

Specification for

Helical-scan digital composite video cassette recording system using 19 mm magnetic tape, format D2 (NTSC, PAL, PAL-M)

The European Standard EN 61179:1993 has the status of a
British Standard

UDC 621.397.43

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National foreword

This British Standard has been prepared under the direction of the Electronic Equipment Standards Policy Committee and is the English language version of EN 61179:1993 *Helical-scan digital composite video cassette recording system using 19 mm magnetic tape, format D2 (NTSC, PAL, PAL-M)*, published by the European Committee for Electrotechnical Standardization (CENELEC). It is identical with IEC 1179:1993 published by the International Electrotechnical Commission (IEC).

Copies of International Radio Consultative Committee (CCIR), International Telegraph and Telephone Consultative Committee (CCITT) and Institute of Electrical and Electronic Engineers (IEEE) documents may be purchased from BSI Standards, Linford Wood, Milton Keynes, MK14 6LE

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 102, an inside back cover 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.

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Descriptors: Recording apparatus, digital recording, video tape recorders, chrominance, cassette for magnetic tapes, magnetic tapes, digital signals, video signals, acoustic signals, recording track, electric properties, mechanical properties, interchangeability, dimensions, recording characteristics

English version

Helical-scan digital composite video cassette recording system using 19 mm magnetic tape, format D2 (NTSC, PAL, PAL-M)

(IEC 1179:1993)

Système de magnétoscope numérique à chrominance composite à cassette à balayage hélicoïdal utilisant la bande magnétique de 19 mm, format D2 (NTSC, PAL, PAL-M) (CEI 1179:1993)

Videokassettensystem mit Schrägspuraufzeichnung digitaler Composite-Signale auf Magnetband 19 mm, D2-Format (NTSC, PAL, PAL-M) (IEC 1179:1993)

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

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Foreword

The text of document 60B (CO) 144, as prepared by Sub-Committee 60B: Video recording, of IEC Technical Committee 60: Recording, was submitted to the IEC-CENELEC parallel vote in March 1992.

The reference document was approved by CENELEC as EN 61179 on 6 July 1993.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1994-07-01
- latest date of withdrawal of conflicting national standards (dow) 1994-07-01

Annexes designated “normative” are part of the body of the standard. Annexes designated “informative” are given only for information. In this standard, Annex A, Annex B and Annex ZA are normative and Annex C is informative.

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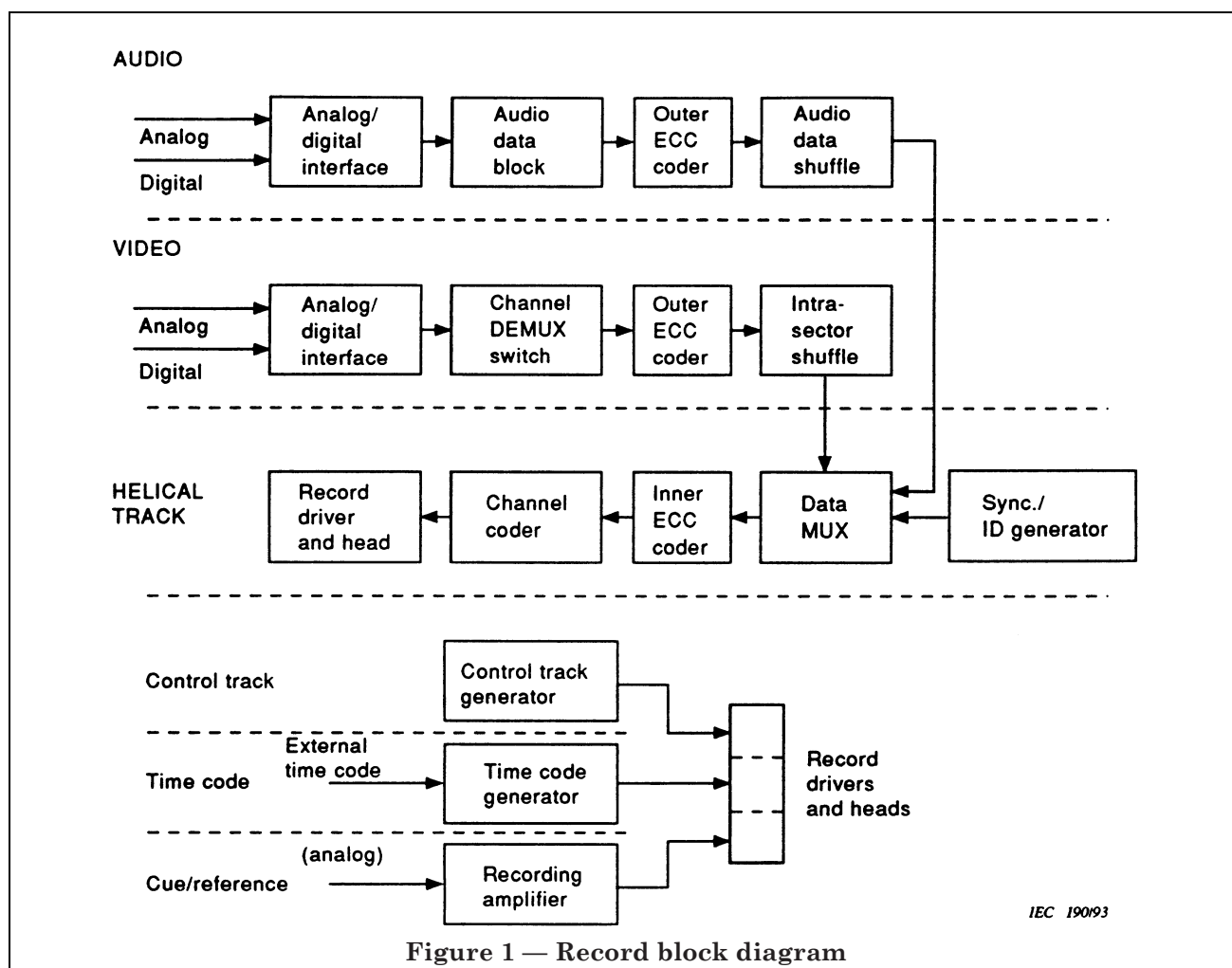
Introduction

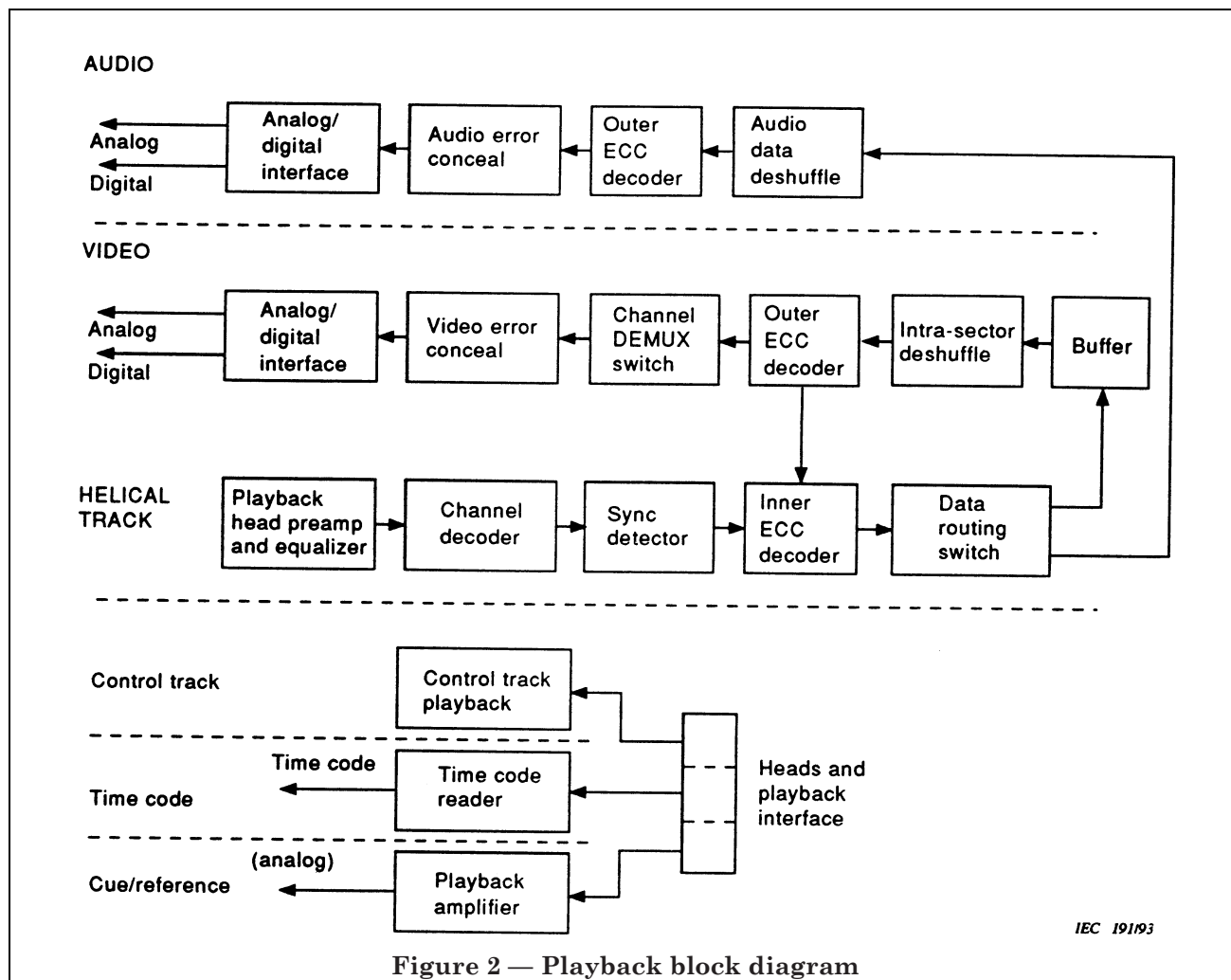
The purpose of International Standard IEC 1179 is to define the electrical and mechanical characteristics of equipment which permits the interchangeability of 19 mm cassettes containing digitally recorded composite video programs.

The requirements given relate to 525-line composite TV signals (NTSC, PAL-M) with a frame frequency of 29,97 Hz nominal, and to 625-line composite TV signals (PAL) with a frame frequency of 25 Hz.

One video channel and four independent audio channels are recorded in a digital format. The video signal may be input or output in either analog or digital format. The audio signals may also be input or output in either analog or digital format. In addition, a cue audio signal is recorded in analog format.

Figure 1 and Figure 2 show a block diagram of the processes involved in the recorder.





Section 1. General

1.1 Scope

This International Standard specifies the content, format and recording method of the data blocks forming the helical records on the tape containing video, audio and associated data using the 19 mm type D-2 cassette. In addition, this standard specifies the content, format and recording method of the longitudinal record containing tracking information for the scanning head associated with the helical records.

1.2 Normative references

The following normative documents 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 normative documents 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 normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 461:1986, *Time and control code for videotape recorders*.

IEC 735:1991, *Measuring methods for videotape properties*.

IEC 958:1989, *Digital audio interface*.

CCIR Volume X1 — Part 1 — Section 11A — Rapport 624-3:1986, *Characteristics of television systems*.

CCITT Blue book, Volume III — Fascicle III.4 — Recommendation J.15:1988, *Lining-up and monitoring an international sound-programme connection*.

CCITT Blue book, Volume III — Fascicle III.6 — Recommendation J.17:1988, *Pre-emphasis used on sound-programme circuits*.

IEEE Standard 1952:1953, *Volume measurements of electrical speech and program waves*.

ISO 2110:1989, *Information technology — Data communication — 25-pole DTE/DCE interface connector and contact number assignments*.

1.3 Definitions, symbols and abbreviations

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

1.3.1

AES

audio engineering society

1.3.2

ECL

emitter coupled logic, family of digital logic integrated circuits. In this standard, ECL refers to the 10 000 series of logic integrated circuits

1.3.3

GF Galois field

mathematical field containing a finite number of elements in which algebraic operations may be performed. The number of field elements is generally written as an argument in parentheses, e.g. GF(256)

1.3.4

LSB

- 1) Least significant bit of a word of data.
- 2) Least significant byte of a data item consisting of two or more bytes.

1.3.5

MSB

- 1) Most significant bit of a word of data.
- 2) Most significant byte of a data item consisting of two or more bytes.

1.3.6

r.p.s.

revolutions per second

1.3.7 ScH

colour subcarrier to horizontal sync timing relationship

1.4 Environment and test conditions, reference tape and calibration tape

1.4.1 Environment and test conditions

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

- temperature: $20\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$;
- relative humidity: $50\% \pm 2\%$;
- barometric pressure: $96\text{ kPa} \pm 10\text{ kPa}$;
- tape conditioning: not less than 24 h;
- tape tension: $0,7\text{ N} \pm 0,05\text{ N}$.

1.4.2 Reference tape

Blank tape to be used for calibration recordings may be purchased from the following manufacturers:

<i>Company</i>	<i>Part Number</i>
Ampex Corporation	Series – 319 ¹⁾
Sony Corporation	to be determined ¹⁾

1.4.3 Calibration tape

Manufacturers of videotape recorders to this format specification will sell calibration tapes meeting the following requirements.

1.4.3.1 Record locations and dimensions

Tolerances shown in Table 4 and Table 5, will be reduced by 50 %.

1.4.3.2 Calibration signals

Two classes of signals will be recorded on the calibration tapes.

- a) A series of conventional test signals for level calibration, consisting of at least:
- video: colour bars;
 - audio: 1 kHz tone at – 20 dB below full level;
 - cue: 1 kHz tone at operating level;
10 KHz tone at operating level.

These test signals are contained on the following tapes:

- Sony part number 8-960-071-52 (525/60)¹⁾;
- Ampex part number 1525058 (525/60); 1525053 (625/50)¹⁾.

- b) Signals recorded on only one of the four record heads for the purpose of mechanical alignment.

These test signals are contained on the following tapes:

- Sony part number 8-960-071-11¹⁾;
- Ampex part number 1525052-02¹⁾.

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.

Section 2. Videotape-cassette

2.1 Mechanical parameters

2.1.1 Cassette dimensions

The dimensions of the three different cassettes used for recording shall be in accordance with Figure 3 to Figure 17.

General tolerances for dimensions, except those for which tolerances are otherwise specified, shall be as indicated in Table 1.

Table 1 — Mechanical tolerances

From mm	To mm	Tolerances mm
0	4	$\pm 0,2$
4	16	$\pm 0,3$
16	63	$\pm 0,4$
63	250	$\pm 0,5$
250		$\pm 0,7$

2.1.2 Identification of cassettes

The three sizes of cassettes shall be identified as:

- small: S;
- medium: M;
- large: L.

2.1.3 Tape lengths, thickness and play times

The tape length, thickness and play time for the three sizes of cassettes shall be as indicated in Table 2 for 525/60 and 625/50 systems.

Table 2 — Tape length and play time of S, M, L cassettes

Cassette size	Tape thickness 13 μm	
	Tape length m	Play time min
S	253	31
M	744	93
L	1 647	207

2.1.4 Face of magnetic coating

The magnetic coating on the tape shall face out of the cassette as specified in Figure 3 to Figure 5.

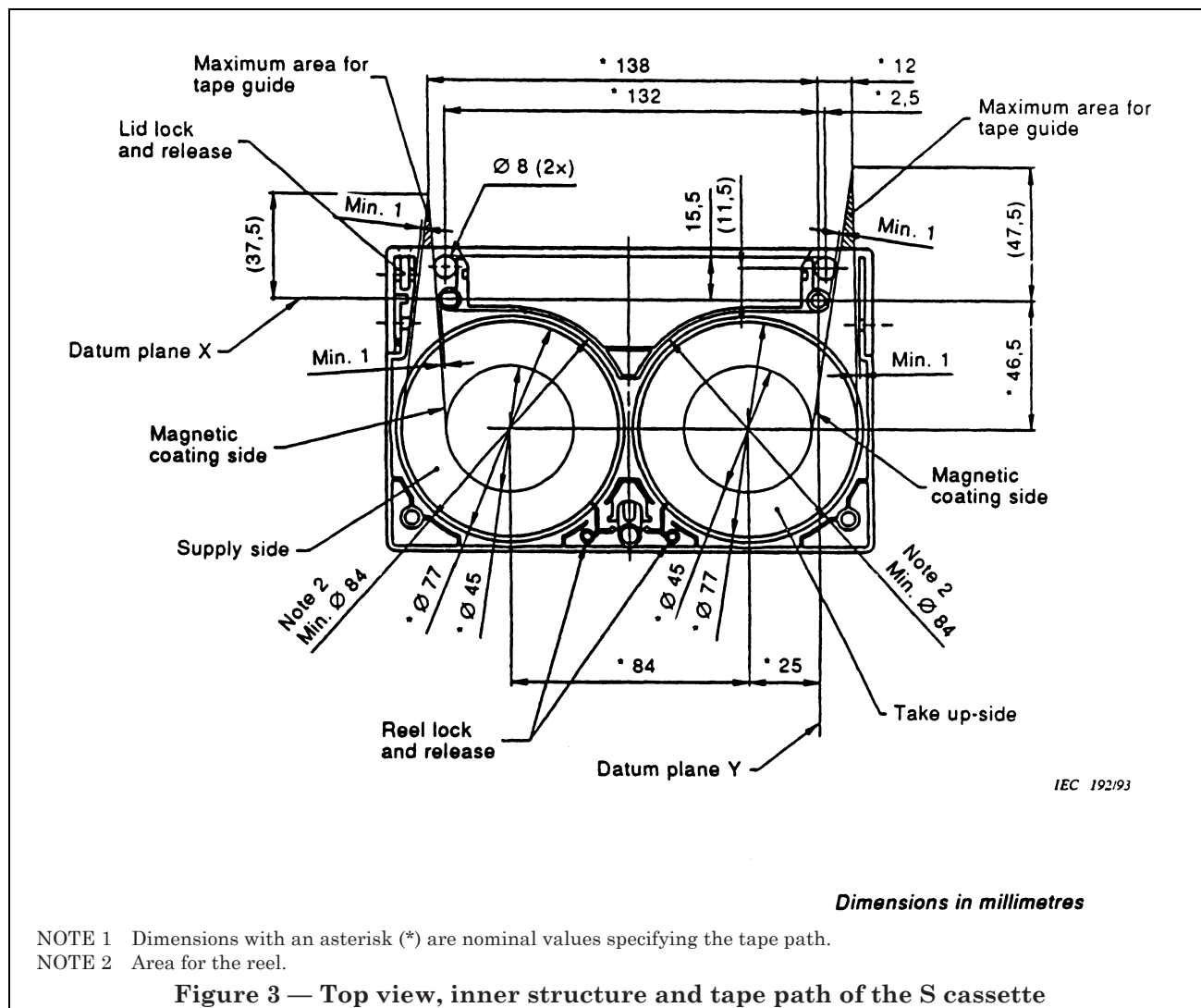
2.1.5 Datum planes

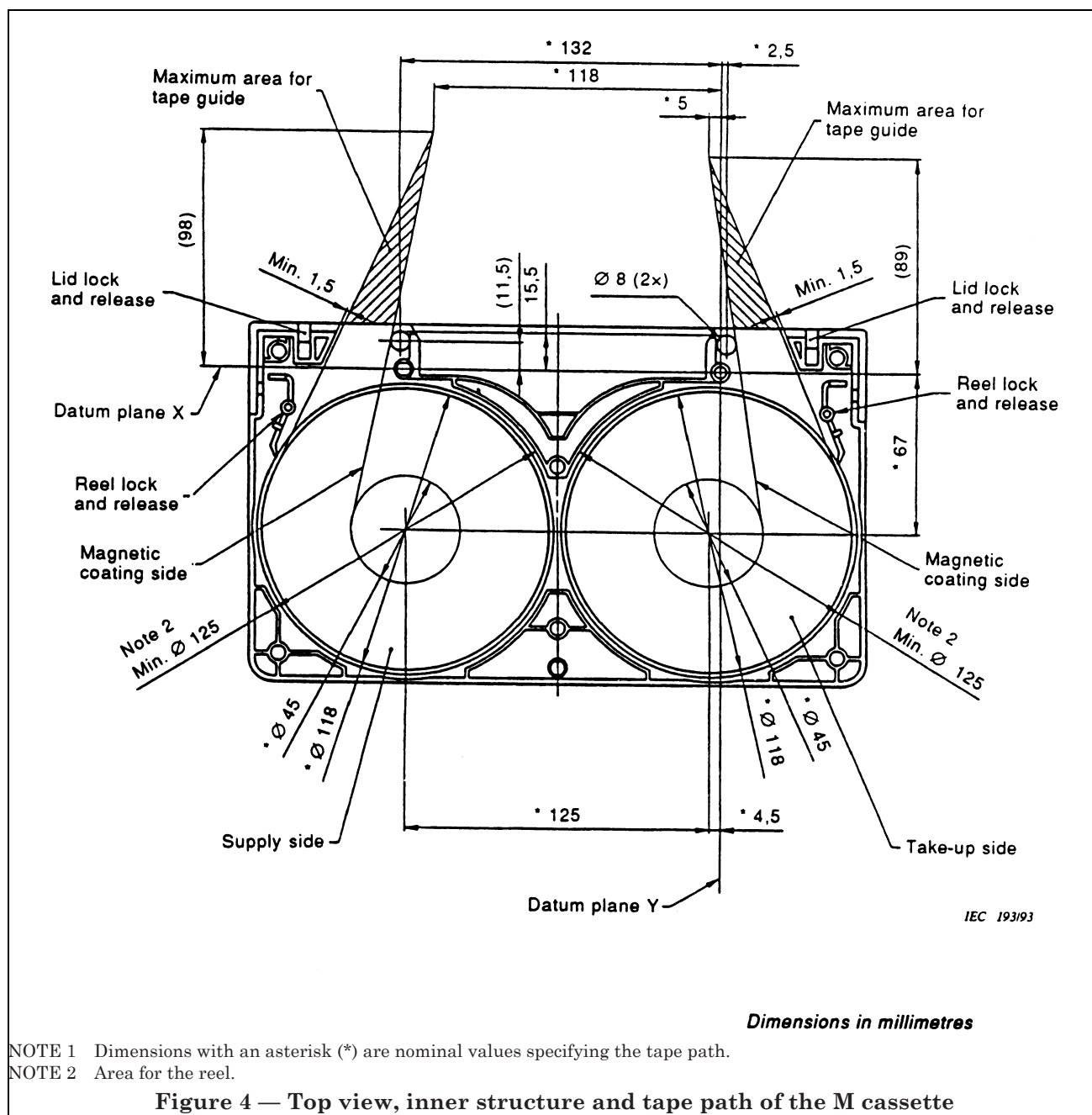
2.1.5.1 Datum plane Z shall be determined by datum areas A, B and C as specified in Figure 6 to Figure 8.

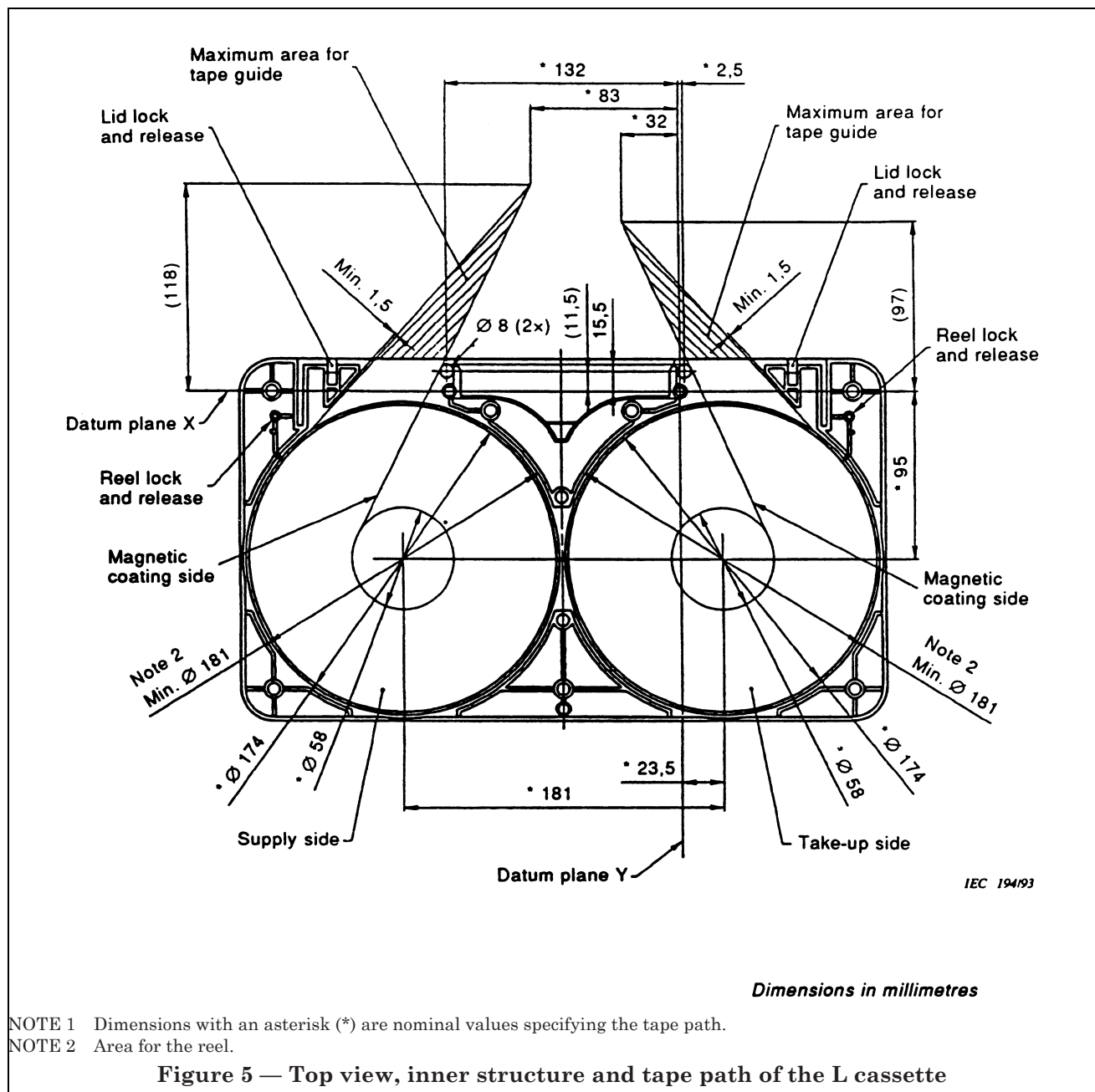
2.1.5.2 Datum C does not correspond to a fastener.

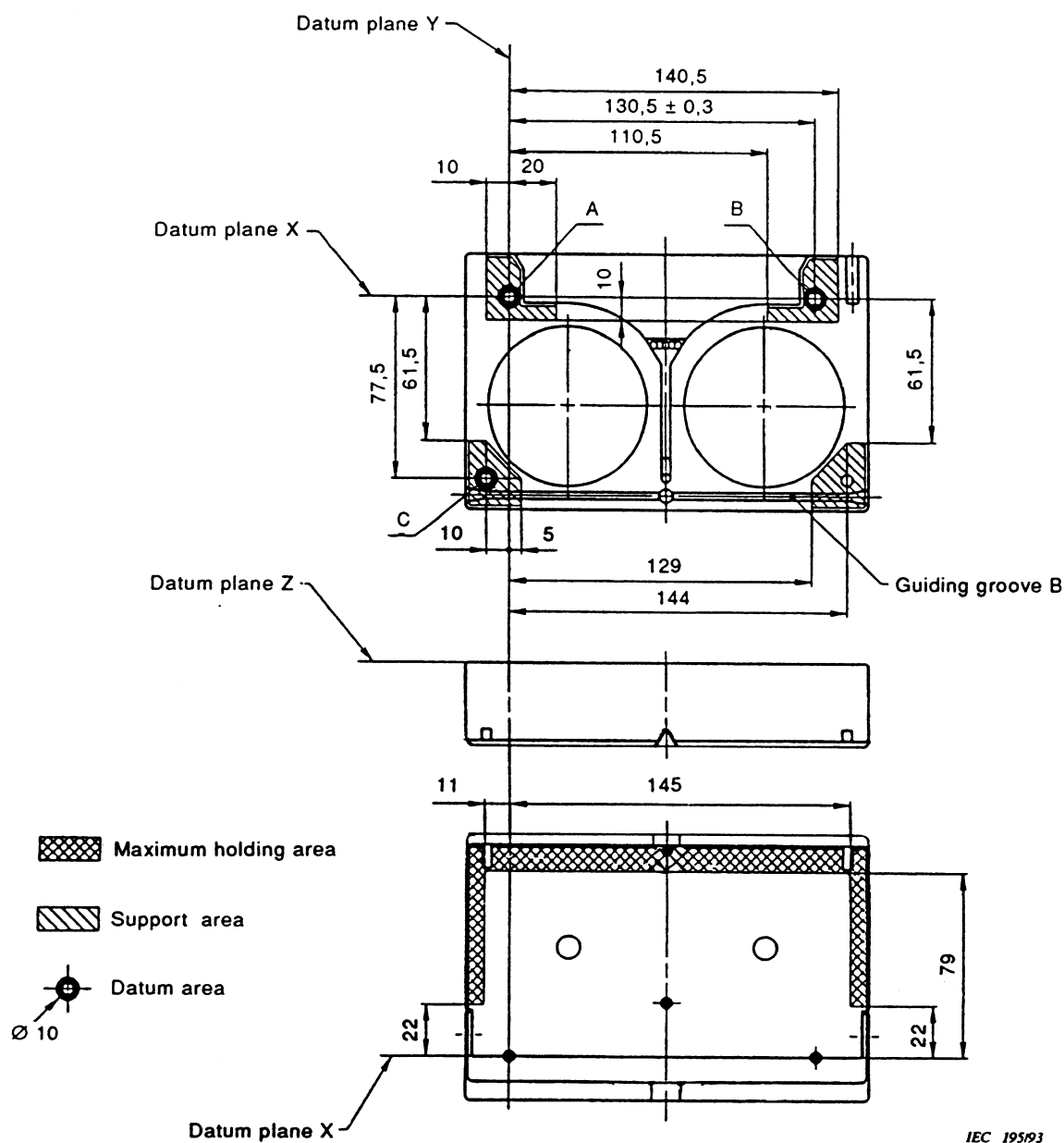
2.1.5.3 Datum plane X shall be orthogonal to datum plane Z and shall run through the center of datum hole (a) and datum hole (b) as specified in Figure 9 to Figure 11.

2.1.5.4 Datum plane Y shall be orthogonal to both datum plane X and datum plane Z and shall run through the centre of datum hole (a) as specified in Figure 9 to Figure 11.







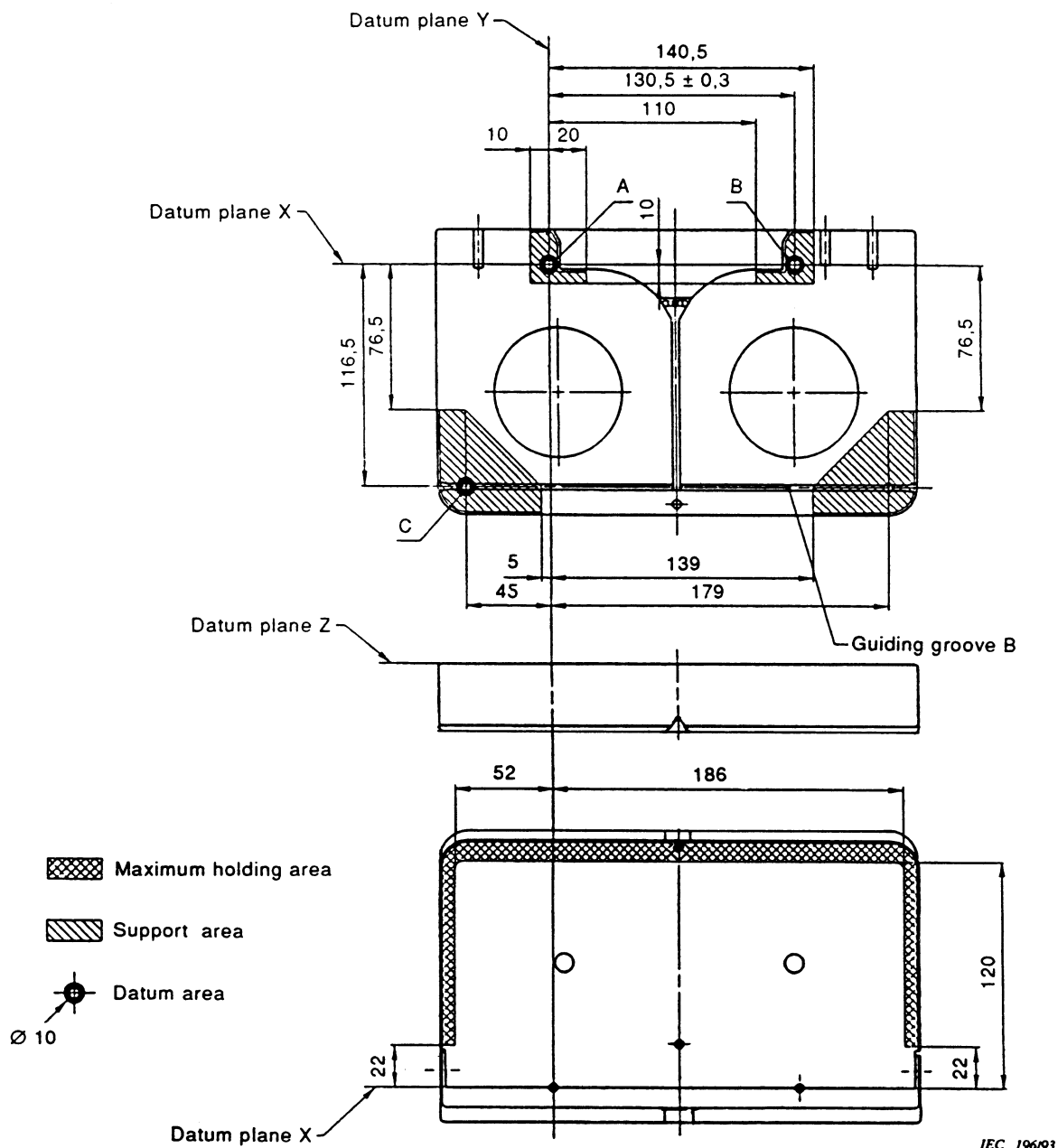


NOTE 1 The cassette shall be secured by the recorder and/or player unit on the crosshatched area.

NOTE 2 The periphery within 1,0 mm from the edge of guiding groove B and from the edge of the cassette shall be removed from the support area. The cassette shall be supported by the recorder and/or player unit on the hatched area.

NOTE 3 Datum plane Z shall be determined by datum areas A, B, and C.

Figure 6 — Datum area, support area and holding area of the S cassette



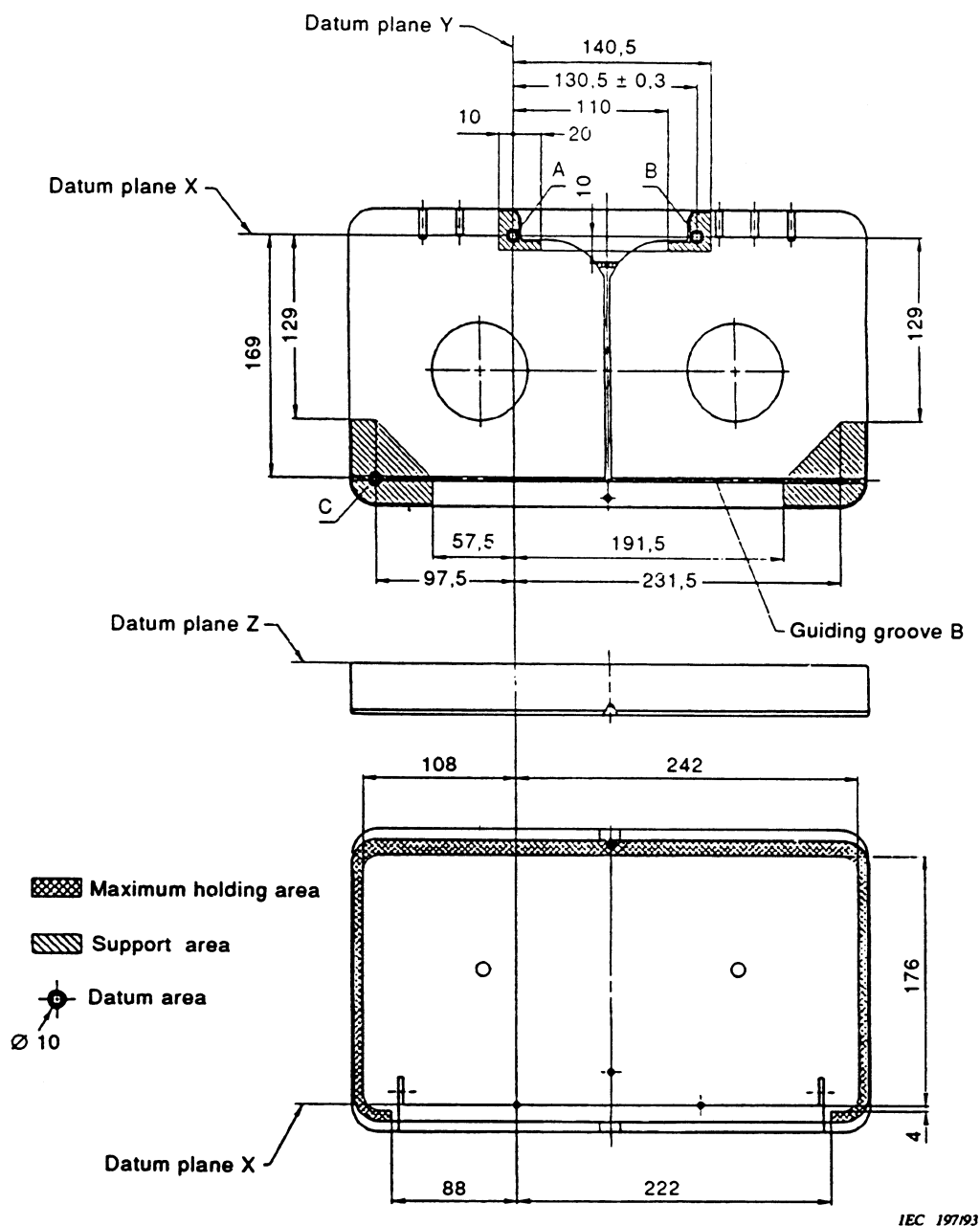
Dimensions in millimetres

NOTE 1 The cassette shall be secured by the recorder and/or player unit on the crosshatched area.

NOTE 2 The periphery within 1,0 mm from the edge of guiding groove B and from the edge of the cassette shall be removed from the support area. The cassette shall be supported by the recorder and/or player unit on the hatched area.

NOTE 3 Datum plane Z shall be determined by datum areas A, B, and C.

Figure 7 — Datum area, support area and holding area of M cassette



Dimensions in millimetres

NOTE 1 The cassette shall be secured by the recorder and/or player unit on the crosshatched area.

NOTE 2 The periphery within 1,0 mm from the edge of guiding groove B and from the edge of the cassette shall be removed from the support area. The cassette shall be supported by the recorder and/or player unit on the hatched area.

NOTE 3 Datum plane Z shall be determined by datum areas A, B, and C.

Figure 8 — Datum area, support area and holding area of L cassette

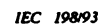
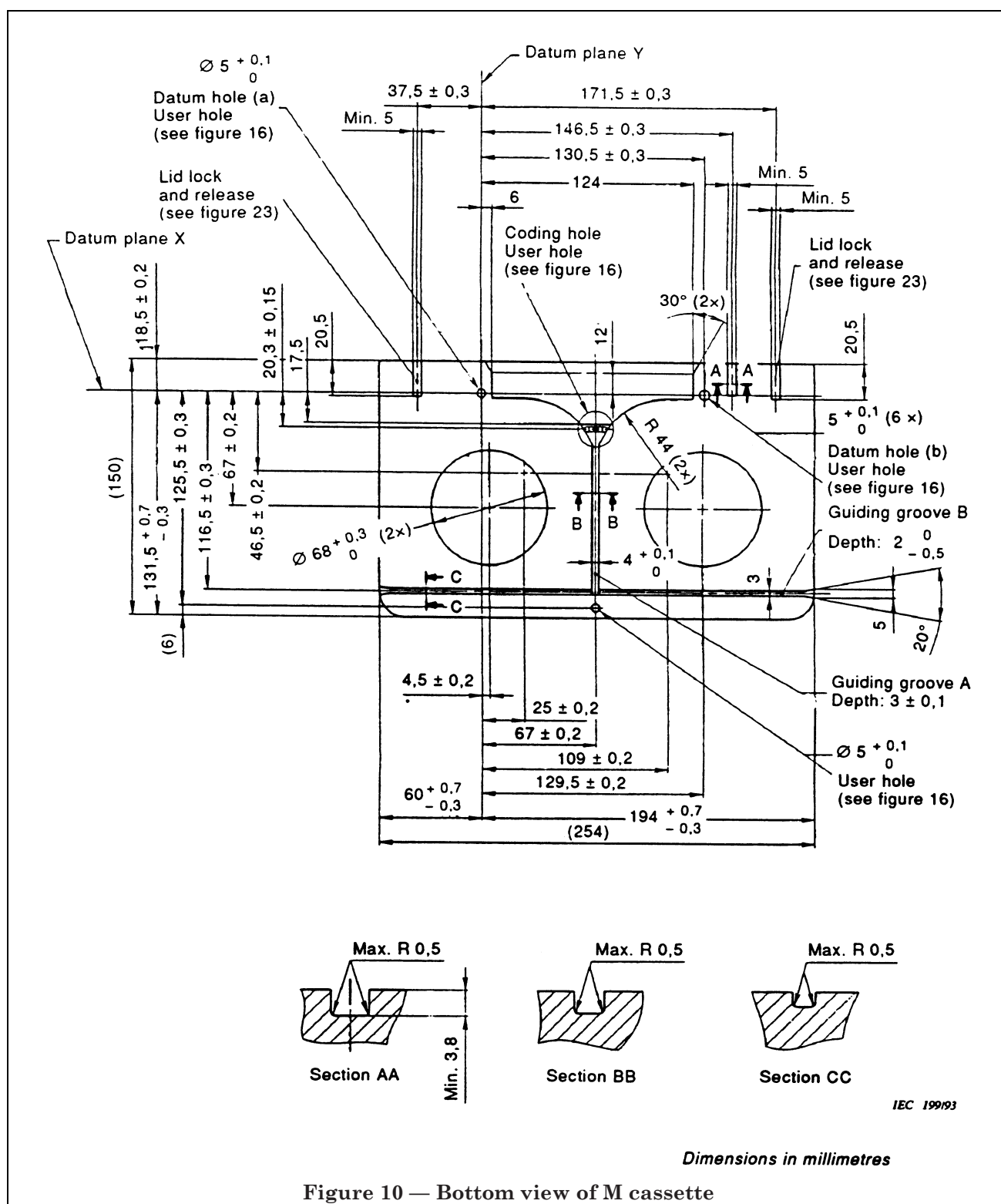
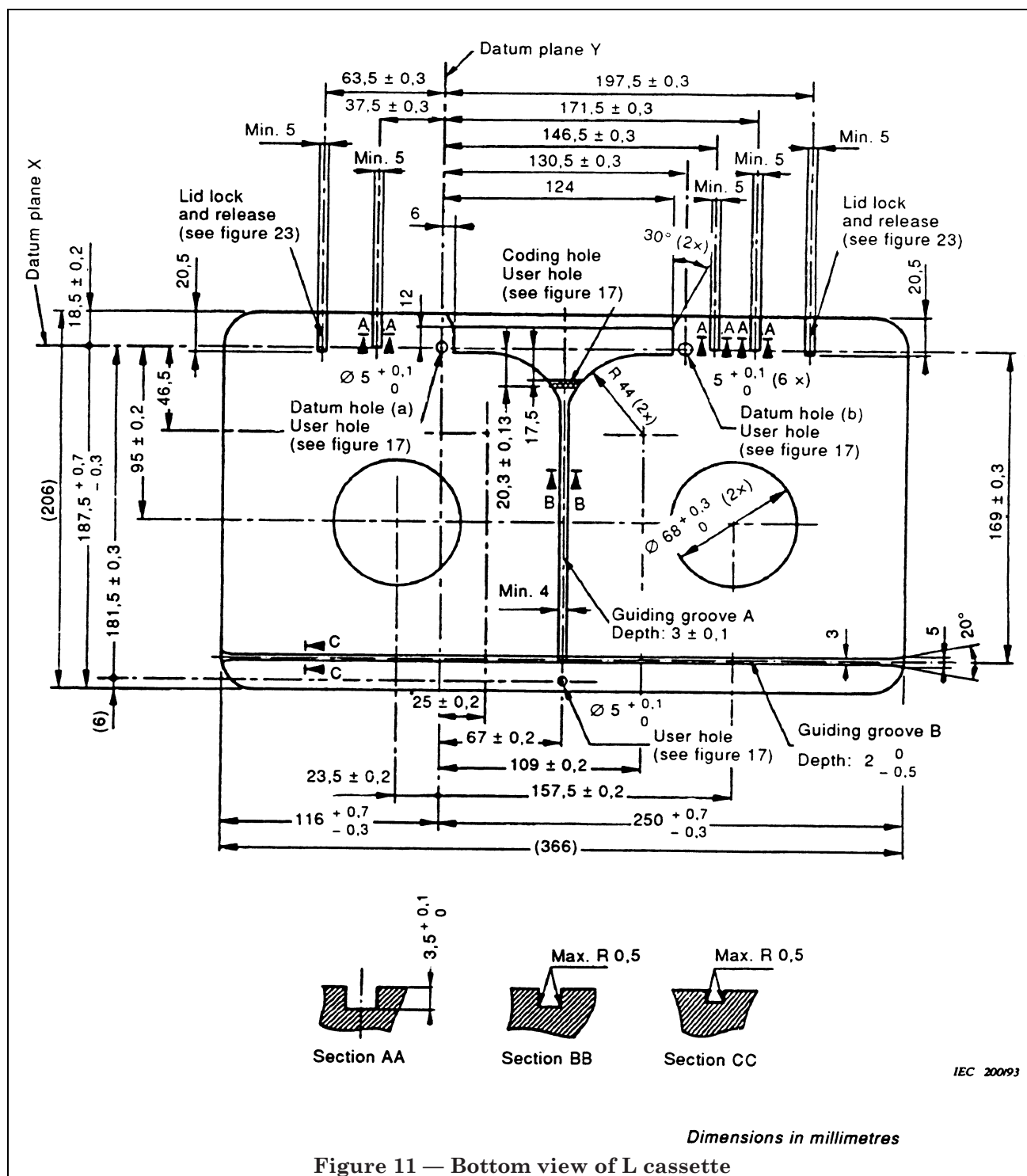


Figure 9 — Bottom view of S cassette





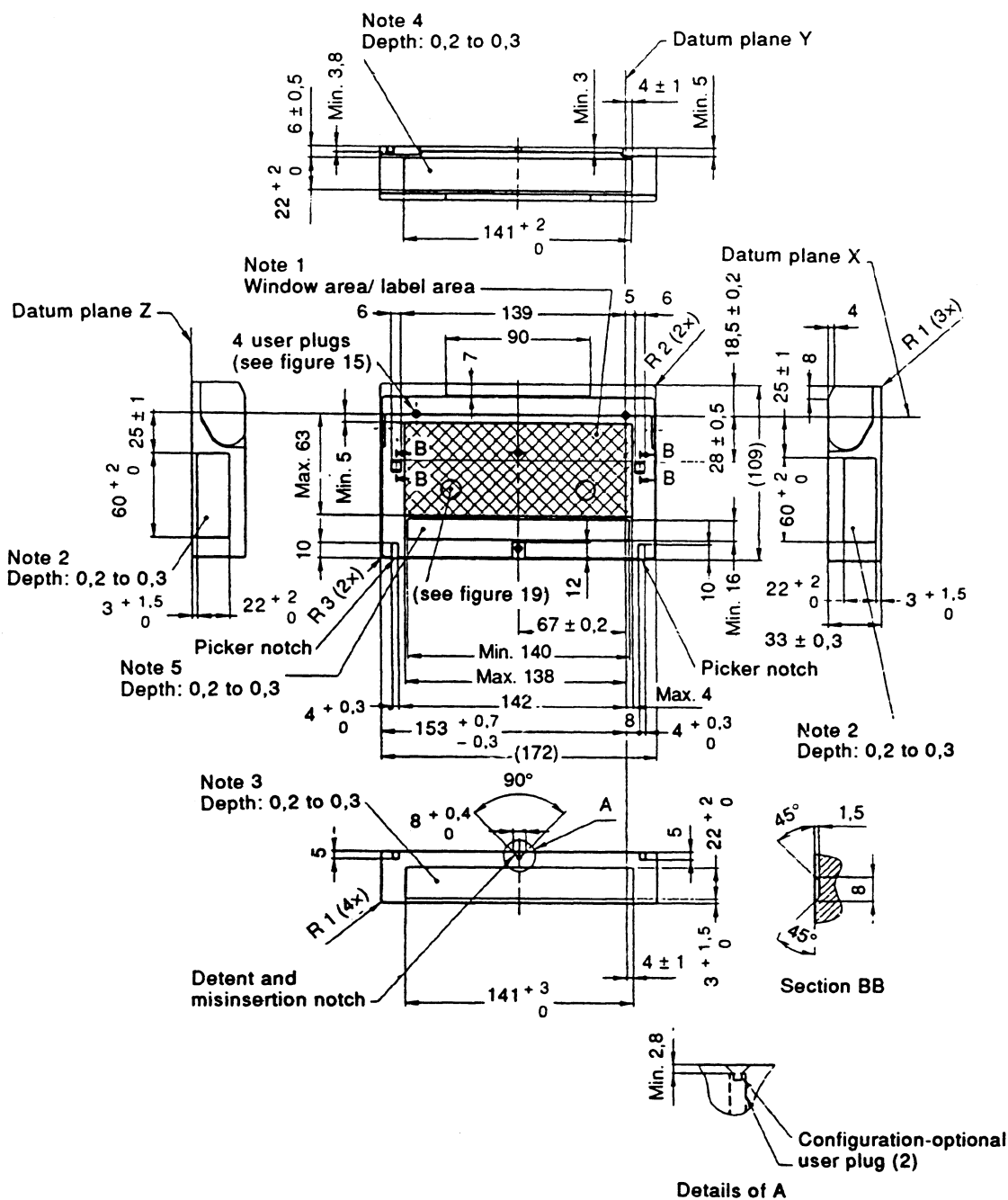
2.1.6 Window and labels

2.1.6.1 Window and label areas shall be as specified in Figure 12 to Figure 14.

2.1.6.2 Labels attached to the cassette shall not extend beyond the external dimensions as shown in Figure 12 to Figure 14.

2.1.6.3 Labels shall not interfere with the identification holes of the users or the manufacturers.

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



- NOTE 1 The crosshatched area is available for the window/labels.
- NOTE 2 The side label may be attached to this recessed area.
- NOTE 3 The rear label may be attached to this recessed area.
- NOTE 4 The lid label may be attached to this recessed area.
- NOTE 5 The top label may be attached to this recessed area.

Figure 12 — Top and side view of S cassette

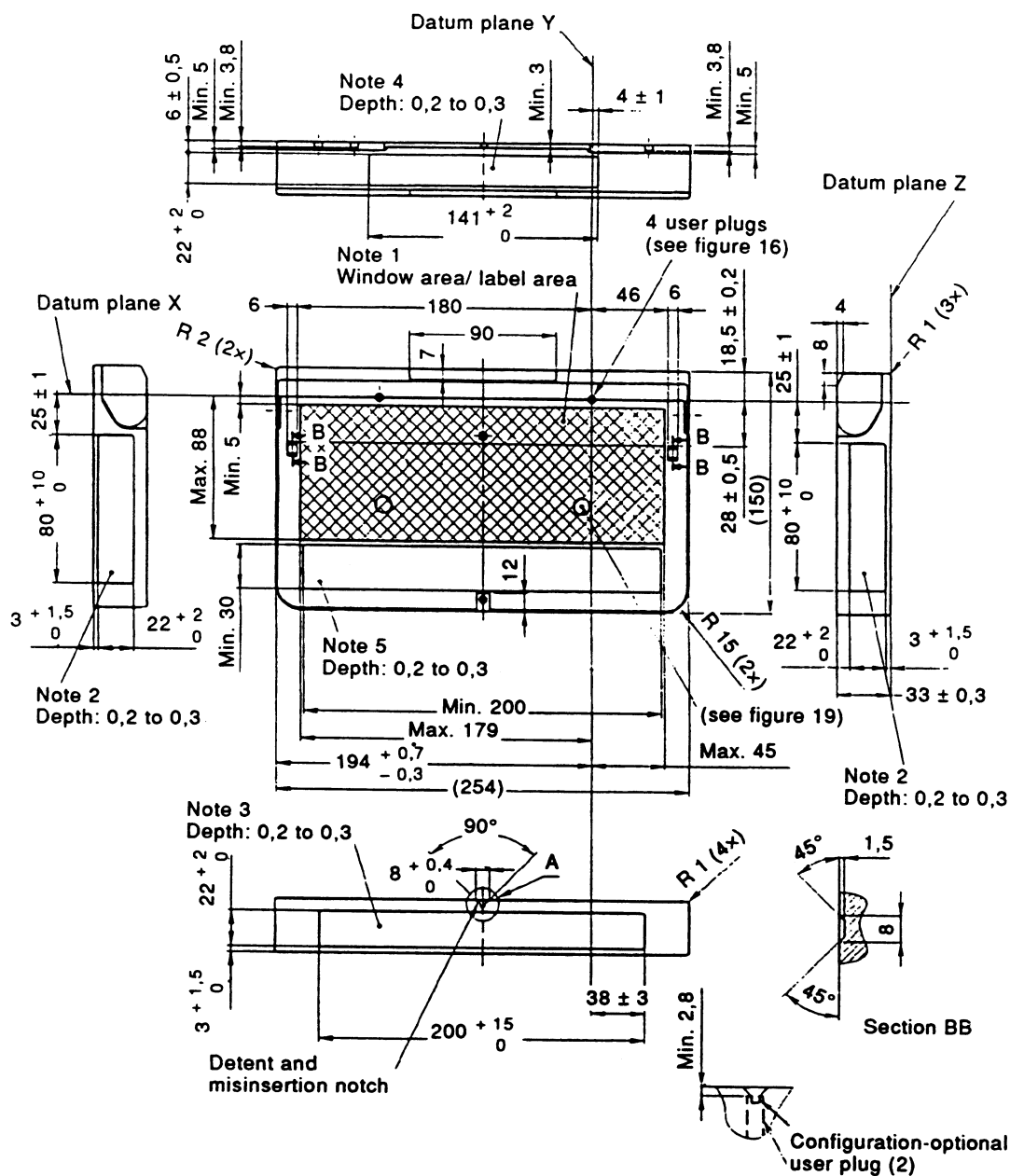


Figure 13 — Top and side view of M cassette

Dimensions in millimetres

- NOTE 1 The crosshatched area is available for the window/labels.
- NOTE 2 The side label may be attached to this recessed area.
- NOTE 3 The rear label may be attached to this recessed area.
- NOTE 4 The lid label may be attached to this recessed area.
- NOTE 5 The top label may be attached to this recessed area.

Figure 13 — Top and side view of M cassette



Figure 14 — Top and side view of L cassette

2.1.7 Identification holes

2.1.7.1 There shall be two sets of identification holes; one for use by the manufacturer and the other for the user.

2.1.7.2 The dimension and location of manufacturers' coding holes, specified in Figure 15 to Figure 17 shall be defined as follows:

Holes 1 and 2 shall be used in combination to indicate tape thickness according to the following logic table:

Hole numbers: 1 2

0 0 = 16 µm tape

0 1 = 13 µm tape

1 0 = undefined/reserved

1 1 = undefined/reserved

NOTE Only 13 µm tape is recognized for the purposes of interchangeability.

Holes 3 and 4 shall be used to indicate the coercivity of the magnetic recording tape according to the following logic table.

Hole numbers: 3 4

0 0 = class 850

0 1 = class 1 500 (metal particle)

1 0 = undefined/reserved

1 1 = undefined/reserved

NOTE 1 Only class 1 500 is used for the purposes of interchangeability.

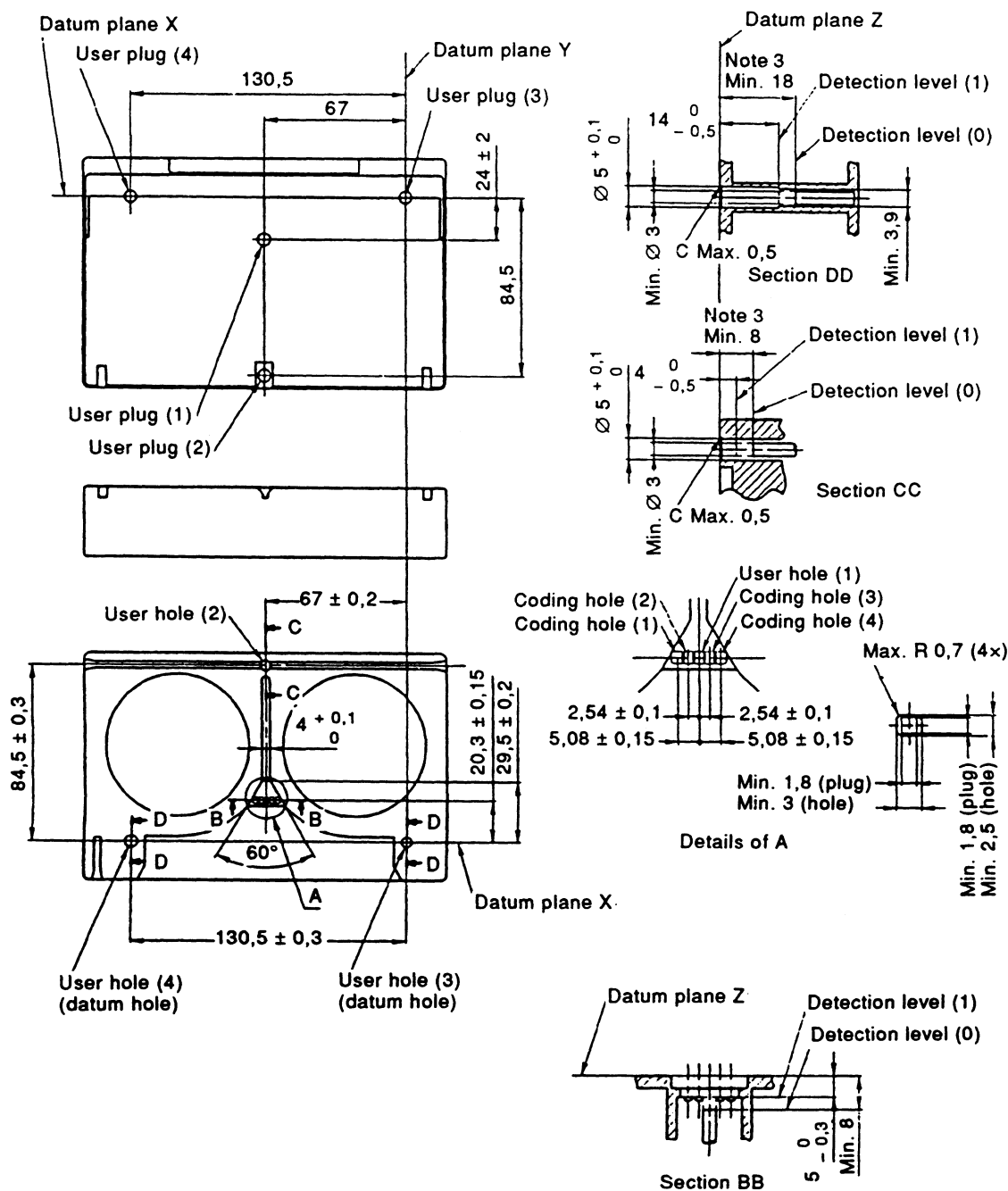
NOTE 2 A "0" in tables for holes 1 through 4 indicates that the indicator tab is removed or open, which results in an undetected state by the recorder/player sensor mechanism.

The dimension and location of the users' coding holes specified in Figure 15 to Figure 17 are defined as follows.

When a "0" state exists, the user holes shall identify the following conditions:

- a) total record lockout (audio/video/cue/time code/control track);
- b) reserved and undefined;
- c) video and control track record lockout;
- d) reserved and undefined.

2.1.7.3 The user plug mechanism shall withstand an axial force of 0,5 N.



IEC 204/93

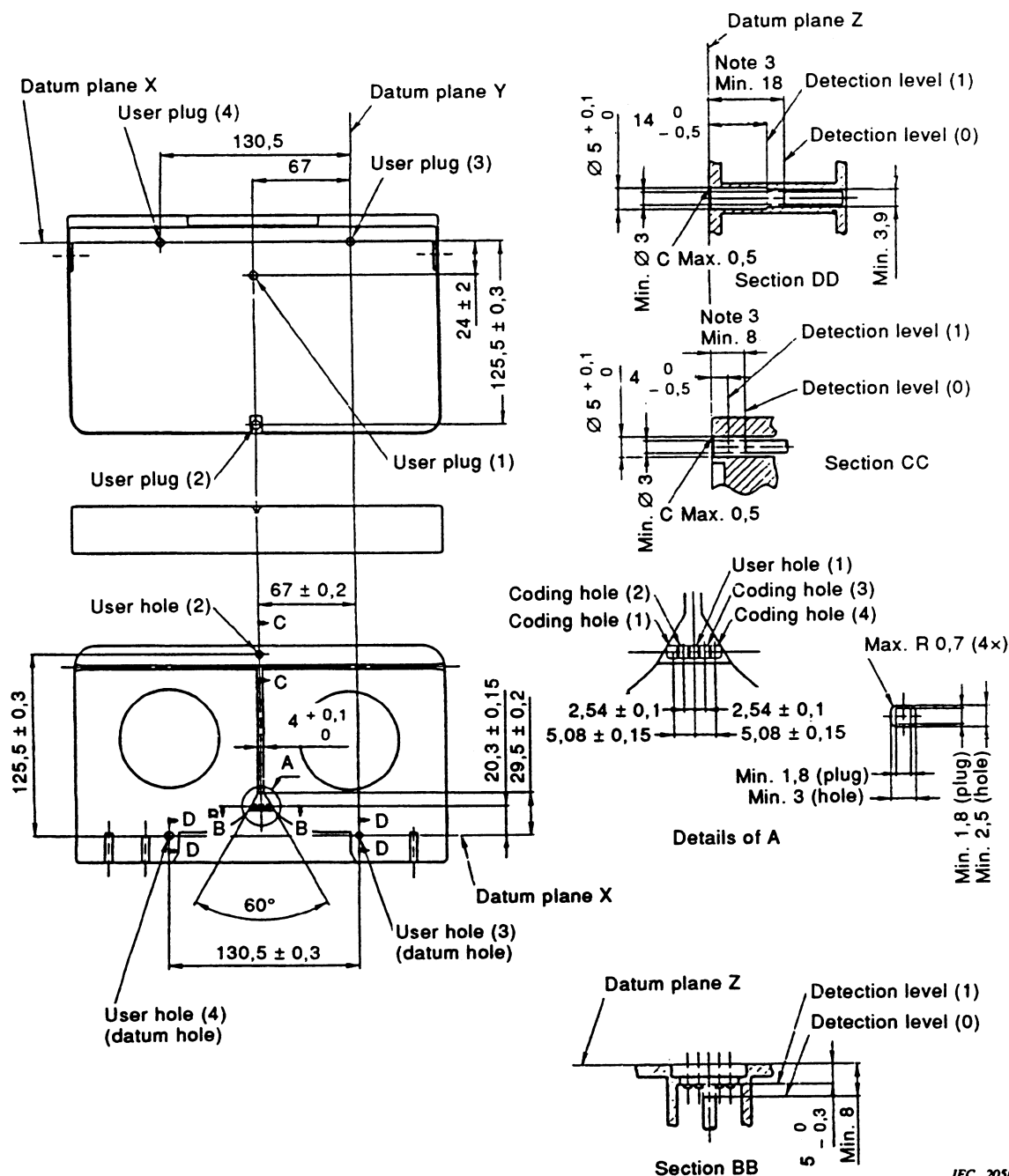
Dimensions in millimetres

NOTE 1 The cassette shall be provided with four coding holes (1) to (4) and four user holes (1) to (4). When any plug is removed, the opening shall be as shown in detail A.

NOTE 2 User holes (3) and (4) on the upper shell shall be opened when user plugs are removed.

NOTE 3 All cassettes shall be provided with holes as defined by sections DD and CC.

Figure 15 — S cassette coding holes and user holes



IEC 205193

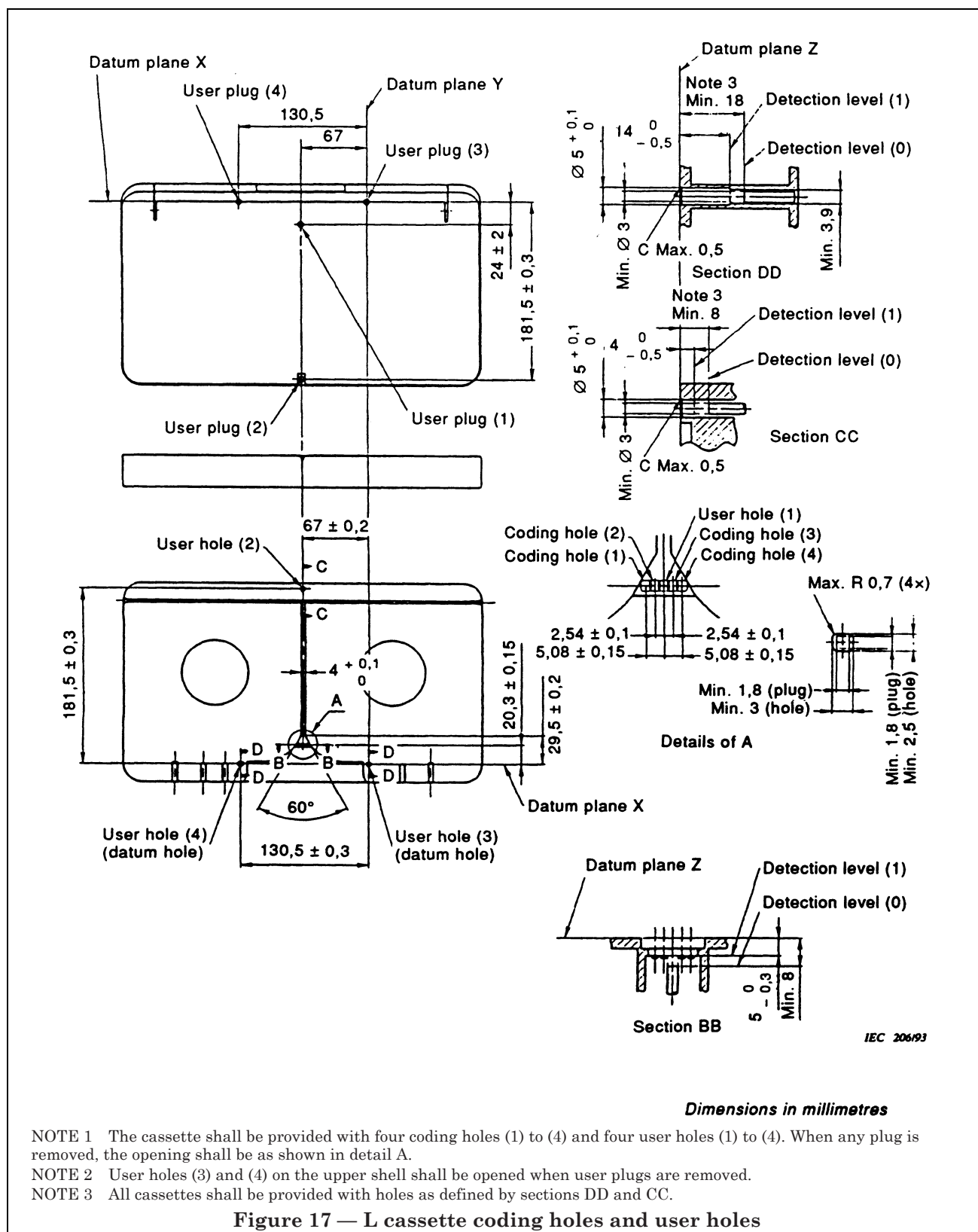
Dimensions in millimetres

NOTE 1 The cassette shall be provided with four coding holes (1) to (4) and four user holes (1) to (4). When any plug is removed, the opening shall be as shown in detail A.

NOTE 2 User holes (3) and (4) on the upper shell shall be opened when user plugs are removed.

NOTE 3 All cassettes shall be provided with holes as defined by sections DD and CC.

Figure 16 — M cassette coding holes and user holes



2.1.8 Leader/Trailer tape

2.1.8.1 The cassette shall include leader and trailer tape. When attached to the hub, there shall be a length of 300 mm $\pm$ 30 mm between the splice point and the outside of the cassette shell.

2.1.8.2 The leader/trailer tape material shall be polyester or equivalent having a transmissivity of at least 60 % when measured with a 700 nm to 900 nm light source.

2.1.8.3 When attached to the hub, the leader/trailer tape shall not separate when subjected to a force of 22 N or less.

2.1.8.4 The width of the leader/trailer tape shall be 19 mm $\pm$ 0,025 mm.

2.1.8.5 The thickness of the leader/trailer tape shall be 20 μ m $\pm$ 10 μ m.

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

2.1.9 Reels

2.1.9.1 The dimensions of the reels and the relationship between the reels and reel tables are specified in Figure 18 and Figure 19.

2.1.9.2 The reels shall be locked automatically when the cassette is removed from the recorder/player.

2.1.9.3 When a S cassette is inserted into a recorder/player, the reels shall be unlocked automatically as specified in Figure 20.

The force needed to release the reel lock of the S cassette shall be 0,5 N $\pm$ 0,1 N.

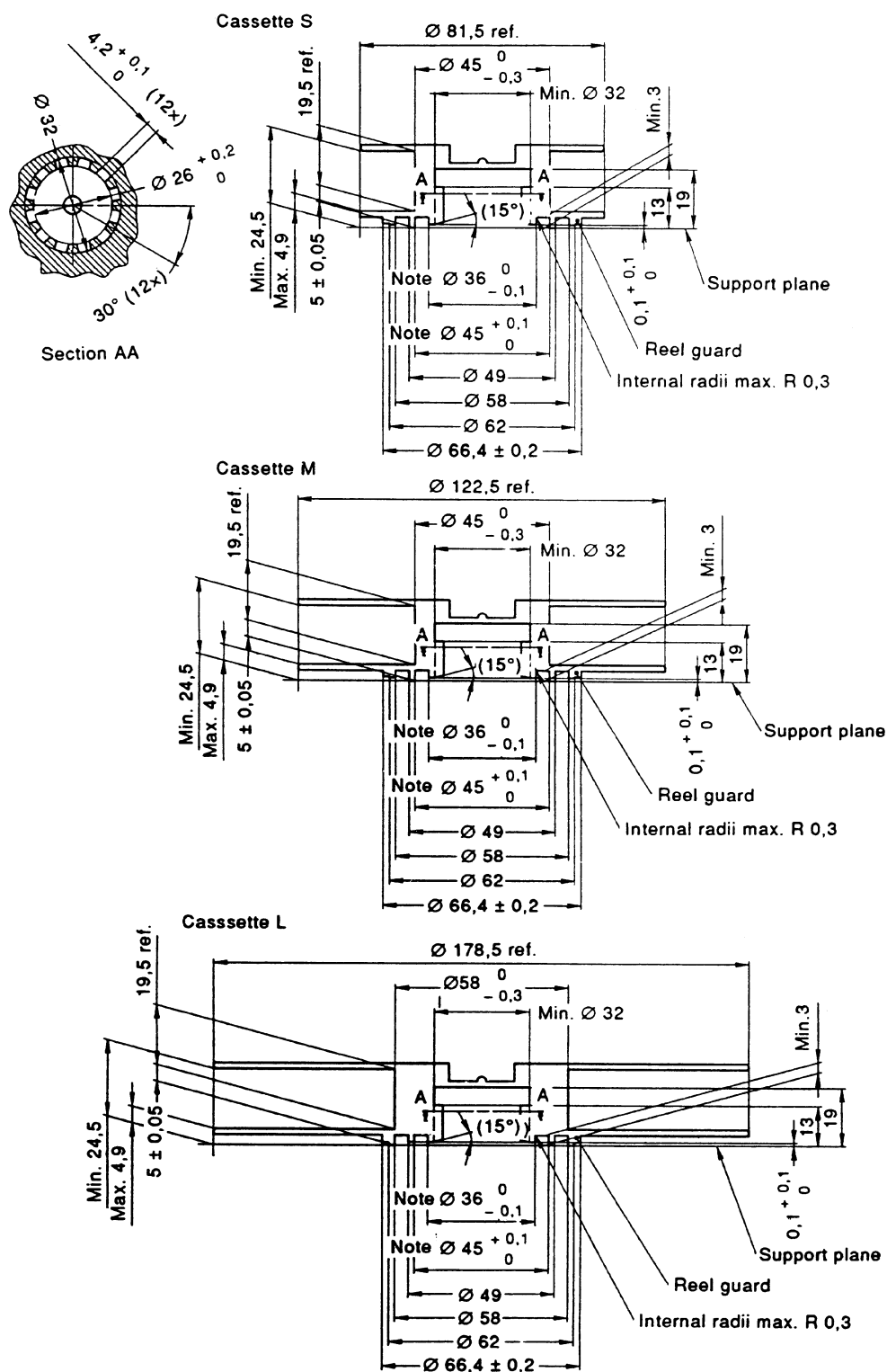
2.1.9.4 When an M or L cassette is inserted into a recorder/player, the reels shall be unlocked automatically by opening the lid as specified in Figure 21 and Figure 22.

2.1.9.5 The reels shall be held in position by a reel spring with a force as shown in Table 3, when the height of the reel table support is 2,0 mm $\pm$ 0,2 mm from datum plane Z.

2.1.9.6 The reel spring force shall be as indicated in Table 3.

Table 3 — Reel spring force

Cassette size	Force N
S	3 – 4
M	3 – 11
L	8 – 11

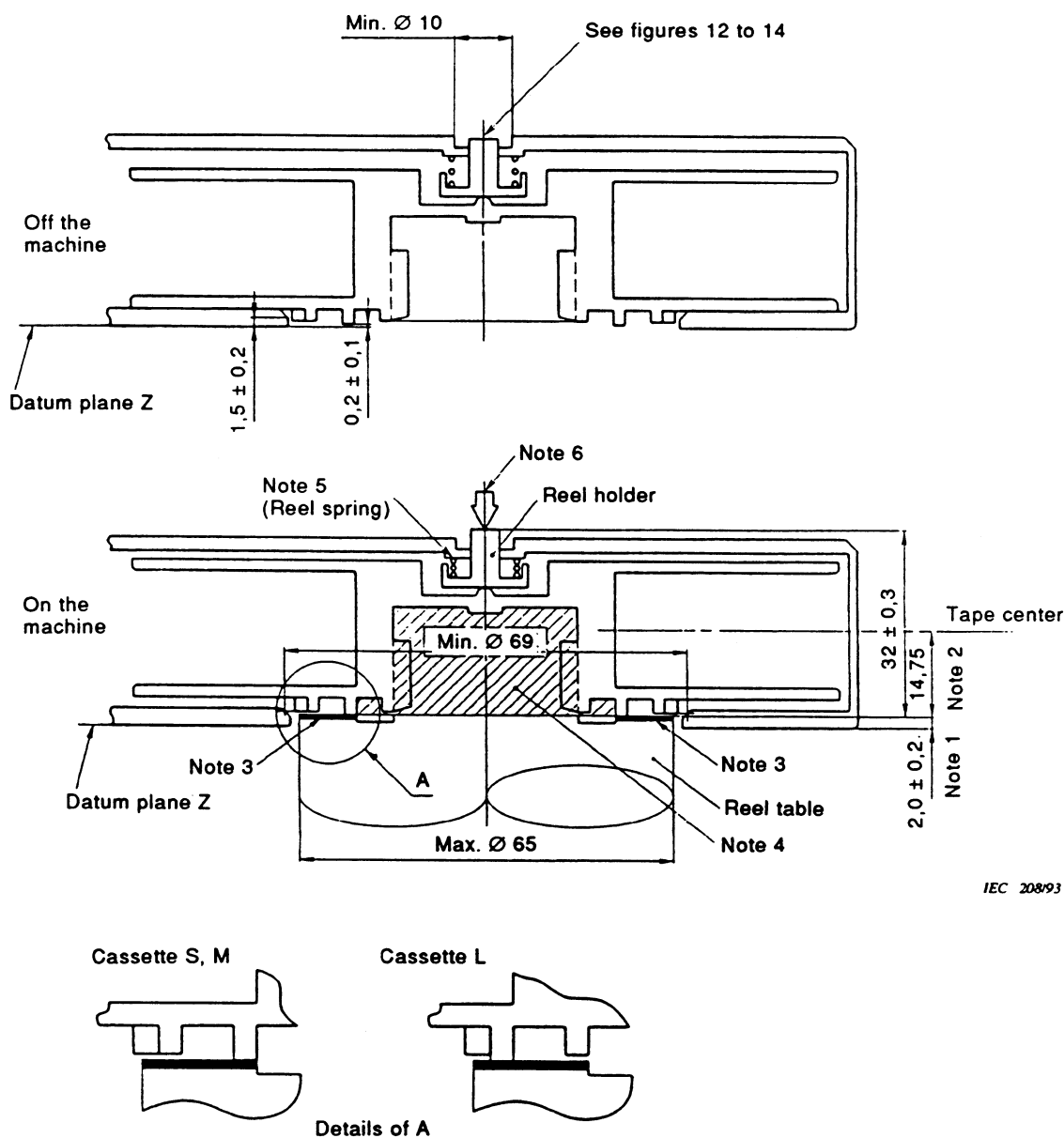


IEC 207/93

Dimensions in millimetres

NOTE The centre of the reel and the reel table shall be positioned on either the centre of the area $36.0^{+0.1}_{-0.0}$ mm in diameter or the centre of the area $45.0^{+0.1}_{-0.0}$ mm in diameter.

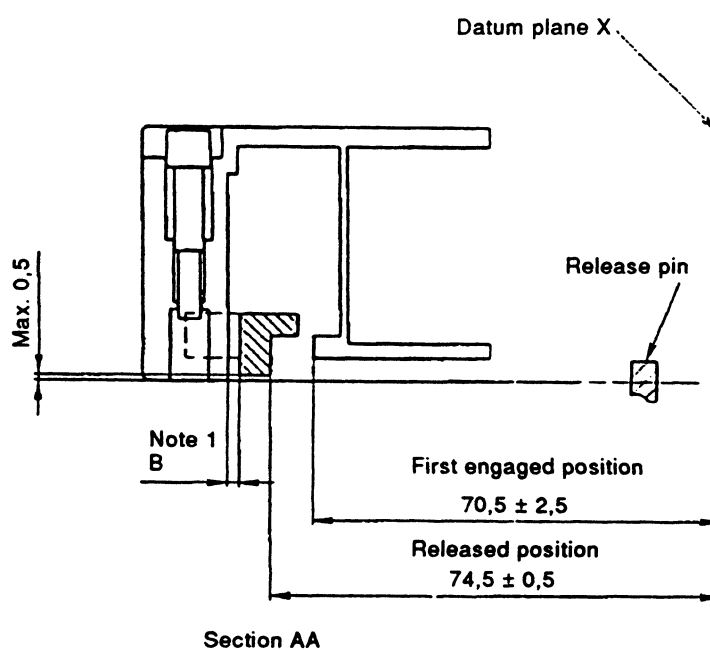
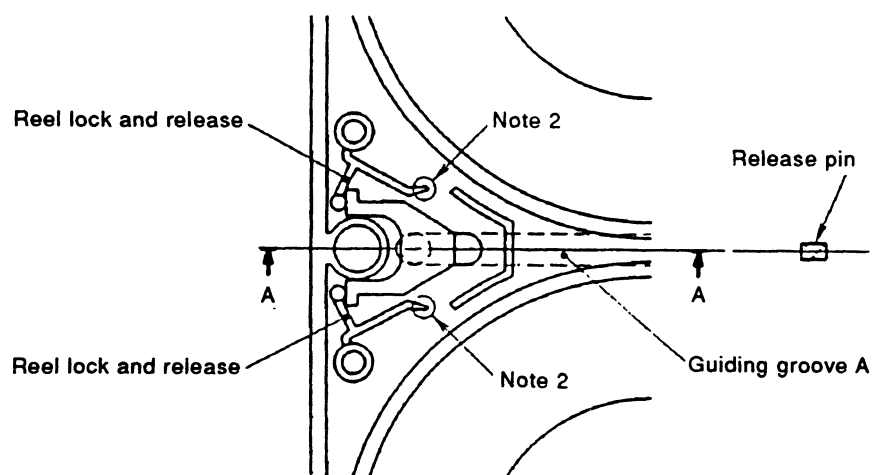
Figure 18 — Video cassette reel



Dimensions in millimetres

- NOTE 1 Distance between the support area of the reel table and datum plane Z.
- NOTE 2 Distance between the support area of the reel table and tape centre.
- NOTE 3 Support area of the reel table.
- NOTE 4 Hatched area shows the maximum reel table area.
- NOTE 5 Reel spring pressure shall meet the specifications shown in 2.1.9.5.
- NOTE 6 If necessary, more reel spring pressure shall be applied to this portion from the outside.
- NOTE 7 The reel spring structure is at manufacturer's option.

Figure 19 — Relationship between reel and reel table



IEC 209193

Dimensions in millimetres

NOTE 1 Clearance B shall be 0,5 mm at a minimum when the release pin is located 75 mm away from datum plane X.

NOTE 2 The end of the reel lock shall be outside the reel area 84 mm minimum in diameter when the release pin is located 74 mm away from datum plane X.

Figure 20 — S cassette reel lock and release