ANSI/SMPTE 226M-1996

SMPTE STANDARD

for Television Digital Recording — 19-mm Tape Cassettes

1 Scope

This standard specifies dimensions for three sizes of cassettes (S, M, and L) for use with 19-mm television digital recorders.

2 Measurements

2.1 Dimensions are in the metric system.

2.2 Tests and measurements on cassette parameters shall be made under the following atmospheric conditions:

- Temperature 20° C ± 1°C
- Relative humidity (50 ± 2)%
- Stabilization time 24 hours

2.3 Dimensions shall be as specified in the figures and tables.

2.4 General tolerances for dimensions, except those for which tolerances are otherwise specified, shall be as follows:

Over	To	mm
0	4	± 0.2
4	16	± 0.3
16	63	± 0.4
63	250	± 0.5
250		± 0.7

2.5 The tolerances employed by cassette manufacturers must also conform to the requirements specified in figure 23.

3 General specifications

3.1 The three sizes of cassettes shall be defined as:

- S: Small
- M: Medium
- L: Large

3.2 Maximum recording time in minutes for a fully loaded cassette shall be as specified in table 1.

Table 1 – Maximum recording time

Cassette size	Tape thickness 16 µm D-1	13 µm D-1	13 µm D-2	11 µm D-6
S	11 min	13 min	31 min	8 min
M	34 min	41 min	93 min	28 min
L	76 min	94 min	207 min	64 min

3.3 The magnetic coating on the tape shall face out of the cassette as specified in figures 1 to 3.

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3.4 Transmissivity of the cassette perpendicular to datum plane Z shall be less than 5%, measured over the range of wavelengths 700 nm to 900 nm.

4 Datum planes

4.1 Datum plane Z is determined by datum areas A, B, and C as specified in figures 4 to 6.

4.1.1 Datum C need not correspond to a fastener.

4.2 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 to 9.

4.3 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 to 9.

5 Window and labels

5.1 Window and label areas shall be as specified in figures 10 to 12.

5.2 Labels attached to the cassette shall not extend beyond the external dimensions as shown in figures 10 to 12.

5.2.1 Labels shall not interfere with users' or manufacturer's identification holes.

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

6 Identification holes

6.1 There shall be two sets of identification holes: user holes and manufacturer coding holes.

6.1.1 Figures 13 to 15 detail the location of user and manufacturer coding holes. Manufacturer holes shall be used in combinations according to the tape thickness, coercivity, and/or application according to table 2.

6.1.2 A "0" in table 2 indicates that the recorder/player sensor mechanism has detected that the indicator tab has been removed and the hole is open.

Table 2 – Manufacturer coding holes

Code designation	Hole number				Description	Format application
	1	2	3	4		
A	0	0	0	0	16 µm tape, class 850	D-1
B	1	0	0	0	Undefined	
C	0	1	0	0	13 µm tape, class 850	D-1
D	1	1	0	0	Undefined	
E	0	0	1	0	Cleaning tape	NA
F	1	0	1	0	11 µm tape, class 1700	(D-6)
G	0	1	1	0	Undefined	
H	1	1	1	0	Undefined	
I	0	0	0	1	Undefined	
J	1	0	0	1	Undefined	
K	0	1	0	1	13 µm tape, class 1500	D-2
L	1	1	0	1	Undefined	
M	0	0	1	1	Undefined	
N	1	0	1	1	11 µm tape – Reserved	Reserved
O	0	1	1	1	Undefined	
P	1	1	1	1	11 µm tape – Reserved	Reserved

6.2 The dimensions and location of the user holes are specified in figures 13 to 15. Their use shall be defined as follows:

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

Hole number 1: Total record lock out (audio/video/cue/time code/control track)
Hole number 2: Reserved and undefined
Hole number 3: Video and control track record lock out
Hole number 4: Reserved and undefined

6.2.2 The user plug mechanism shall withstand an axial force of 0.5 N.

7 Leader/trailer tape

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

7.2 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.

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

7.4 The width of the leader/trailer tape shall be 19.000 mm ± 0.025 mm.

7.5 The thickness of the leader/trailer tape shall be 20 µm ± 10 µm.

7.6 The splicing tape used to attach the leader tape shall be applied to the nonmagnetic coated side.

8 Reels

8.1 The dimensions of the reels and the relationship between the reels and reel tables are specified in figures 16 and 17.

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

8.3 When an S cassette is inserted into a recorder/player, the reels shall be unlocked automatically as specified in figure 18.

8.3.1 The force needed to release the reel lock of the S cassette shall be 0.6 N max.

8.4 When an M or L cassette is inserted into a recorder/player, the reel shall be unlocked automatically by opening the lid as specified in figures 19 and 20.

8.5 The reel 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 ± 0.2 mm from datum plane Z.

9 Lid

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

9.1.1 The lid shall be unlocked by a 0.6 N max force being exerted upon the release pin, as specified in figures 21 and 23.

9.1.2 The inner door shall be lifted by the recorder/player to the position shown in figure 22.

9.2 The outer door when open shall not exceed 51 mm with respect to datum plane Z, as specified in figure 22.

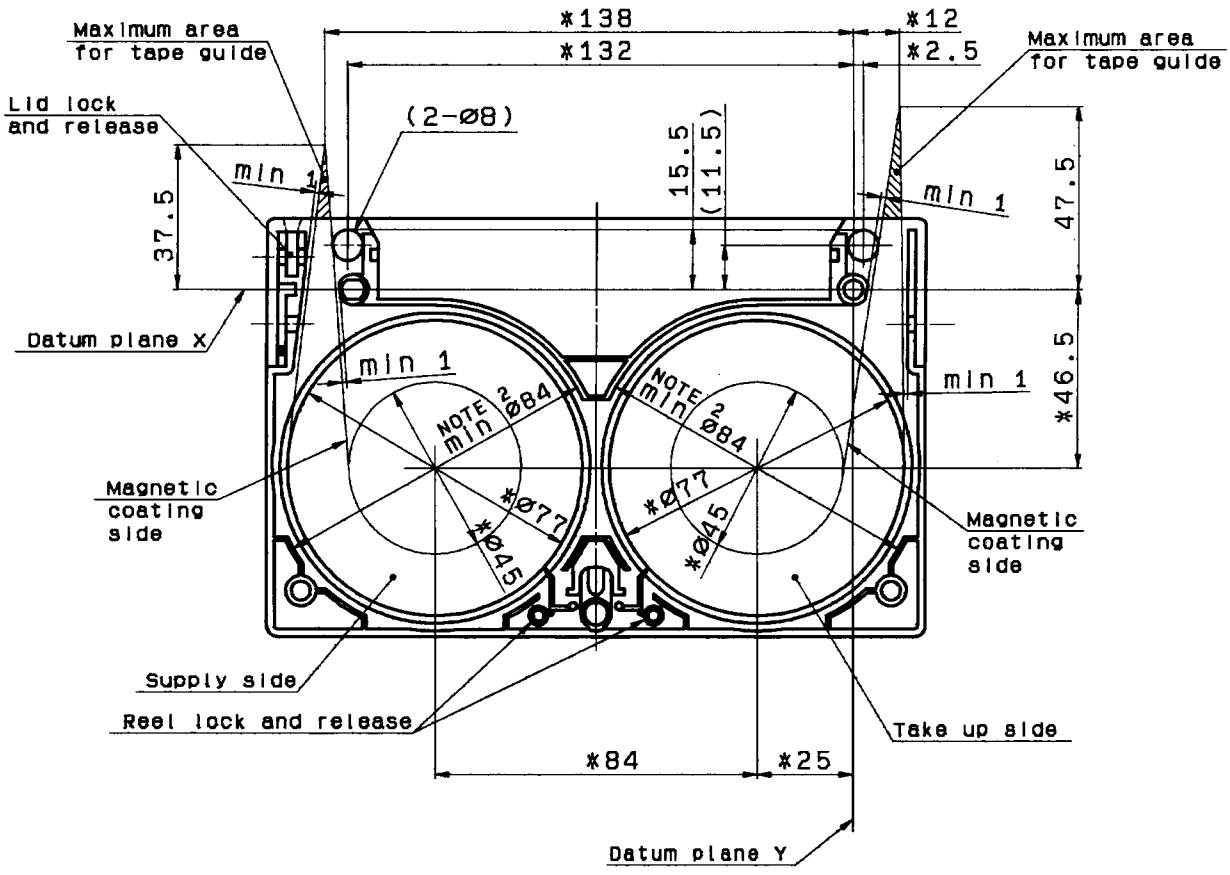
9.3 When the cassette is removed from the recorder/player, the lid shall lock automatically.

9.4 The maximum force to open the lid shall be 1.5 N at the minimum height defined in figure 22.

9.5 The force required to open the lid shall be applied 90° ± 5° to datum plane Z.

10 Space for tape loading mechanism

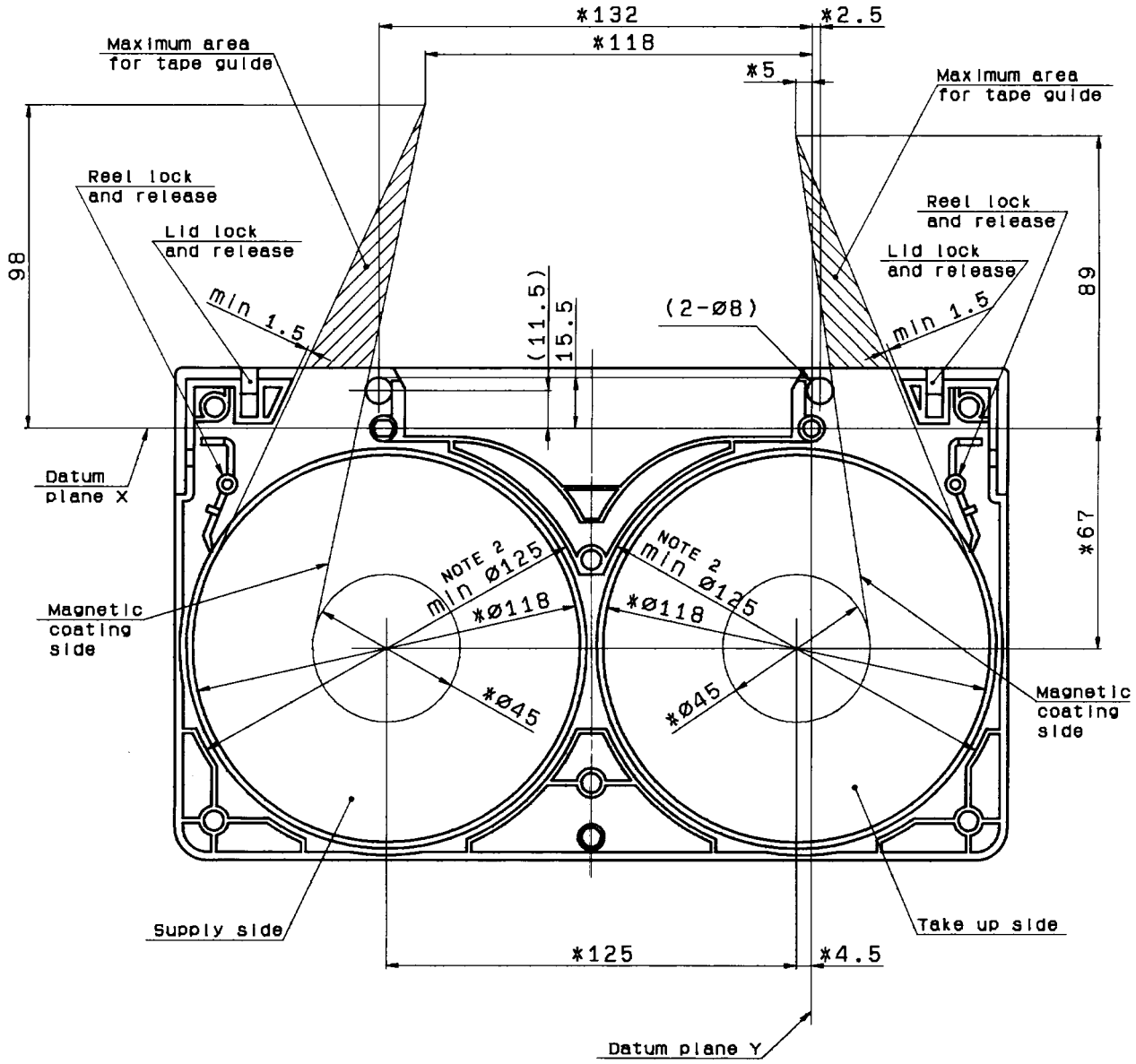
The shaded area of figure 23, intended for manufacturers of DTTRs, is the area available for loading (threading) of tape. It should be noted that the dimensions defining this space are not cassette dimensions, but are shown to be an interference-free space. Cassette dimensions are shown in figures 7, 8, and 9.



NOTES

1 Dimensions marked with an asterisk are nominal values specifying the tape path.
2 Area for the reel.

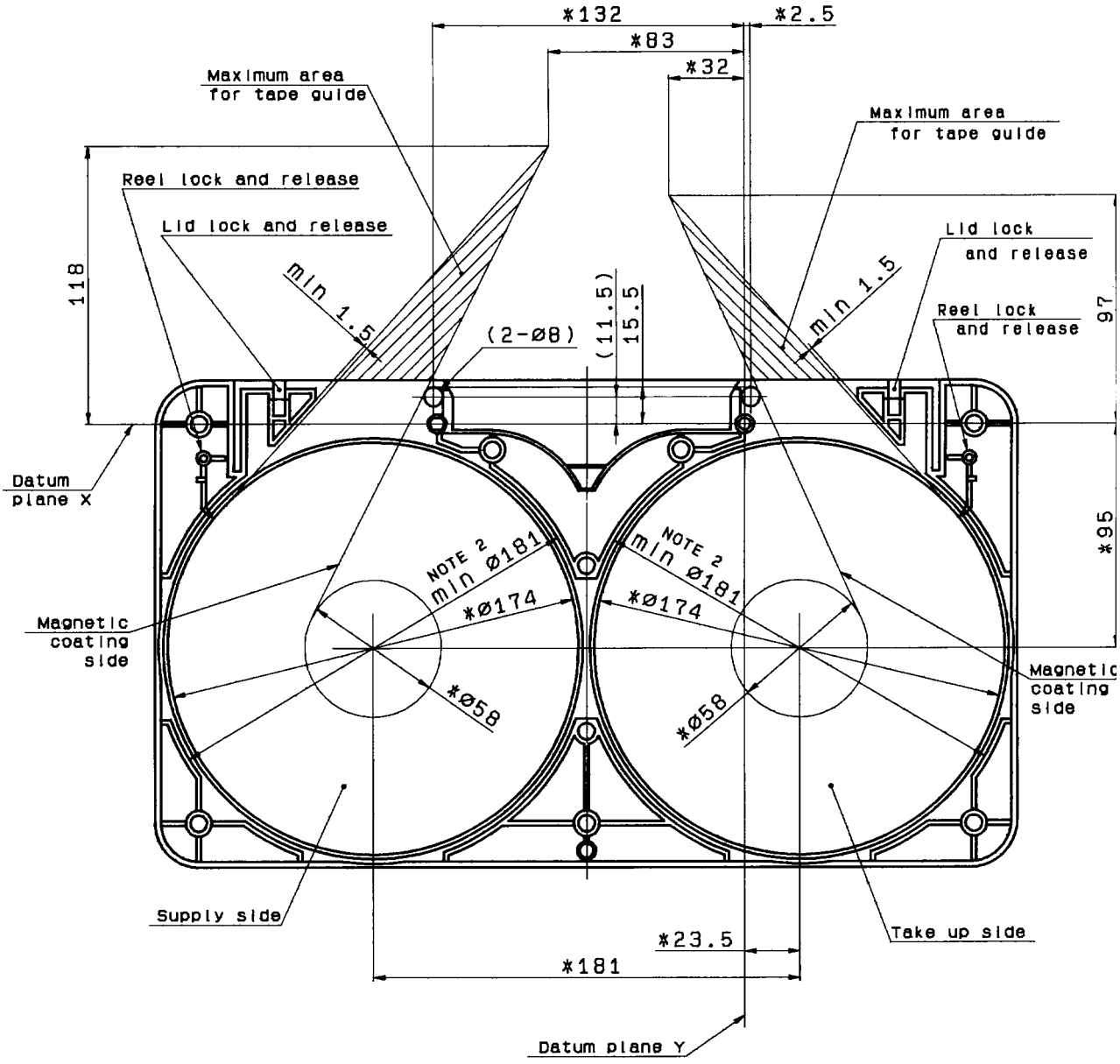
Figure 1 – Internal structure and tape path of S cassette – Top view (for reference only)



NOTES

1 Dimensions marked with an asterisk are nominal values specifying the tape path.
2 Area for the reel.

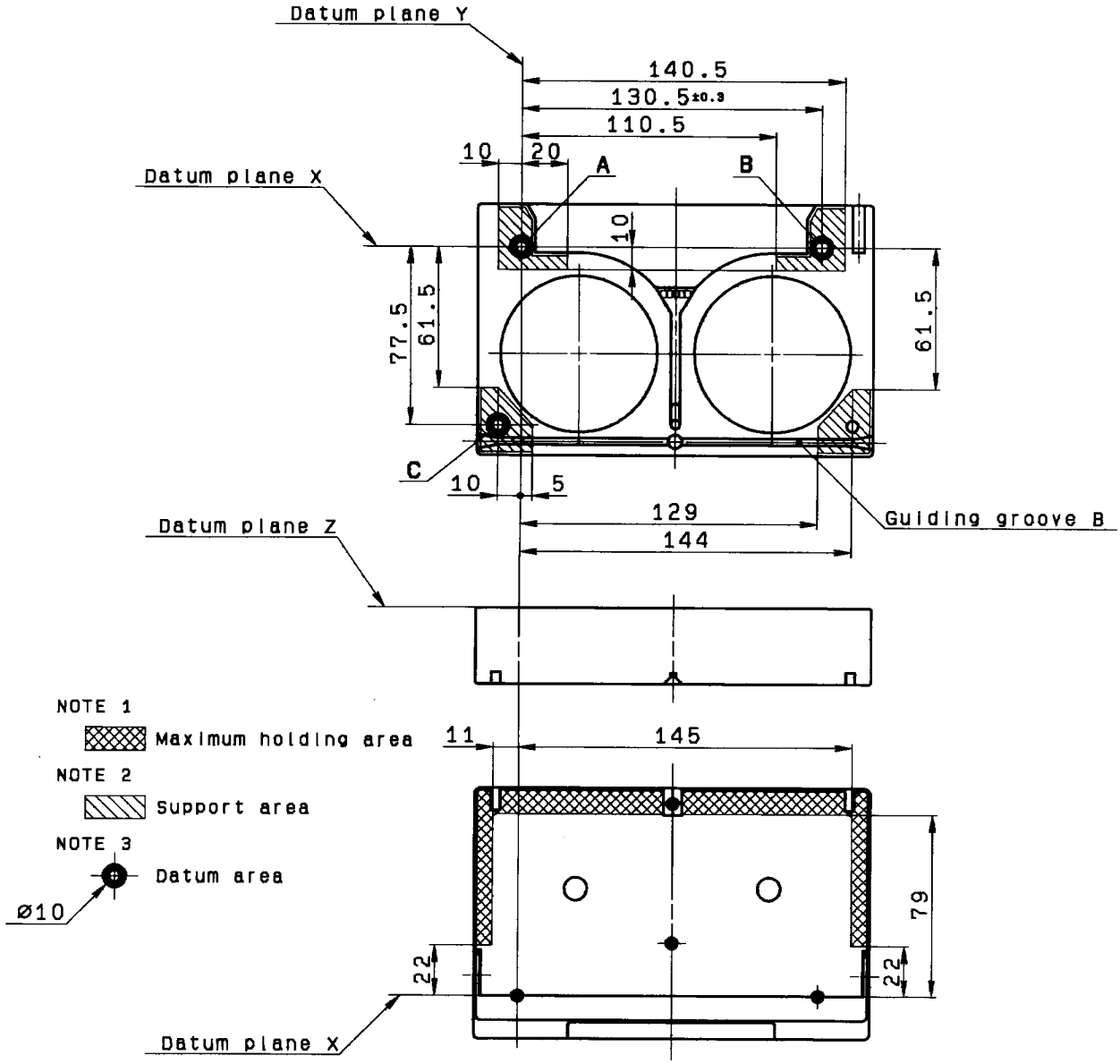
Figure 2 – Internal structure and tape path of M cassette – Top view (for reference only)



NOTES

1 Dimensions marked with an asterisk are nominal values specifying the tape path.
2 Area for the reel.

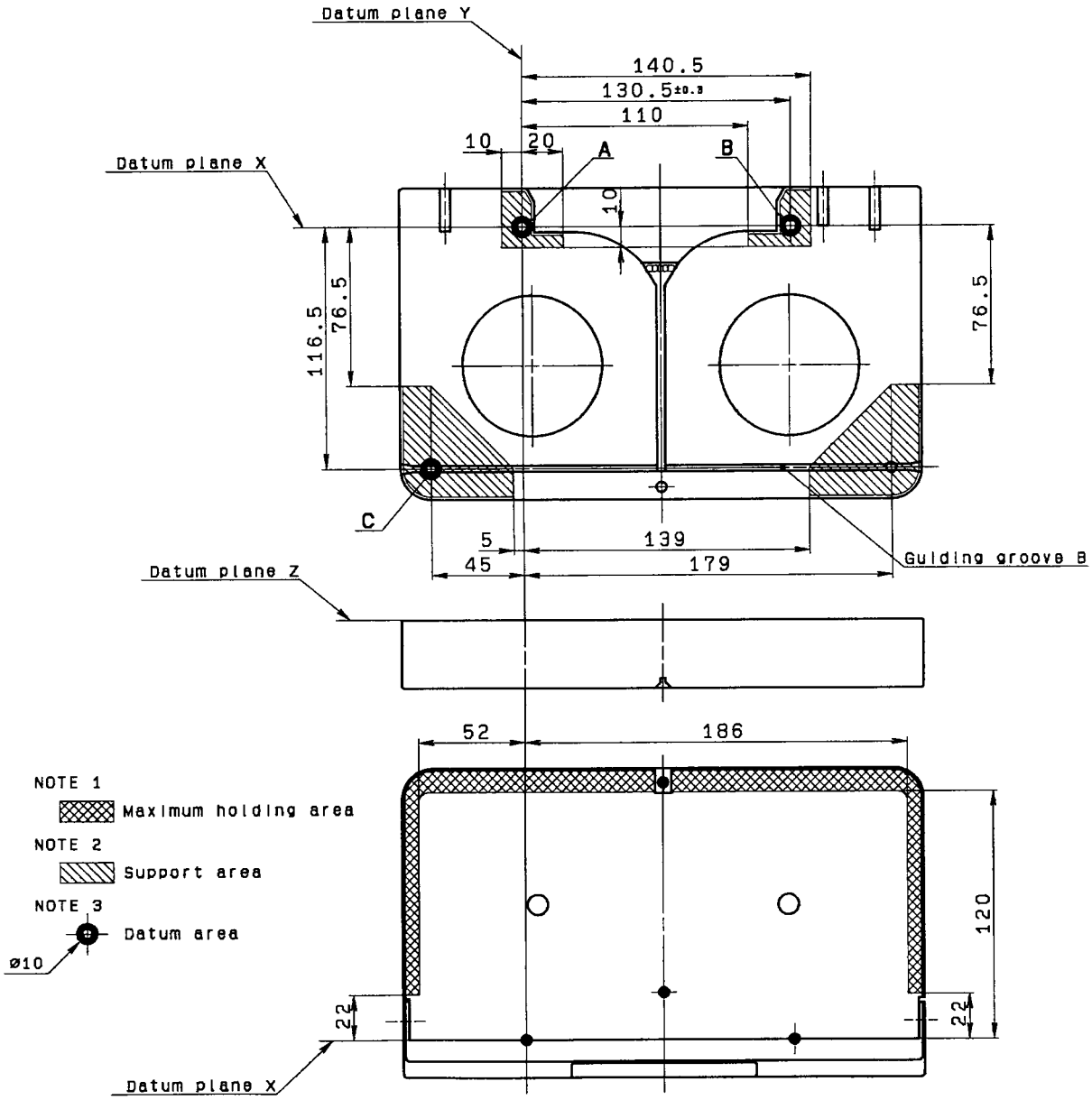
Figure 3 – Internal structure and tape path of L cassette – Top view (for reference only)



NOTES

1 The cassette shall be secured by the recorder and/or player unit on the dotted area.
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 hatched area.
3 Datum plane Z shall be determined by datum areas A, B, and C.

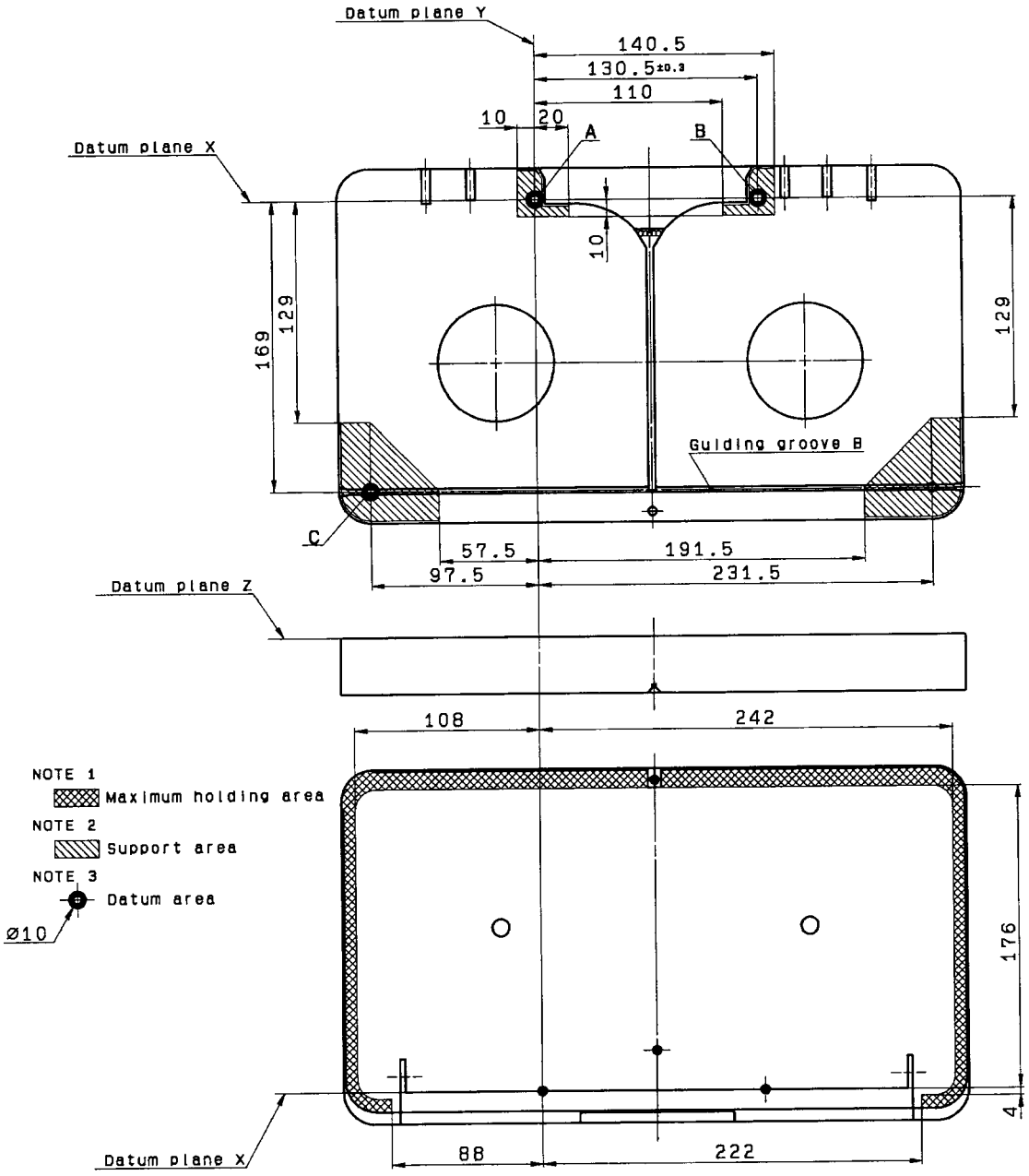
Figure 4 – Datum area, support area and holding area of S cassette



NOTES

1 The cassette shall be secured by the recorder and/or player unit on the dotted line.
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.
3 Datum plane Z shall be determined by datum areas A, B, and C.

Figure 5 – Datum area, support area and holding area of M cassette



NOTES

1 The cassette shall be secured by the recorder and/or player unit on the dotted line.
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.
3 Datum plane Z shall be determined by datum areas A, B, and C.

Figure 6 – Datum area, support area and holding area of L cassette

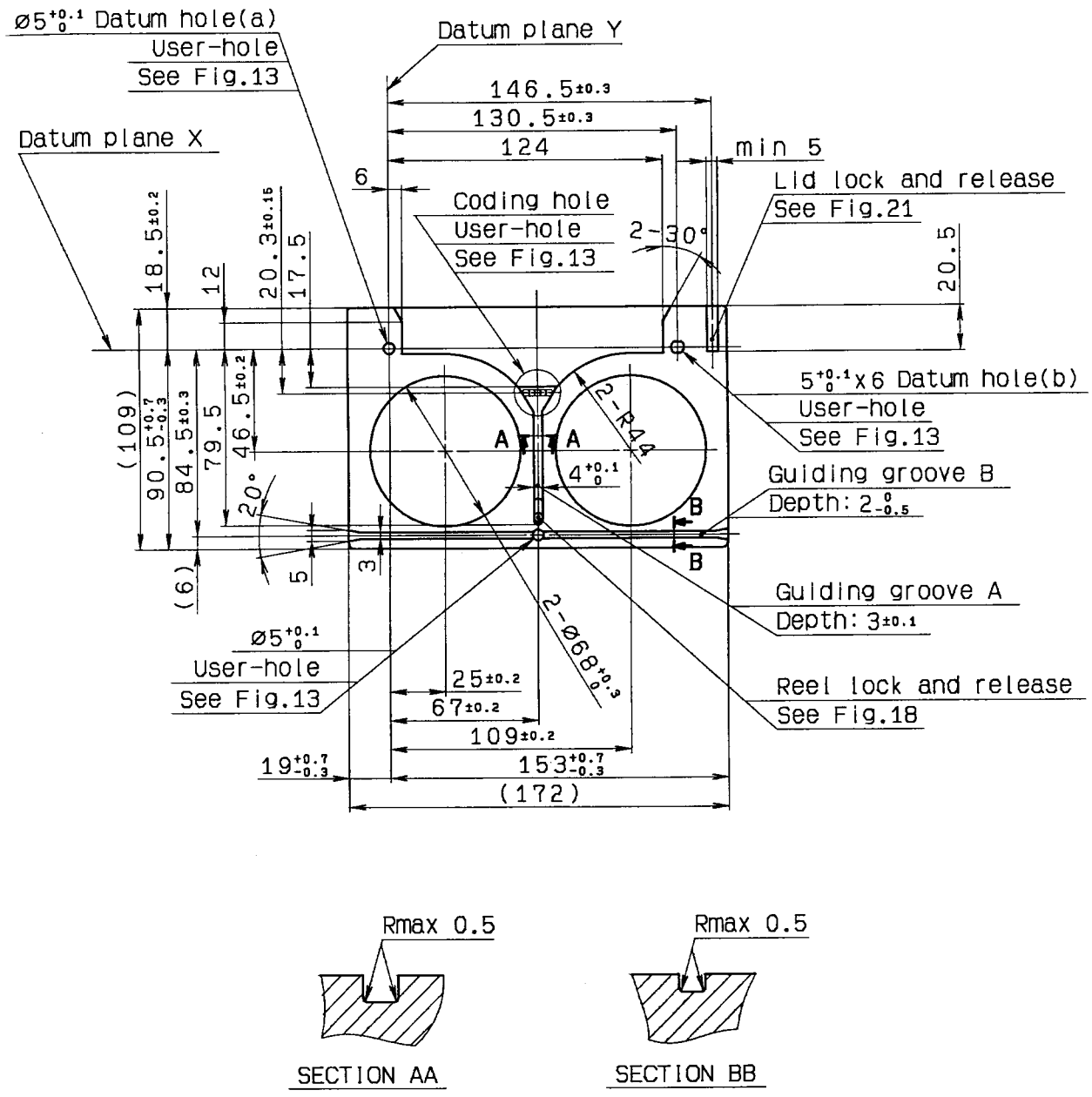


Figure 7 – Bottom view of S cassette

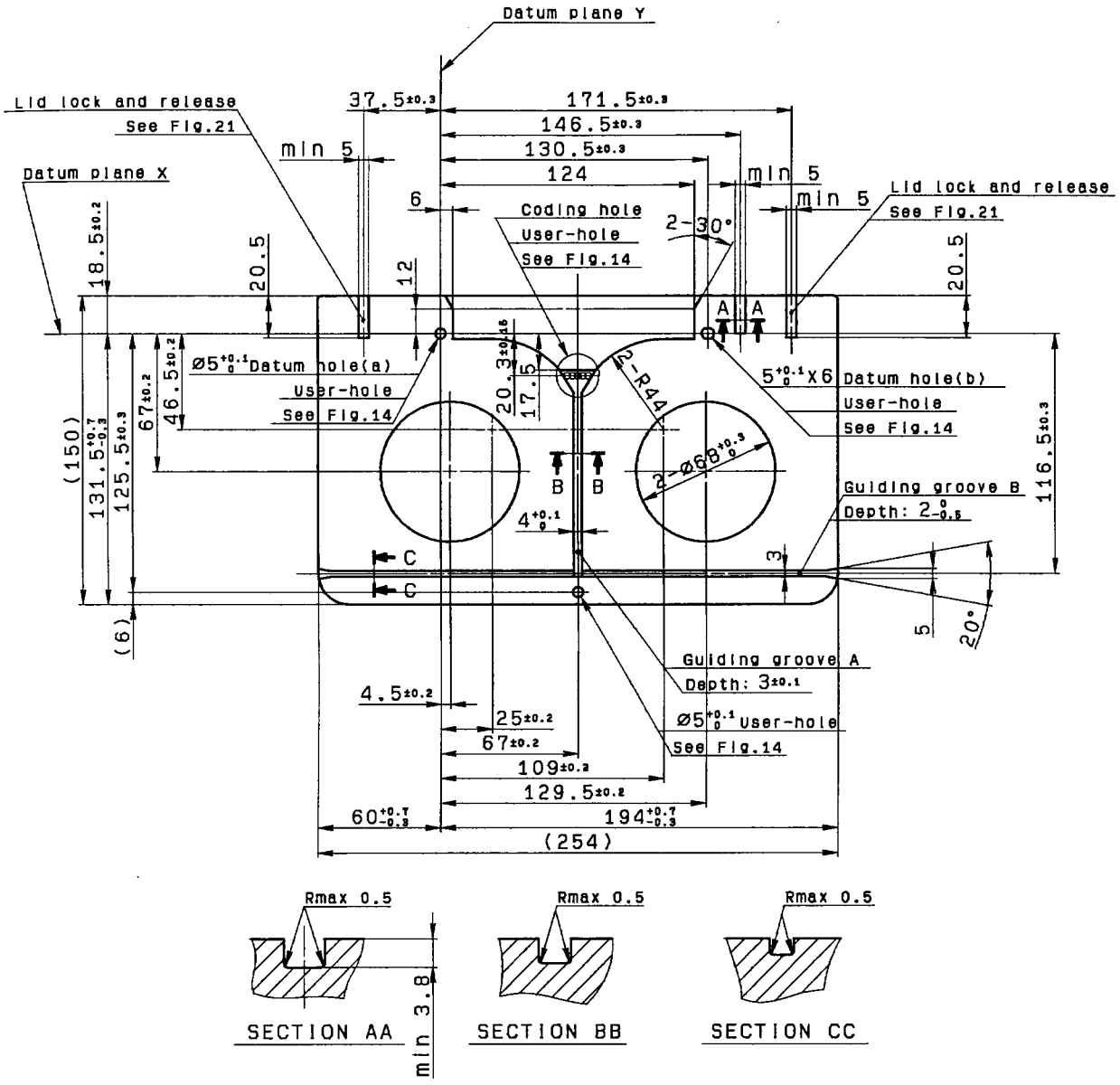


Figure 8 – Bottom view of M cassette

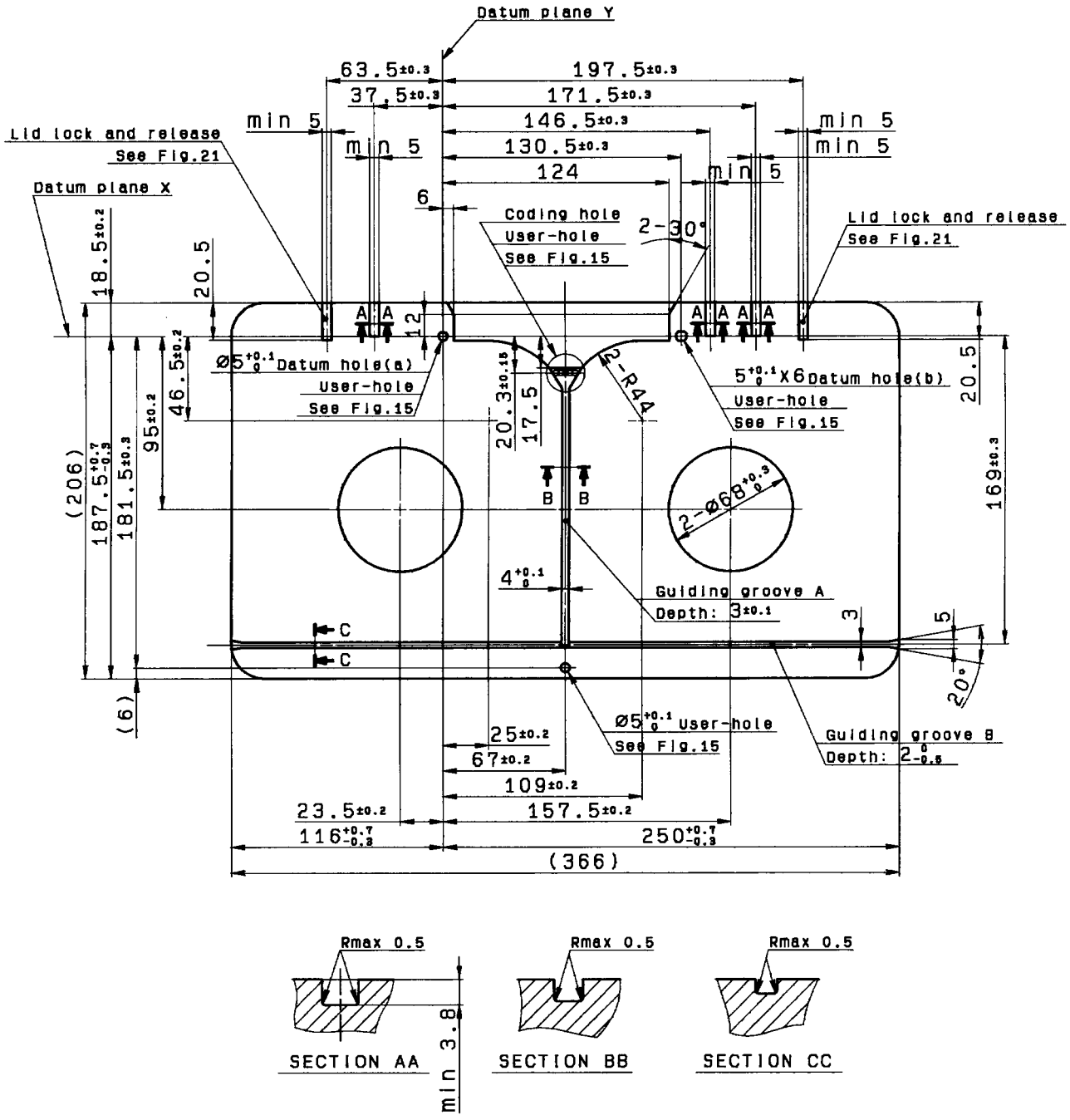
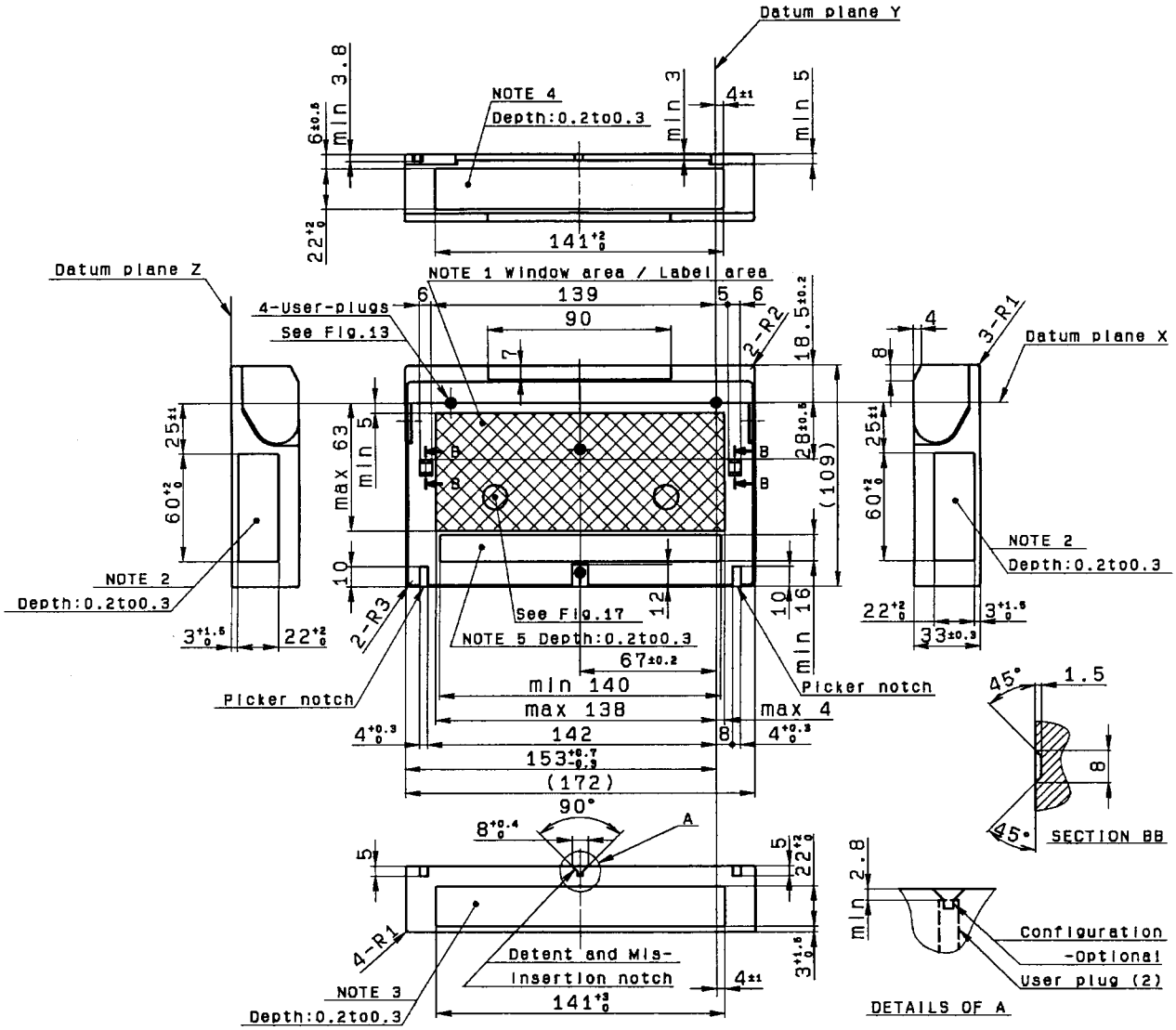


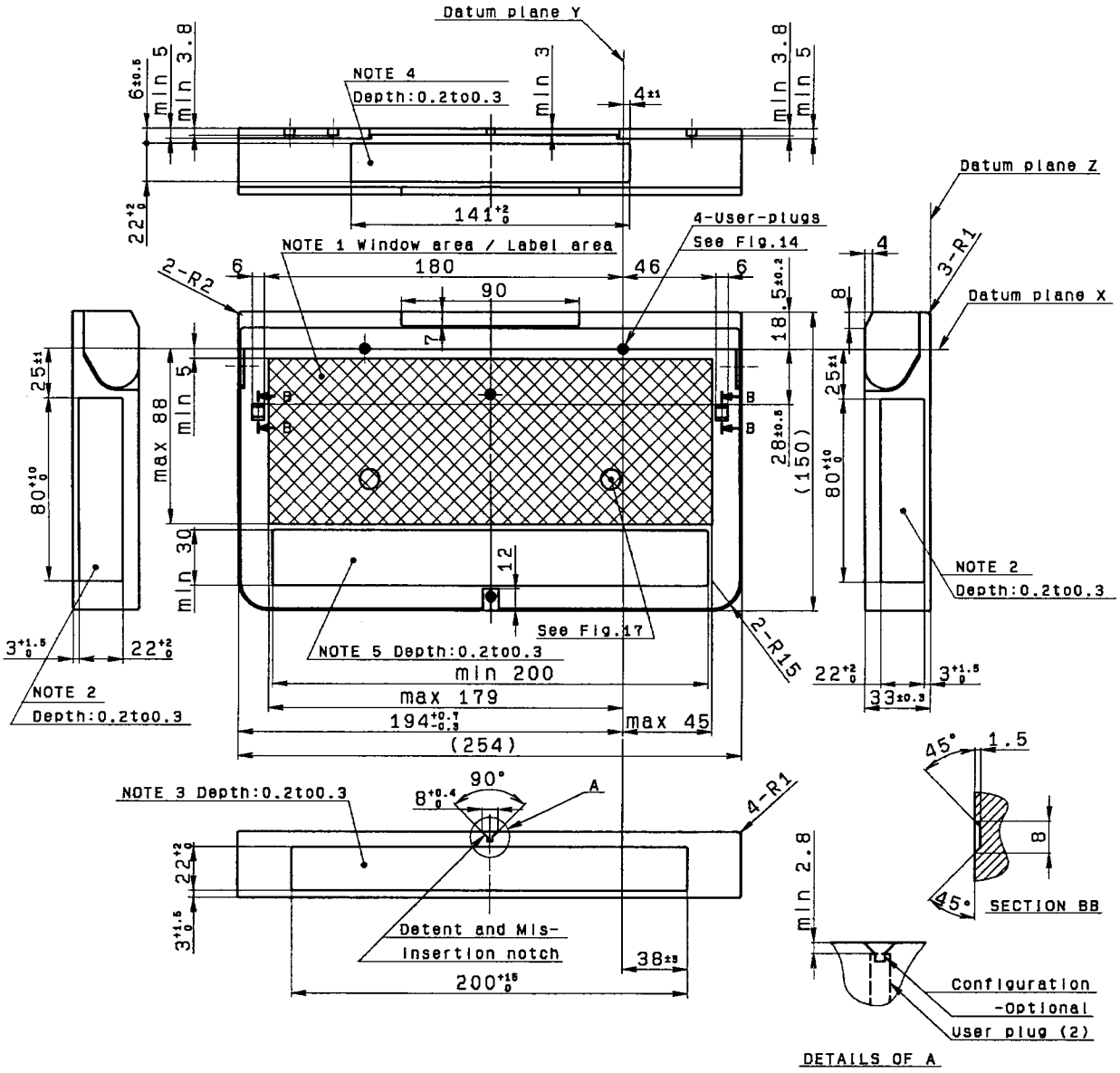
Figure 9 – Bottom view of L cassette



NOTES

1 The crosshatched area is available for the window/labels.
2 Side label may be attached to this recessed area.
3 Rear label may be attached to this recessed area.
4 Lid label may be attached to this recessed area.
5 Top label may be attached to this recessed area.

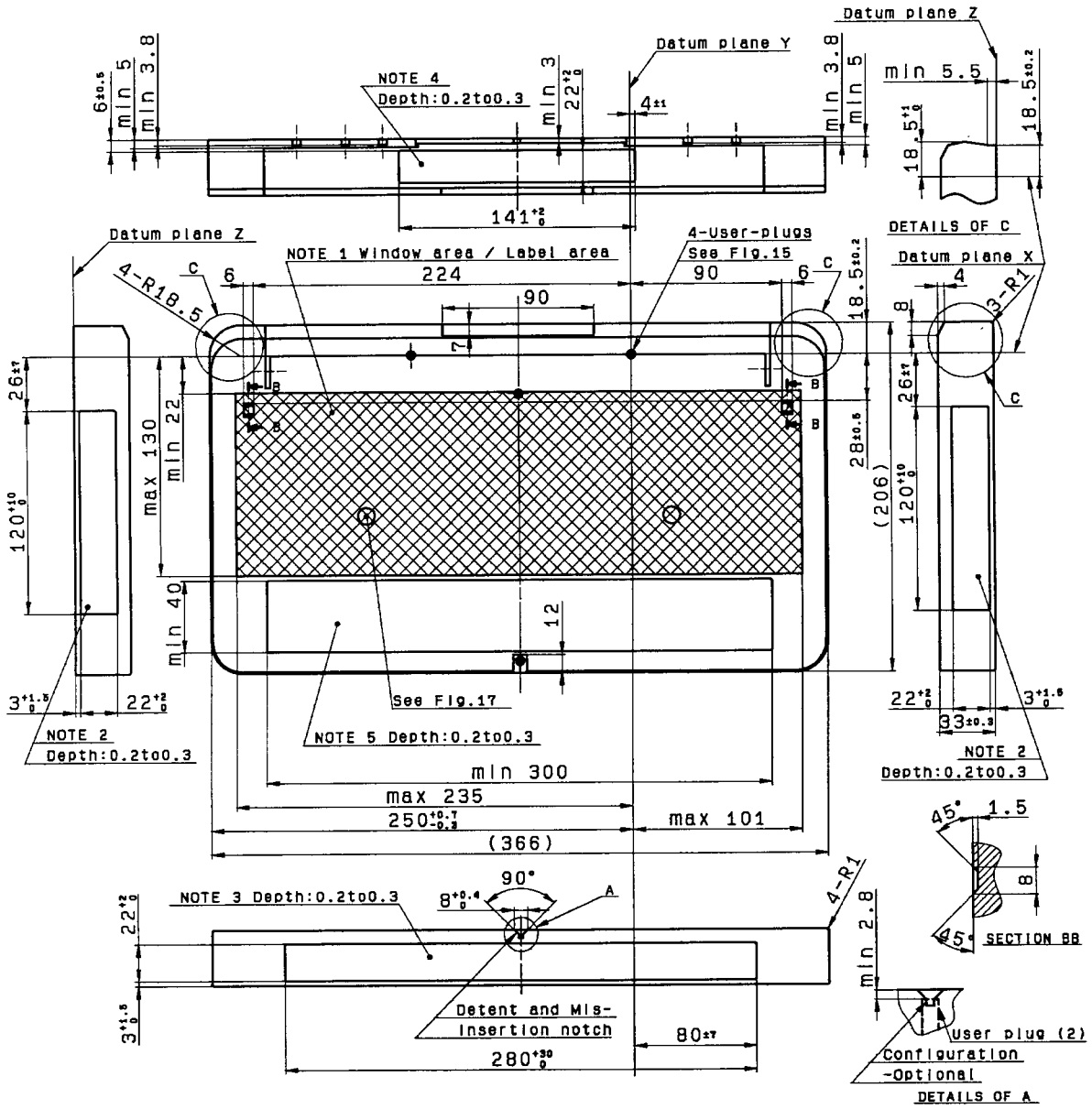
Figure 10 – Top and side view of S cassette



NOTES

1 The crosshatched area is available for the window/labels.
2 Side label may be attached to this recessed area.
3 Rear label may be attached to this recessed area.
4 Lid label may be attached to this recessed area.
5 Top label may be attached to this recessed area.

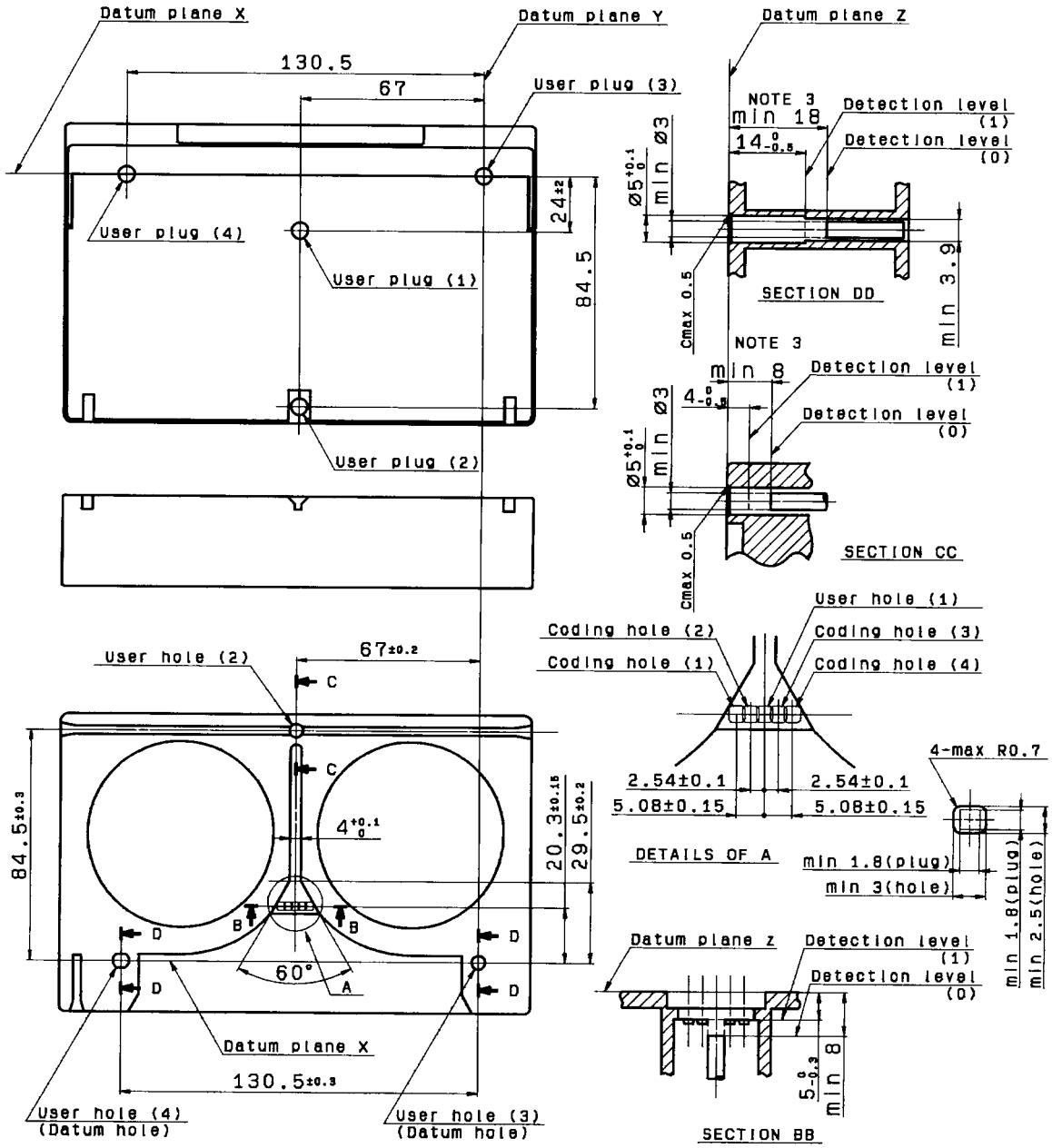
Figure 11 – Top and side view of M cassette



NOTES

1 The crosshatched area is available for the window/labels.
2 Side label may be attached to this recessed area.
3 Rear label may be attached to this recessed area.
4 Lid label may be attached to this recessed area.
5 Top label may be attached to this recessed area.

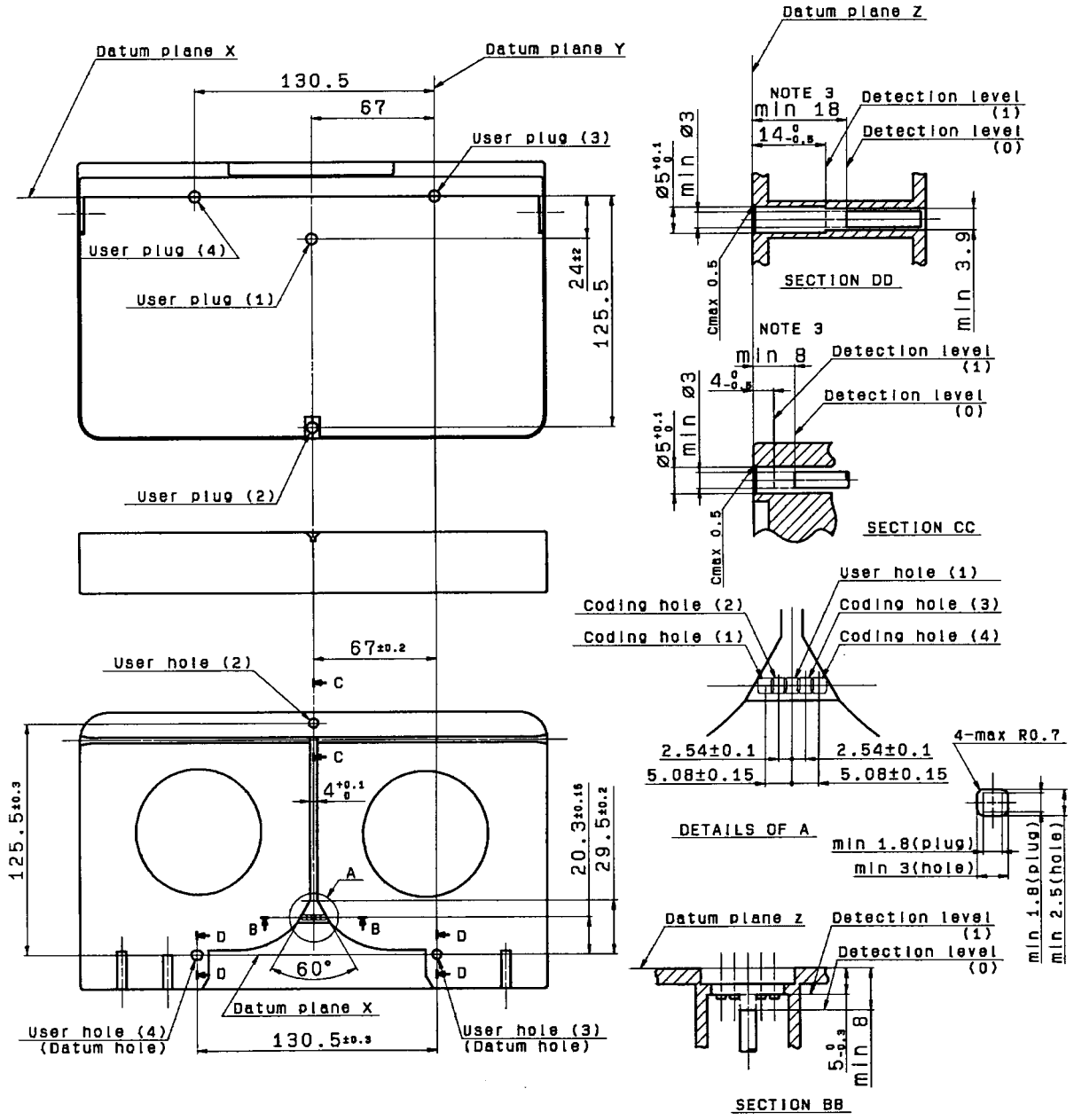
Figure 12 – Top and side view of L cassette



NOTES

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. User plug (1) shall be green.
2 User holes (3) and (4) on the upper shell shall be opened when user plugs are removed.
3 All cassettes shall be provided with holes as defined by sections DD and CC.
4 See annex A.

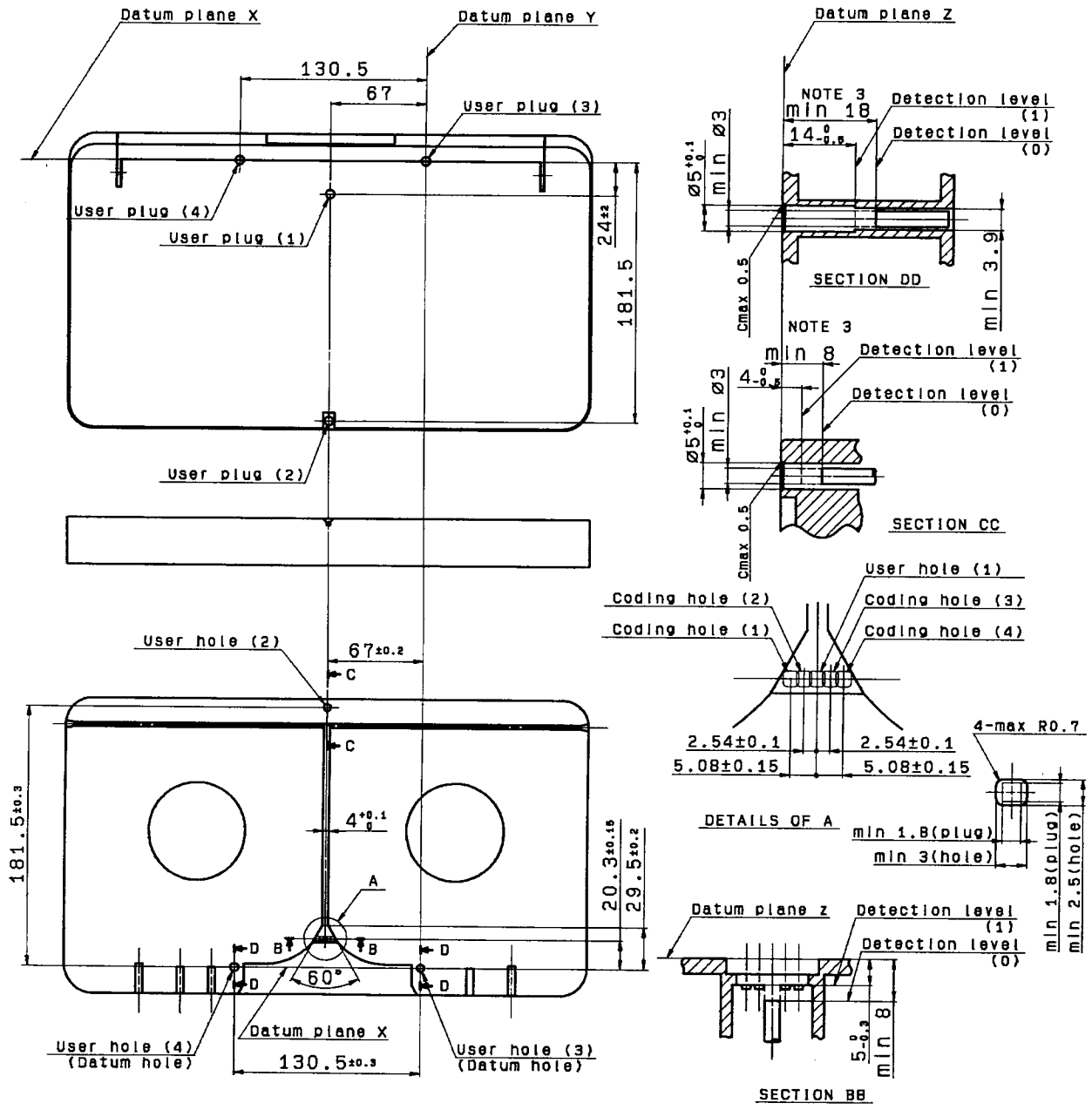
Figure 13 – S cassette coding holes and user holes



NOTES

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. User plug (1) shall be green.
2 User holes (3) and (4) on the upper shell shall be opened when user plugs are removed.
3 All cassettes shall be provided with holes as defined by sections DD and CC.
4 See annex A.

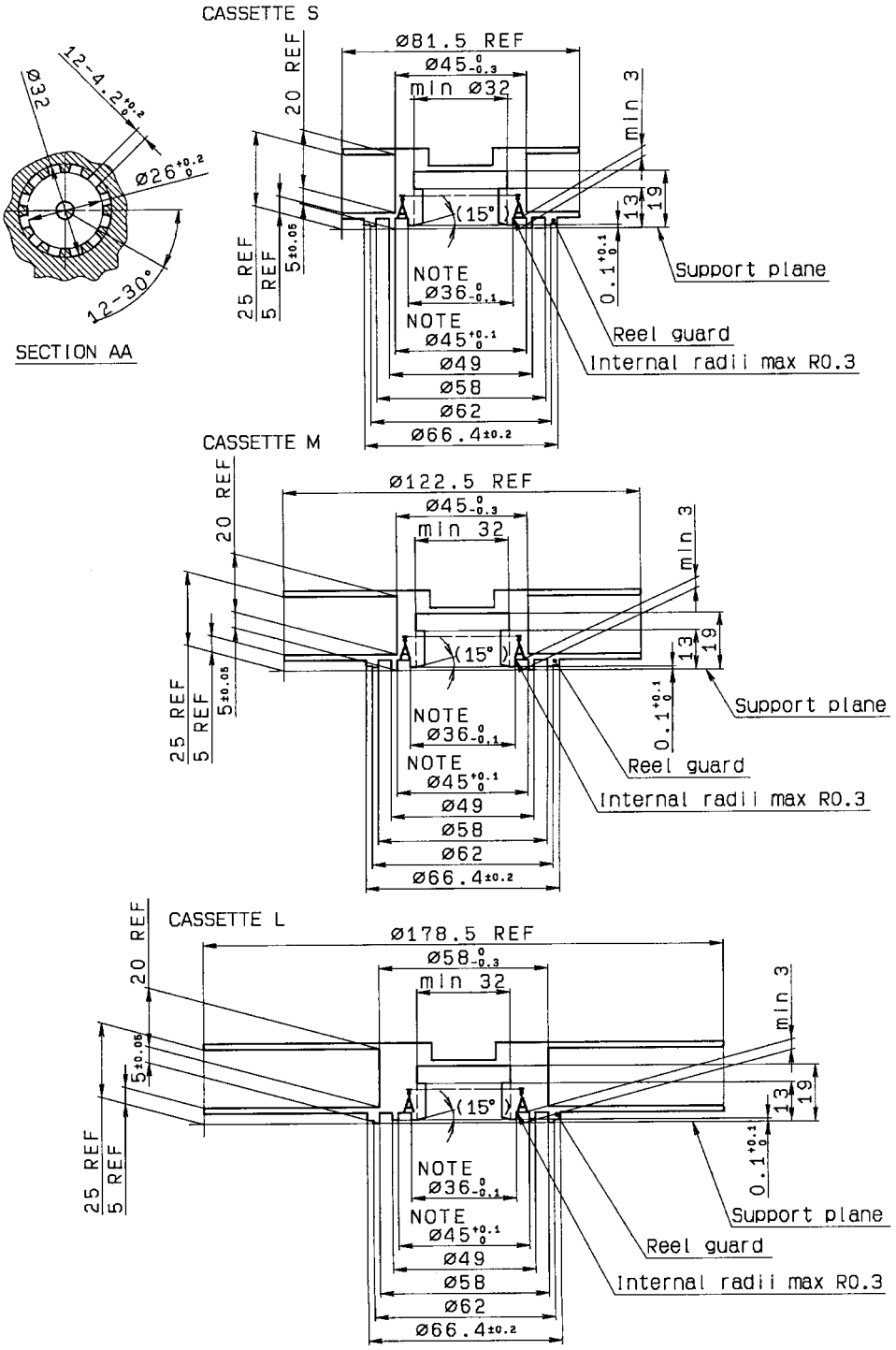
Figure 14 – M cassette coding holes and user holes



NOTES

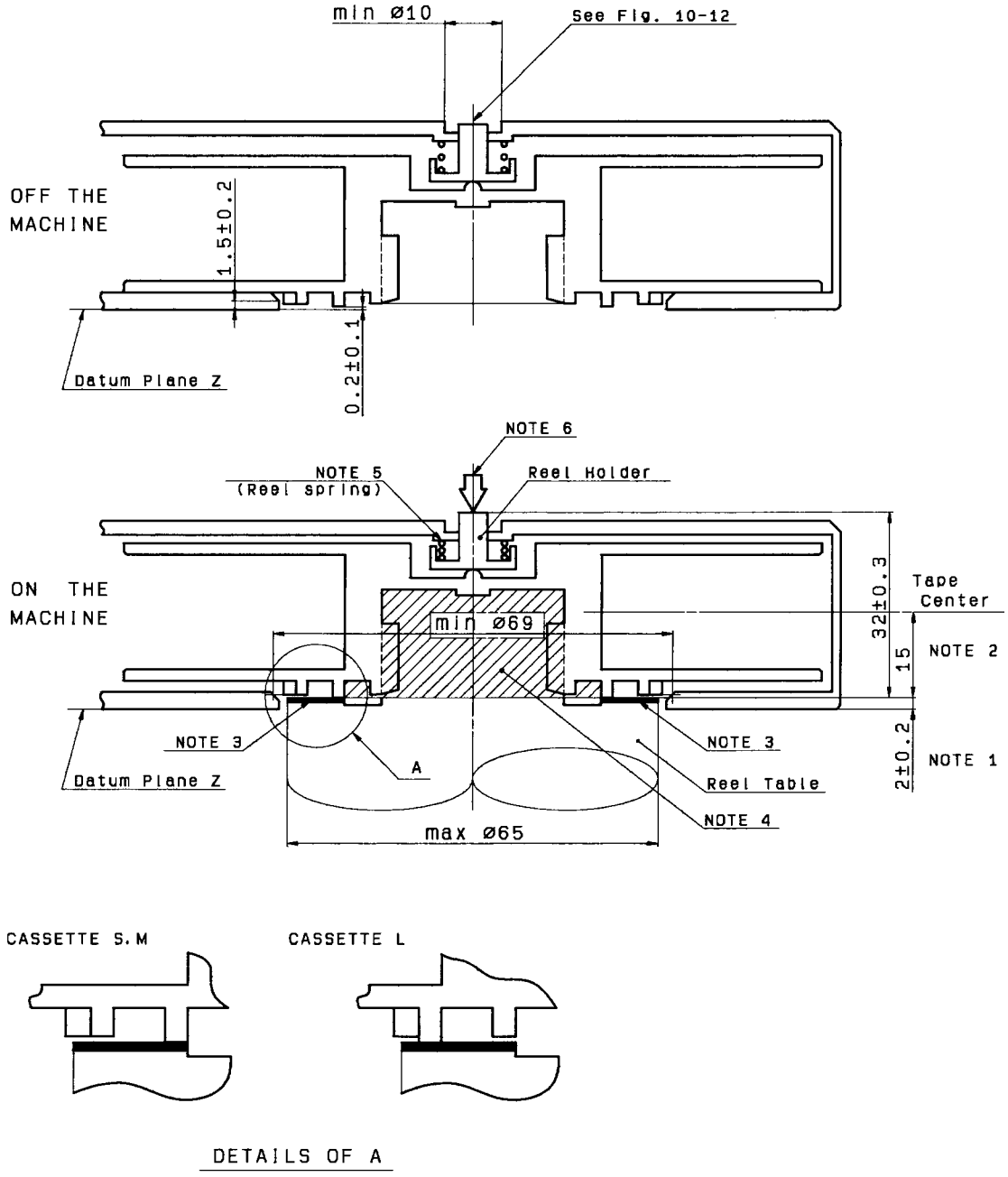
1 The cassette shall be provided with four coding holes (1) to (4) and four user holes (1) to (4). When any plug is removed, the opening shall be as shown in detail A. User plug (1) shall be green.
2 User holes (3) and (4) on the upper shell shall be opened when user plugs are removed.
3 All cassettes shall be provided with holes as defined by sections DD and CC.
4 See annex A.

Figure 15 – L cassette coding holes and user holes



NOTE – The center of the reel and the reel table shall be positioned on either the 36.0 mm + 0 mm – 0.1 mm or the 45.0 mm + 0.1 mm – 0 mm diameter.

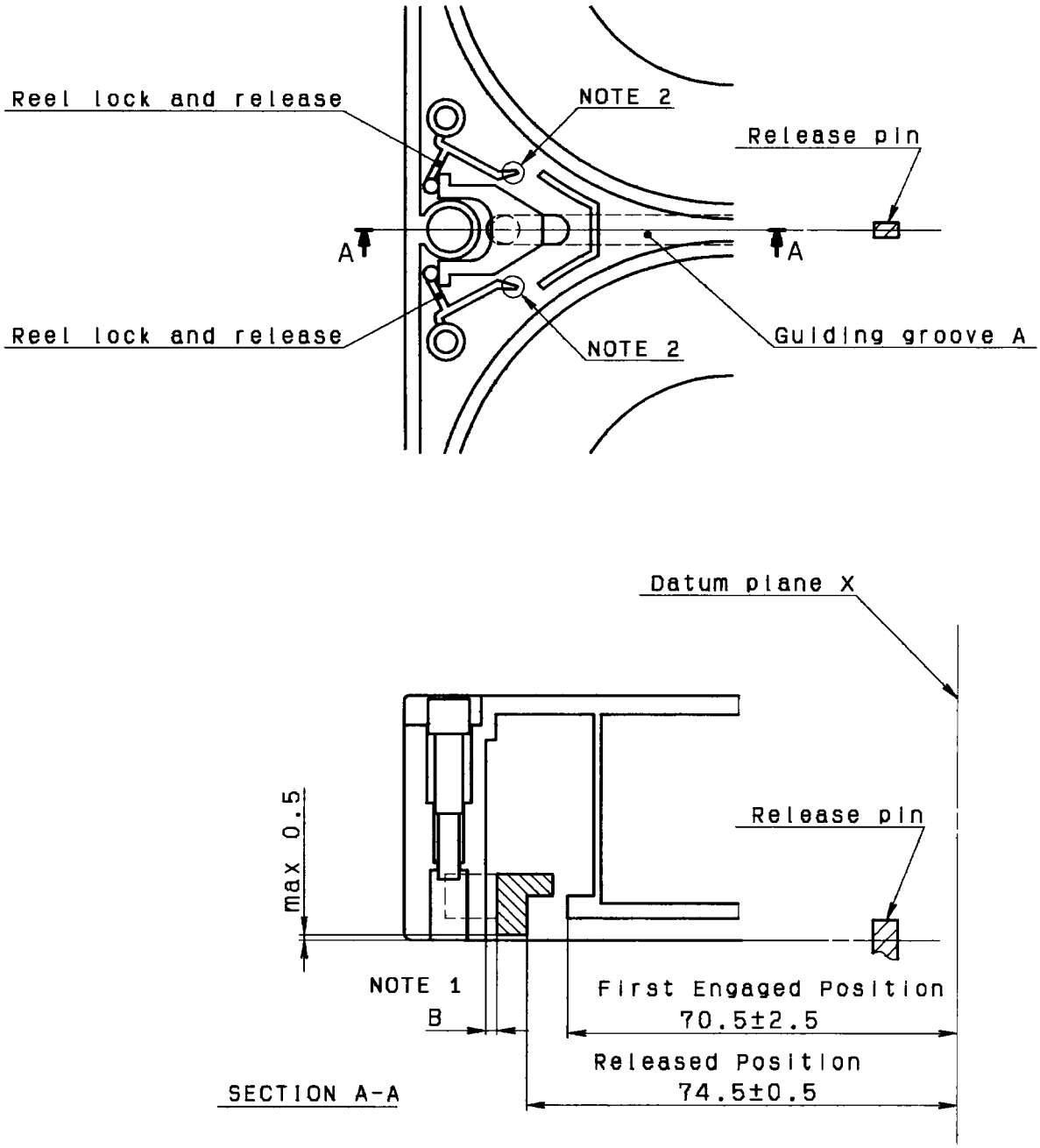
Figure 16 – Video cassette reel



NOTES

1 Distance between the support area of the reel table and datum plane Z.
2 Distance between the support area of the reel table and tape center.
3 Support area of the reel table.
4 Hatched area shows the maximum reel table area.
5 Reel spring pressure shall meet the specifications shown in 8.5.
6 If necessary, more reel spring pressure shall be applied to this portion from the outside.
7 The reel spring structure is at manufacturer's option.

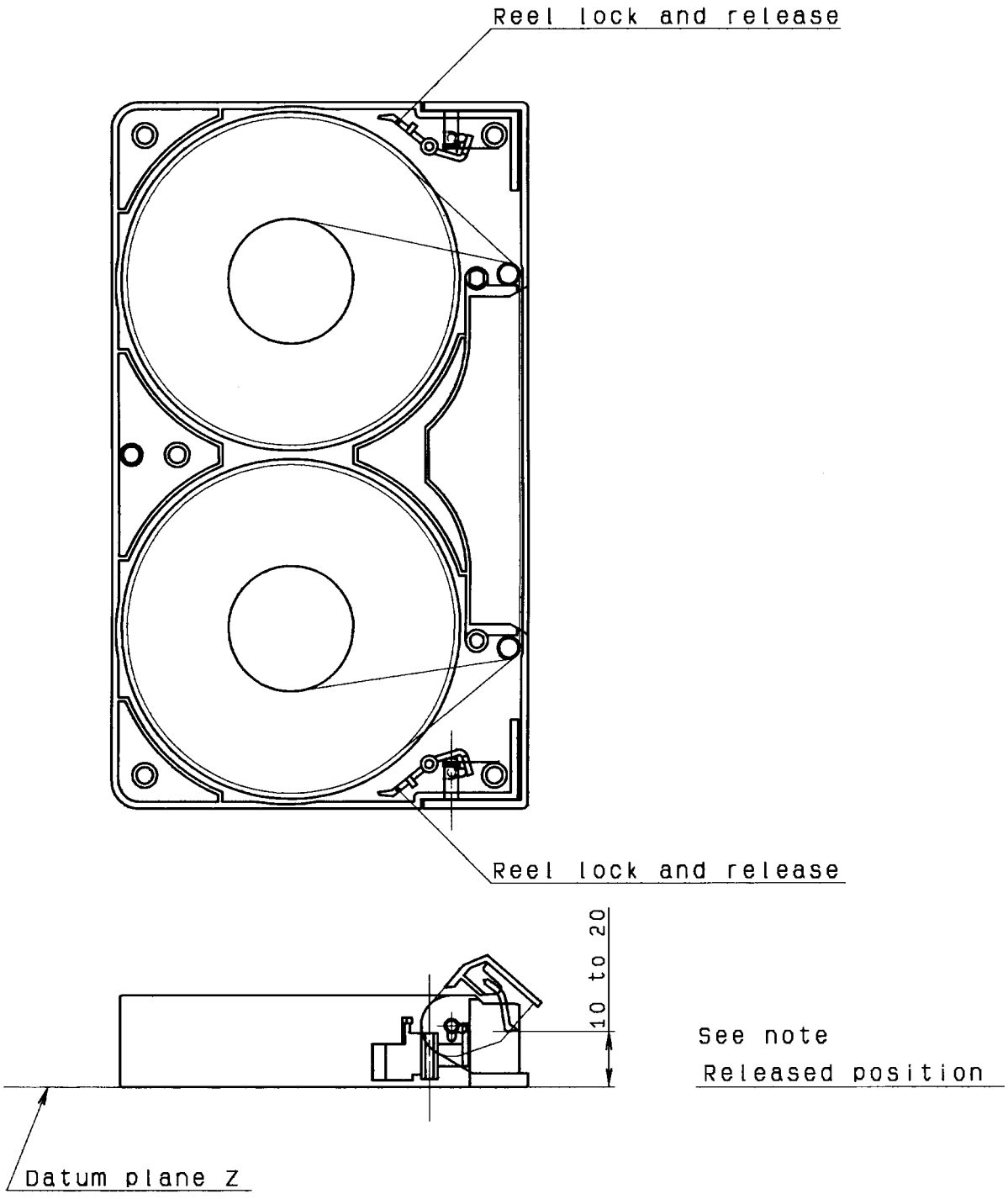
Figure 17 – Relationship between reel and reel table



NOTES

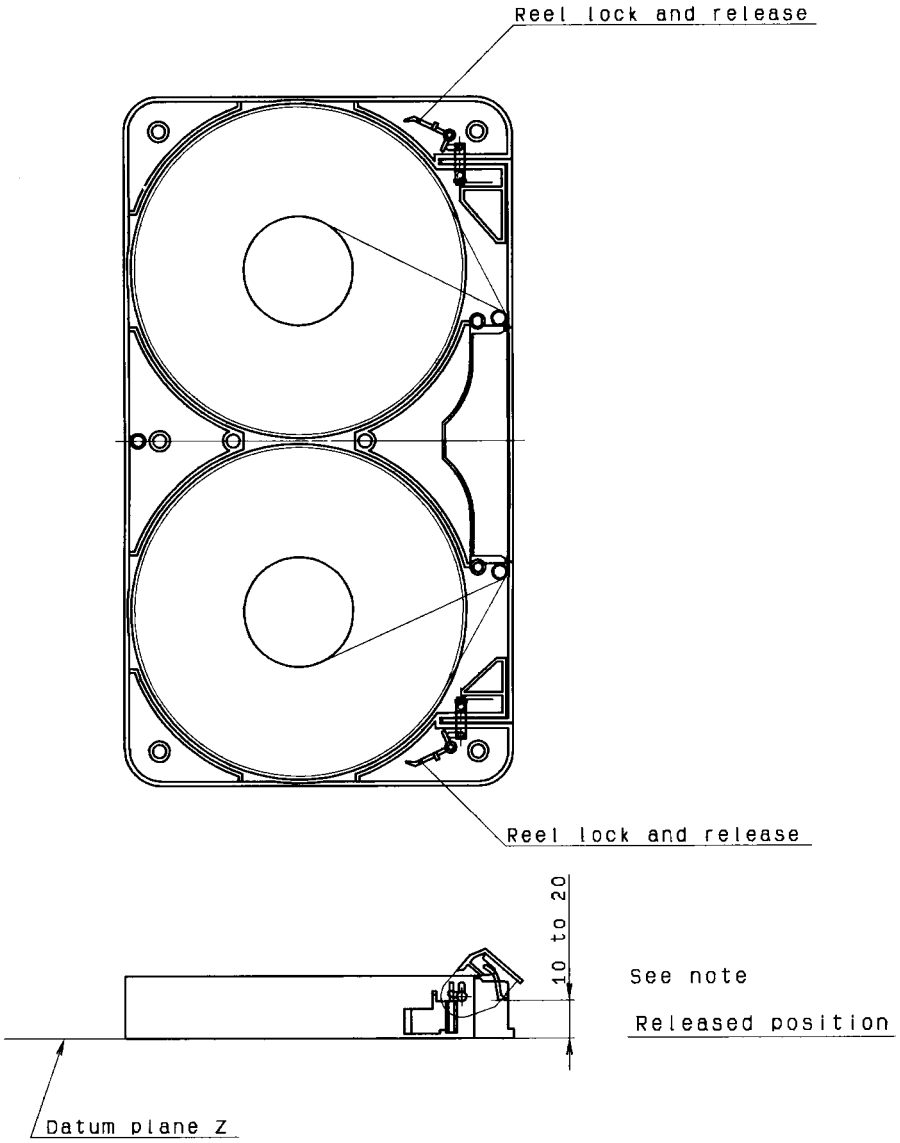
1 Clearance B shall be 0.5 mm at a minimum when the release pin is located 75 mm away from datum plane X.
2 The end of the reel lock shall be outside the reel area 84 mm in diameter, when the release pin is located 74 mm away from datum plane X.

Figure 18 – S cassette reel lock and release



NOTE – The reel lock shall release when the lid is opened 15 mm ± 5 mm above datum plane Z.

Figure 19 – M cassette reel lock and release

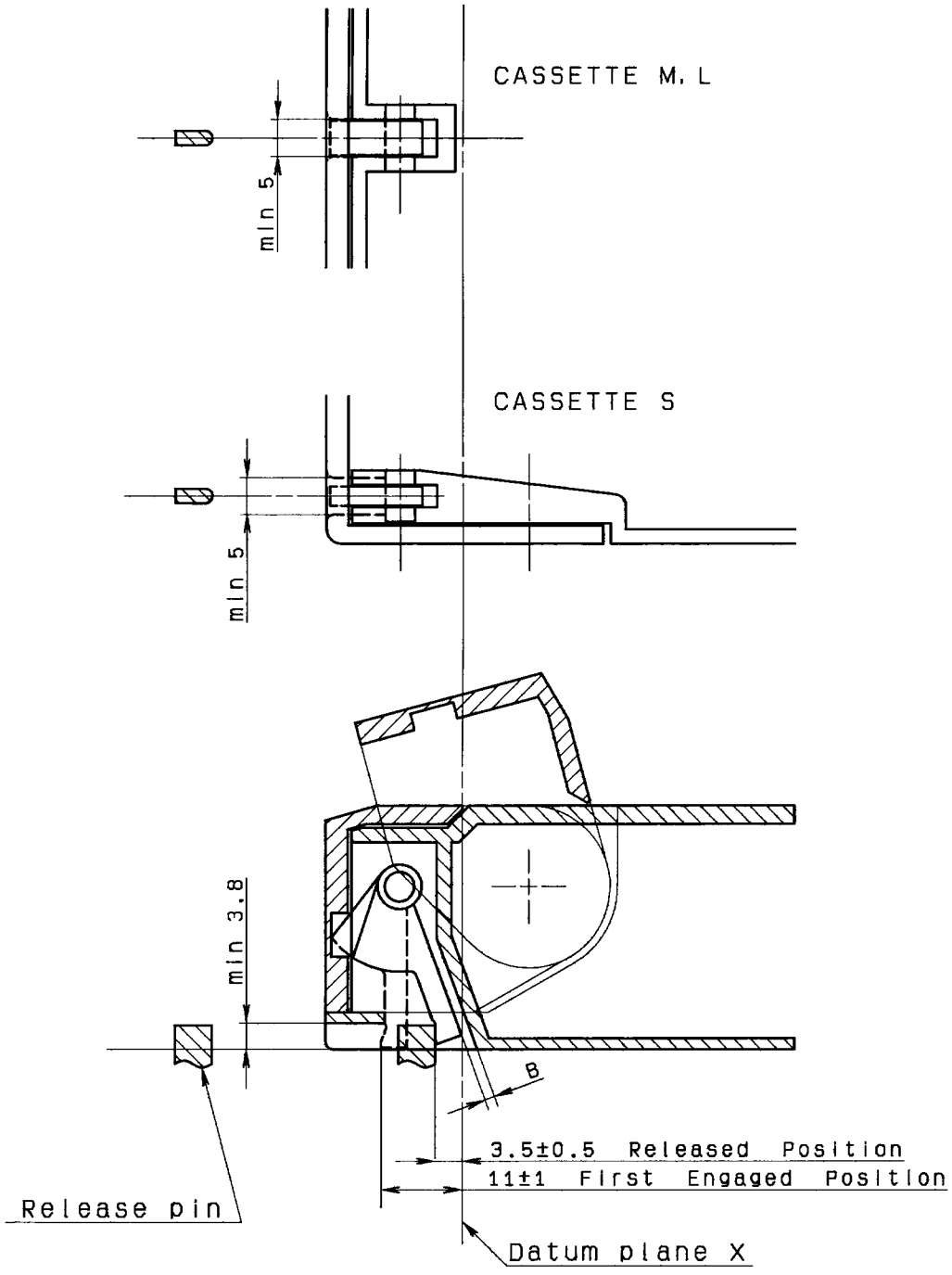


NOTE – The reel lock shall release when the lid is opened 15 mm ± 5 mm above datum plane Z.

Figure 20 – L cassette reel lock and release

Table 3 – Reel spring force

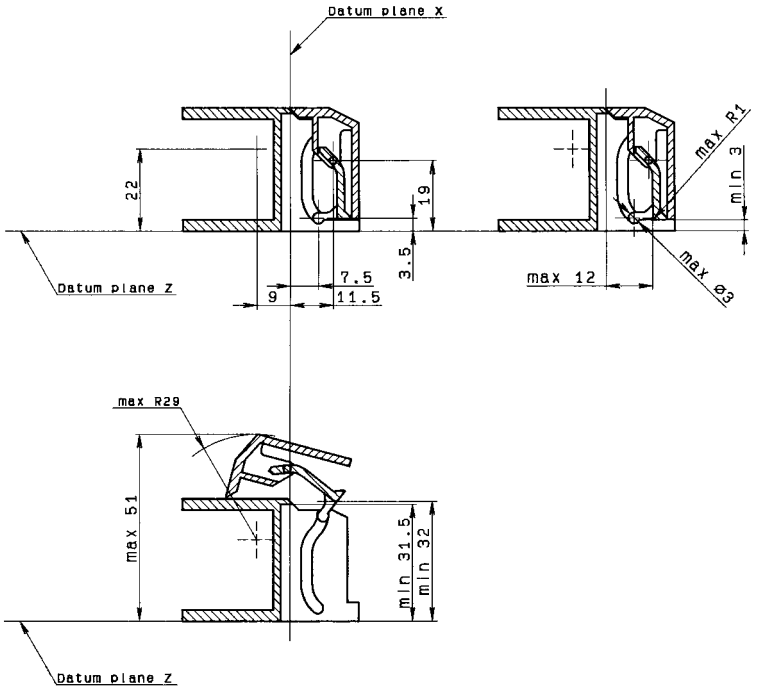
Cassette size	Force
S	3 – 4 N
M	8 – 11 N
L	8 – 11 N



NOTES

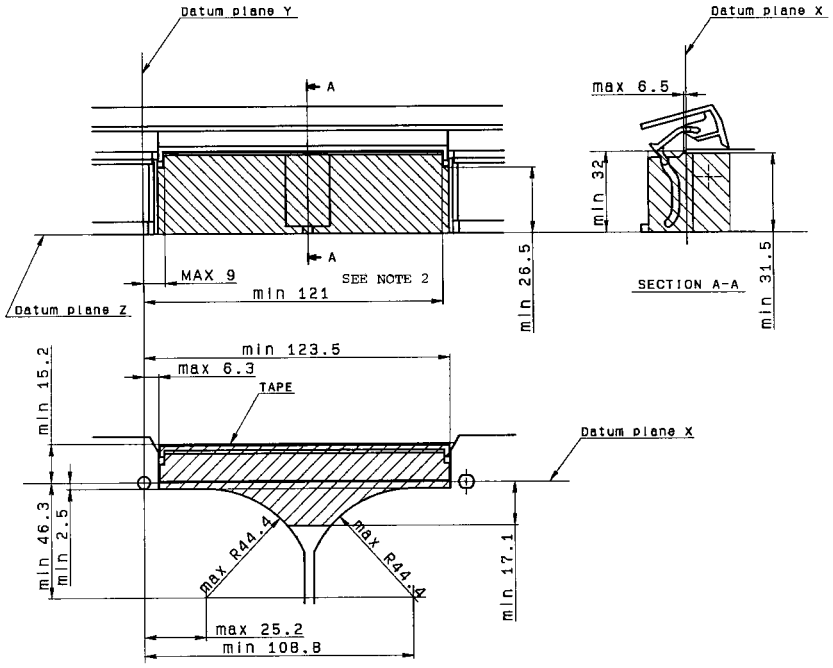
1 Clearance B shall be 0.5 mm at a minimum when the release pin is located 3 mm away from datum plane X.
2 The lid lock shall be released when the release pin is located 4 mm away from datum plane X.

Figure 21 – Lid lock and release



NOTES
1 Lid shall open to a height of at least 32 mm.
2 Mechanical implementation is for reference only.

Figure 22 – Lid structure



NOTES
1 The shaded area represents an interference-free space for threading.
2 Cassette manufacturers should be aware that some DTTRs supplied prior to this standard may not operate correctly with cassettes having dimensions conforming to this standard.

Figure 23 – Space for tape loading mechanism

Annex A (informative)
Cassette tabs

Cassettes manufactured prior to the approval of this standard may have manufacturer's tabs with different dimensions. Specifically, the manufacturer's tabs may have less than the dimension and tolerance now specified.

Annex B (informative)
Bibliography

ANSI/SMPTE 224M-1996, Television Digital Component Recording — 19-mm Type D-1 — Tape Record

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ANSI/SMPTE 228M-1996, Television Digital Component Recording — 19-mm Type D-1 — Time and Control Code and Cue Records

ANSI/SMPTE 245M-1993, Television Digital Recording — 19-mm Type D-2 Composite Format — Tape Record

ANSI/SMPTE 246M-1993, Television Digital Recording — 19-mm Type D-2 Composite Format — Magnetic Tape

ANSI/SMPTE 247M-1993, Television Digital Recording — 19-mm Type D-2 Composite Format — Helical Data and Control Records

ANSI/SMPTE 248M-1993, Television Digital Recording — 19-mm Type D-2 Composite Format — Cue Record and Time and Control Code Record

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SMPTE EG 20-1993, Tape Transport Geometry Parameters for 19-mm Type D-2 Composite Format for Television Digital Recording

SMPTE EG 21-1993, Nomenclature for Television Digital Recording of 19-mm Type D-1 Component and Type D-2 Composite Formats

SMPTE EG 22-1993, Description and Index of Documents for 19-mm Type D-2 Composite Television Digital Recording