

Video recording — 12,65 mm Type D-11 format —

Part 1: Tape recording

The European Standard EN 62356-1:2004 has the status of a British Standard

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio, video and multi-media systems, which has the responsibility to:

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Summary of pages

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**Video recording –
12,65 mm TYPE D-11 format
Part 1: Tape recording
(IEC 62356-1:2003)**

Enregistrement Vidéo –
Format 12,65 mm de type D11
Partie 1: Enregistrement sur bande
(CEI 62356-1:2003)

Videoaufzeichnung –
D-11-Format mit 12,65 mm
Teil 1: Bandaufzeichnung
(IEC 62356-1:2003)

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CENELEC

European Committee for Electrotechnical Standardization
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Foreword

The text of the International Standard IEC 62356-1:2003, prepared by IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the formal vote and was approved by CENELEC as EN 62356-1 on 2004-09-01 without any modification.

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Endorsement notice

The text of the International Standard IEC 62356-1:2003 was approved by CENELEC as a European Standard without any modification.

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VIDEO RECORDING – 12,65 mm TYPE D-11 FORMAT –

Part 1: Tape recording

1 Scope

This International Standard specifies the format for the recording of Type D-11 compressed pictures, four channels of AES3 data and associated data which form helical records on 12,65 mm tape in cassettes. This standard also defines the helical track record parameters, the content and format of the longitudinal records and the cassette physical specifications.

The recording format supports frame frequencies of 30/1,001 Hz, 25 Hz, 24 Hz and 24/1,001 Hz.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61213:1993, *Analogue audio recording on video tape – Polarity of magnetization*

IEC 61237-1:1994, *Broadcast video tape recorders – Methods of measurement – Part 1: Mechanical measurements*

IEC 62356-2, *Video recording – 12,65 mm type D-11 format – Part 2: Picture compression and data stream*¹

IEC 62356-3, *Video recording – 12,65 mm type D-11 format – Part 3: Data mapping over SDTI*¹

ITU-R Recommendation BT.709:2004, *Parameter values for the HDTV* standard for production and international program exchange*

SMPTE 12M:1999, *Television – Audio and Film – Time and Control Code*

SMPTE 292M:1998, *Bit-Serial Digital Interface for High-Definition Television Systems*

SMPTE 276M:1995, *Transmission of AES-EBU Digital Audio Signals Over Coaxial Cable*

AES3-1992, *Serial transmission format for two-channel linearly represented digital audio data*

¹ To be published.

3 Abbreviations and acronyms

For the purposes of this document, the following abbreviations and acronyms apply.

AUX	Auxiliary
DCT	Discrete cosine transform
ECC	Error correcting code
EOB	End of block
I-NRZI	Interleaved non-return to zero inverted
MUX	Multiplex
VLC	Variable length coding

4 Environment and test conditions

4.1 Environmental conditions

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

- temperature: $20\text{ °C} \pm 1\text{ °C}$
- relative humidity: $50\% \pm 2\%$
- barometric pressure: from 86 kPa to 106 kPa
- tape tension: $0,3\text{ N} \pm 0,05\text{ N}$
- tape conditioning: not less than 24 h

4.2 Calibration tape

Calibration tapes meeting the tolerances specified below should be made available by manufacturers of digital television tape recorders and players in accordance with this standard.

4.3 Record locations and dimensions

Geometrical location and dimensions of the recordings on the tape and their relative positions in regard to timing relations of the recorded signals shall be as specified in Figure 27 and Table 1. Tolerances shown in Table 1 should, however, be reduced by 50 % for calibration tapes.

5 Tape and cassette physical specifications

5.1 Magnetic tape specifications

5.1.1 Base

The base material shall be polyester or equivalent.

5.1.2 Tape width and width fluctuation

The tape width shall be $12,650\text{ mm} \pm 0,005\text{ mm}$. Tape width fluctuation shall not exceed $6\text{ }\mu\text{m}$ peak to peak. The value of tape width fluctuation shall be evaluated by measuring 10 points, each 20 mm apart, over a tape length of 200 mm.

5.1.1 Tape thickness

The tape thickness shall be from 12,5 µm to 13,8 µm.

5.1.2 Offset yield strength

The offset yield strength shall be greater than 15 N.

5.1.3 Magnetic coating

The magnetic tape used shall have a coating of metal particles or equivalent, longitudinally oriented. The coating coercivity shall be in the range of 120 000 A/m to 140 000 A/m, with an applied field of 800 000 A/m (10 000 oersted) as measured by a 50 Hz or 60 Hz BH meter or vibrating sample magnetometer (VSM).

5.2 Cassette specifications

5.2.1 Cassette dimensions

Two sizes of cassettes shall be identified as follows:

S cassette	96 × 156 × 25 mm	As shown in Figures 1 to 13
L cassette	145 × 254 × 25 mm	As shown in Figures 14 to 26

5.2.2 Tape length and recording time

Maximum tape length and recording time are recommended as follows:

S cassette	241 m ⁺² / ₀ m	40 min for 29,97PsF/59,94I	48 min for 25PsF/50I	50 min for 24PsF	50 min for 23,98PsF
L cassette	732 m ⁺² / ₀ m	124 min for 29,97PsF/59,94I	148 min for 25PsF/50I	155 min for 24PsF	155 min for 23,98PsF

5.2.3 Datum planes

Datum plane Z shall be determined by three datum areas, A, B and C, as shown in Figures 3a and 16a. Datum plane X shall be orthogonal to datum plane Z and shall include the centres of datum holes (a) and (b). Datum plane Y shall be orthogonal to both datum plane X and datum plane Z and shall include the centre of datum hole (a) as shown in Figures 2 and 15.

5.2.4 Tape winding

The magnetic coating side of the magnetic tape shall face outside on both the supply reel and the take-up reel as shown in Figures 4 and 17.

5.2.5 Label area and window area

The hatched areas shown in Figures 1 and 14 are for the label and window. Labels attached to the cassette shall not protrude above the outside cassette surface plane.

5.2.6 Guiding groove

For correct insertion into the VTR, four guiding grooves for S cassettes, as shown in Figures 1 and 2, and three guiding grooves for L cassettes, as shown in Figure 15, shall be provided.

5.2.7 Safety tab and safety plug for recording inhibition

For S cassettes, a safety plug at the supply reel side and a hole of minimum depth 10 mm from datum plane Z at the take-up reel side shall be provided as shown in Figure 2.

For L cassettes, a safety plug shall be provided at the take-up reel side as shown in Figure 15.

The safety plug shall not be deformed by 0,3 mm or more when a force of 2,0 N (204 gf) is applied to the centre of it, using a 2,5 mm diameter rod. See Figures 12 and 25.

5.2.8 Identification holes

Six identification holes (holes 1 to 6) shall be located as specified in Figures 2 and 15. For this format, holes 1, 2, 3, 4 and 6 shall be closed. Hole 5 shall be open.

5.2.9 Reels

5.2.9.1 Reel lock system

The reels shall be automatically unlocked when the cassette is inserted into the video tape recorder and/or player unit and automatically locked when the cassette is ejected from it.

The locations of the reels when in the unlocked position are shown in Figures 4 and 17. Dimensions of the reels are shown in Figures 6 and 19. Heights of the reels are shown in Figures 7 and 20.

The reel shall be completely released when the cassette lid is opened 23,5 mm minimum from datum plane Z.

5.2.9.2 Reel spring force

The reels assembled in the cassette shall be pressed by the reel spring with a specified force under the conditions specified in Figures 11 and 24. The spring force shall be $1,5 \text{ N} \pm 0,5 \text{ N}$ (153 gf $\pm$ 51 gf) for S cassettes and $3,5 \text{ N} \pm 0,5 \text{ N}$ (357 gf $\pm$ 51 gf) for L cassettes when pressing on a reel 2,4 mm above datum plane Z as shown in Figures 11 and 24.

5.2.9.3 Extraction force

The force (F_1 , F_2) required to pull the tape out from the reel shall not exceed 0,17 N (17 gf), as specified in Figures 13a and 26a.

5.2.9.4 Friction torque

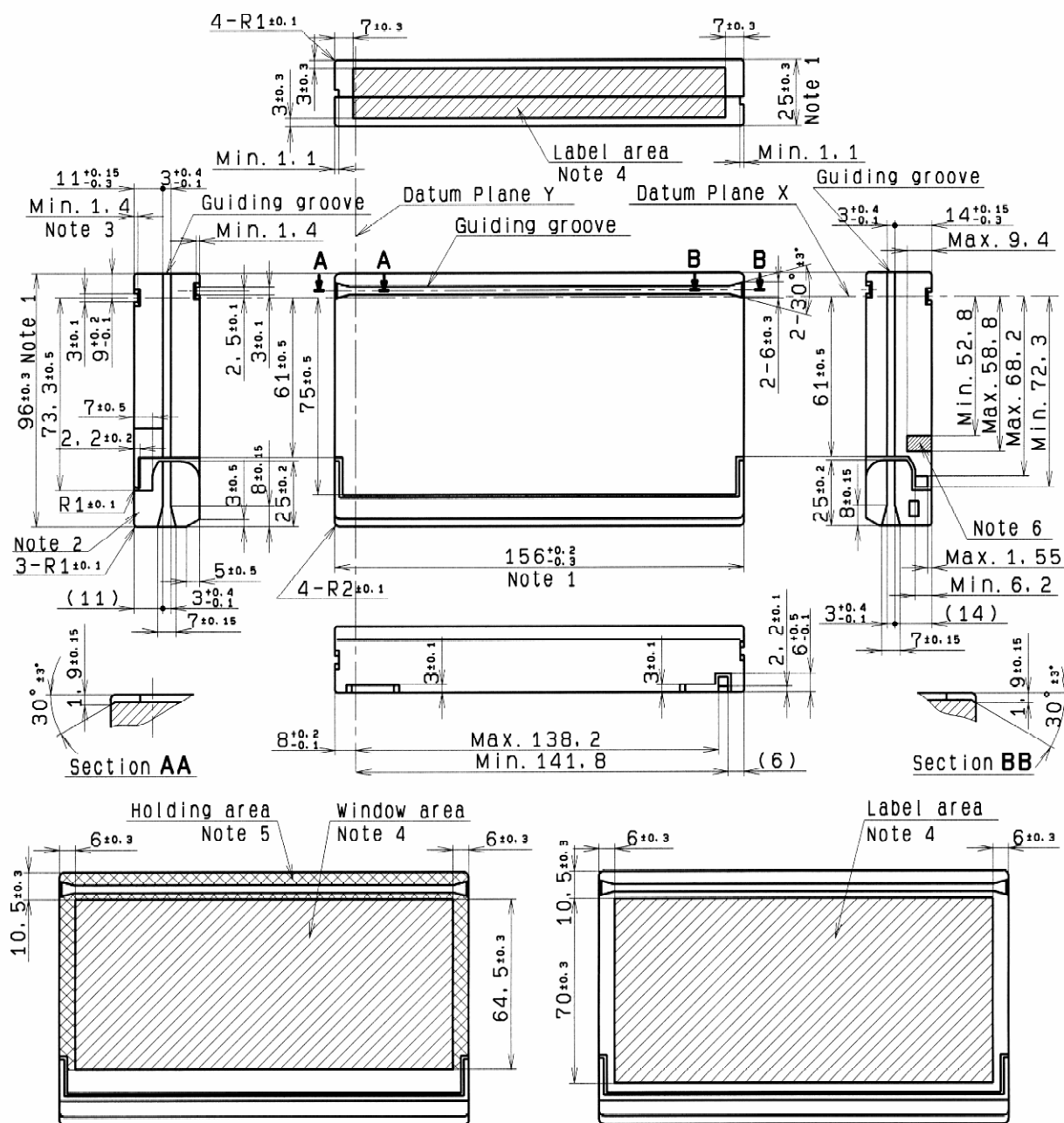
The torque required to wind the tape shall be less than 15 mN m (152 gf cm) for S cassettes and less than 30 mN m (305 gf cm) for L cassettes, as specified in Figures 13b and 26b.

5.2.10 Protecting lid

The cassette lid shall be automatically unlocked when the cassette is inserted into the video tape recorder and/or player unit and automatically locked when the cassette is ejected from it.

The unlocking lever insertion area is specified in Figures 8 and 21. The lid shall be unlocked when the lid lock lever is shifted in either direction A or B, as illustrated in Figures 9 and 22. The force required to unlock the lid shall be less than 1 N (101 gf) in the A direction or less than 1,5 N (152 gf) in the B direction.

The lid shall open 29,0 mm with a force of 1,5 N (152 gf) or less as specified in Figures 10 and 23.

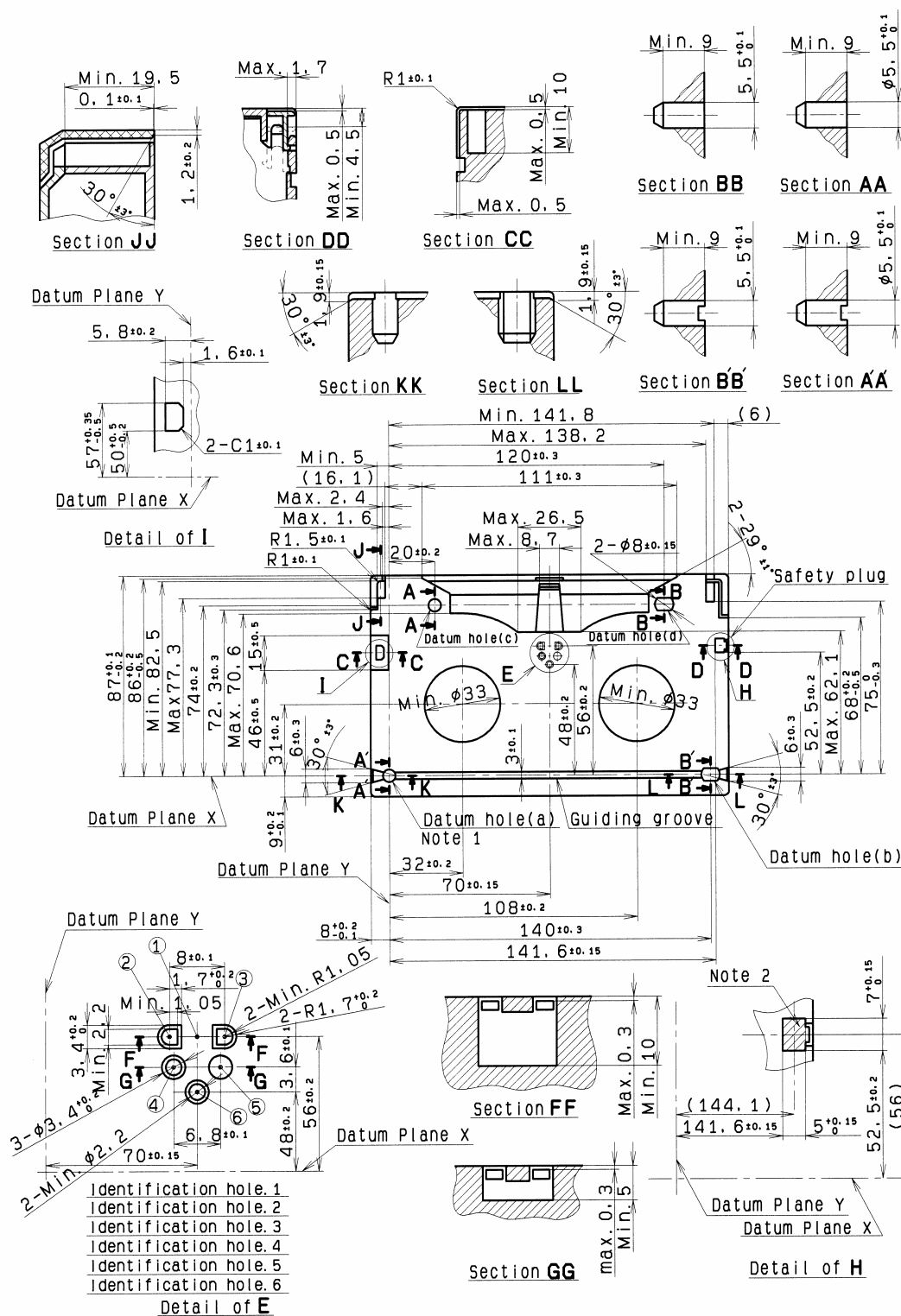


IEC 2549/03

Dimensions in millimetres

- NOTE 1 These dimensions are inspected by using limit gauges.
- NOTE 2 No part of the lid shall protrude beyond the bottom plane of the cassette when the lid opens nor when it closes.
- NOTE 3 These dimensions shall be specified based on datum plane Z.
- NOTE 4 Label and/or window areas shown by the hatched area are available for the label and/or window.
- NOTE 5 The cassette may be held in position by the recorder and/or player unit on the holding area shown by the cross-hatched area.
- NOTE 6 The fine-hatched area shows the acceptable range of plug-notch position and depth at the side.

Figure 1 – Top- and side-view dimensions (S-Cassette)



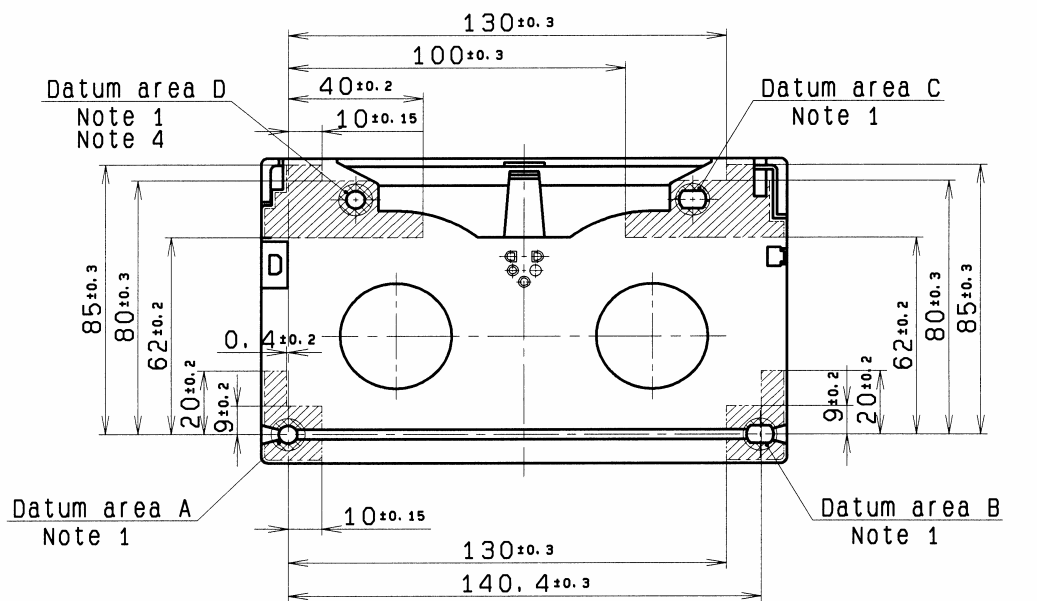
IEC 2550/03

Dimensions in millimetres

NOTE 1 Datum hole (a) is primary.

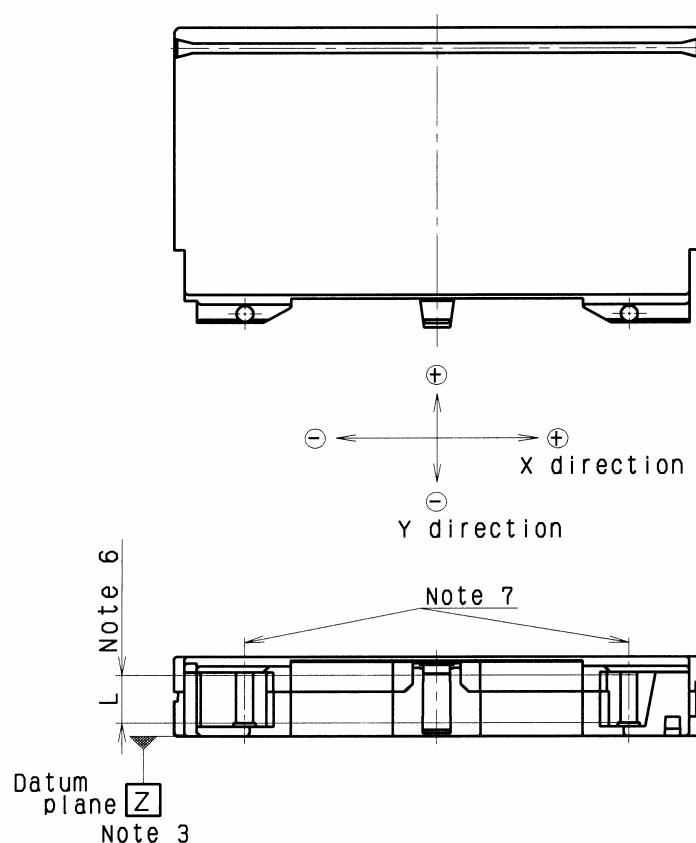
NOTE 2 The cross-hatched area shows the VTR detection area.

Figure 2 – Bottom-view dimensions (S-Cassette)



IEC 2551/03

Figure 3a – Datum areas and supporting areas



IEC 2552/03

Dimensions in millimetres

Figure 3b — Tape guides

NOTE 1 The cross-hatched areas 10 mm in diameter are datum areas.

NOTE 2 The four supporting areas shown by the hatched areas shall be coplanar with their corresponding datum areas within 0,05 mm of each of them.

NOTE 3 Datum plane Z shall be defined by the three datum areas, A, B, C.

NOTE 4 Datum area D shall be coplanar, within 0,3 mm, with datum plane Z.

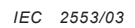
NOTE 5 The areas within 1 mm of the edges of a cassette shall not be included in the supporting areas.

Measurement *L*: 15 mm.

NOTE 6 The perpendicularity of tape guides is specified as follows (even if they themselves are tapered):

Direction Tape guide	X^a mm	Y^b mm
Supply side	0 ± 0,15	0 ± 0,15
Take-up side	0 ± 0,15	0 ± 0,15
^a Direction X: Parallel to the tape running direction. ^b Direction Y: Horizontally orthogonal to direction X.		

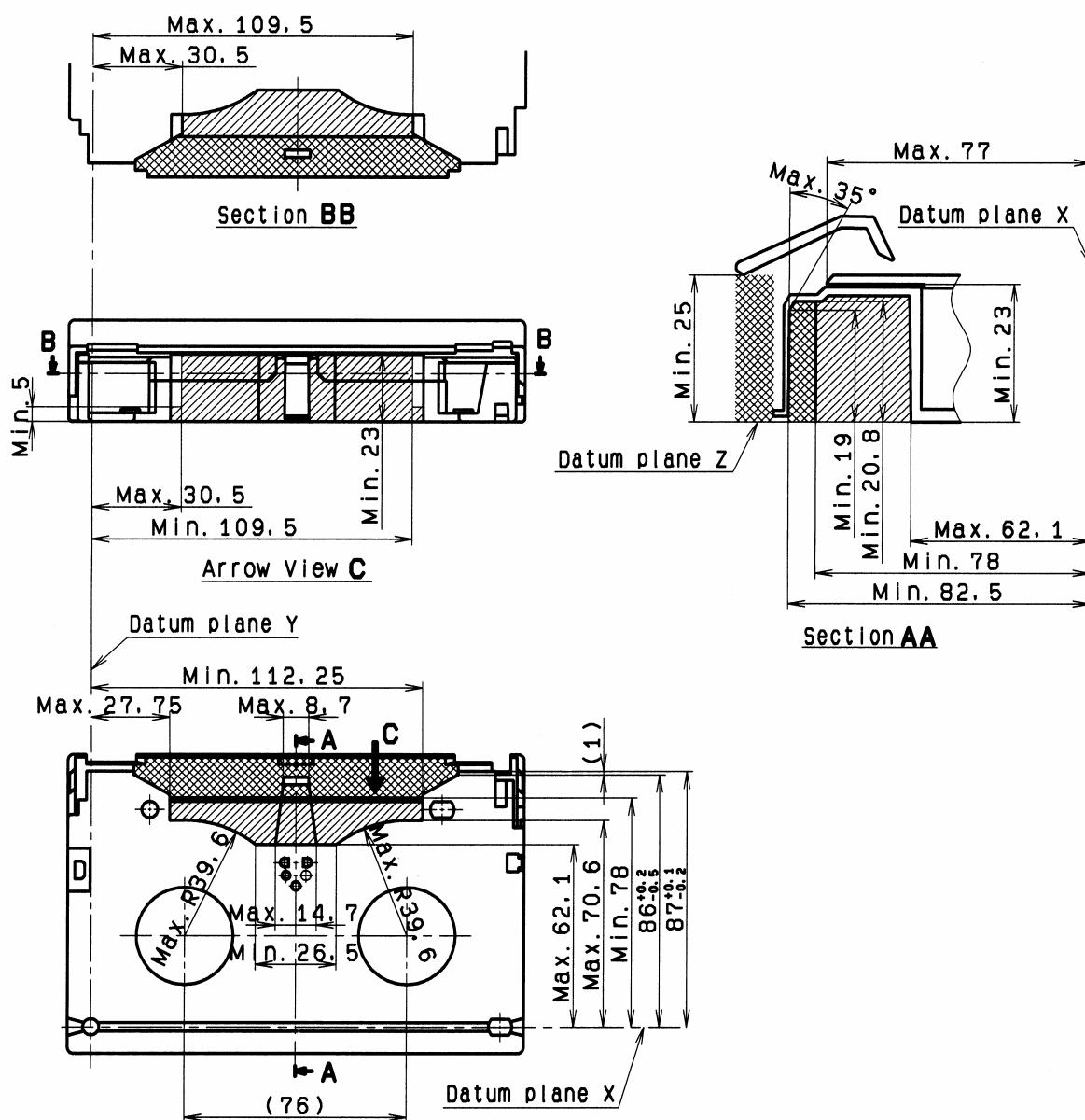
Figure 3 – Datum areas, supporting areas, tape guides and associated dimensions (S-Cassette)



Dimensions in millimetres

NOTE 3 The reel shall be reset completely when the lid opening height L is 23,5 mm.

Figure 4 – Reel location in the unlocked position (S-Cassette)



IEC 2554/03

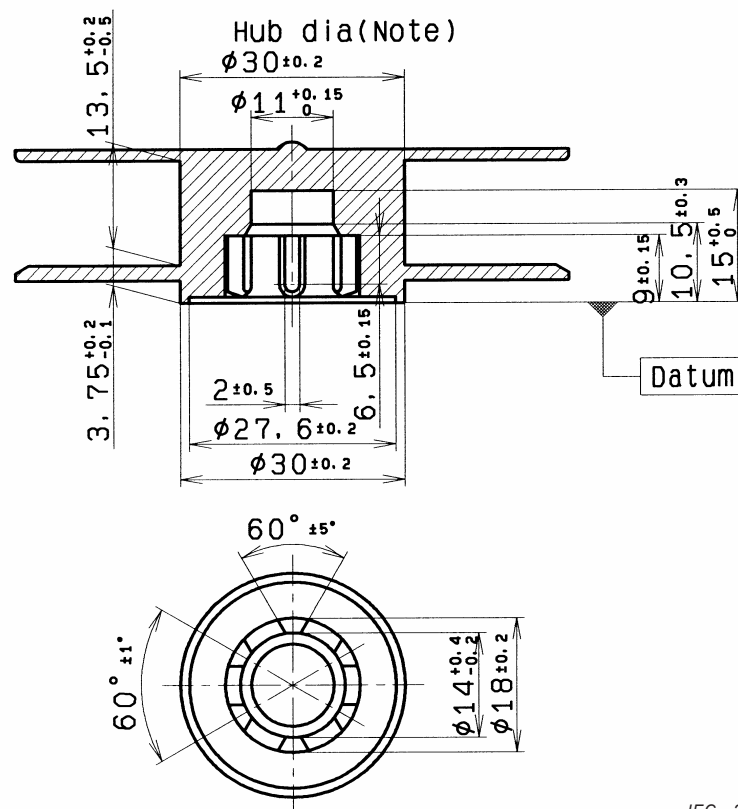
Dimensions in millimetres

NOTE 1 The hatched area is where the loading mechanism of the video tape recorder and/or player unit positions the video cassette when it is inserted.

NOTE 2 The hatched and cross-hatched areas are so designed that the loading mechanism of the video tape recorder and/or player unit unwinds and extends the magnetic tape towards the head drum after the lid opens.

Figure 5 – Protecting lid dimensions (S-Cassette)

(This condition is sometimes defined as “Minimum space for loading mechanism”).

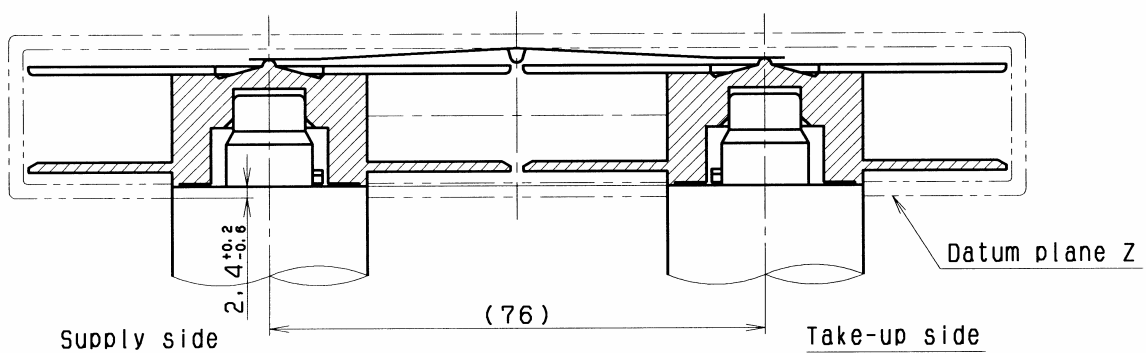


IEC 2555/03

Dimensions in millimetres

NOTE The reels with large hubs (hub diameter 53.3 ± 0.2 mm) can be used for cassettes whose recording time is less than 12 min.

Figure 6 – Reel dimensions (S-Cassette)



IEC 2556/03

Dimensions in millimetres

Figure 7 – Reel height in the unlocked position (S-Cassette)

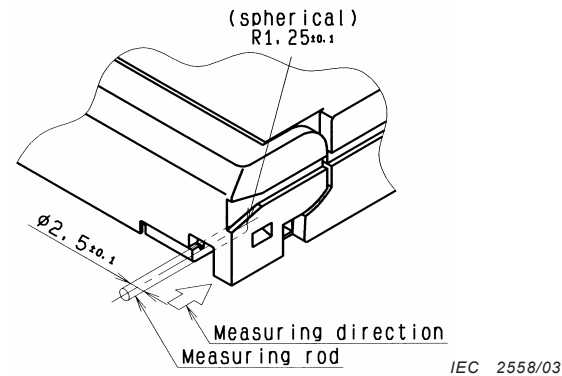


Dimensions in millimetres

NOTE 5 The tip of the unlocking lever shall be shaped into a semicircle or hemisphere whose radius is a half of the unlocking lever width.

Figure 8 – Unlocking lever insertion area (S-Cassette)

Direction A
 The force to unlock the lid shall be not greater than 1,0 N in the A direction.
 Refer to Figure 8 regarding the measuring ranges.



Direction B
 The force to unlock the lid shall be less than 1,5 N in the B direction.
 Refer to Figure 8 regarding the measuring ranges.

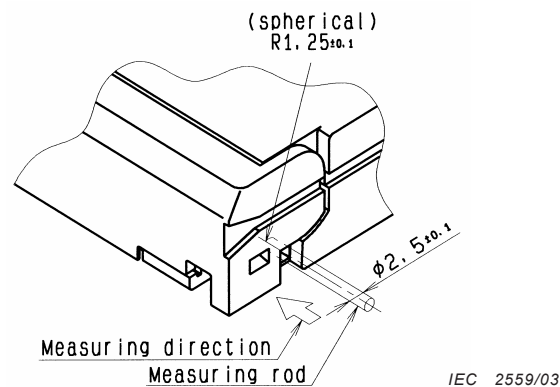


Figure 9 – Lid unlocking force (S-Cassette)

The maximum force to open the lid shall be 1,5 N.

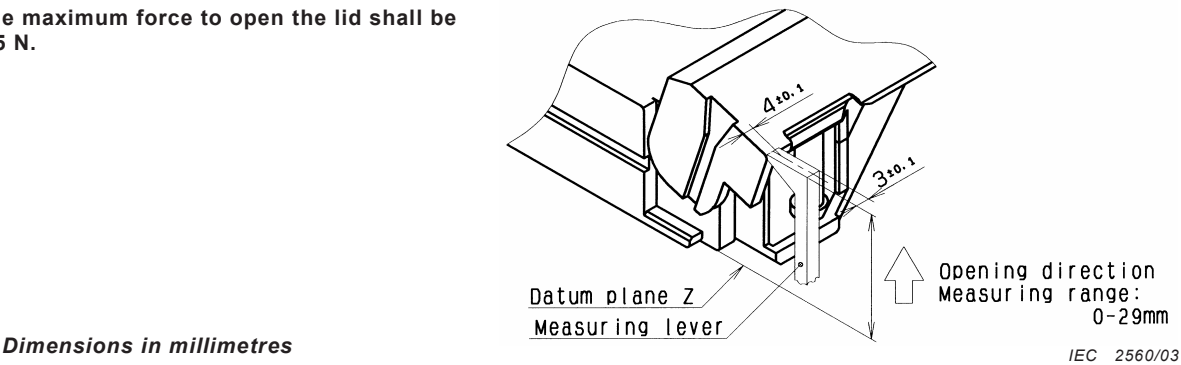


Figure 10 – Lid opening force (S-Cassette)

The force of the spring for pushing down the reel shall be (1,5 ± 0,5) N.

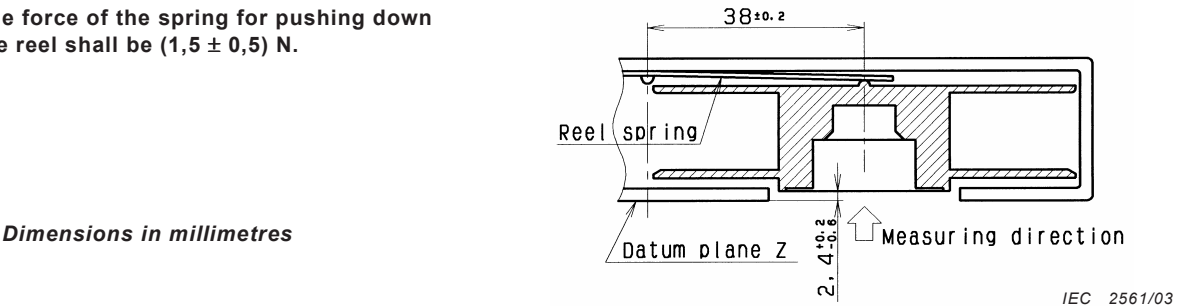
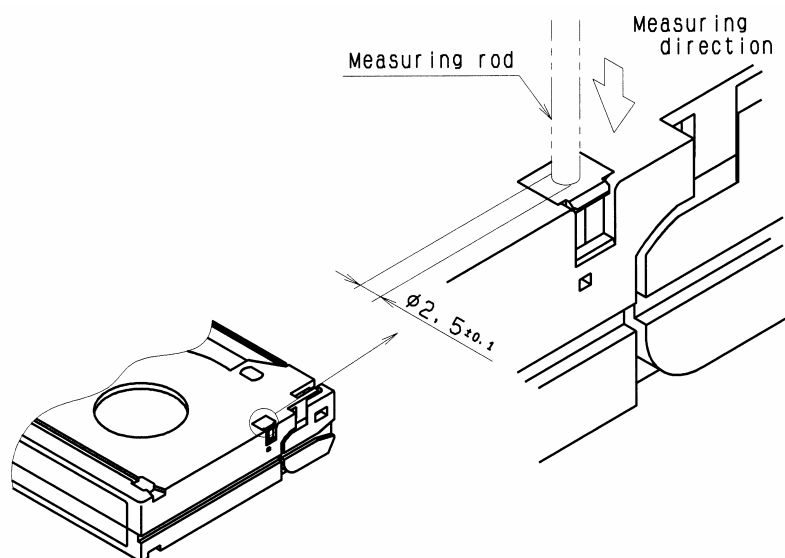


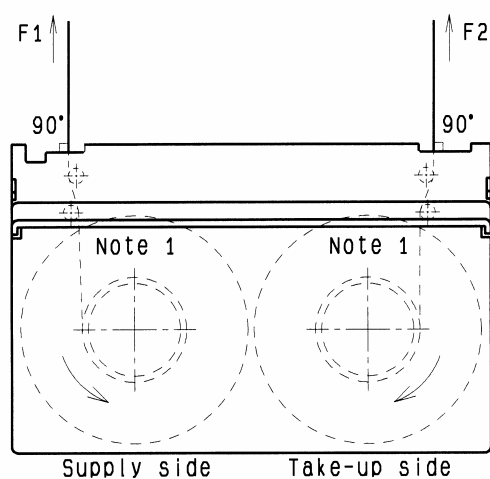
Figure 11 – Reel spring force (S-Cassette)



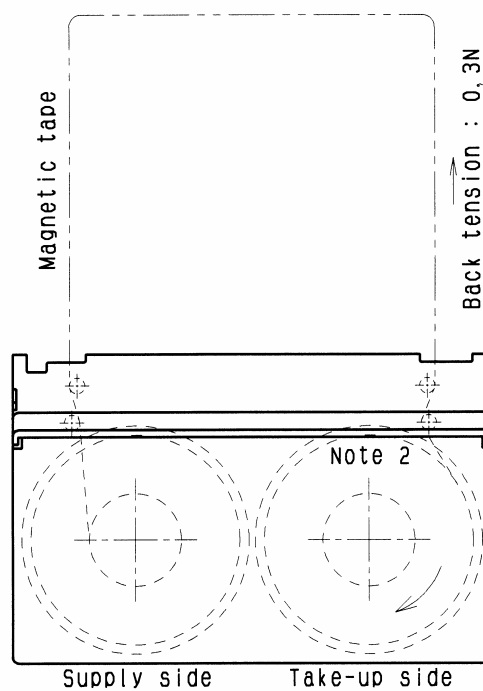
IEC 2562/03

Dimensions in millimetres

Figure 12 – Safety plug strength (S-Cassette)



IEC 2563/03



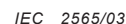
IEC 2564/03

Figure 13a – Extraction force (F1, F2) Figure 13b – Friction torque

NOTE 1 Holdback torque of 1 mN m.

NOTE 2 Friction torque to wind the tape.

Figure 13 – Extraction force (F1, F2) and friction torque (S-Cassette)



Dimensions in millimetres

NOTE 5 The fine-hatched area shows the acceptable range of plug-notch position and depth at the side.

Figure 14 – Top and side views (L-Cassette)