SMPTE 307M-2002
Revision of
SMPTE 307M-1998

SMPTE STANDARD

for Television Digital Recording — 6.35-mm Type D-7 and Type D-12 Component Format — Tape Cassette

1 Scope

This standard specifies the dimensions for three types of 6.35-mm type D-7 and type D-12 tape cassettes (M, L, and EL) for use with digital recorders.

NOTE – The cassette is used for more than a single recording format. The cassette provides no information to indicate the format of the recording contained on the tape within the cassette.

2 Measurements

2.1 Tests and measurements on cassette parameters shall be carried out under the following atmospheric conditions:

- Temperature: 20°C ± 1°C
- Relative humidity: (50 ± 2)%
- Barometric pressure: 86 kPa to 106 kPa
- Stabilization time: 24 hours

3 Video tape cassette

3.1 General specifications

3.1.1 The dimensions of the three cassettes used for recording shall be in accordance with figures 1 to 29.

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

3.1.3 The three types of cassette shall be identified as:

- Medium: M
- Large: L
- Extended large: EL

The size of the EL cassette is the same as the L cassette except for the reel size.

NOTE – Annex A shows the adapter size for the small cassette which is specified in IEC 61834-1.

3.1.4 Tape length and tape thickness for the three types of cassette shall be as given in table 2.

Approved
March 28, 2002

Table 1 – Mechanical tolerances

Length		Tolerance
Over	To	mm
0	30	± 0.1
30	50	± 0.15
50		± 0.2
Angle		± 1.0°

Table 2 – Tape length and tape thickness of M, L and EL cassettes

Tape cassette	Length (m)	Thickness (μm)
M	27^{+1}_{-0} 51^{+1}_{-0} 70^{+1}_{-0} 96^{+1}_{-0} 137^{+1}_{-0}	8.8
L	72^{+1}_{-0} 137^{+1}_{-0} 190^{+1}_{-0} 194^{+1}_{-0} 259^{+2}_{-0} 263^{+2}_{-0}	8.8
EL	377^{+3}_{-0}	6.7

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

3.2 Datum planes

3.2.1 Datum plane Z is determined by datum areas A, B, and C as specified in figures 6 to 8.

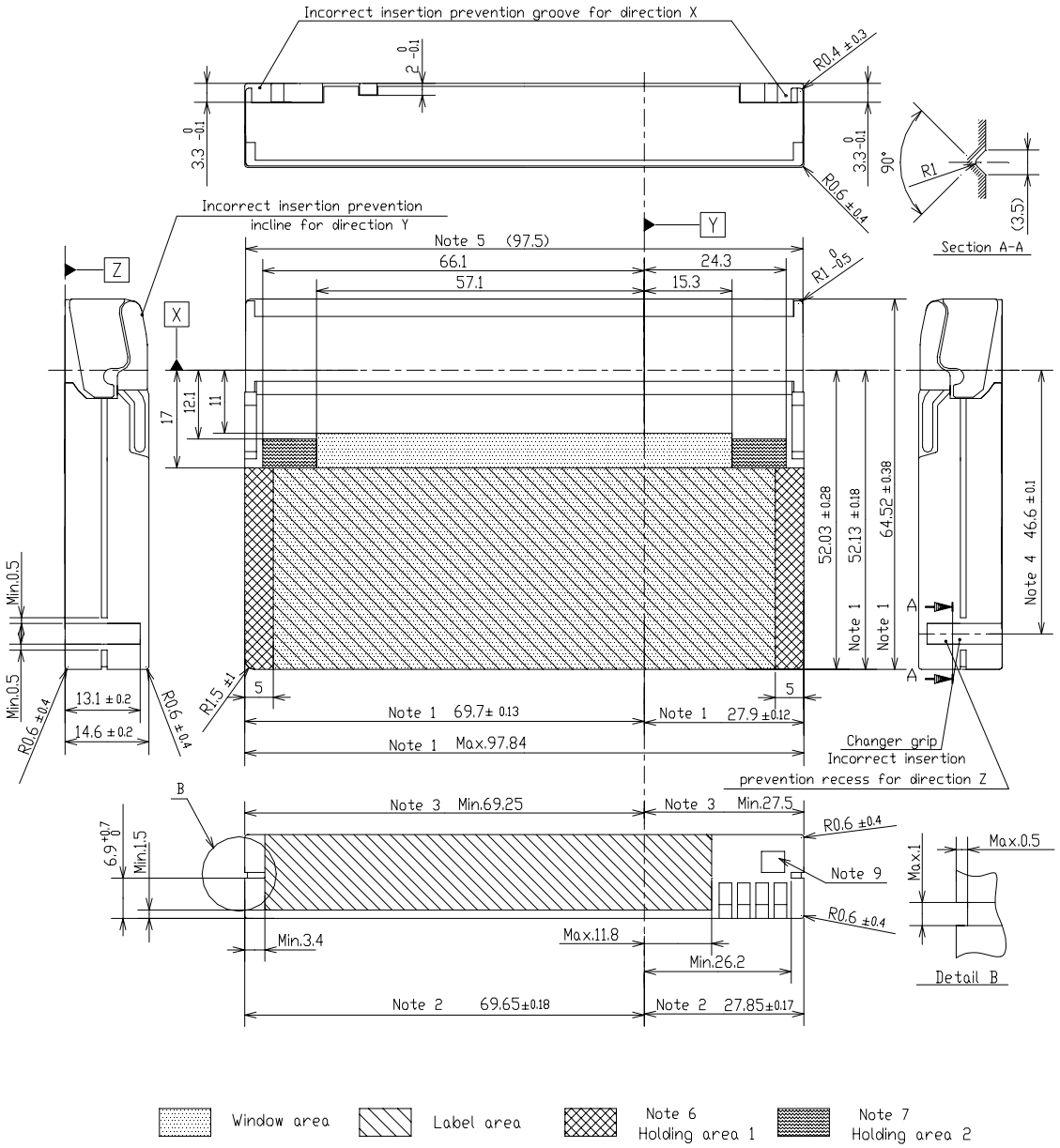
3.2.2 Datum plane X shall be orthogonal to datum plane Z and shall run through the center of datum hole (A) and datum hole (B) as specified in figures 9 to 11.

3.2.3 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 9 to 11.

3.3 Window and labels

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

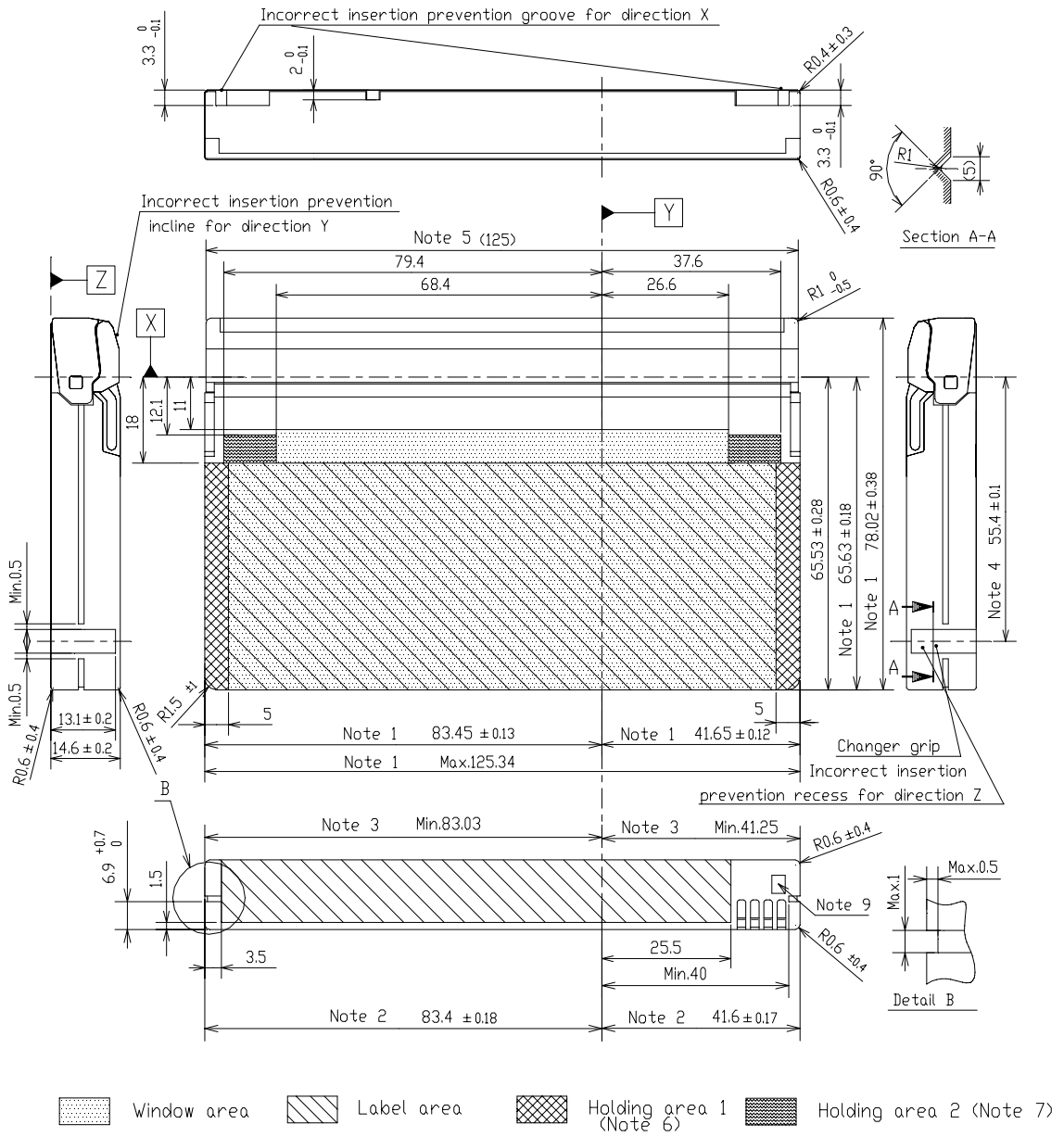
3.3.2 Labels attached to the cassette shall not extend beyond the external dimensions as shown in figures 1 and 2.



Dimensions in millimeters

NOTES
1 The maximum outside dimension of the shell.
2 The tolerance applies to the region up to 6.7 mm from datum plane Z.
3 The dimension applies to the upper half.
4 The tolerance applies to the region up to 6.7 mm from datum plane Z. General tolerance applies beyond 6.7 mm.
5 The lid width shall be smaller than the shell width.
6 The cassette shall be held in the recorder/player within the area indicated.
7 When the lid is open, a portion of this area may not be available for the cassette holding mechanism (see figure 26).
8 The surface roughness of holding areas 1 and 2 shall not exceed 40 μm Rmax.
9 Indication of accidental erasure prevention shall be placed in this area (see figure 12 for the accidental erasure prevention hole dimensions).

Figure 1 – Top and side views of M cassette

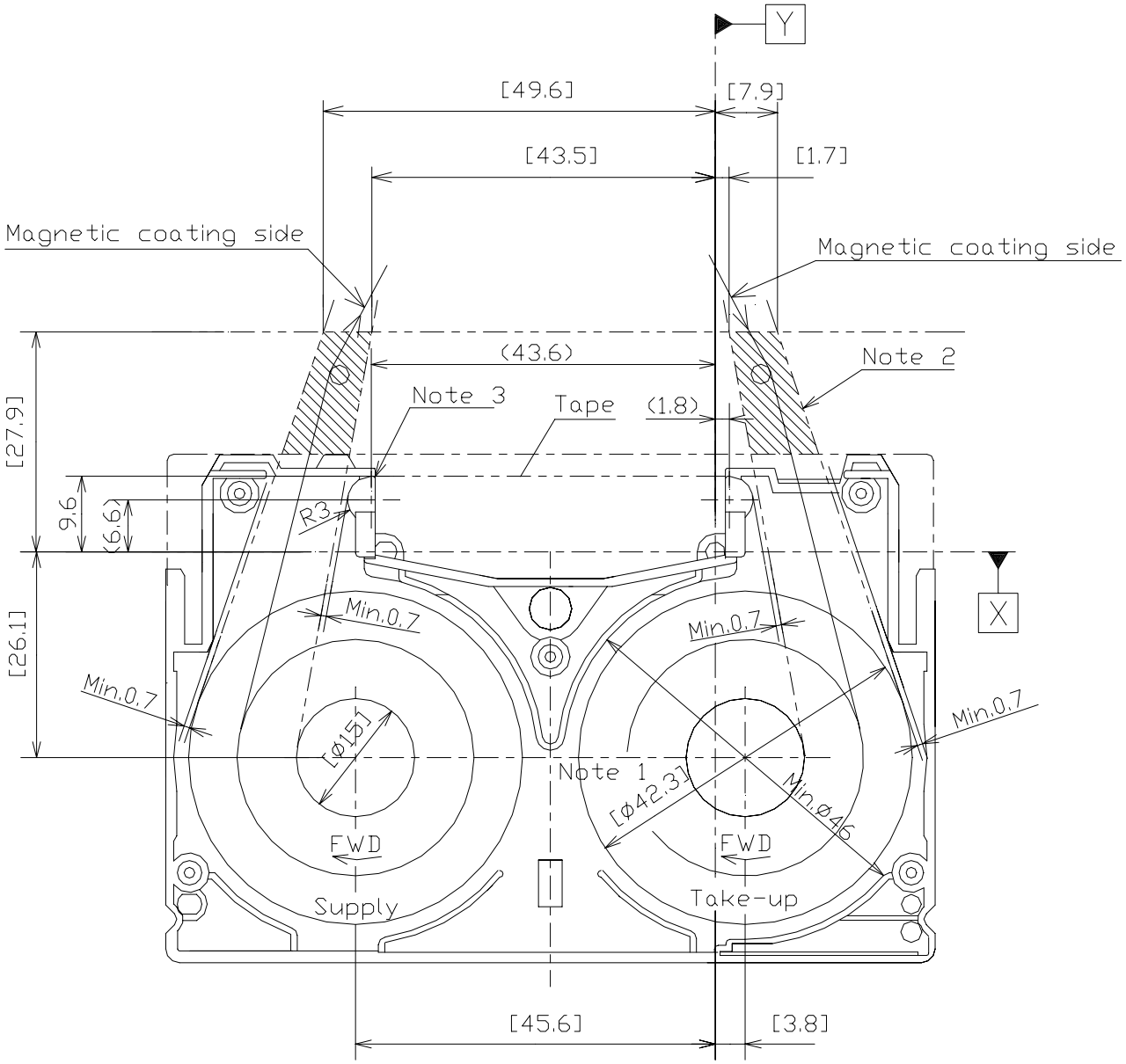


Dimensions in millimeters

NOTES

1 The maximum outside dimension of the shell.
2 The tolerance applies to the region up to 6.7 mm from datum plane Z.
3 The dimension applies to the upper half.
4 The tolerance applies to the region up to 6.7 mm from datum plane Z. General tolerance applies beyond 6.7 mm.
5 The lid width shall be smaller than the shell width.
6 The cassette shall be held in the recorder/player within the area indicated.
7 When the lid is open, a portion of this area may not be available for the cassette holding mechanism (see figure 27).
8 The surface roughness of holding areas 1 and 2 shall not exceed 40 µm Rmax.
9 Indication of accidental erasure prevention shall be placed in this area (see figure 13 for L cassette and figure 14 for EL cassette for the accidental erasure prevention hole dimensions).

Figure 2 – Top and side views of L and EL cassettes



Dimensions in millimeters

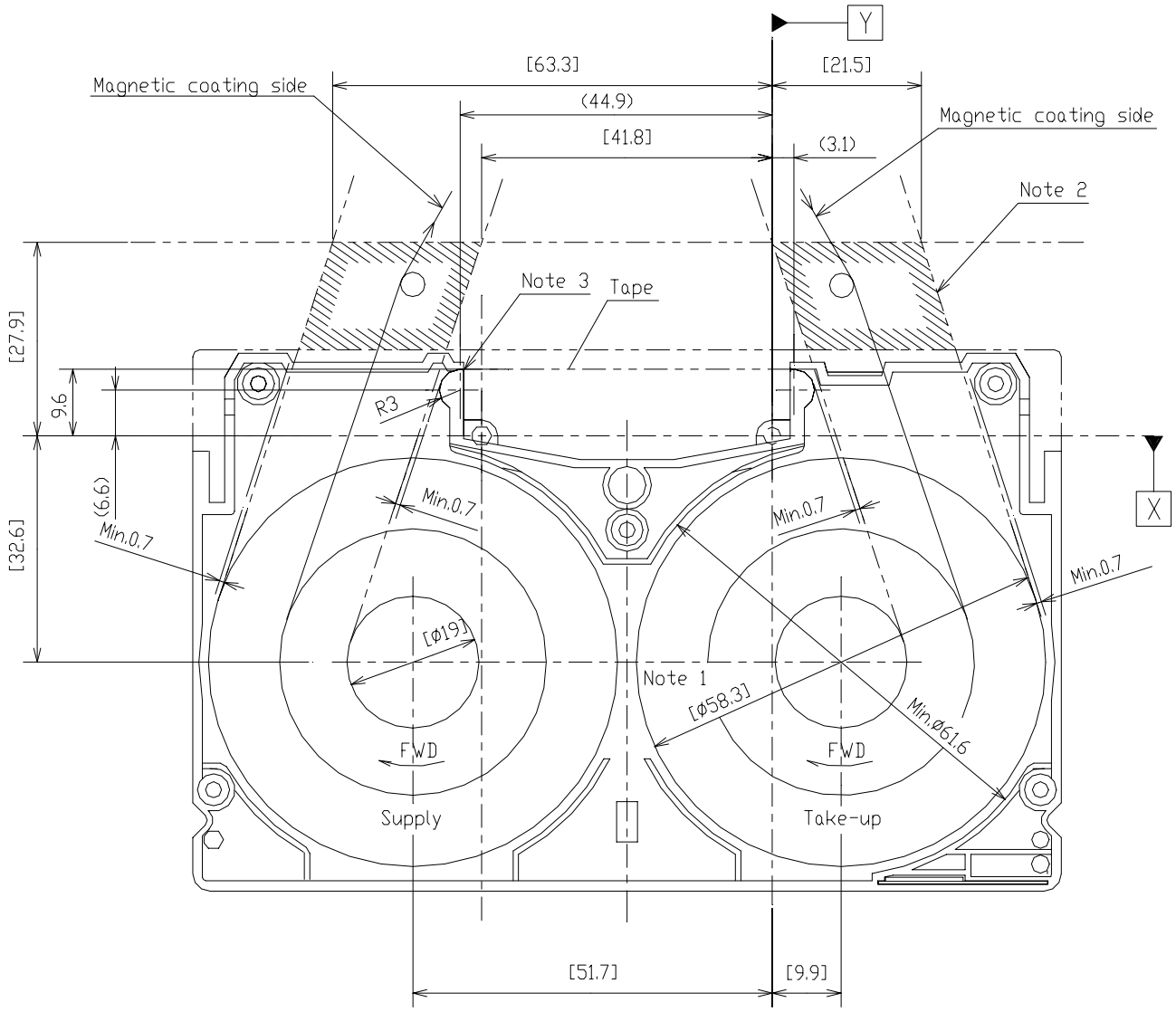
NOTES

1 Dimensions in brackets, derived from a packed tape diameter of 42.3 mm, indicate area normally occupied by tape pass.

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

3 The corner shall be rounded.

Figure 3 – Internal structure and tape path for M cassette



Dimensions in millimeters

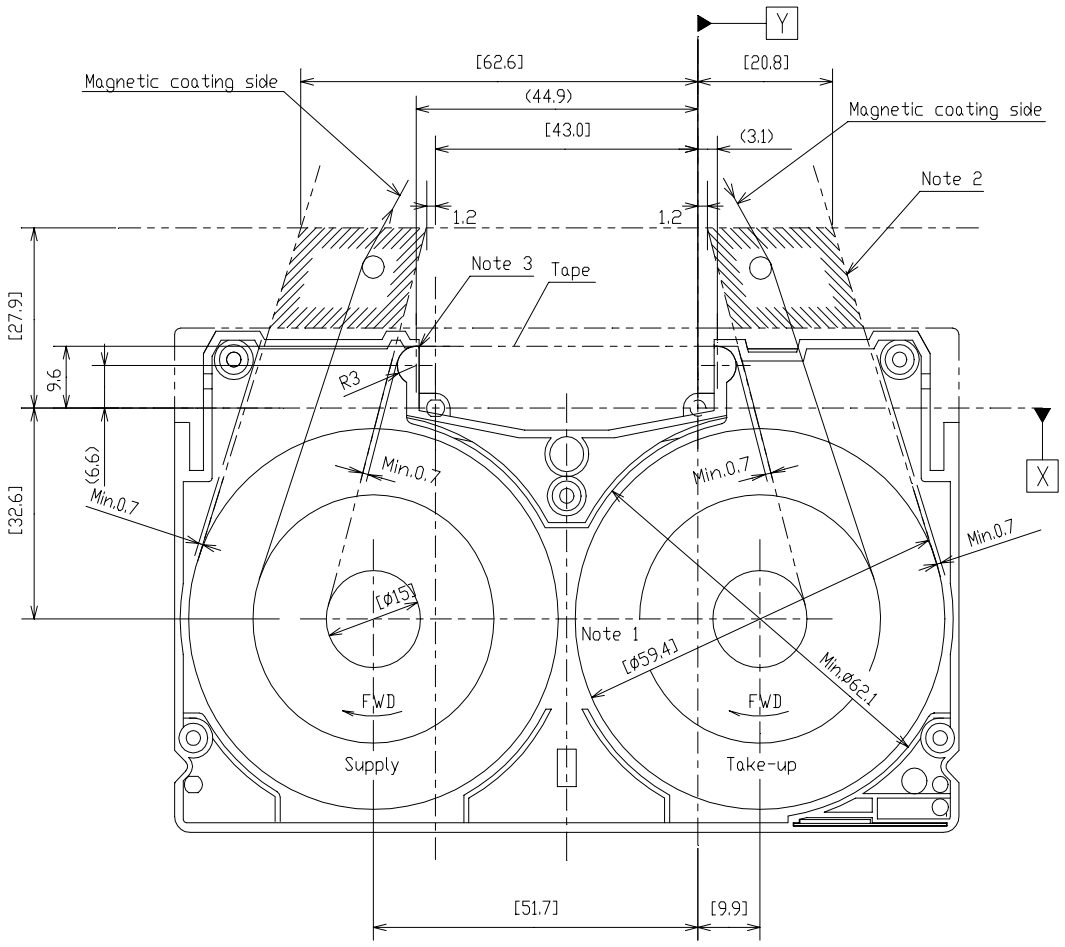
NOTES

1 Dimensions in brackets, derived from a packed tape diameter of 58.3 mm, indicate area normally occupied by tape pass.

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

3 The corner shall be rounded.

Figure 4 – Internal structure and tape path for L cassette

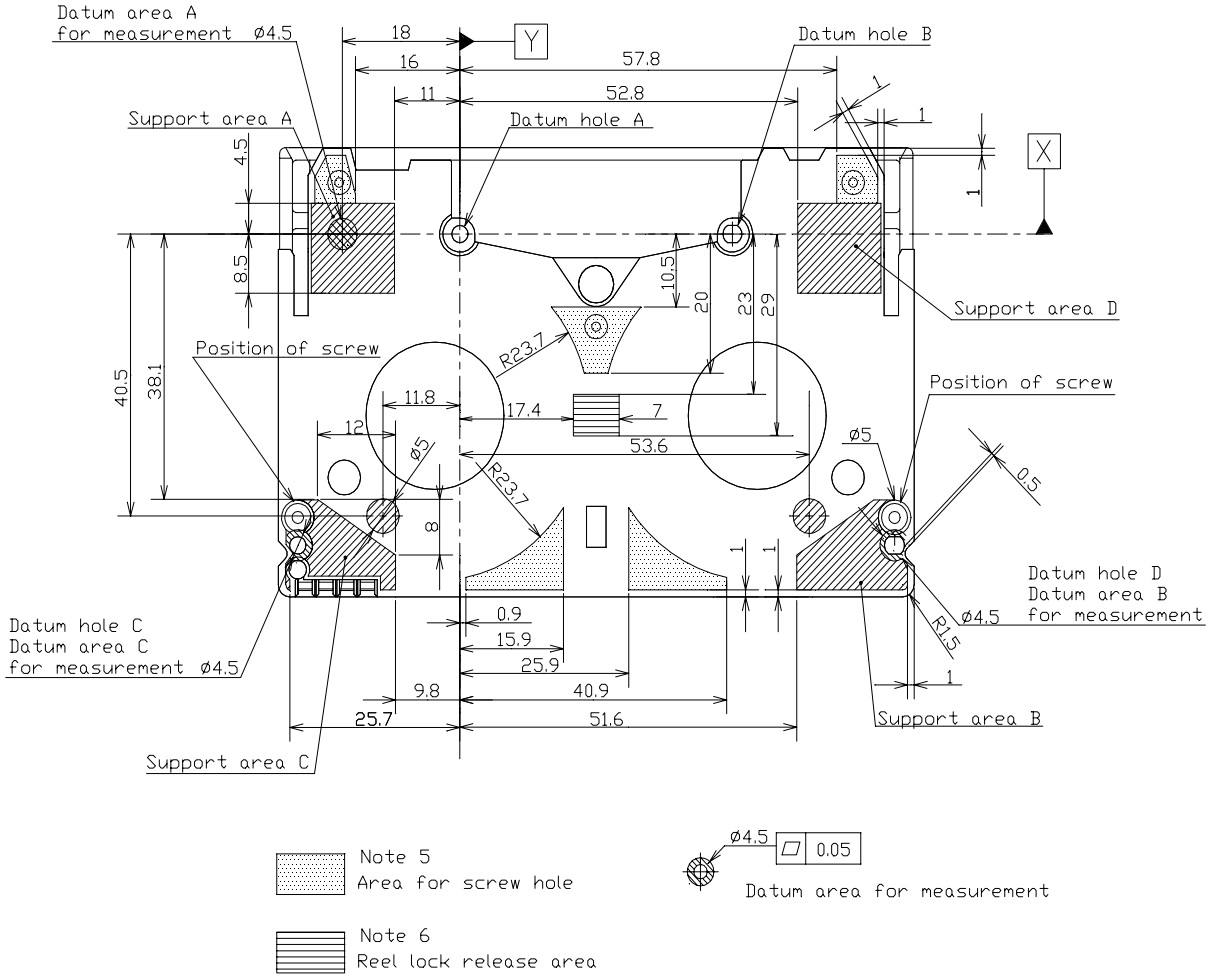


Dimensions in millimeters

NOTES

1 Dimensions in brackets, derived from a packed tape diameter of 58.3 mm, indicate area normally occupied by tape pass.
2 The first guidepost shall be within the tape path area as indicated.
3 The corner shall be rounded.

Figure 5 – Internal structure and tape path for EL cassette

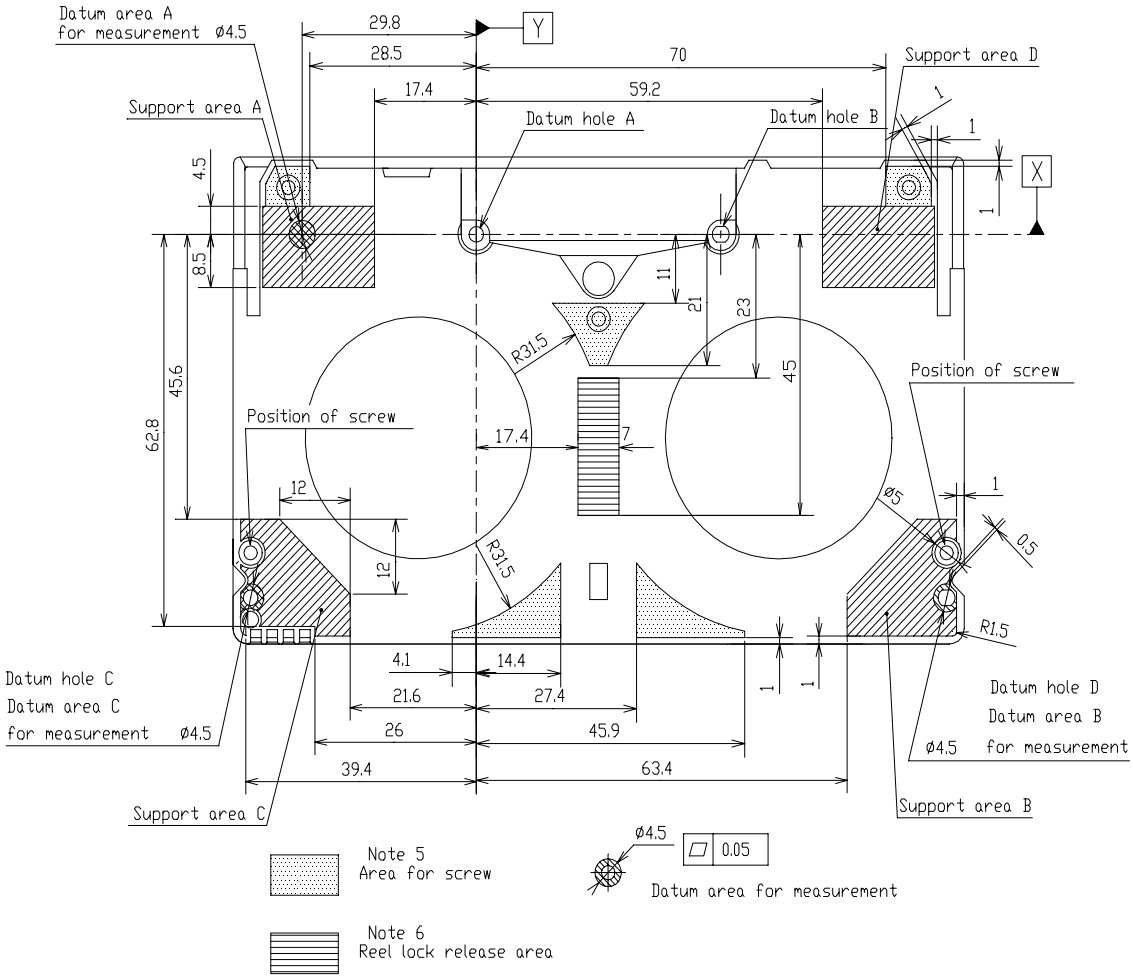


Dimensions in millimeters

NOTES

1 Support areas A, B, and C shall be coplanar with datum plane Z within ± 0.15 mm.
2 Support area D shall be coplanar with datum plane Z within ± 0.2 mm.
3 Datum areas may be used as support areas.
4 Unless specified otherwise, datum areas and support areas exclude 0.5 mm around holes and edges with the exception of datum holes.
5 The screw holes, if required, must be located within the area indicated.
6 Reel lock release area must be flat. If an indentation is made in the reel lock area, it must be of a depth no greater than 0.2 mm from the cassette surface. The indentation should be beveled with an angle to the surface of less than 35°.

Figure 6 – Datum areas and support areas for M cassette

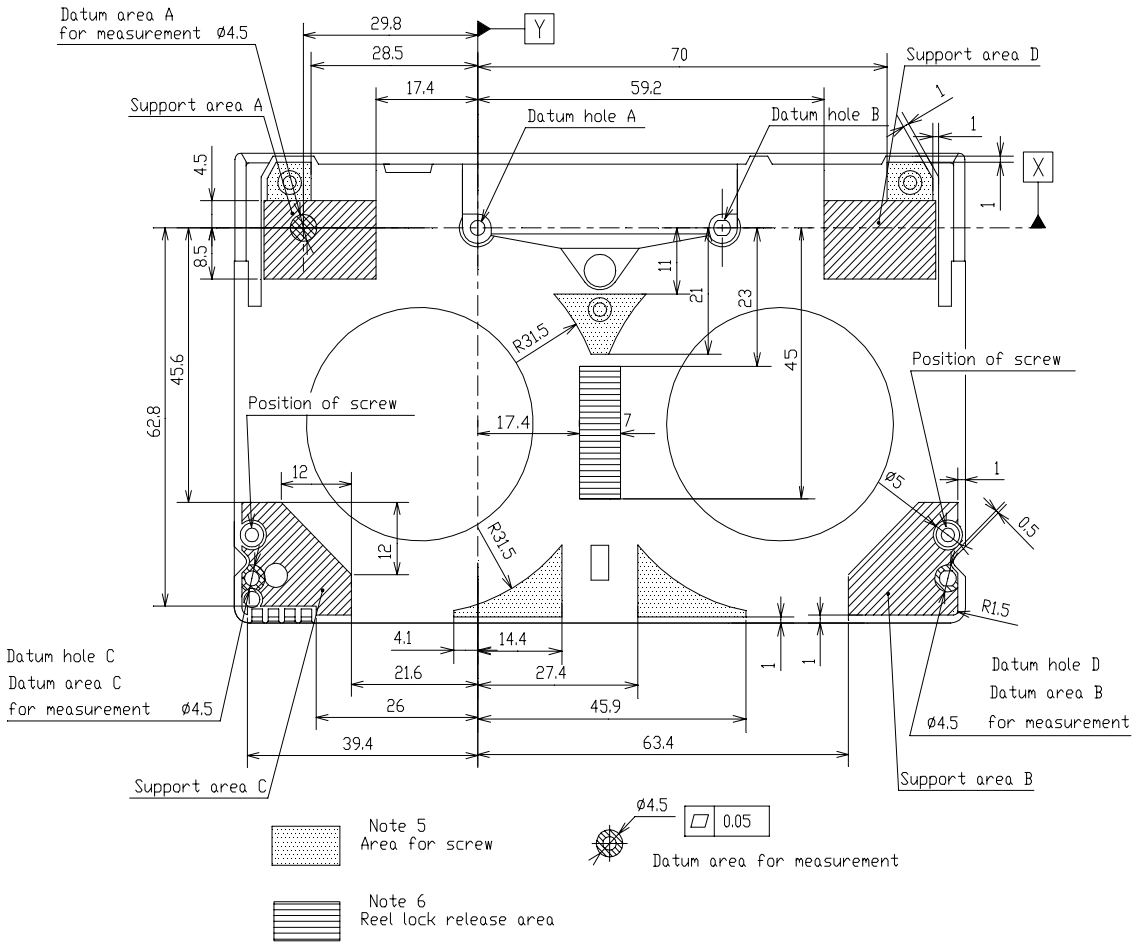


Dimensions in millimeters

NOTES

1 Support areas A, B, and C shall be coplanar with datum plane Z within ± 0.15 mm.
2 Support area D shall be coplanar with datum plane Z within ± 0.2 mm.
3 Datum areas may be used as support areas.
4 Unless specified otherwise, datum areas and support areas exclude 0.5 mm around holes and edges with the exception of datum holes.
5 The screw holes, if required, must be located within the area indicated.
6 Reel lock release area must be flat. If an indentation is made in the reel lock area, it must be of a depth no greater than 0.2 mm from the cassette surface. The indentation should be beveled with an angle to the surface of less than 35°.

Figure 7 – Datum areas and support areas for L cassette

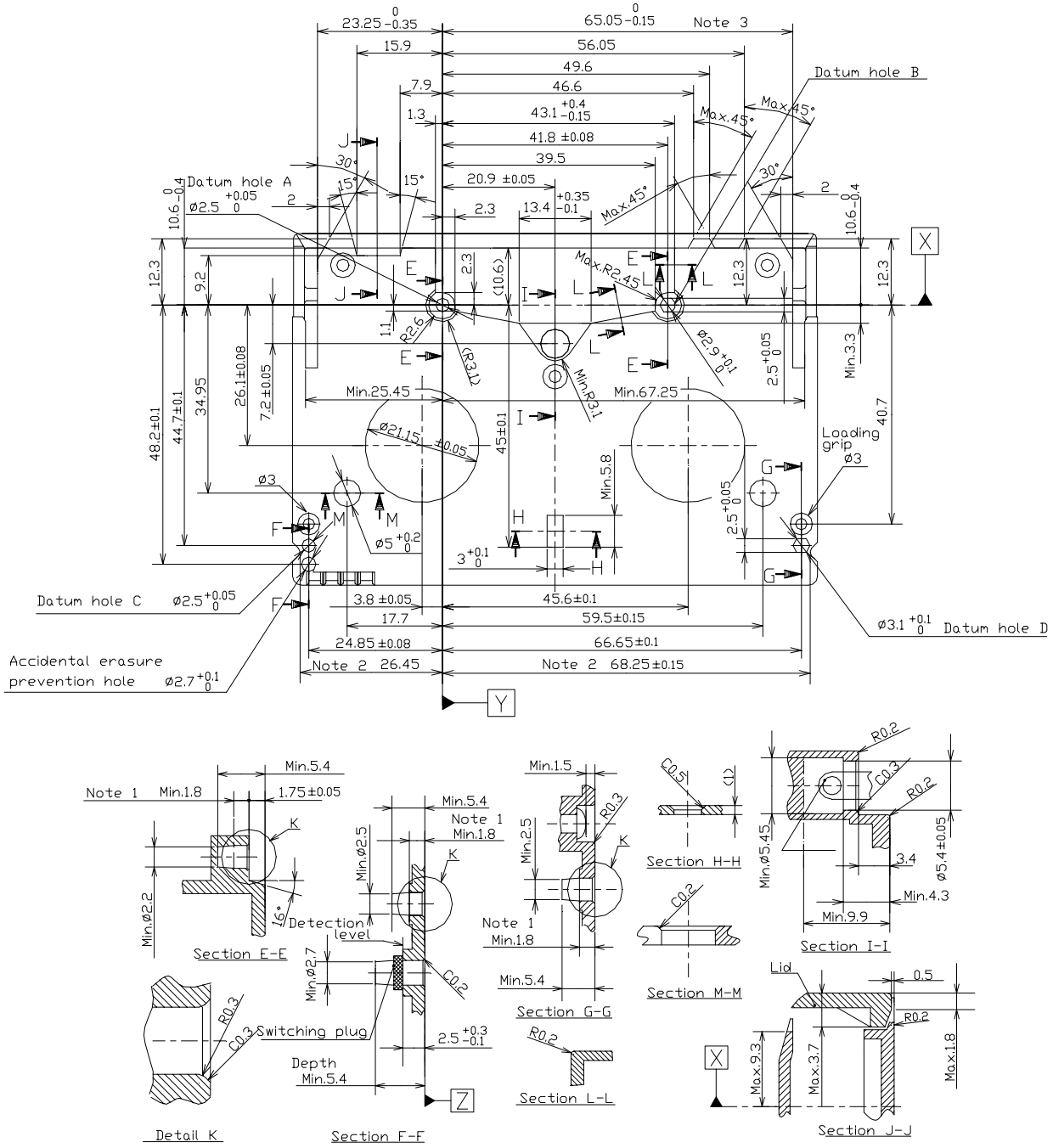


Dimensions in millimeters

NOTES

1 Support areas A, B, and C shall be coplanar with datum plane Z within ± 0.15 mm.
2 Support area D shall be coplanar with datum plane Z within ± 0.2 mm.
3 Datum areas may be used as support areas.
4 Unless specified otherwise, datum areas and support areas exclude 0.5 mm around holes and edges with the exception of datum holes.
5 The screw holes, if required, must be located within the area indicated.
6 Reel lock release area must be flat. If an indentation is made in the reel lock area, it must be of a depth no greater than 0.2 mm from the cassette surface. The indentation should be beveled with an angle to the surface of less than 35°.

Figure 8 – Datum areas and support areas for EL cassette



Dimensions in millimeters

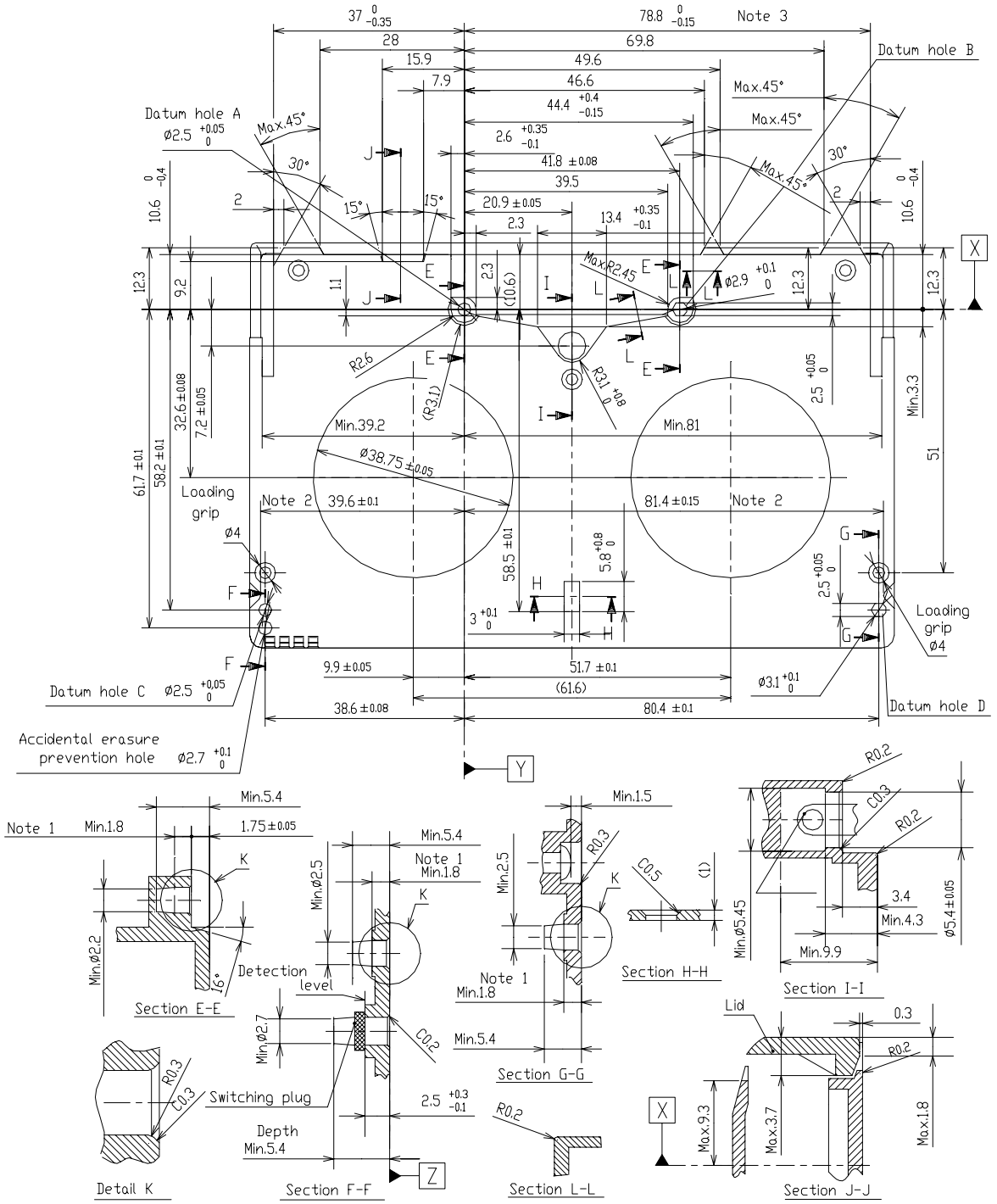
NOTES

1 Datum holes A, B, C, and D must maintain their respective dimensions through a depth of 1.8 mm.

2 The tolerance applies to the region up to 6.7 mm from datum plane Z.

3 The tolerance applies to the region up to 2.3 mm from datum plane Z.

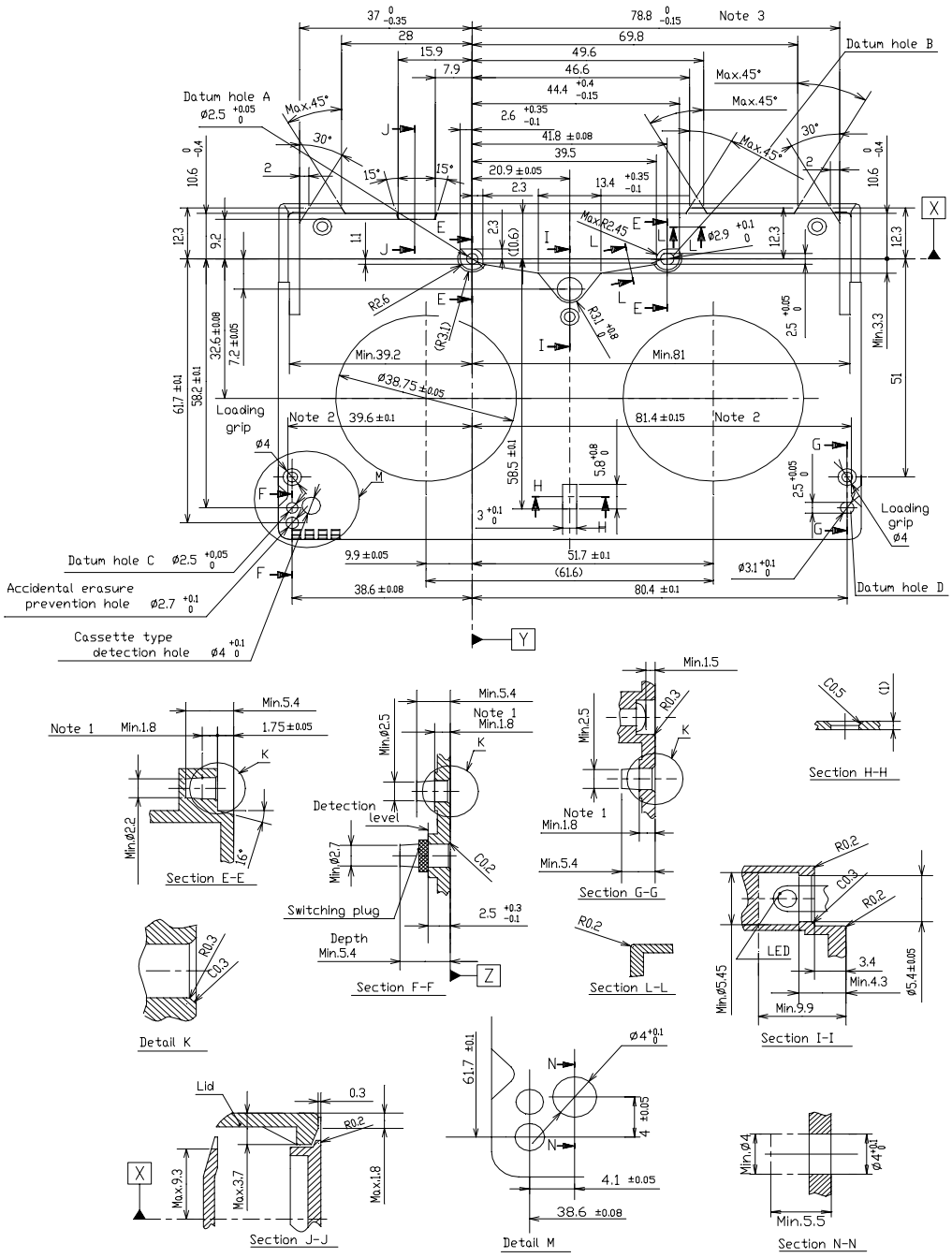
Figure 9 – Bottom view of M cassette



Dimensions in millimeters

NOTES
1 Datum holes A, B, C, and D must maintain their respective dimensions through a depth of 1.8 mm.
2 The tolerance applies to the region up to 6.7 mm from datum plane Z.
3 The tolerance applies to the region up to 4.1 mm from datum plane Z.

Figure 10 – Bottom view of L cassette



Dimensions in millimeters

NOTES

1 Datum holes A, B, C, and D must maintain their respective dimensions through a depth of 1.8 mm.

2 The tolerance applies to the region up to 6.7 mm from datum plane Z.

3 The tolerance applies to the region up to 4.1 mm from datum plane Z.

Figure 11 – Bottom view of EL cassette

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

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

3.4 Accidental erasure prevention hole

The dimensions and location of the accidental erasure prevention hole, detailed in figures 9 to 11, shall be defined as follows:

– Open: Total record lock out (audio, video, cue, time code, and control track);
– Closed: Possible to record.

3.5 Tape type identification and cassette type detection

3.5.1 Identification board

The dimensions and location of the identification board shall be as given in figures 12 to 14.

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 ohms. The contact resistance shall be measured when any value of DC current between 50 μA to 300 mA is applied.

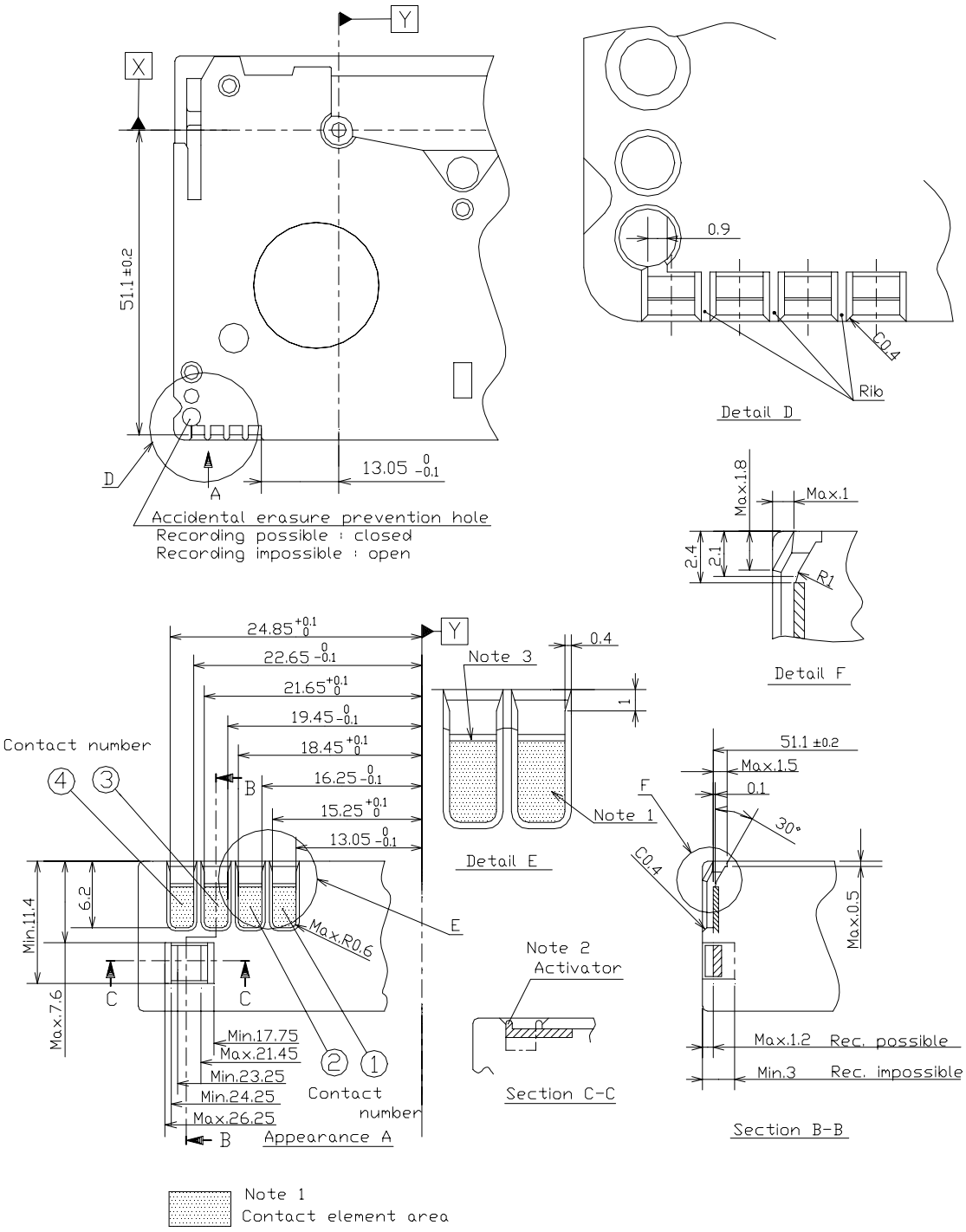
– Each contact impedance of the connector shall be less than 1.0 ohm. The contact impedance shall be measured when an AC current of 10 mA at 4 MHz is applied.

Table 3 – Identification board for M cassette

Contact number	Identification		Resistance to common ground (ohms)
1	Tape thickness	8.8 μm	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 L and EL cassettes

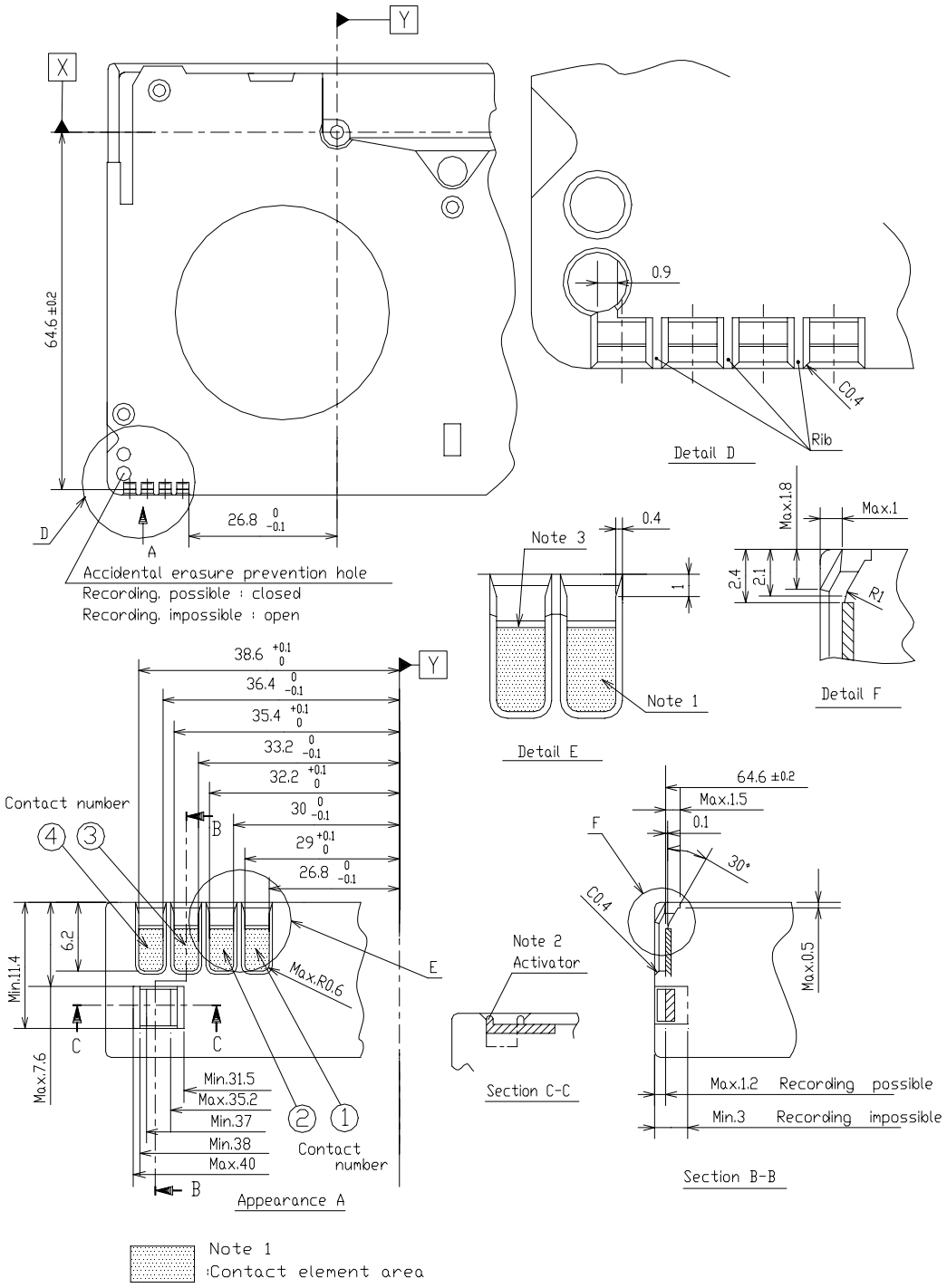
Contact number	Identification		Resistance to common ground (ohms)
1	Tape thickness	6.7, 8.8 μm	1.8 k ± 5%
		Reserved	Reserved
2	Tape type	MP	Less than 2 (short)
		Reserved	Reserved
3	Tape grade	Standard	6.8 k ± 5%
		Reserved	Reserved
4	Common ground (GND)		



Dimensions in millimeters

NOTES
1 The contact element shall be located within the area indicated.
2 The activator shall not exceed the cassette surface.
3 The spacing between the contact element and the shell shall not exceed 0.3 mm.

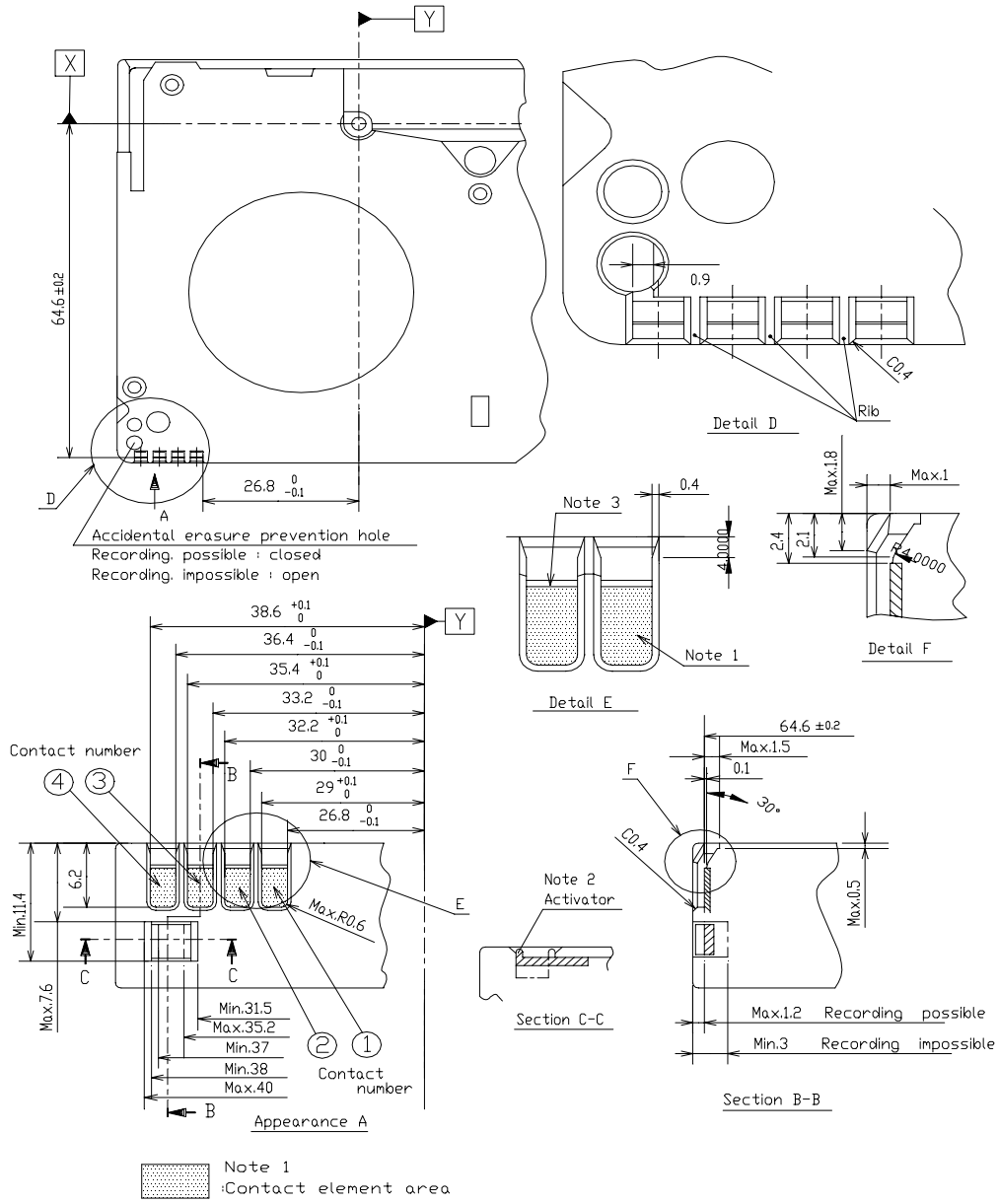
Figure 12 – Contact area of ID board for M cassette



Dimensions in millimeters

NOTES
1 The contact element shall be located within the area indicated.
2 The activator shall not exceed the cassette surface.
3 The spacing between the contact element and the shell shall not exceed 0.3 mm.

Figure 13 – Contact area of ID board for L cassette



Dimensions in millimeters

NOTES
1 The contact element shall be located within the area indicated.
2 The activator shall not exceed the cassette surface.
3 The spacing between the contact element and the shell shall not exceed 0.3 mm.

Figure 14 – Contact area of ID board for EL cassette

3.5.2 Cassette-type detection hole

The dimensions and location of the cassette-type detection hole, detailed in figures 10 and 11, shall be as follows:

– Open: EL cassette with 6.7 μm thick tape;
– Closed: L cassette with 8.8 μm thick tape.

3.6 Leader/trailer tape

3.6.1 The light path shall be as specified in figures 15 to 17.

3.6.2 The cassette shall include a leader and 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 15 to 17.

Table 5 – Length of leader and trailer tape

Cassette size	Length mm
M	75 ± 10
L	80 ± 10
EL	82 ± 10

3.6.3 The leader/trailer tape material shall be polyester or its equivalent having a transmissivity of at least 65% when measured with an 800 nm to 1000 nm light source.

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

3.6.5 The width of the leader/trailer tape shall be 6.35 mm + 0 mm – 0.05 mm.

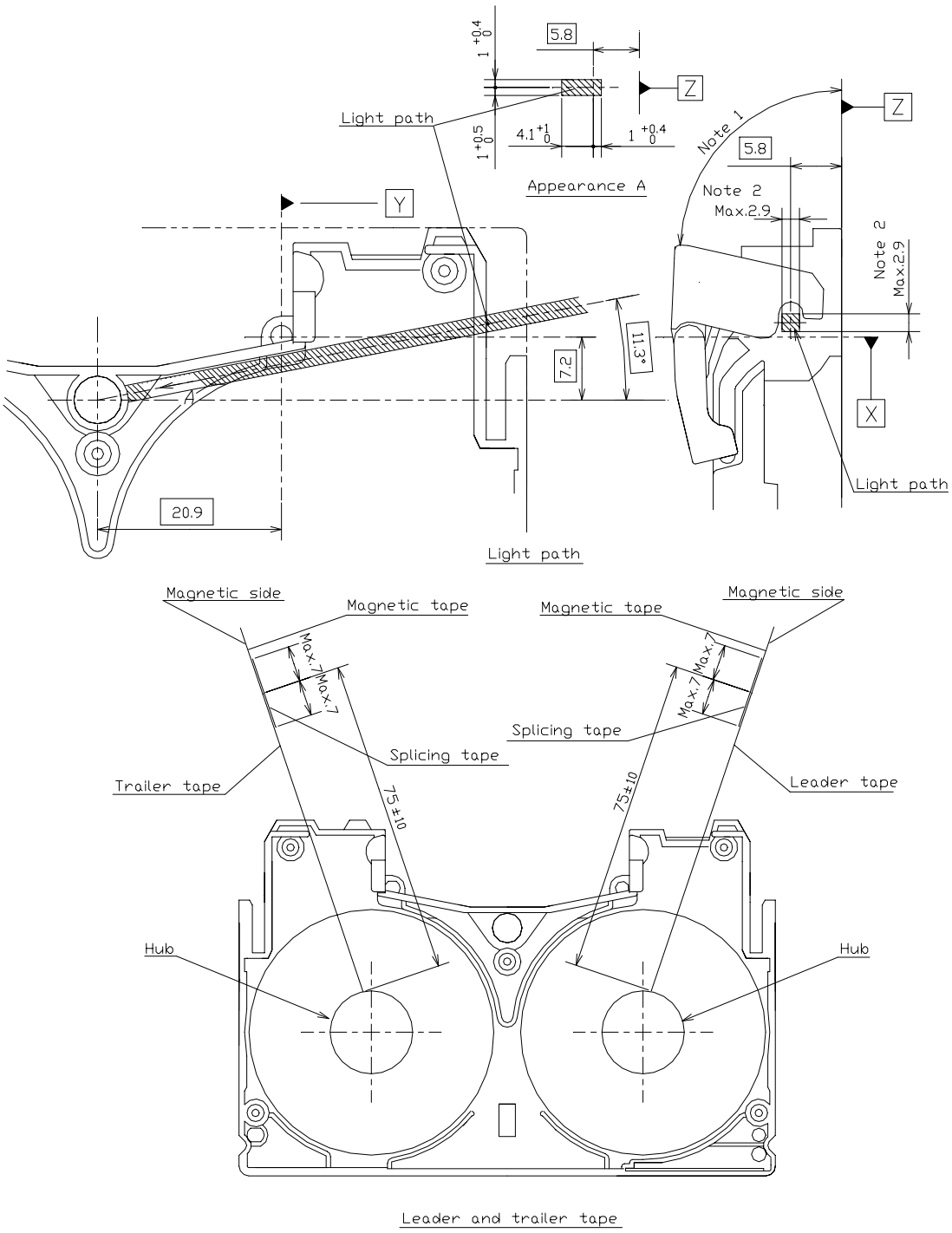
3.6.6 The thickness of the leader/trailer tape shall be 15 μm + 0 μm – 3 μm. The splicing tape used to attach the leader/trailer tape shall be applied to the nonmagnetic coated side.

3.7 Reels

3.7.1 The dimensions of the reels and the relationship between the reels and reel tables shall be as specified in figures 18 to 20.

3.7.2 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 21 to 23.

3.7.3 When a cassette is inserted into the recorder/player, the reels shall be unlocked automatically as specified in figures 21 to 23. The force needed to release the reel lock shall be less than 1.2 N.



Dimensions in millimeters

NOTES
1 The light path, as shown, shall be unobstructed when the lid is open beyond 85°.
2 The light path aperture shall be a 2.0-mm minimum diameter hole, but shall not exceed a 2.9-mm square area.

Figure 15 – Light path and leader/trailer tape for M cassette

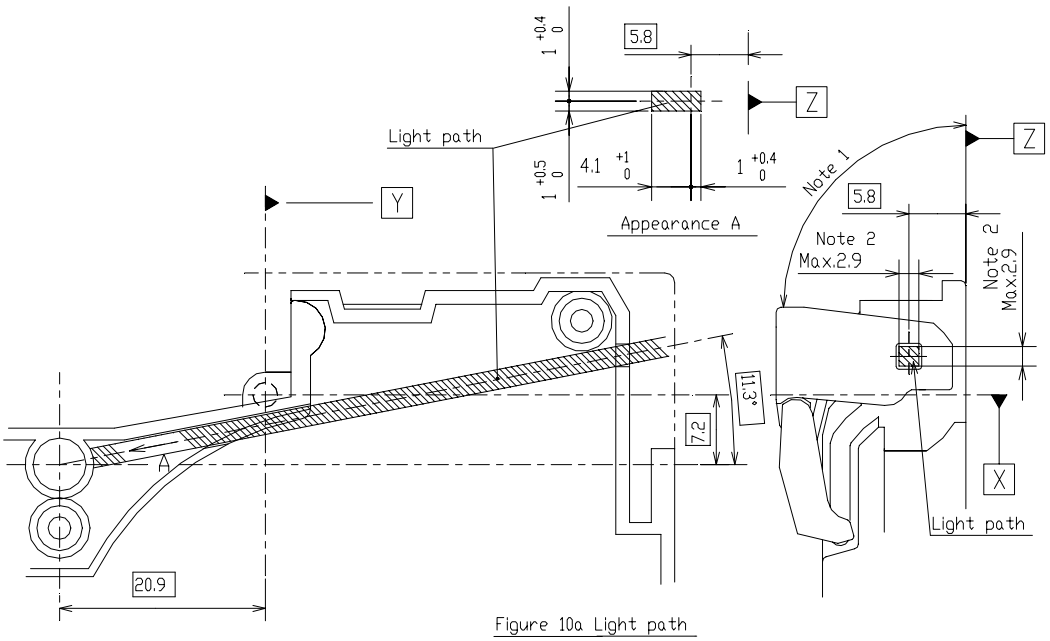


Figure 10a Light path

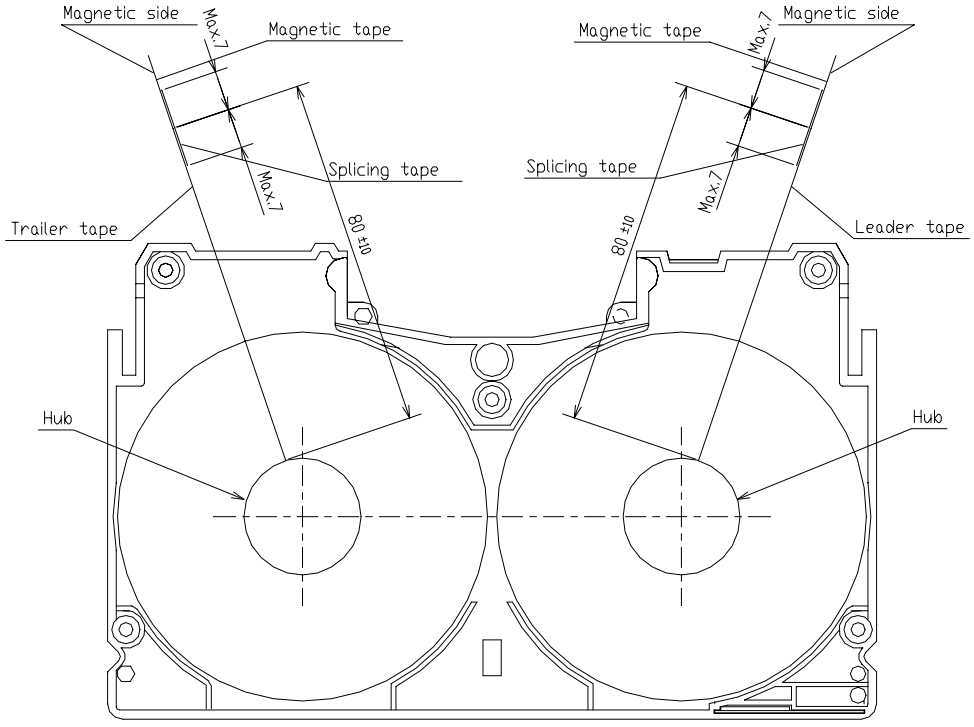


Figure 10b Leader and trailer tape

Dimensions in millimeters

NOTES
1 The light path, as shown, shall be unobstructed when the lid is open beyond 85°.
2 The light path aperture shall be a 2.0-mm minimum diameter hole, but shall not exceed a 2.9-mm square area.

Figure 16 – Light path and leader/trailer tape for L cassette

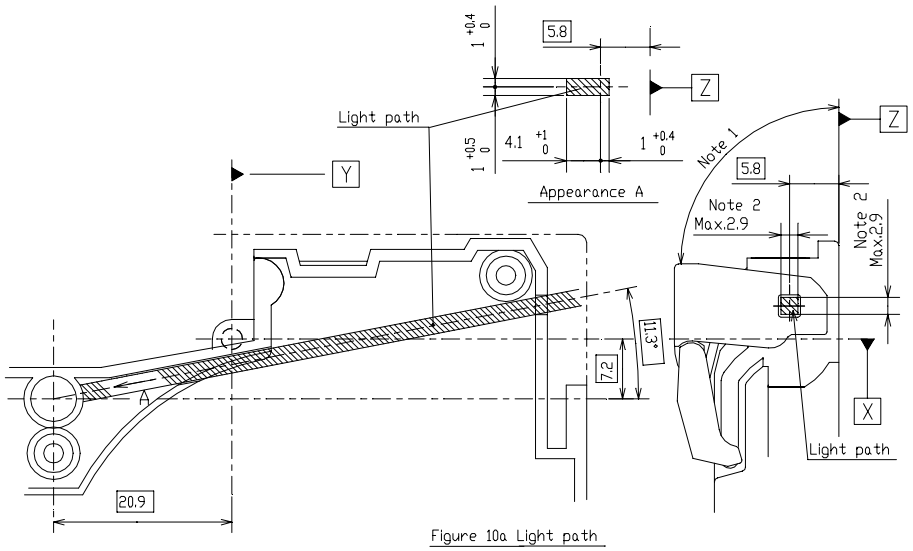


Figure 10a Light path

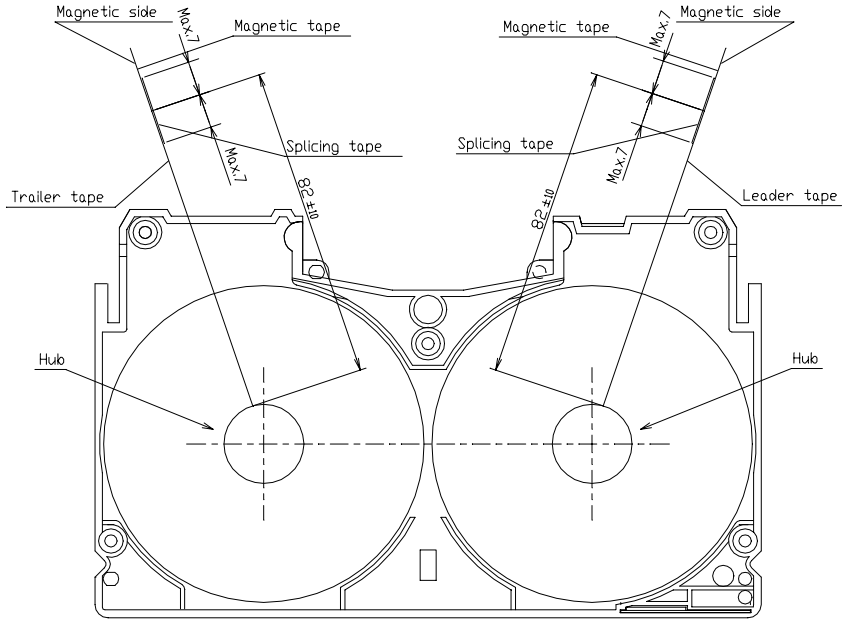
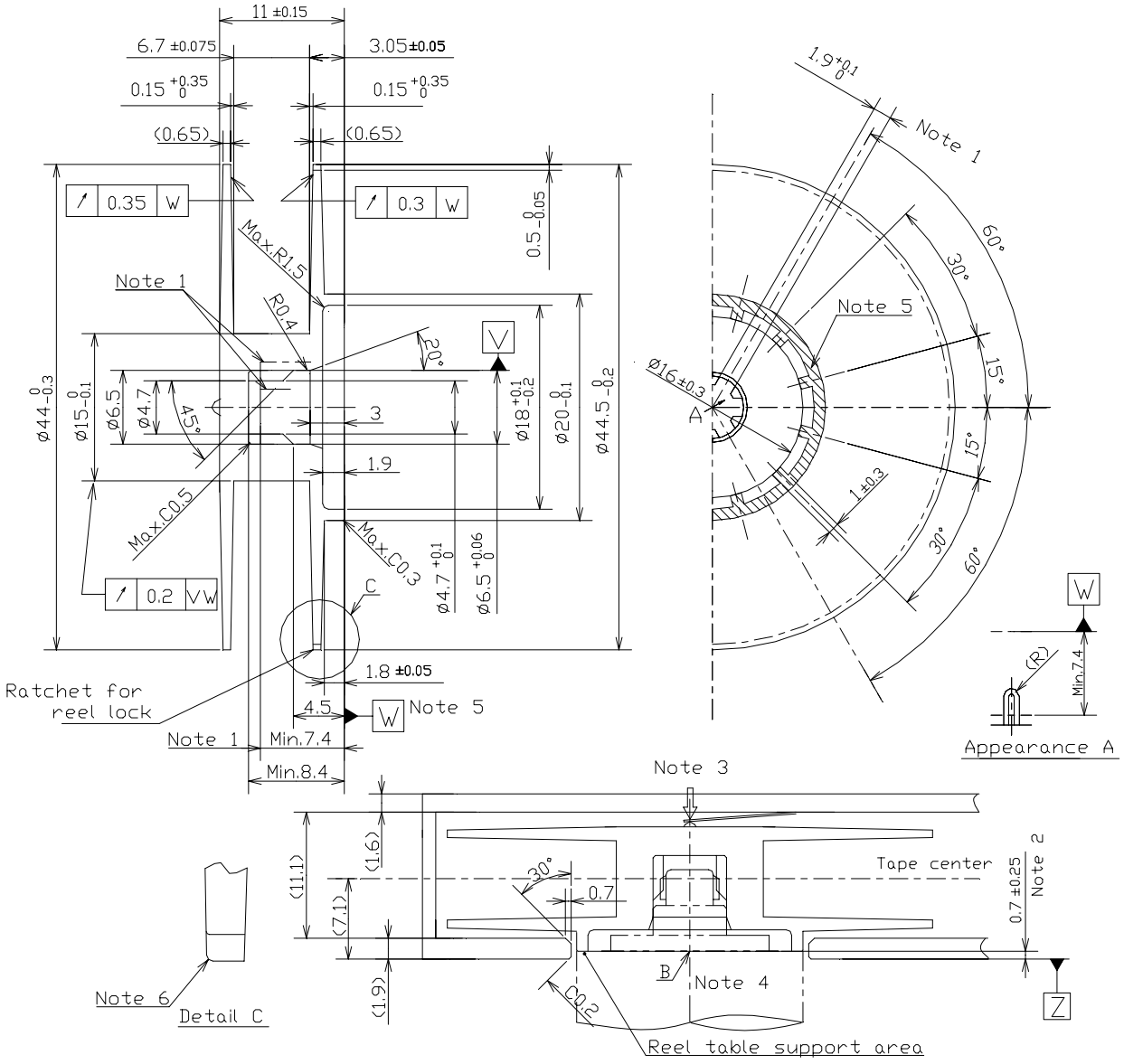


Figure 10b Leader and trailer tape

Dimensions in millimeters

NOTES
1 The light path, as shown, shall be unobstructed when the lid is open beyond 85°.
2 The light path aperture shall be a 2.0-mm minimum diameter hole, but shall not exceed a 2.9-mm square area.

Figure 17 – Light path and leader/trailer tape for EL cassette

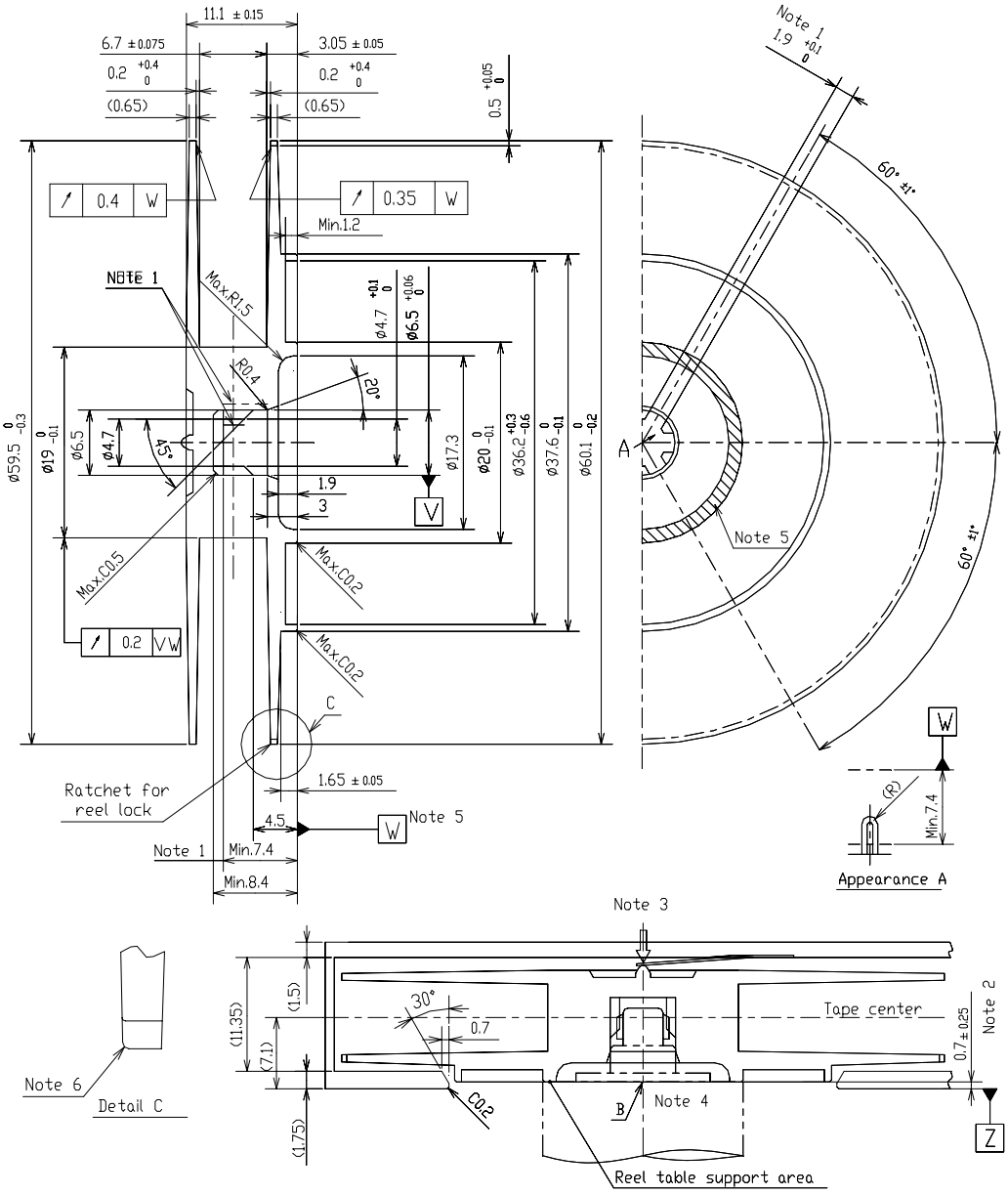


Dimensions in millimeters

NOTES

1 All dimensioned tolerances for the reel drive holes shall be maintained through a depth of 7.4 mm.
2 The height of the reel table.
3 The reel spring pressure force shall be within a 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.
4 The flange of the reel shall not contact 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 minutes.
5 Datum plane W shall be defined by the circular area as indicated.
6 The serration of the reel flange shall not contain sharp edges.

Figure 18 – Reels for M cassette



Dimensions in millimeters

NOTES

1 All dimensioned tolerances for the reel drive holes shall be maintained through a depth of 7.4 mm.

2 The height of the reel table.

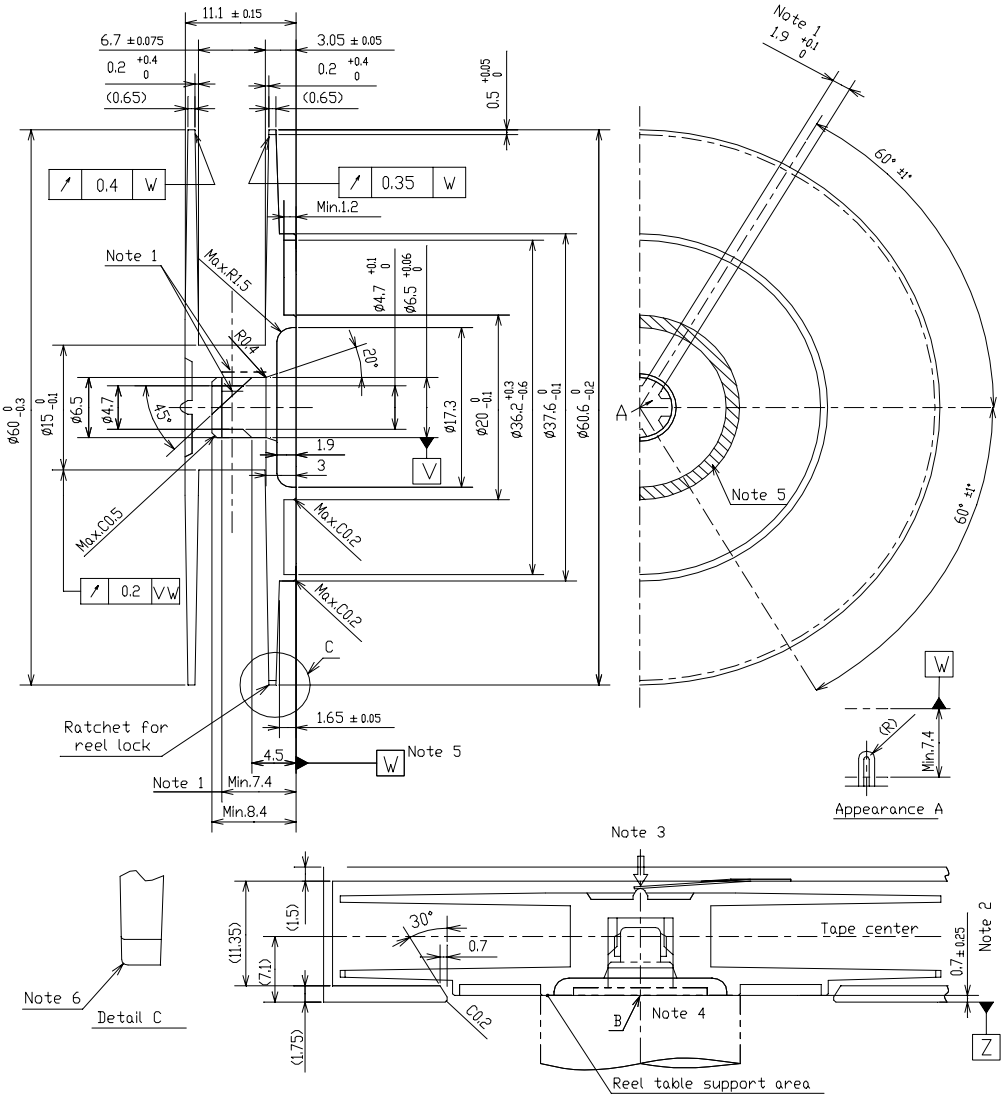
3 The reel spring pressure force shall be within a range of 0.65 N to 1.15 N when the height of the reel table support area is 0.7 mm ± 0.25 mm from datum plane Z.

4 The flange of the reel shall not contact 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 minutes.

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

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

Figure 19 – Reels for L cassette

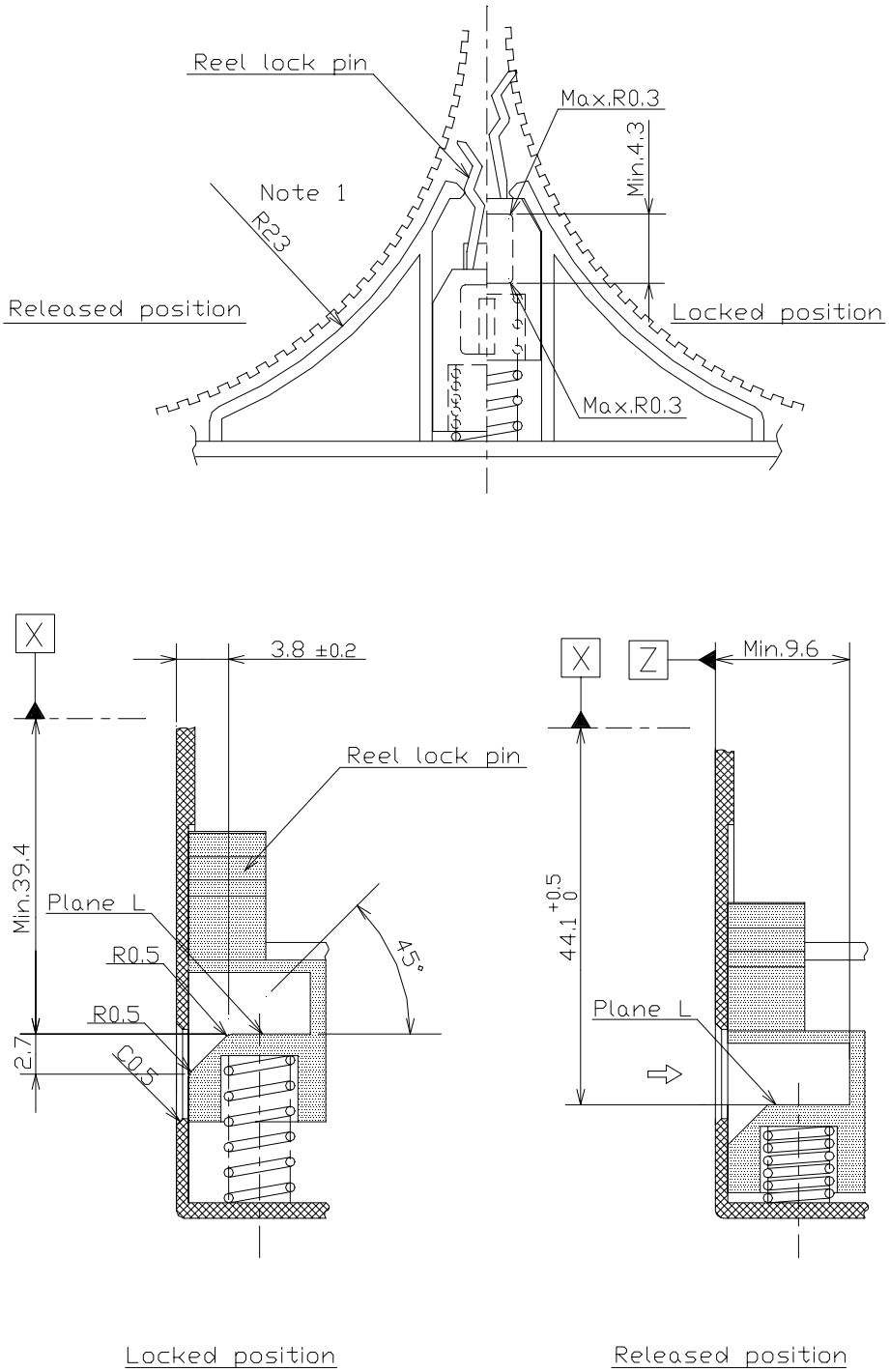


Dimensions in millimeters

NOTES

1 All dimensioned tolerances for the reel drive holes shall be maintained through a depth of 7.4 mm.
2 The height of the reel table.
3 The reel spring pressure force shall be within a 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.
4 The flange of the reel shall not contact 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 minutes.
5 Datum plane W shall be defined by the circular area as indicated.
6 The serration of the reel flange shall not contain sharp edges.

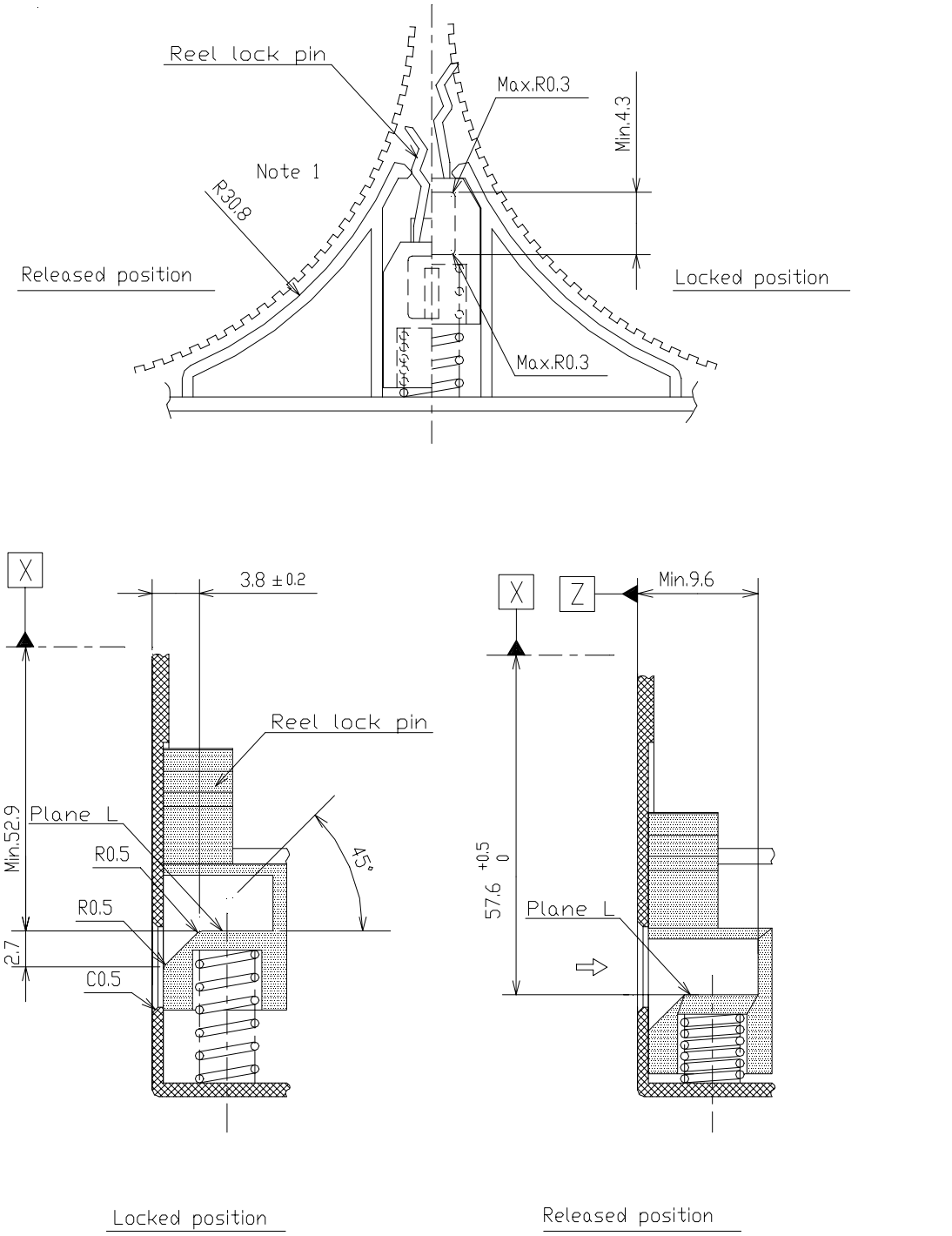
Figure 20 – Reels for EL cassette



Dimensions in millimeters

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 must be clear of the 23-mm radius circle.

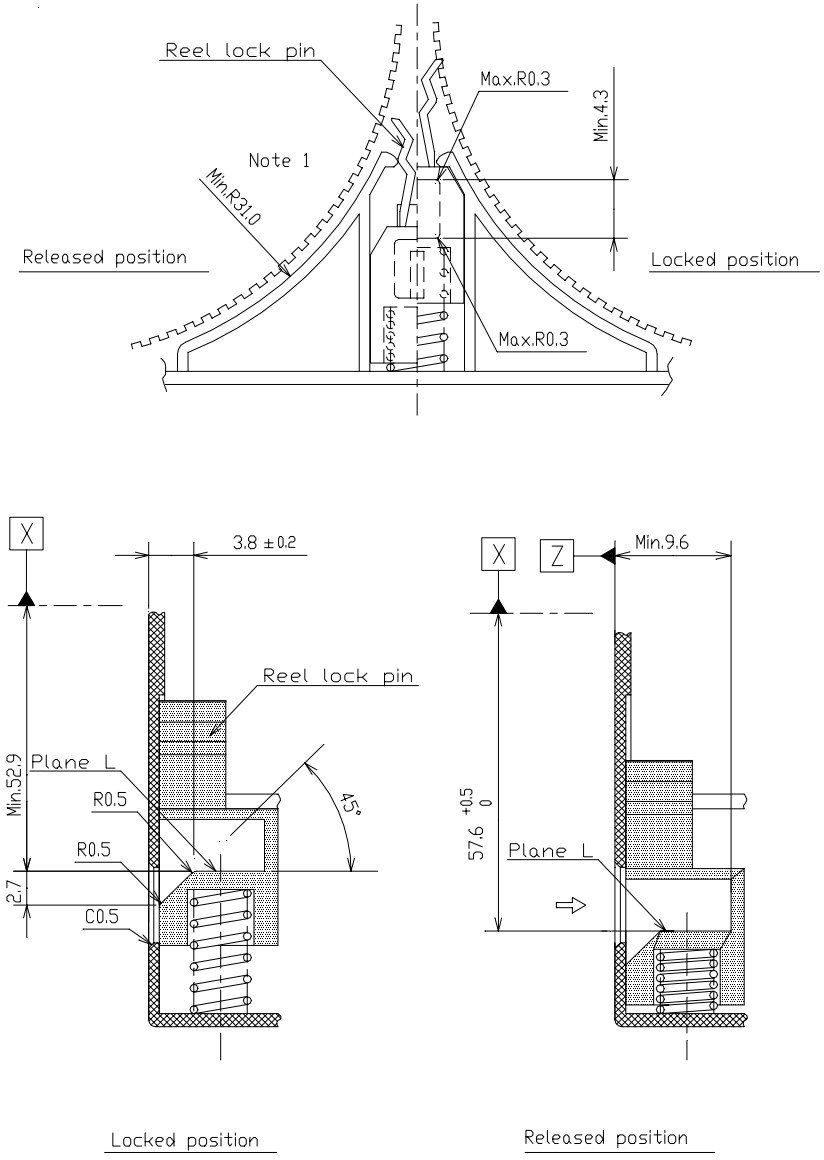
Figure 21 – Reel lock and release for M cassette



Dimensions in millimeters

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 must be clear of the 30.8-mm radius circle.

Figure 22 – Reel lock and release for L cassette



Dimensions in millimeters

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 must be clear of the 30.8-mm radius circle.

Figure 23 – Reel lock and release for EL cassette

3.7.4 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 mm ± 0.25 mm from datum plane Z as shown in figures 18 to 20.

Table 6 – Reel spring force

Cassette size	Force
M	0.9 N ± 0.25 N
L	0.9 N ± 0.25 N
EL	0.9 N ± 0.25 N

3.8 Lid

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

3.8.1.1 The lid shall be unlocked by a force of less than 0.2 N exerted upon each release member as specified in figures 24 and 25.

3.8.1.2 The inner door shall be lifted by the recorder/player to the position shown in figures 26 and 27.

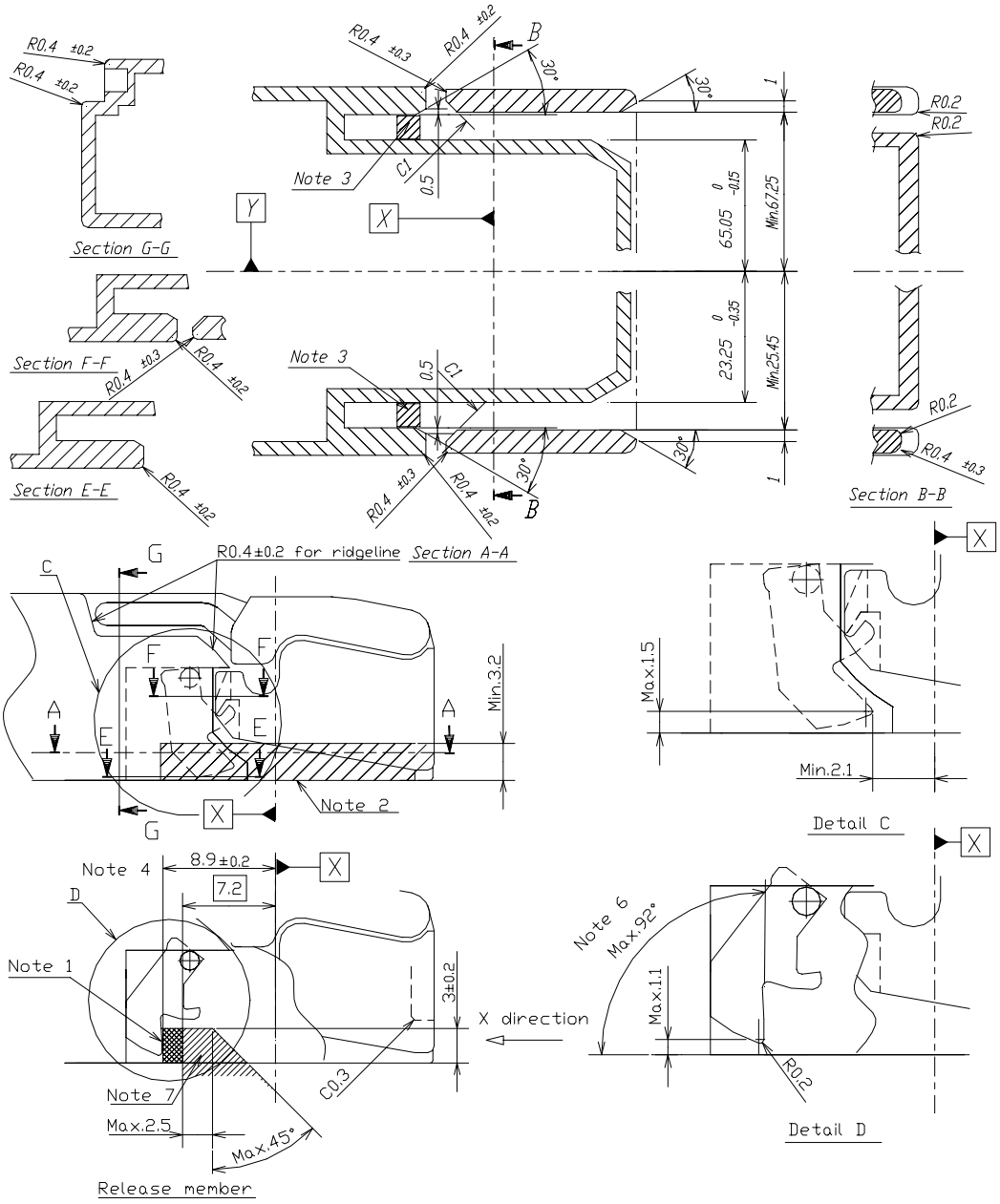
3.8.1.3 The outer door shall be lifted by the recorder/player to the position shown in figures 28 and 29.

3.8.2 The minimum space of cassettes for the video tape recording loading mechanism shall be as shown in figures 26 and 27. The shaded area of figures 26 and 27 is intended to indicate to VTR manufacturers the area available for loading (threading) the tape. Note that the dimensions defining this space are not cassette dimensions.

3.8.3 When open, the outer door shall not exceed 19.6 mm with respect to datum plane Z, as specified in figures 28 and 29.

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

3.8.5 The maximum force to open the lid shall be less than 1 N up to the 19.6-mm minimum height defined in figures 28 and 29.

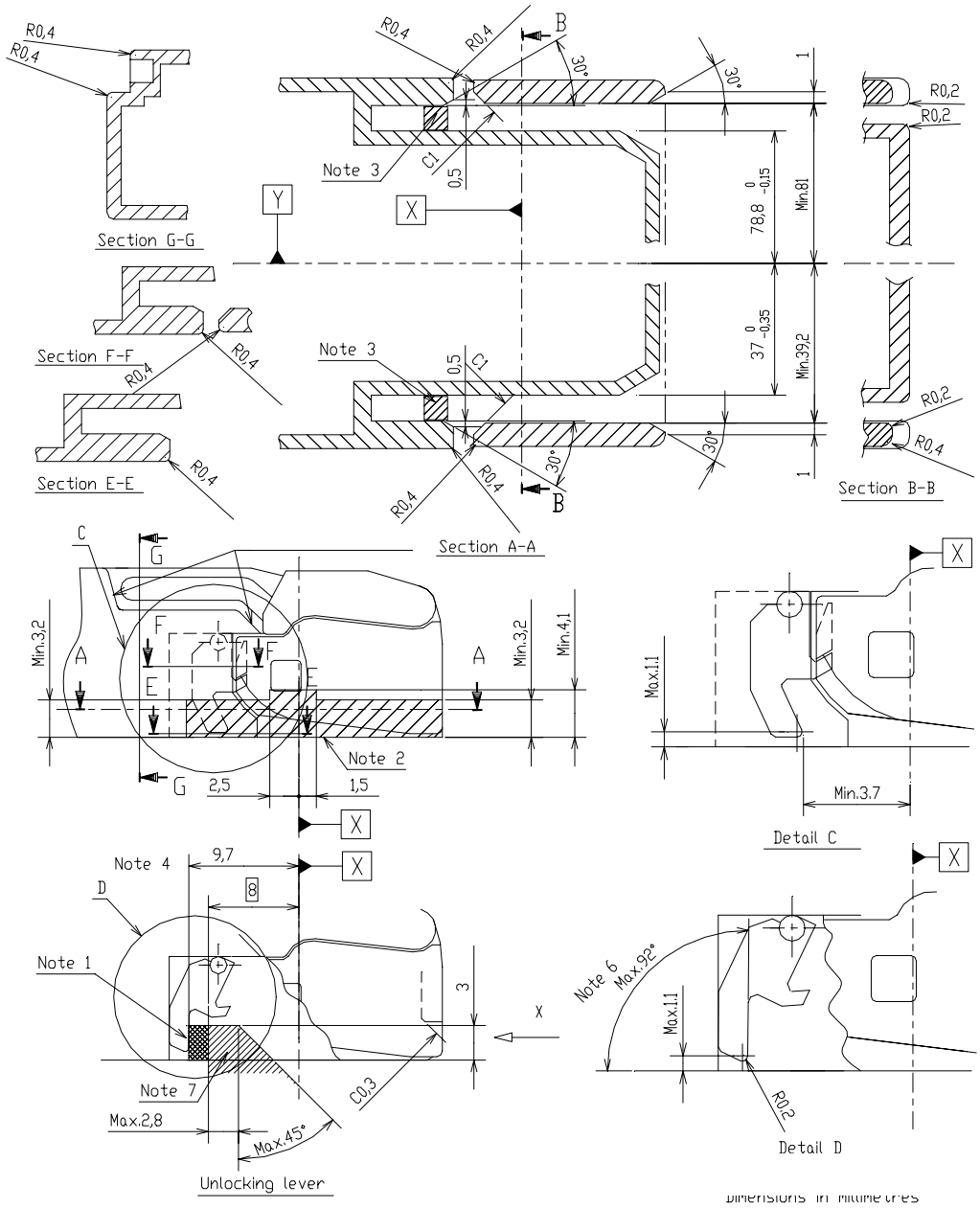


Dimensions in millimeters

NOTES

1 When the unlocking lever is in the crosshatched area, the lid locks shall be released.
2 Lid lock unlocking lever insertion area.
3 The cassette shall be provided with lid locks on the take-up side and the supply side.
4 The lid lock levers shall be stopped within 8.9 mm ± 0.2 mm as indicated.
5 The loading mechanism shall be provided with unlocking levers for the lid locks on both sides.
6 The angle shall be effective to a height 3.2 mm min from the bottom of the cassette.
7 The unlocking lever shall be contained within the indicated area.
8 The lid lock shall not extend beyond the bottom of the cassette in any position.

Figure 24 – Lock lid and release for M cassette



Dimensions in millimeters

NOTES
1 When the unlocking lever is in the crosshatched area, the lid locks shall be released.
2 Lid lock unlocking lever insertion area.
3 The cassette shall be provided with lid locks on the take-up side and the supply side.
4 The lid lock levers shall be stopped within 9.7 mm ± 0.2 mm as indicated.
5 The loading mechanism shall be provided with unlocking levers for the lid locks on both sides.
6 The angle shall be effective to a height 3.2 mm min from the bottom of the cassette.
7 The unlocking lever shall be contained within the indicated area.
8 The lid lock shall not extend beyond the bottom of the cassette in any position.

Figure 25 – Lock lid and release for L and EL cassettes

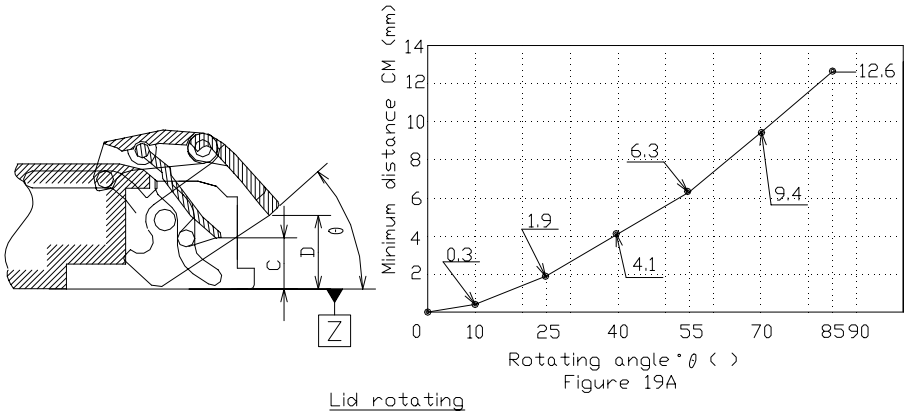
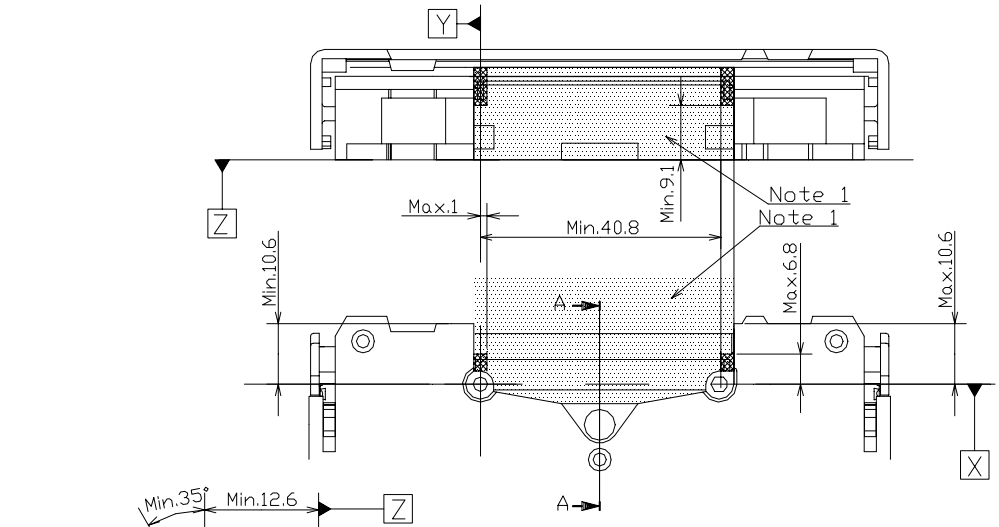
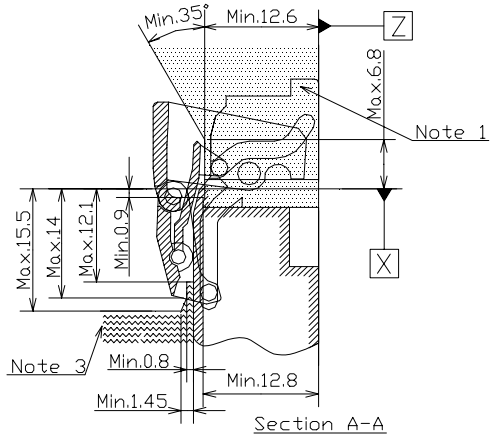


Figure 19A

Lid rotating



After installation



Section A-A

Dimensions in millimeters

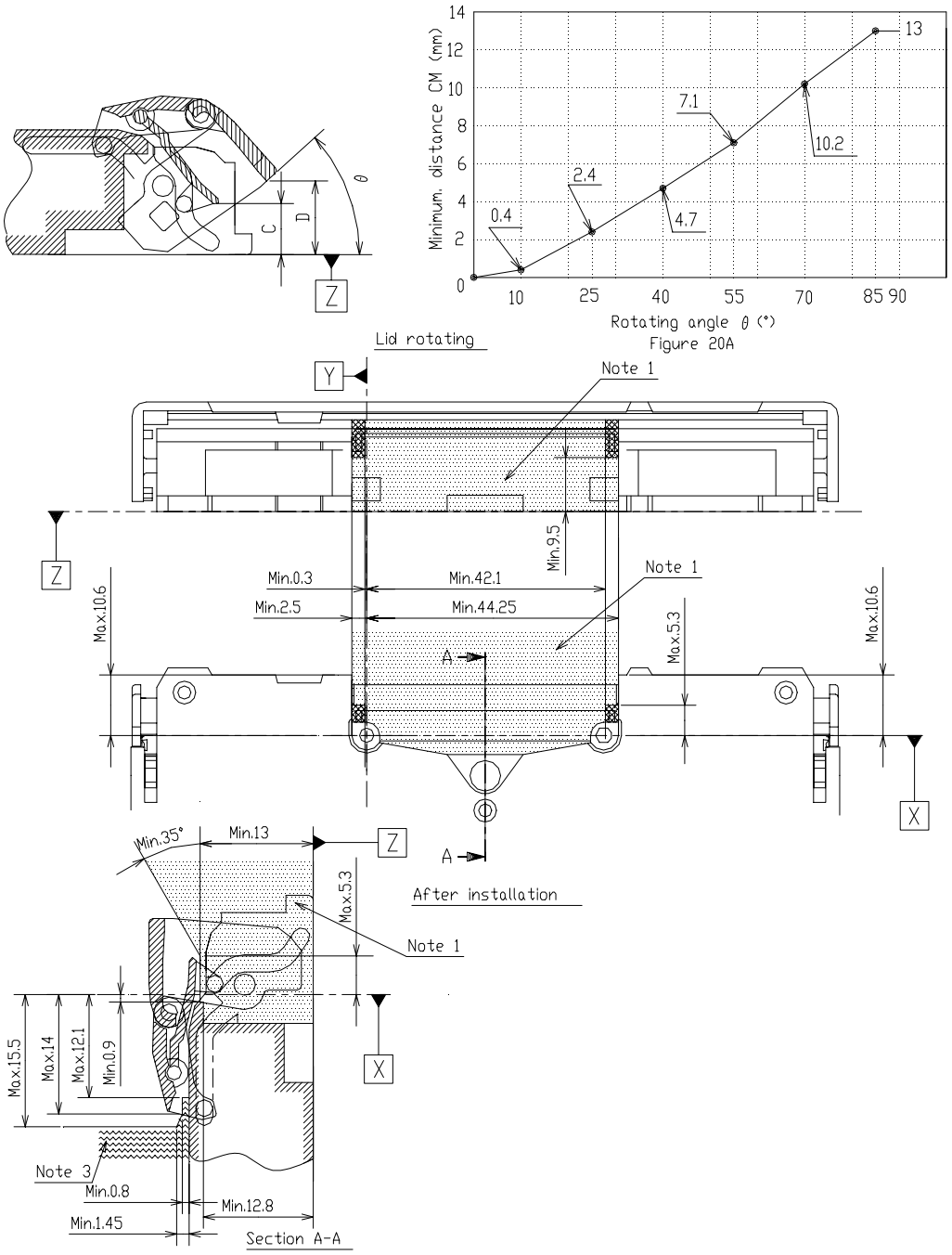
NOTES

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

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.

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

Figure 26 – Space of M cassette for VTR loading mechanism



Dimensions in millimeters

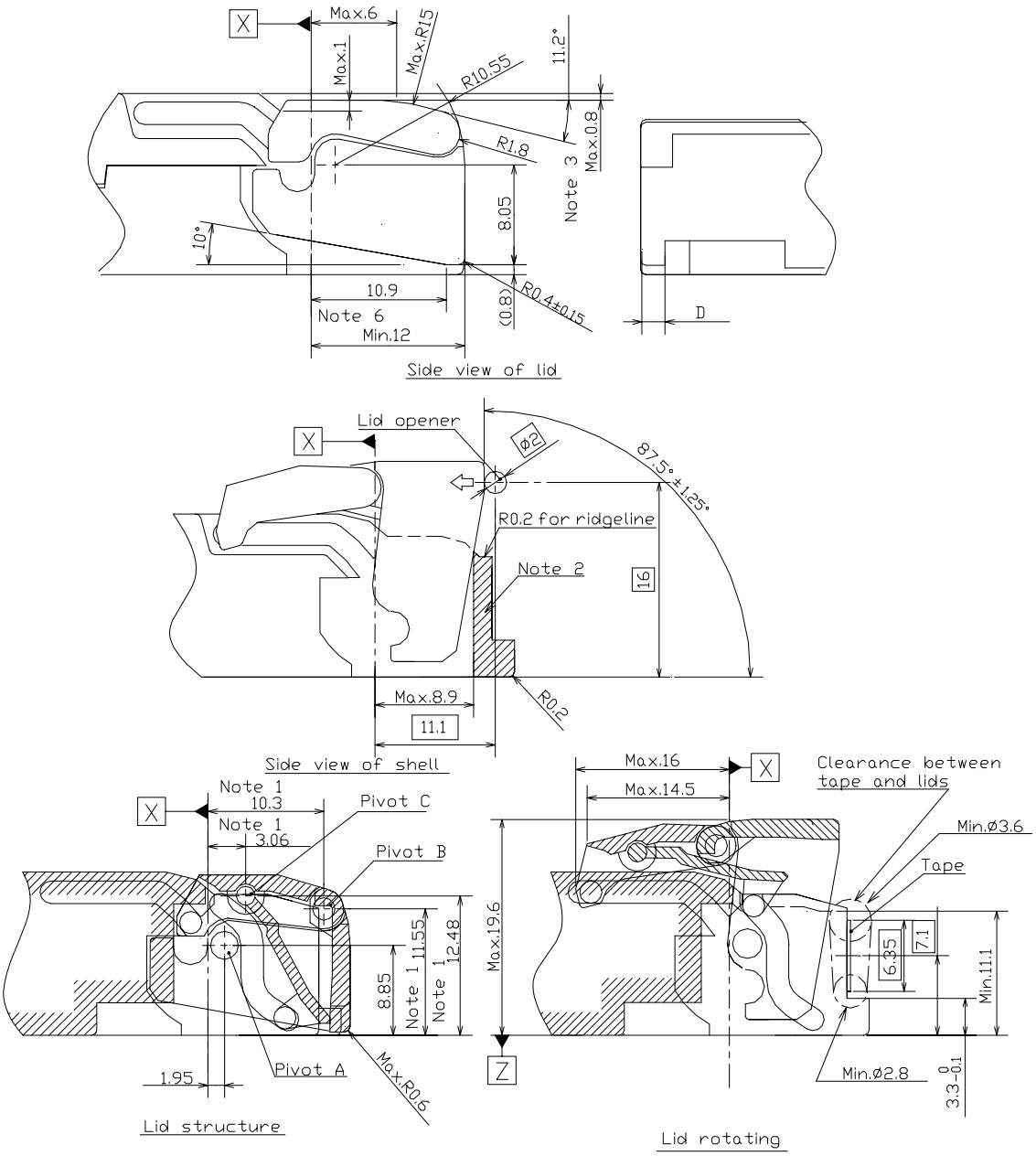
NOTES

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

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.

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

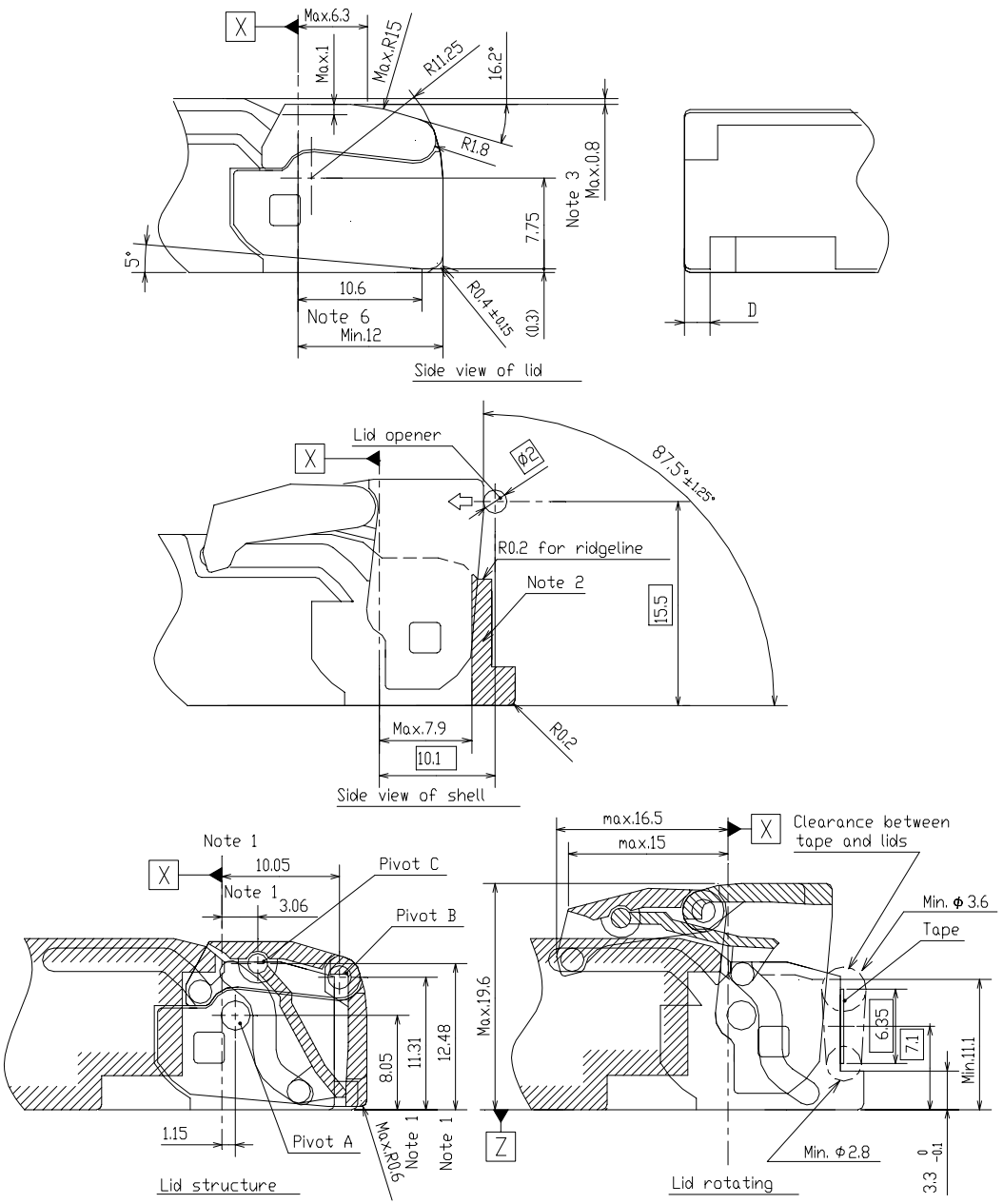
Figure 27 – Space of L and EL cassettes for VTR loading mechanism



Dimensions in millimeters

NOTES
1 Recommended value for design.
2 The difference in level between both shells shall not exceed a distance of 0.2 mm in this area.
3 The height of the lid shall not exceed the height of the shell.
4 The recorder/player shall be provided with a lid opener on the take-up side of the cassette.
5 The lid lock shall not extend beyond the bottom of the cassette in any position.
6 The dimension applies to the lid side piece, indicated as D.

Figure 28 – Lid for M cassette



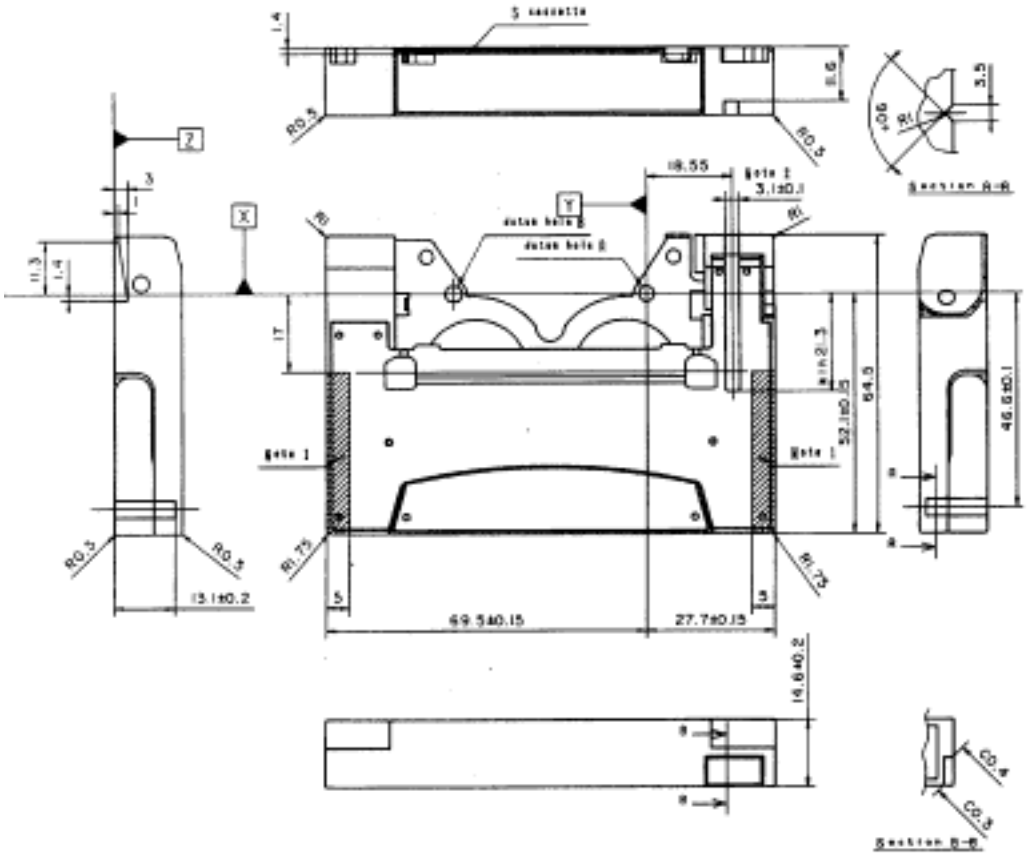
Dimensions in millimeters

NOTES
1 Recommended value for design.
2 The difference in level between both shells shall not exceed a distance of 0.2 mm in this area.
3 The height of the lid shall not exceed the height of the shell.
4 The recorder/player shall be provided with a lid opener on the take-up side of the cassette.
5 The lid lock shall not extend beyond the bottom of the cassette in any position.
6 The dimension applies to the lid side piece, indicated as D.

Figure 29 – Lid for L and EL cassettes

Annex A (informative)
Small cassette adapter

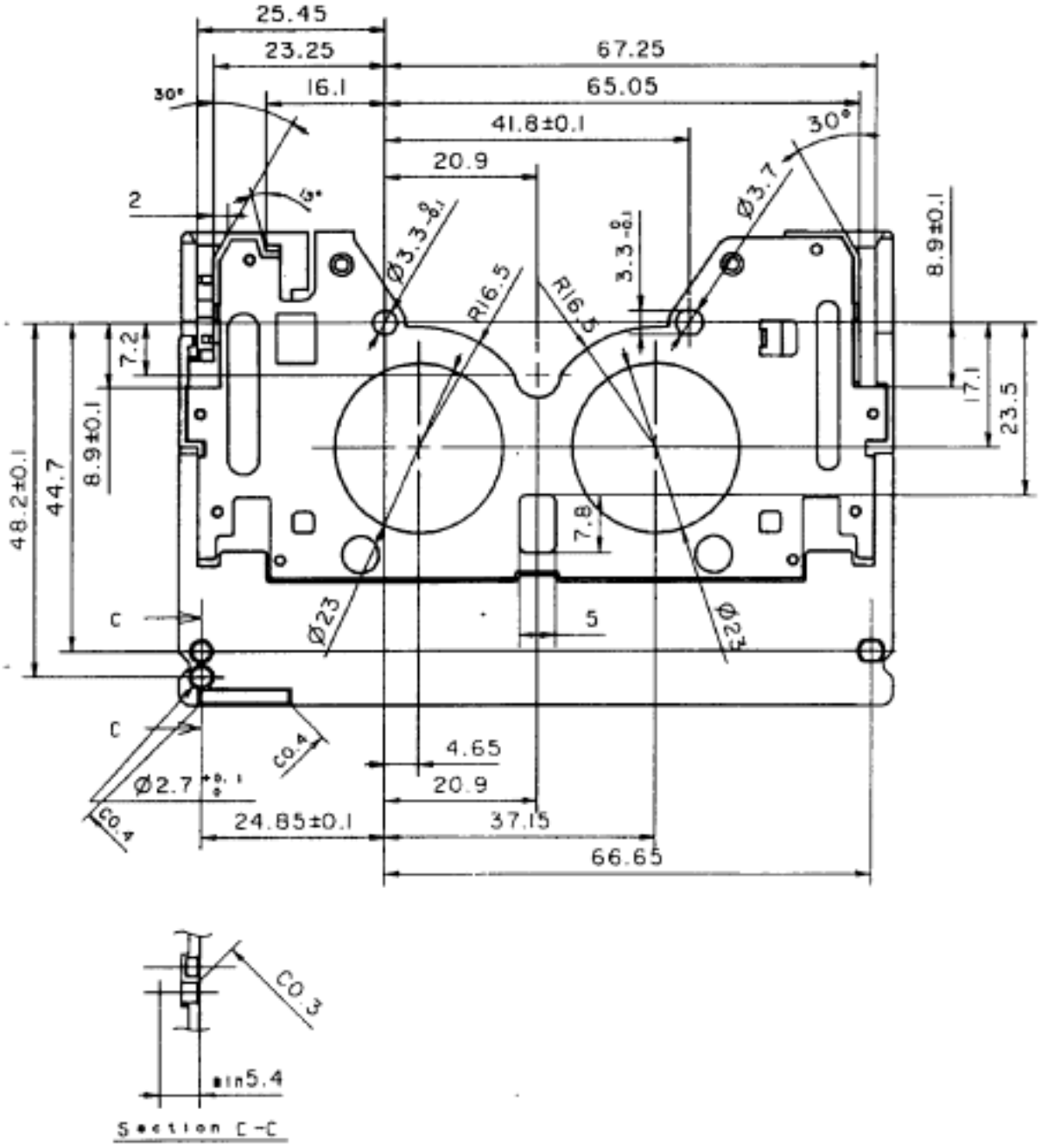
Some video tape recorders may play back the recorded tape of the small cassette which is specified in IEC 61834-1. Figures A.1 to A.6 show possible designs of the adapter.



Dimensions in millimeters

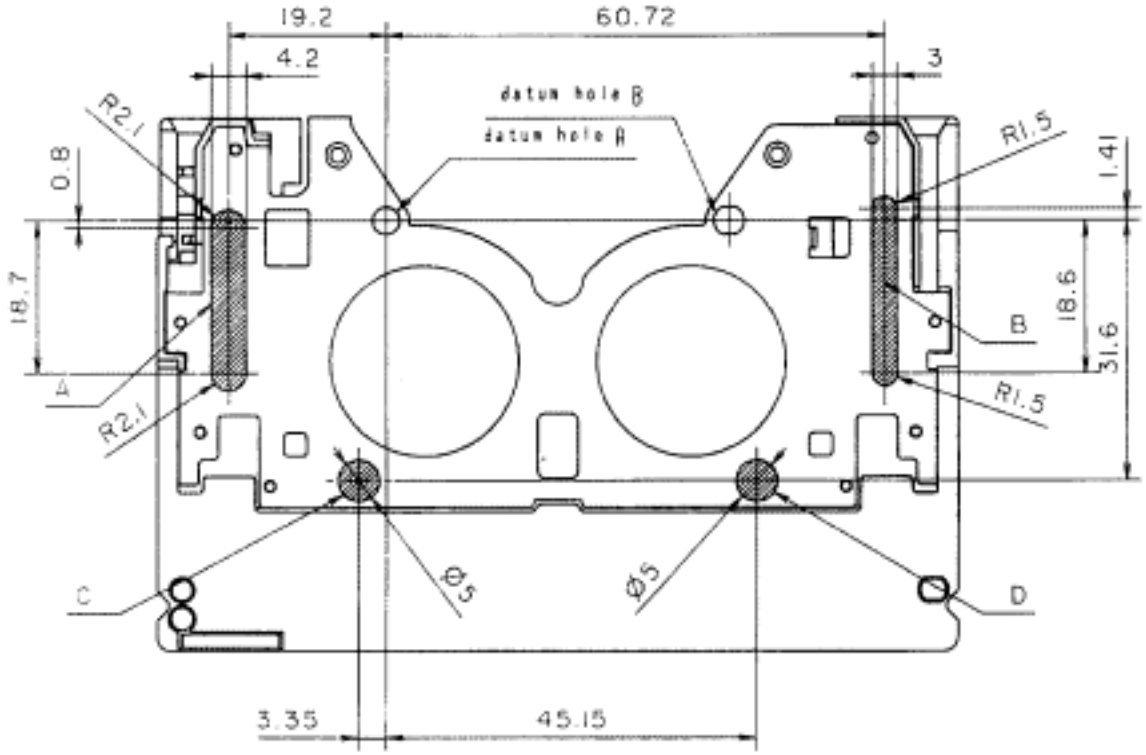
NOTES
1 Holding area.
2 Slot for detection of cassette in the adapter.

Figure A.1 – Top and side views of adapter



Dimensions in millimeters

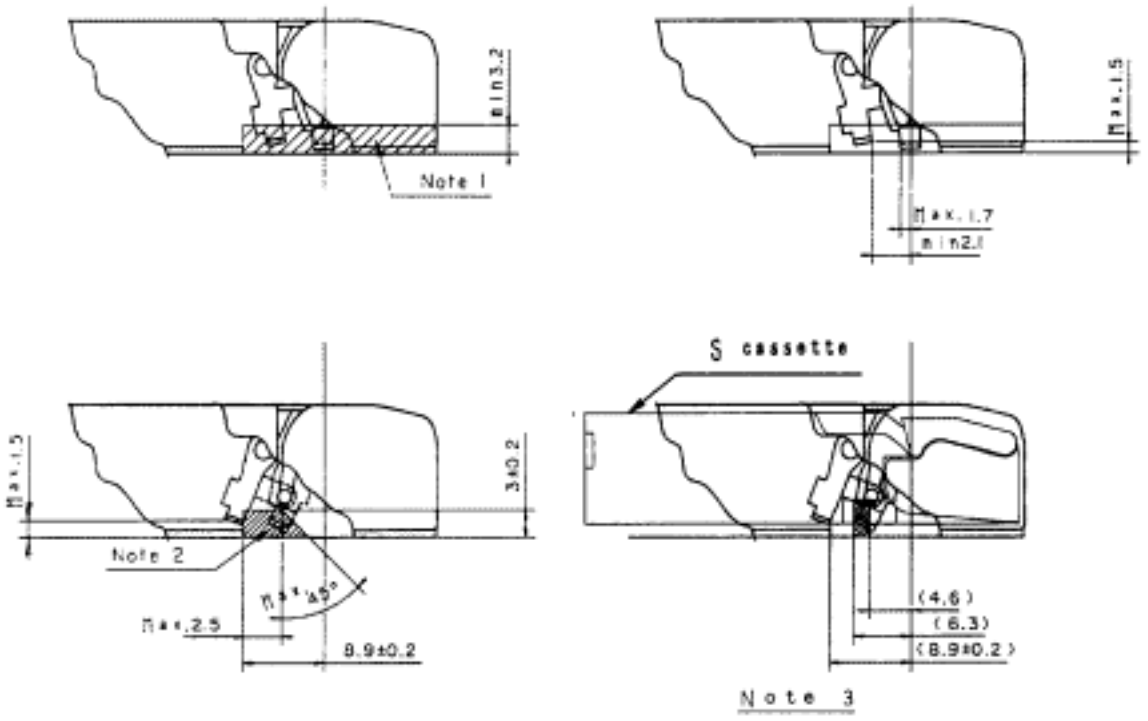
Figure A.2 – Bottom view of adapter



Dimensions in millimeters

NOTES
1 Support areas A to C shall be coplanar with datum plane Z within ± 0.15 mm.
2 Support area D shall be coplanar with datum plane Z within ± 0.2 mm.
3 Datum areas may be used as support areas

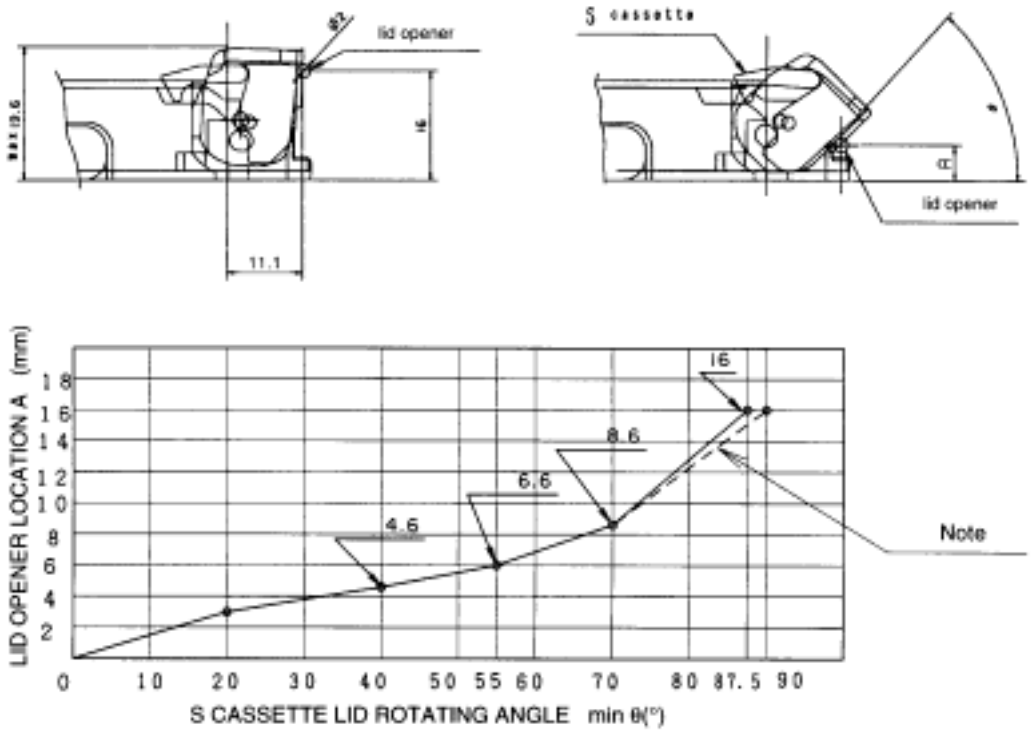
Figure A.3 – Datum and support areas of adapter



Dimensions in millimeters

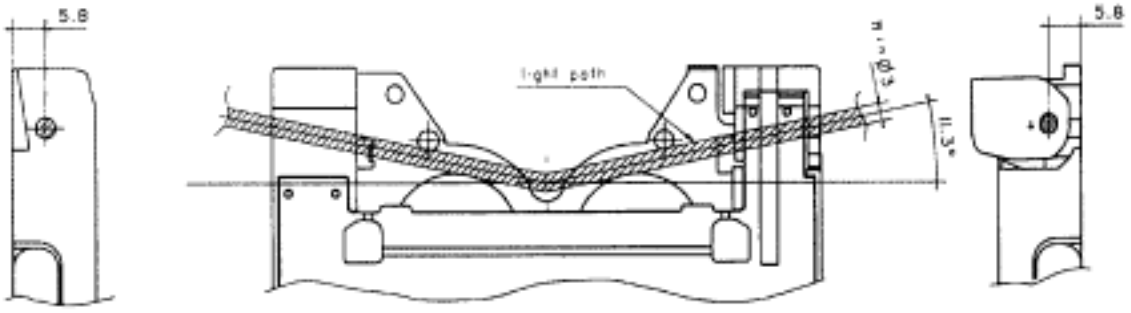
NOTES
1 Lid lock unlocking lever insertion area.
2 The unlocking lever shall be contained within the indicated area.
3 When the lid lock lever is stopped within 8.9 mm ± 0.2 mm as indicated, the release lever drives the lid lock lever of the small cassette within the crosshatched area (see the specifications of the small cassette).
4 The lid lock mechanism shall not extend beyond the bottom of the adapter in any position.

Figure A.4 – Lid lock and release mechanism of adapter



NOTE – Additional mode.

Figure A.5 – Lid opening mechanism



Dimensions in millimeters

Figure A.6 – Light path of adapter

Annex B (informative)
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