length of helical track	32,842	Derived
M ₁	Length of ITI sector with postamble and preamble	0,877	Derived
M ₂	Length of audio sector with postamble and preamble	2,813	Derived
M ₃	Length of video sector with postamble and preamble	27,576	Derived
M ₄	Length of subcode sector with postamble and preamble	0,877	Derived
P ₁	Control track reference pulse to programme reference point (see figure 24)	67,500	$\pm 0,030$
P ₂	Cue signal, start of code word of cue to programme reference point (see figure 24)	70,380	$\pm 0,300$
W	Tape width	6,350	$\pm 0,005$
X ₀	Location of beginning of SSA in ITI sector	0	$\pm 0,050$
X ₁	Location of start of audio data sync blocks	0,810	$\pm 0,050$
X ₂	Location of start of video data sync blocks	3,793	$\pm 0,050$
X ₃	Location of start of subcode data sync blocks	31,917	$\pm 0,050$
Xh	Head stagger and inline tolerance	0,111	$\pm 0,021$
Y ₀	Programme track reference point	0,615	Basic
θ	Track angle	9,1784°	Basic
α_0	Azimuth angle (track 0)	19,97°	$\pm 0,150^\circ$
α_1	Azimuth angle (track 1)	20,03°	$\pm 0,150^\circ$
NOTE The measurements shall be made under the conditions specified in 1.4. The measurements shall be corrected to account for the actual tape speed (see figures B.1 and B.2).			



IEC 1934/2000

Dimensions in millimetres

NOTE $\theta = 9,1784^\circ$.

Figure 25 – Location and dimensions of the tolerance zone of the helical track recording

3.6 Gap azimuth

3.6.1 Cue and control track

The azimuth angle of the cue and control track head gaps used to produce longitudinal track recordings shall be perpendicular to the track recording.

3.6.2 Helical track

The azimuth of the head gaps used for the helical track shall be inclined at angles α_0 and α_1 , as specified in tables 7 and 8, with respect to a line perpendicular to the helical track. The azimuth of the track 0 of every field shall be oriented in the clockwise direction with respect to a line perpendicular to the helical track direction when viewed from the side of the tape containing the magnetic recording.

3.7 Transport and scanner

The effective drum diameter, tape tension, helix angle and tape speed taken together determine the track angle. Different methods of design and/or variations in drum diameter and tape tension can produce equivalent recordings for interchange purposes.

A possible configuration of the transport uses a scanner with an effective diameter of 21,700 mm. The scanner rotation is in the same direction as the tape motion during normal playback mode. Data is recorded by two heads each mounted 180° apart. Figure 26 shows a possible mechanical configuration of the scanner and the relationship between the longitudinal heads and the scanner. Table 9 shows the corresponding mechanical parameters.

Other mechanical configurations are allowable provided the same footprint of recorded information is produced on tape.

Table 9 – Parameters for a possible scanner design

Parameters	525/60 system	625/50 system
Scanner rotation speed (rpm)	8 991	9 000
Number of tracks per rotation	2	
Drum diameter (mm)	21,700	
Center span tension (N)	0,09	
Helix angle (degrees)	9,1500	
Effective wrap angle (degrees)	174	
Scanner circumferential speed (m/s)	10,182	10,192
H1, H3 overwrap head entrance (degrees)	5	
H1, H3 overwrap head exit (degrees)	6	
Maximum tip projection (μm)	20	
Record head track width (μm)	18	