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SMPTE STANDARD**SMPTE 238M-1998**Revision of
ANSI/SMPTE 238M-1992

for Television Analog Recording — 1/2-in Type L — Tapes and Cassettes



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1 Scope

This standard specifies the magnetic tapes and video cassettes for the 1/2-in type L helical-scan video tape recorder system.

2 Test conditions

2.1 Tests and measurements shall be made under the following conditions unless otherwise stated:

- Temperature $20^{\circ}\text{C} \pm 1^{\circ}\text{C}$
- Relative humidity $(50 \pm 2)\%$
- Stabilization time 24 hours

2.2 Dimensions shall be as specified in the figures and tables (see annex B).

3 Mechanical characteristics of video cassettes**3.1 Outside dimensions**

3.1.1 Two cassette sizes shall be identified as shown in table 1.

Table 1 – Cassette identification

Model	Outside dimensions (mm)	Figures
S – Small cassette	$96 \times 156 \times 25$	1 to 9
L – Large cassette	$145 \times 254 \times 25$	10 to 18
NOTE – For purposes of drawing clarity, the S cassette shell is represented as two different shells — oxide tape and metal-particle tape shells. It is the manufacturer's choice to manufacture single or dual shells.		

3.2 Datum planes

3.2.1 Datum plane Z is determined by three datum spots, A, B, and C, as indicated in figures 3A and 12A.

3.2.2 Datum plane X shall be orthogonal to datum plane Z and include the center of datum holes (a) and (b), as shown in figures 2A/2B and 11.

3.2.3 Datum plane Y shall be orthogonal to both datum planes X and Z and include the center of datum hole (a), as shown in figures 2A/2B and 11.

3.3 Window area and label area

The crosshatched areas in figures 1A/1B and 10, defined as the label/window area, shall not protrude beyond the height of the cassette surface.

3.4 Manufacturer's identification holes

Three manufacturer's holes, referred to as recognition holes, shall be provided (refer to figures 2A/2B and 11).

3.4.1 Tape type identification hole

Hole one shall identify the tape type within the cassette. The detected state "1" shall indicate metal-oxide tape; detected state "0" shall indicate metal-particle tape. Detection of tape type by the machine shall determine mode 1 or mode 2 operation.

3.4.2 Tape thickness identification hole

Hole two shall identify tape thickness. Detected state "1" shall identify 20 μm tape; detected state "0" shall identify 15 μm tape.

3.4.3 Reel hub diameter identification hole

Hole three shall identify the reel hub diameter. Detected state "1" shall identify a small hub; detected state "0" shall identify a large hub (see figures 6 and 15 for details concerning usage).

3.5 Safety tab and plug

3.5.1 Usage

Use of the safety tab (for oxide) and safety plug (for metal) is intended to activate or produce a record lock-out condition in the event the safety tab or plug is activated.

3.5.2 S cassette

The S cassette may contain either oxide or metal-particle tape. When loaded with oxide tape, the safety tab (for oxide), as shown in figures 2A/2B, shall activate the mode 1 record lock-out condition if the tab is removed. A hole 10 mm minimum deep from datum plane Z (CC in figures 2A/2B) defines the mechanical tolerances for the sensing device.

When loaded with metal-particle tape, the safety tab (for oxide) shall be removed (preventing the record condition for machines capable of mode 1 operation). The safety plug defined by DD in figure 2B defines the mechanical tolerances for the sensing device. Detection of no hole shall cause the record lock-out condition for mode 2 to exist.

3.5.3 L cassette

The L cassette contains only one safety plug. If the safety plug is removed, both mode 1 and mode 2 record lock-out is activated. Dimensions of the safety plug are shown in C-C of figure 11. The cassette may be loaded with either oxide or metal-particle tape.

3.5.4 Deformation

The safety tab and plug shall not be deformed over 0.3 mm when a force of 2.0 N is applied, using a 2.5-mm diameter rod.

3.6 Reels

3.6.1 The dimensions of the reels shall be in accordance with those given in figures 6 and 15.

3.6.2 The reels shall be locked automatically when the cassette is ejected from the video tape recorder or player unit.

3.6.3 The reels shall be unlocked automatically when the cassette is inserted into the video tape recorder/player unit. The reel shall be completely released when the cassette lid is opened 27.5 mm or more from datum plane Z.

3.6.4 The reels in the cassette shall be pressed by the reel spring with a specified force under the conditions specified in figures 7 and 16. The reel spring shape shall conform to figure 7 for the S cassette and figure 16 for the L cassette. The spring force shall be $1.5 \text{ N} \pm 0.5 \text{ N}$ for the S cassette and $3.4 \text{ N} \pm 0.5 \text{ N}$ for the L cassette when the reel is depressed to 2.0 mm +0.2 mm – 0.1 mm above datum plane Z.

3.6.5 Dimensions specified in this standard apply to the cassette only; no transport dimensions should be derived from this standard.

3.7 Cassette lid

3.7.1 The cassette shall be provided with a lid that is unlocked automatically when the cassette is inserted into the video tape recorder/player unit and locked automatically when the cassette is ejected.

3.7.2 The force needed to open the lid shall be 1.5 N or less (see figures 9 and 18).

3.7.3 The lid shall open 29.0 mm, as shown in figures 4 and 13, when the cassette is inserted into the video tape recorder/player unit.

3.7.4 The lid shall be unlocked when the lid lock lever is shifted in either direction A or B, as illustrated in figures 8 and 17. The force needed to unlock the lid shall not be greater than 1 N in the A direction and not greater than 1.5 N in the B direction.

4 Magnetic tape

4.1 Type

The magnetic tape used for 1/2-in type L helical-scan video tape recorders shall be either oxide tape or metal-particle tape.

4.2 Base material

The base material shall be polyester or its equivalent.

4.3 Tape width

The width of the magnetic tape shall be $12.65 \text{ mm} \pm 0.01 \text{ mm}$.

4.4 Tape thickness

The thickness of the magnetic tape shall be as shown in table 2.

4.5 Coercivity

Two levels of coercivity shall be permitted: Class 720 tape (mode 1 operation) oxide; class 1500 tape (mode 2 operation) metal particle.

4.6 Transmissivity

Transmissivity shall be less than 5% measured over the range of wavelengths 700 nm to 900 nm.

4.7 Offset yield strength

The offset yield strength shall be greater than 19.6 N.

4.8 Residual elongation

The residual elongation of the magnetic tape shall be less than 0.15%. (Test method: Apply a 13.9 N load to a 1 m long and 12.65 mm wide test tape for 10 minutes. Remove the load and measure the tape length after a 0.2 N load is applied continuously for another 10 minutes.)

4.9 Magnetic orientation

The magnetic particles shall be longitudinally oriented.

5 Leader and trailer tape

5.1 Mechanical characteristics

The leader and trailer tape shall contain a metal foil providing conductivity per centimeter of more than 200 S (mho) so that the magnetic tape automatically stops running when this end is detected in the recorder.

5.2 Leader and trailer tape dimensions

5.2.1 Tape width

The width of the leader and trailer tape shall be $12.65 \text{ mm} \pm 0.03 \text{ mm}$.

5.2.2 Tape thickness

The thickness of the leader and trailer tape shall be less than $45 \mu\text{m}$.

5.2.3 Tape length

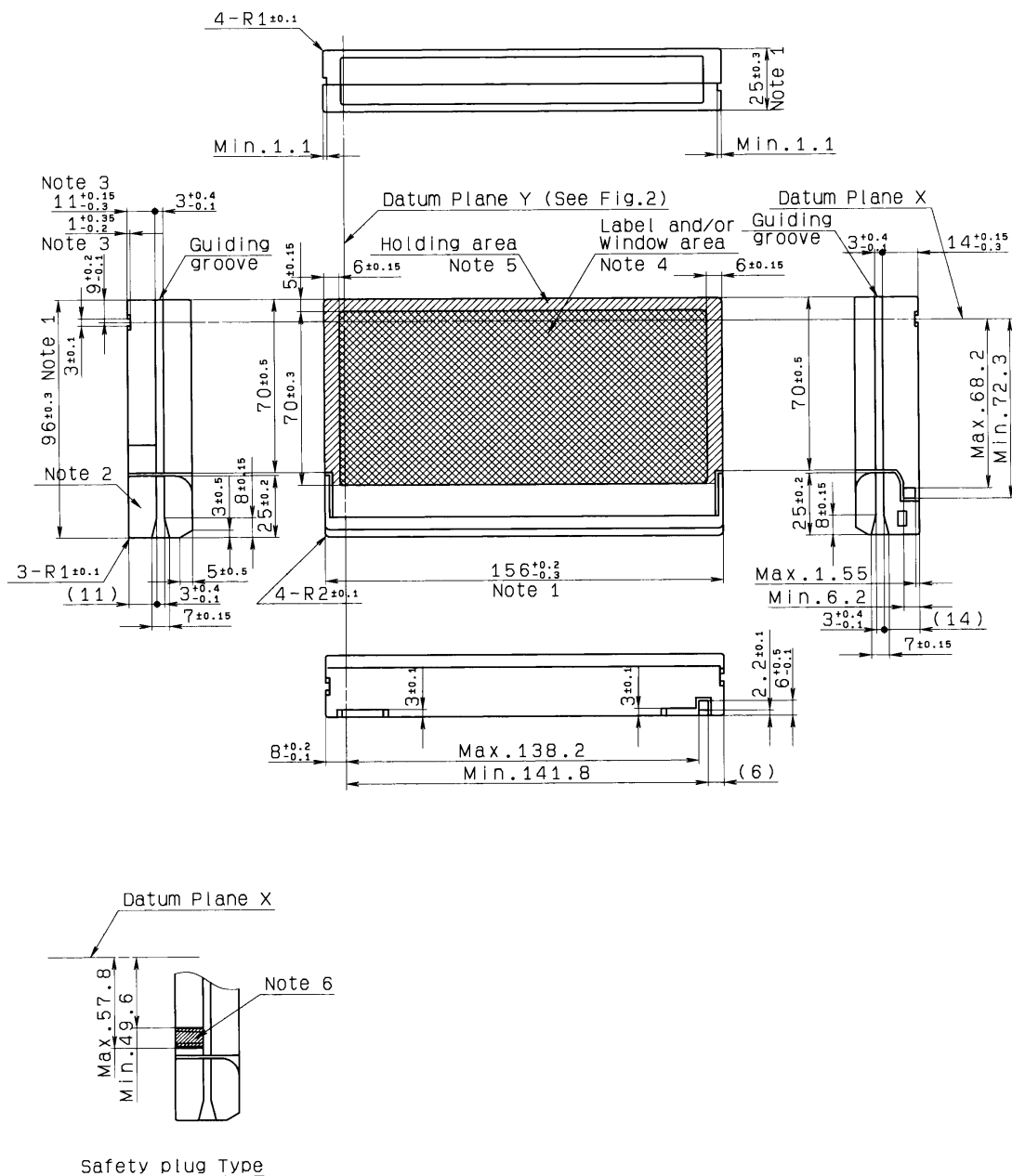
The length of the leader tape, L_1 , and the trailer tape, L_2 , specified in figure 19, shall be as shown in table 3.

5.3 Offset yield strength

The offset yield strength of the leader and trailer tape shall be greater than 29.4 N.

5.4 Splicing break strength

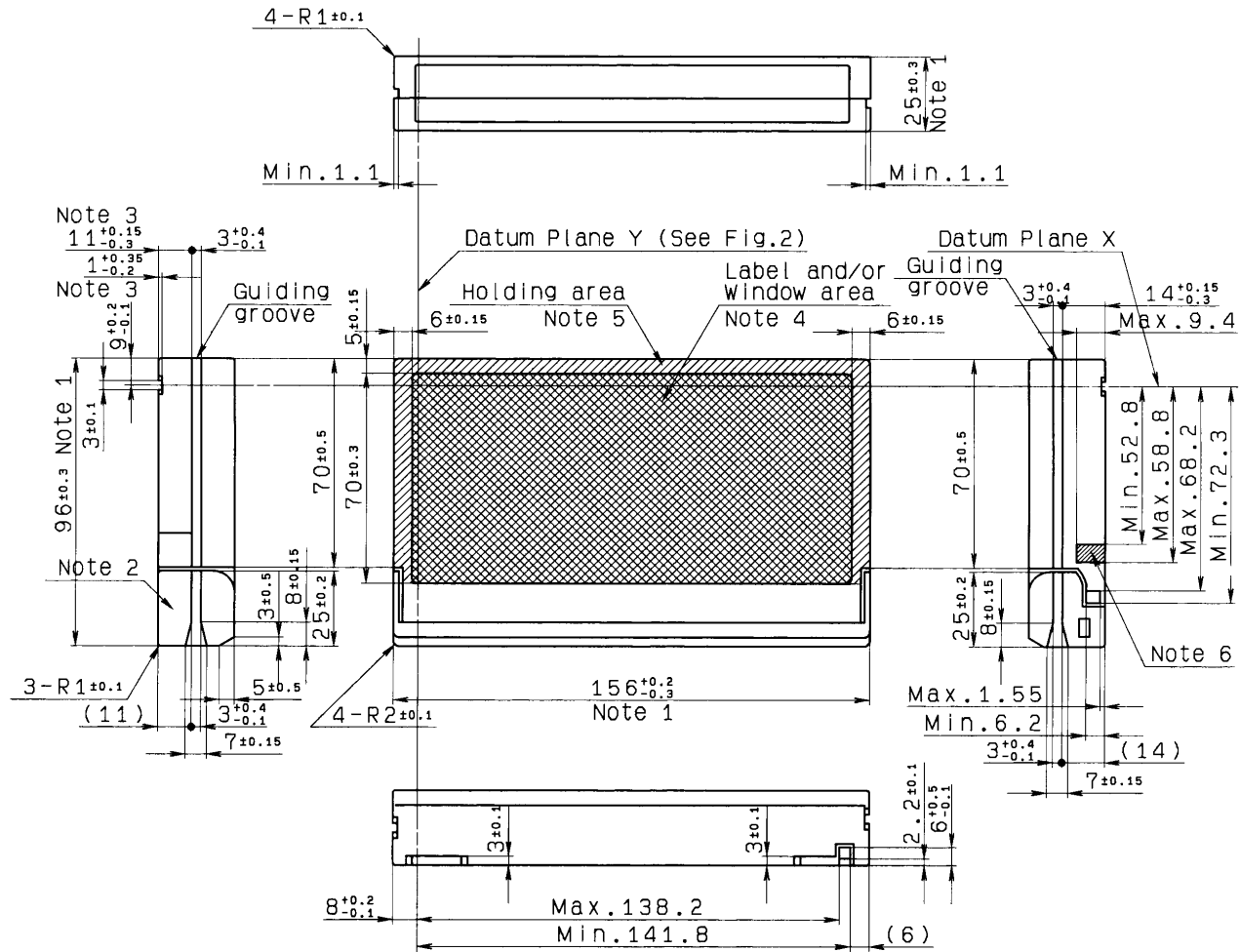
The spliced portion between the magnetic tape and the leader or trailer tape shall withstand a tension of 14.7 N.



NOTES

- 1 The dimensions are inspected by using limit gauges.
- 2 No part of the lid shall protrude beyond the bottom plane of the cassette during the opening and closing motion of the lid.
- 3 This dimension shall be specified from datum plane Z.
- 4 Label and/or window area is available for the label and/or window (crosshatched area).
- 5 The cassette may be held in position by the recorder and/or player unit on this holding area (hatched area).
- 6 The fine hatched area shows the acceptable range of the plug notch position and depth at the side when the plug is used.

Figure 1A — Appearance of video cassette top and side view (oxide tape S cassette)



NOTES

- 1 The dimensions are inspected by using limit gauges.
- 2 No part of the lid shall protrude beyond the bottom plane of the cassette during the opening and closing motion of the lid.
- 3 This dimension shall be specified from datum plane Z.
- 4 Label and/or window area is available for the label and/or window (crosshatched area).
- 5 The cassette may be held in position by the recorder and/or player unit on this holding area (hatched area).
- 6 The fine hatched area shows the acceptable range of the plug notch position and depth at the side when the plug is used.

Figure 1B — Appearance of video cassette top and side view (metal tape S cassette)