

Care, Storage, Operation, Handling and Shipping of Magnetic Recording Tape for Television



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Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in Part XIII of its Administrative practices.

SMPTE Engineering Guideline EG 44 was prepared by Technology Committee V16.

1 Scope

This document provides guidance to technical managers, archivists, and technicians for the care, storage, operation, handling, and shipping conditions that help maximize the life expectancy of television (video) magnetic recording tape.

2 Storage conditions

2.1 Temperature and humidity

Tapes should not be stored in areas of extreme temperature and/or extreme humidity for long periods of time (see table 1). Temperature and humidity in the storage area should be selected as follows:

For short- and medium-term storage (up to 10 years):

Temperature	+15°C to +23°C
Humidity	40% RH to 55% RH

For long-term storage (greater than 10 years):

Temperature	+17°C
Humidity	30% RH

NOTE – Supplemental information on impact of temperature and humidity see annex C.

2.1.1 Variation from selected storage temperature and humidity from above values should be kept within $\pm 2^\circ\text{C}$ and $\pm 5\%$ RH throughout the storage period.

2.2 Storage area pressure and airborne contaminants

Air pressure in the storage area shall be maintained at a positive pressure relative to adjacent hallways and rooms. Air entering the storage area should be filtered to ensure or approach a class 100,000 environment as defined by Federal Standard 209E.

INFORMATIVE NOTE 1 – It is recommended that clean air conditions in operations and storage areas be periodically measured and benchmarked, especially around potential sources of debris, using a particle concentration meter and particle counter.

Floors should be finished so that dust and debris are minimized due to pedestrian traffic. (See informative notes 1 and 2.)

2.2.1 Cement floors should be sealed.

2.2.2 Tile floors should not be waxed.

2.2.3 Floor covering materials should be selected to minimize airborne debris and static generation.

INFORMATIVE NOTE 2 – Various types of airborne pollutants, including toxic gas, exist in the general environment. They may be generated as a result of combustion (automobile, cooking, etc.) by-products, from furniture, floor and garment cleaning agents, or by means of out-gassing from furniture, woods and internal office walls, insulating materials etc. Some of these pollutants are chemically reactive to components of magnetic storage media. Chloride, used in many cleaning and bleaching agents, is particularly reactive to magnetic materials used in metal evaporated (ME) and metal particle (MP) tape. Cobalt used as the main magnetic recording material for metal evaporated (ME) tape, reacts with chloride, sulfur dioxide and hydrogen sulfide. High temperature and high humidity accelerates chemical reactions.

Table 1 – Summary of environmental conditions

Storage				
	Operations	Medium term < 10 Years	Long term > 10 Years	Shipping
Temperature*	+17°C to +25°C	+15°C to +23°C ± 2°C	+17°C ± 2°C	-20°C to +45°C
Humidity*	30% to 70% ± 5%	40% to 55% ± 5%	30% ± 5%	5% to 80%
Temperature gradient per hour	10°C per hour	N/A	N/A	10°C per hour
Humidity gradient per hour	10% per hour	N/A	N/A	10% per hour
Stray magnetic fields	800 A/m (10 Oe)	800 A/m (10 Oe)	800 A/m (10 Oe)	4000 A/m (50 Oe)

* NOTE – For operations or medium term storage, the center point for temperature and humidity can be selected anywhere within the allowable range, but the variation cannot exceed the allowable range.

2.3 Physical characteristics

2.3.1 To minimize the possibility of the tape taking an unwanted set due to stepped or scattered winding, the tape should be given a continuous, full-length wind or rewind at the transport manufacturer's recommended wind tension and speed before storage. All magnetic recording cassettes may be stored in a fully wound or rewound condition, with the exception of SMPTE type E (3/4-in video cassettes) which must be stored in a fully rewound condition.

2.3.2 Tape destined for long-term storage should have very few record / playback passes to maximize playback performance and minimize the probability of head clogging and physical damage.

2.3.3 Open reel and cassette tapes should be stored in such a manner that they are supported by the hub by maintaining the plane of the flange perpendicular to the horizontal storage surface.

2.3.4 The tape should be stored in a clean, inert plastic container that provides protection from dust, atmospheric pollutants, and excessive moisture. Sealed plastic bags, cardboard containers, and sleeves are not recommended for storage. Except for labels, paper should not be stored inside a storage container.

2.3.5 The outer end of open reel tapes should be secured by an adhesive tab which leaves no residue on the tape after removal. Tab material is usually obtainable from the tape manufacturer.

2.3.6 No splices, other than the splices attaching the leader and trailer to the tape, shall be used in tapes that are placed in long-term storage.

2.4 Stray magnetic fields

The stray magnetic field at any point on the surface of the tape should not exceed a field strength of 800 A/m (10 Oe).

2.5 Environmental pollutants

Certain gaseous impurities commonly found in the atmosphere should be filtered out of the long-term storage environment in order to minimize the deterioration of the recording media and the paper labels and other documentation stored with the media. The recommended maximum levels are as follows:

Sulfur dioxide (SO ₂)	1.0 µg/m ³	0.35 ppb
Nitrogen dioxide (NO ₂)	5.0 µg/m ³	2.43 ppb
Ozone (O ₃)	25.0 µg/m ³	11.70 ppb
Acetic acid (CH ₃ COOH)	Use best control technology.	

INFORMATIVE NOTE – For supplemental information see annex E.

2.6 Storage shelves

2.6.1 Shelving used for storage of magnetic media should allow the tapes to be stored vertically in their shipping and storage cases with the tape identification label visible from the front.

2.6.2 Shelves should allow for adequate airflow so that the conditioned environment can be maintained throughout the storage area.

2.6.3 To avoid catastrophic damage, shelves should not be placed too close to heat sources, water pipes, and sprinkler heads.

2.6.4 Shelves should be designed to support the weight of tape when fully loaded. Additionally, the shelves should be placed on a floor that can support the weight of a fully loaded shelving system.

2.6.5 The shelves should possess a lip of sufficient depth to prevent dripping of melted plastic and burning plastic onto lower shelves in case of fire.

2.6.6 Magnetic latches on tape storage cabinets should not be used, since they could cause partial erasure of tapes if brought closer than 7 cm to the magnetic latch.

2.7 Periodic physical inspection

Every tape in an archive should be physically inspected at least every 3 to 5 years for such things as tape playback performance, debris, contaminants, container gasket deterioration, or other problems. This can be carried out by inspection of one-third to one-fifth of the archive each year. A full-length wind/rewind should be completed on each tape at least once in every ten years, preferably during the periodic physical inspection. For extended care of archived tapes see annex D.

2.8 Identification

Records containing proper date, control-number information, location, title, and other required information shall be maintained.

2.9 Smoking

To minimize airborne debris and reduce fire hazard, smoking should not be allowed in the tape storage area.

3 Operating conditions

3.1 Temperature and humidity

The temperature and humidity in the operations area should be selected and maintained as follows:

Temperature	+17°C to +25°C
Humidity:	30% RH to 70% RH

3.1.1 Variation from selected operating temperature and humidity from the above values should be kept within $\pm 2^\circ\text{C}$ and $\pm 5\%$ relative humidity.

3.1.2 Tapes that have been exposed to environmental conditions that are significantly different from planned operating conditions should be allowed to acclimate in the operating environment for at least 24 hours before usage. The maximum temperature and humidity gradient during transition should not exceed $10^\circ\text{C}/\text{hour}$ or $10\% \text{ RH}/\text{hour}$. This gradient refers to the maximum temperature and humidity change that the tape (not the reel, cassette, or container) is subjected to. The tape should remain in its container during acclimation to help control humidity and temperature gradient extremes.

3.2 Physical conditions

The operations area should be maintained as closely as possible to clean-room conditions. The following guidelines will ensure that clean-room conditions are met:

3.2.1 Airborne debris

Air entering the operations area should be filtered to ensure or approach a class 100,000 environment, as defined by Federal Standard 209E. Air pressure in the operations area shall be maintained at a positive pressure relative to adjacent hallways and rooms.

3.2.2 Floors

Floors should be finished so that dust and debris due to pedestrian traffic are minimized. Cement floors should be sealed. Tile floors should not be waxed. Carpeted floors shall utilize carpeting that minimizes debris and static generation.

3.2.3 Surfaces

All playback equipment shall be maintained and operated according to specifications provided by the manufacturers. Before replaying the tape, all surfaces of the tape transport that touch either side of the tape or carrier shall be cleaned in accordance with the method and frequency recommended by the tape transport manufacturer. Isopropyl or ethyl alcohol is an acceptable cleaning fluid for routine cleaning. Other cleaning agents may be acceptable. Care shall be taken so that the cleaning fluid does not contact the tape. For other than routine cleaning, such as removal of head clogs, use the transport manufacturer's recommended cleaning procedures.

3.2.4 Tapes

Tapes should be kept in appropriate containers that provide a barrier to water and debris when not on the tape transport.

3.2.5 Restrictions

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

3.2.6 Threading

For threading open reel tapes, the tape should only be handled by the ends. Doors on cassette and cartridge tapes shall not be opened unless the tape is inserted into the transport.

3.2.7 Cassette and open reel tapes

Tape containers shall be wiped clean prior to transportation and opening in the operations area.

Cassette and open reel tapes shall be transported so that the tape is supported by the reel hub. Open reel tape flanges shall never be squeezed together. The cassette loading door shall never be used as a carrying handle.

3.2.8 Tape ends

Frayed or wrinkled ends of open reel tapes should be cut off, using nonmagnetic scissors, prior to thread up.

3.2.9 Opening cartons

Cardboard cartons, such as master shipping cartons, should not be ripped open in the tape operations area, and cardboard use in the operations area should be avoided.

3.2.10 Dust and debris

Tape containers should be wiped clean prior to opening or transportation to the operations area.

3.3 Stray magnetic fields

The stray magnetic field at any point on the surface of the tape should not exceed a field strength of 800 A/m (10 Oe).

3.4 Winding

All tapes should be uniformly wound or rewound as described in 2.3.1 whenever the tape comes out of long-term storage or has been subjected to significant temperature and humidity variations.

3.5 Cassette removal from transport

Cassettes should be fully wound or rewound before removal from a transport. In cases where this is not immediately possible, such as during an editing session, cassette load/eject cycles should be minimized. Cassettes should be fully wound or rewound at the end of the day.

4 Shipping conditions

4.1 Winding

All tapes should be uniformly wound or rewound before shipment, as described in 2.3.1.

4.2 Containers

Tapes should be shipped in containers designed to withstand rugged handling and adverse environments, and should contain adequate shock-absorbing material. Heavy reels, such as those used for 1-in and 2-in open reel television magnetic recording tapes, should be supported by the hub and allowed to rotate freely inside the container. SMPTE type E (3/4-in) cassette tapes that do not provide self-locking reels shall be shipped in containers that provide hub locks.