SMPTE RECOMMENDED PRACTICE — RP 103-1982

Care and Handling of Video Magnetic Recording Tape

1. *Scope*

This practice specifies the storage, operating, and shipping conditions that ensure maximum life and interchange performance of video magnetic recording tape used in quadruplex or helical-scan recording systems.

2. *Storage Conditions*

2.1 Temperature and Humidity. Tapes should not be stored in areas of high humidity for long periods of time. Temperature and humidity in the storage area should be maintained as follows:

Temperature	21 ± 2°C
Relative humidity	50 ± 20 percent (See Note.)

2.2 Dust. To minimize the accumulation of dust which could be transported later to the operations area, it is recommended that the controlled air to the storage area be filtered. The filtering used shall have an efficiency rating of at least 90 percent, based on the National Bureau of Standards Dust Spot Efficiency Test—Atmospheric Dust.

2.3 Physical Characteristics

2.3.1 To minimize the possibility of the tape taking an unwanted set due to stepped or scattered winding, it is recommended that the tape be given a continuous, smooth, full-length rewind before storage.

2.3.2 The reels of tape should be stored in such a manner that they are supported by the hub on end, and protected from dust. The original tape manufacturer's container, which serves this purpose, is recommended.

2.3.3 The outer end of the tape should be secured by means of an adhesive tab which leaves no residue after removal. This material is usually obtained from the tape manufacturer.

3. *Operating Conditions*

3.1 Temperature and Humidity. The temperature and humidity in the operations area should be the same as those in the storage area, i.e., 21 ± 2°C and 50 ± 20 percent relative humidity. Tapes that have been exposed to other atmospheric conditions should be allowed to acclimatize in the normal environment for 24 hours before usage. This applies to cartridge/cassette tapes as well as reel-to-reel tapes.

3.2 Physical Conditions. Ideally, the operations area should be maintained at "clean room" conditions. Since, in most cases, this is impractical, the user should adhere to as many of the following recommendations as possible in order to minimize drop-out, scratch, and head-wear problems:

3.2.1 Air entering the area should be filtered as specified in Sec. 2.2 and maintained at a positive pressure compared to adjacent rooms or hallways.

3.2.2 Floors should be finished so that dust and debris are not generated due to pedestrian traffic; e.g., tile floors should not be waxed and cement floors should be sealed. Indoor-outdoor carpeting with static drain treatment is acceptable and sometimes desirable.

3.2.3 All surfaces of the transport that touch either side of the tape should be cleaned in accordance with the method and frequency recommended by the manufacturer.

3.2.4 Reels of tape should be kept in their containers when not on the machine.

3.2.5 Smoking, eating, and drinking should not be allowed in the operations area.

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3.2.6 Take-up reels on reel-to-reel machines should be cleaned at the start of each day to remove dust and debris from the tape winding surface and inside flange surfaces.

3.2.7 The tape should not be fingered or handled except at the ends for thread-up.

3.2.8 Frayed or wrinkled ends of the tape should be cut off.

3.2.9 Cardboard cartons, such as master shipping cartons, should not be ripped open in the operations area.

3.2.10 Reel flanges should not be squeezed together during handling; the reel should be held by the bottom flange or carried by the hub.

4. *Shipping Conditions*

4.1 Winding. All tapes should be given an even uniform winding before shipment, as described in Sec. 2.3.1.

4.2 Containers. Tapes should be shipped in containers designed to withstand rugged handling and still protect the tape. Heavy reels, such as those for 1- or 2-in applications, should be supported by the hub and free to rotate inside the case.

4.3 Fastening. All tapes should be secured at the outer end as specified in Sec. 2.3.3.

NOTE: Raw tape stocks will withstand relatively short-term storage conditions, for example during shipment, of —30 to +50°C temperature and 10 to 90 percent relative humidity. The short-term range of temperature and humidity conditions that a prerecorded video tape can withstand and still have acceptable playback is dependent on the tape and machine format used. This is due to the dimensional changes that take place in the tape which will change the amount of time-base error and tracking error on the prerecorded signal. The machine and tape manufacturer should be consulted for guidelines.

SMPTE RECOMMENDED PRACTICE — RP 106-1982

Film Tension in 35-mm Motion-Picture Systems Operating Under 0.9 m/s (180 ft/min)

Introduction

This practice was developed by the Committee on Theatrical Projection Technology to guide equipment manufacturers, projectionists, and service personnel in making designs for and adjustments to new or current equipment for 35-mm motion-picture projectors and film-handling devices. Current film and sprocket tooth combinations have a tension limit of 66.7 N (15 lbf) before rupture occurs. Therefore, all film handling equipment must maintain a film tension that is only a small fraction of this rupture limit. Film tension in excess of 4.4 (16 ozf) is unnecessary and only increases film wear, while tension as low as 1.7 N (6 ozf) appears to be sufficient to provide a steady screen image.

1. *Scope*

1.1 This practice specifies the film tension needed to transport 35-mm motion-picture film through a film-handling system operating under 0.9 m/s (180 ft/min) while minimizing conditions that contribute to film damage.

1.2 This practice also recommends methods for testing film tension.

2. *Film Tension*

Film tension under normal operating conditions shall be 1.7 to 4.4 N (6 to 16 ozf).

3. *Measurement Methods*

3.1 A feed or take-up system shall be measured with the equipment in normal operating mode after placing 0.9 to 1.8 m (3 to 6 ft) of film around the hub of the reel and attaching the other end to a dynamometer. Tension shall be plotted against winding diameter and shall be as specified in Sec. 2.

3.2 To measure the film tension necessary to move the film through the projector gate, a short length of normal print material shall be placed in the projector gate and the gate closed. The film shall be attached to a dynamometer that pulls it through the gate.

NOTE: Gate tension should be adjusted to avoid picture image jump of more than 0.15 percent of the image height.

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Cinematography — 16 mm motion-picture film perforated 8 mm Type R — Cutting and perforating dimensions

1 Scope and field of application

This International Standard specifies the cutting and perforating dimensions for 16 mm motion-picture film which is perforated 8 mm Type R, as well as the width of motion-picture film after processing and slitting.

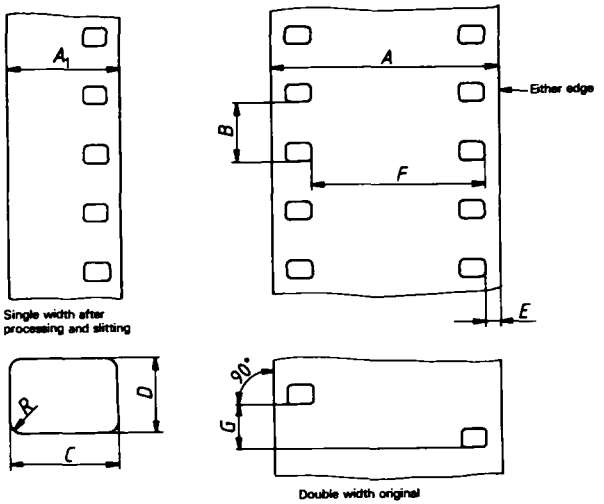
NOTE — Film perforated in accordance with this International Standard is also referred to as "double 8 mm motion-picture film".

2 Reference

ISO 543, *Cinematography — Motion-picture safety film — Definition, testing and marking.*

3 Dimensions

The dimensions shall be as shown in the figure and given in the table.



Figure

Table — Dimensions

Dimension	mm	in
A	15,96 ± 0,03	0.628 ± 0.001
A_1	7,975 ± 0,050	0.314 0 ± 0.002 0
B	3,810 ± 0,013	0.150 0 ± 0.000 5
C	1,83 ± 0,01	0.072 0 ± 0.000 4
D	1,27 ± 0,01	0.050 0 ± 0.000 4
E	0,90 ± 0,05	0.035 ± 0.002
F	12,32 ± 0,03	0.485 ± 0.001
G	0,025 max.	0.001 max.
L	381,00 ± 0,40	15.000 ± 0.016
R	0,25 ± 0,03	0.010 ± 0.001

NOTES

1 These dimensions and tolerances, except dimension A_1, apply to safety unexposed motion-picture film as specified in ISO 543 immediately after cutting and perforating. If required by usage, the manufacturer should indicate the atmospheric conditions applied to the dimensional control at the time of cutting and perforating.

2 Dimension *L* represents the length of any 100 consecutive perforation levels.

3 The dimensions apply to low-shrunk film base, as defined in clause A.2 of the annex. For film with higher shrinkage characteristics, dimension *A* should be 15,98 ± 0,025 mm (0.629 ± 0.001 in), and *E* 0,91 ± 0,05 mm (0.036 ± 0.002 in).

4 The inch dimensions follow the practice of those countries using the imperial system and in some instances are not exact conversions from the metric dimensions.

Annex

(This annex does not form part of the standard.)

A.1 Uniformity of perforations

The dimensions given in this International Standard represent the practice of film manufacturers in that the dimensions and their tolerances are for film stock immediately after perforation. The punches and dies themselves are made to tolerances considerably smaller than those given, but since the film is a plastic material, the dimensions of the slit and perforated film stock never agree exactly with the dimensions of the slitter knives, punches and dies. Film can shrink or swell due to loss or gain in moisture content, or can shrink due to loss of solvent or plasticizer. These changes invariably result in changes in the dimensions during the life of the film. The change is generally uniform throughout a roll.

The uniformity of pitch, hole size and margin (dimensions *B*, *C*, *D* and *E*) is an important variable affecting steadiness. Variations in these dimensions from roll-to-roll are of little significance compared to variations from one sprocket hole to the next. Actually, it is the maximum variation from one sprocket hole to the next within any small group of consecutive perforations that is important.

A.2 Choice of width

The width for 16 mm films is controlled by the shrinkage characteristics of the films involved. Thus, there have been standards for the width of 16 mm stock of the "usual" shrinkage and for stock of "low-shrinkage" characteristics. The purpose was to obtain films of approximately the same width, regardless of the type of film base, during their useful life. This International Standard is based on the values adapted to "low-shrinkage" film base since nearly all films now manufactured meet the definition given below :

For the purpose of choice of width, low-shrinkage film base is film base which :

- when coated with emulsion and any other normal coating treatment,
- perforated,
- kept in the manufacturer's normal commercial packing for 6 months at 18 to 24 °C (64 to 75 °F),
- exposed,
- processed,
- stored exposed to air for a period not to exceed 30 days at 18 to 24 °C (64 to 75 °F) and 50 to 60 % relative humidity,
- measured under like conditions of temperature and humidity,

has shrunk not more that 0,2 % from its original dimensions at the time of perforating.

This definition of low-shrinkage film stock has been found by experience to be useful as a guide to film manufacturers in slitting their stock. Departure from this definition shall not be cause for rejection of the stock. Note that this definition of shrinkage differs from the criterion applying to choice of longitudinal pitch, where greater periods of time are involved and where short-time tests can be deceptive.

Allowance has been made in arriving at these values for the common tendency of film to expand when exposed to high relative humidity. Allowance should be made for this factor in equipment design and in no case should the equipment design fail to accommodate a film of 16,00 mm (0.630 in) width.