

SECTION 10/11R-B: TELEVISION RECORDING

RECOMMENDATION ITU-R BR.1215*

**HANDLING AND STORAGE OF TELEVISION AND SOUND
RECORDINGS ON MAGNETIC TAPE**

(Question ITU-R 102/11)

(1995)

The ITU Radiocommunication Assembly,

considering

- a) that international exchange of television and sound programmes is based to a large degree on magnetic tape;
- b) that such programmes are archived for a considerable period of time;
- c) that during archival storage such tapes may be used many times;
- d) that loss of technical quality during the lifetime of the archived programme must be avoided;
- e) that proper care when handling the tape before, during and after each archival interval is a prerequisite for the successful retrieval of the programme; the increased storage density on tape of modern digital recording formats may require special attention in this respect,

recommends

1 that the handling and archival storage of programmes on tape should be carried out following the guidelines given in Annex 1.

NOTE 1 – A glossary of different tape damages can be found in Annex 2.

ANNEX 1

Handling and storage of magnetic tape**1 Handling of magnetic tape**

- Only high quality tapes should be used, preferably those with a proven good long-term performance.
- Cleanliness is extremely important in the recording area. Smoking, eating and drinking should not be permitted. Adequate filtering should be applied to the incoming air to reduce the size of the dust particles. Regular cleaning of the tape drive is necessary.
- Tapes must be kept away from magnetic fields; tapes should not be stacked on top of equipment. The stray magnetic field at any point on the tape surface should not exceed a field strength of 4 000 A/m.
- Open reel or cassette tapes should never be exposed to the sun.
- Tapes should be fully wound or rewound before removal from a transport and returned to their containers when they are not in use.

* This Recommendation should be brought to the attention of the Telecommunication Development Sector (ITU-D).

- Tapes should not be subjected to rapid temperature changes. The maximum temperature and humidity gradient that the tape is subjected to should not exceed 10 °C/h and 10% of RH/h.
- Regular electrical and mechanical alignment of the tape recorder should be carried out. Careful cleaning and degaussing of the complete tape transport, including the guides, the capstan, the scanner, the heads, etc., are necessary. For this cleaning, a spray cleaner can be used, for example “trichloroethane”.
- Excessively low tape tension which results in loose winding must be avoided as this will lead to permanent tape damage after storage.
- To avoid the risk of head clogs, the relative humidity during recording and replay of the tape should be kept within the limits given in § 2.
- A tape being brought in from an environment which differs from that of the storage area must be acclimatized fully and completely rewound, before it is put into the long-term storage. If storage and operating area temperatures differ by more than 8 °C, allow an acclimatization time of 4 h for every 10 °C. In case of extreme outdoor climatic conditions, it would be advisable to carry tapes in isothermal containers which should be closed before leaving the storage area, and reopened only after arrival in the operating area.

In winter-time, major temperature fluctuations may be unavoidable, which might lead to condensation. An acclimatization period of up to 24 h must therefore be allowed.

2 Long-term archival storage of magnetic tape (see Note 1)

- Cleanliness is absolutely necessary. The incoming air must be filtered and should develop a positive pressure in the storage area. Smoking, eating or drinking should not be permitted.
- Temperature and humidity should be kept as stable as possible, and preferably below those in the operating environment. Suitable values for a storage period up to ten years are in the range:
 - temperature: 18-24 °C
 - humidity: 35-45% RH

For a storage time beyond 10 years the following values are recommended:

- temperature: +17 °C
- humidity: 30%

Variations from selected storage temperature and humidity should be kept within ± 2 °C and ± 5 % RH throughout the entire storage period.

- Each tape – open reel and cassette – should be kept in its container. The container should be designed to give adequate protection against debris, sprinklers, fire and careless handling. The tapes should be stored in an upright position, preferably with the spools suspended by the hubs. If the tape is kept in a sealed bag inside the container, it is important that the atmosphere in the bag is dry.
- When the tapes are to be stored in plastic bags, these should be sealed in a dry environment, the tapes themselves having been stored in the same environment for some hours. When no special equipment is available, such as a vacuum bag sealing machine, it would be preferable to store the tapes with no bag at all, but in their normal container. Except for labels, paper should not be stored inside a storage container.
- Shelves should allow for adequate air flow to ensure that the conditioned environment is maintained throughout the storage area.
- 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.
- Every tape in an archive should be physically inspected at least every three to five years for playback performance, debris, contaminants, container gasket deterioration etc. A full length wind/rewind should be completed on each tape at least once in every ten years.
- It is recommended to keep the storage area free from any magnetic fields of noticeable strength, i.e. greater than 1 kA/m.

- The storage area must have an adequate fire protection system of a type using CO₂ or some other non-aggressive chemicals.
- A tape being brought in from an environment which differs from that of the storage area must be acclimatized fully and completely rewound, before it is put into the long-term storage.
- All the tapes in storage should be wound from one end to the other at regular intervals, preferably every two to three years, with a maximum of five years. This procedure should possibly be carried out on a tape evaluator/cleaner to give a smooth wind at a correct tape tension and to remove debris from the magnetic coating (e.g. the white powder developed by certain old tapes).
- Regular inspections should be made of the tapes in order to control the real condition of the recorded material. The check could be performed on samples of the actual programme tapes or on specially prerecorded test tapes, representative of the different batches in the archives. The tapes in question shall be replayed and visually examined.
- Careful maintenance of the machine replaying the archived programme is extremely important. In order to keep machines of earlier formats in continuing operation, skilled operators will be required. These operators will need to be specially trained to operate and maintain these machines, as well as to carry out mechanical splicing of tapes as this is sometimes the only way to recover a damaged programme.

NOTE 1 – Although accelerated lifetime tests carried out by a number of tape manufacturers suggest a lifetime of modern tapes well beyond 10 to 15 years, long-term storage may affect the properties of certain tapes, mainly due to mechanical and/or chemical effects. Consequently, there is no way to guarantee a particular tape will give perfect sound and vision recovery, after several years of storage. The only way to verify the condition of the programme material in archives is by regularly taking out actual samples of the tapes for inspection, and playing them back.

ANNEX 2

Glossary of tape defects

Accordioning (corrugated surface, pleating, wash-board)

A form of cinching where the tape surface has several folds close together.

Bands

Stresses in the tape that are parallel to the edge will cause evenly spaced bands across the tape.

Blocking

The adhesion of oxide of one layer to the back of the adjacent layer. May result in oxide shedding. Caused by a tight tape pack subjected to a hot, humid environment for a long time.

Buckled pack (wavy pack)

Deformation of the circular form of the tape pack. The pack periphery feels lumpy. Can be caused by an edge-curved tape wound too loose.

Cinching

Fold-over of tape within the pack. This may result in cracked oxide and permanent tape damage. Caused by a loose pack being wound with fast acceleration and then stopped.

Country-laning (skew)

Variation in straightness of the edges of the tape with respect to a theoretical tape centre line. Independent of tape width variation.

Edge curl (lipping)

Stretched tape edge causing the diameter of the tape pack near the edge being larger than at the centre.

Leafing (pop-stranding, scattered wind, stepping)

Individual turns standing out from the tape pack. Can be caused by imperfect alignment of the tape guides, particularly when the tape is stopped and restarted during spooling. May lead to edge damage affecting the outer tracks, i.e. audio, time code and control signals.

Loose pack

The outer portion of the tape pack can be easily rotated by hand due to very loose winding and/or very severe temperature cycling in storage or during transport. In extreme cases, voids can be observed in the pack, called windowing.

Particle shredding

The magnetic layer flakes off from the tape base due to change in the characteristics of the binder. This may lead to head-clogging and will cause drop-outs or even complete loss of information.

Powdering

Deposition on the tape surface of components from the binder due to chemical instability of the formulation. This will cause severe head-clogging on the machine.

Print-through

Magnetic flux from one tape layer will make a weak "recording" on adjacent layers under the influence of time, temperature and external fields. The effect is wavelength dependent and will not affect the vision, only the sound is affected as pre- and post-echoes. Modern tapes with high coercivity are less inclined to develop print-through.

Scratches

Physical damage to the magnetic coating. May be caused by misaligned or dirty transport components, or improper handling and storage.

Spoking

The non-circular winding due to splices, dirt, etc. within the layers, giving the appearance of spokes.

Width variation

Independent variation of each edge of the tape with respect to a theoretical centre line. Independent of tape skew.

Windowing

Voids in the tape pack due to an extremely loose pack.

Static charges could be kept to a minimum by selecting appropriate materials for the floor and the walls. If necessary, a "static drain" can be fitted to the carpeting.
