INTERNATIONAL STANDARD

ISO 18933

First edition
2006-07-15

Imaging materials — Magnetic tape — Care and handling practices for extended usage

Matériaux pour l'image — Bande magnétique — Précautions et pratiques de manutention pour usage prolongé

Reference number
ISO 18933:2006(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 18933 was prepared by Technical Committee ISO/TC 42, *Photography*.

Introduction

This International Standard is one of a series of International Standards dealing with the physical properties and stability of imaging materials. To facilitate identification of these International Standards, they are assigned a number within the block from 18900 to 18999 (see Annex A).

Magnetic recording tape has served as a major means of processing, distributing and preserving information, including video, audio, computer and other data since the 1930s. Unlike earlier data-recording media such as paper and photographic material, the information recorded on magnetic tape is not directly human-readable and requires a machine interface and interpretation. In addition, the machine/medium interface must occur within precise conditions in order for the machine interpretation to be accurate. Therefore, the physical integrity of magnetic tape necessary to provide a proper interface with the interpreting machinery is critical. Correct care and handling is essential to preserve the needed physical integrity of magnetic tape both for short-term usage and long-term archiving.

Magnetic tape has proven itself an easy-to-use and versatile medium. Yet despite the substantial resources put into creating recordings and the historical, intellectual and financial assets they represent, tapes often are not treated as valuable objects. Many important and unique recordings are lost due to inadequate care and handling of the tape. This poses problems for users who wish to preserve the content. Among these problems are the following.

a) Improper handling can damage magnetic tapes and compromise the future ability to retrieve content.

b) Due to the enormous volume of existing tapes, the impracticality and cost of making copies of each and every one frequently results in large numbers of unique records being subjected to excessive use and wear without any back-up or protection. Repeated use of magnetic tape can cause wear or physical damage that shortens its effective life.

c) Some magnetic tapes are known to have a finite shelf life and will eventually decay. Recorded documents on these tapes must be copied to new media before decay precludes access.

d) The ability to play back a tape in the future depends on the existence of functional playback equipment. As new tape formats become popular, equipment manufacturers discontinue the production and support of older, superseded equipment. Eventually, usable equipment to play older, obsolete magnetic tape formats becomes impossible to find. Before this occurs, a migration plan should be in place.

Like all media, magnetic tape is subject to both damage and decay. Consequently, its effective life can increase or decrease significantly depending on the conditions under which it is stored and handled. This International Standard contains recommendations for the care and handling of magnetic tape. Recommendations for the preservation and storage of polyester-base magnetic tape appear in ISO 18923. Following these recommendations promotes the physical integrity of the media and increases the effective life of magnetic tape.

Imaging materials — Magnetic tape — Care and handling practices for extended usage

1 Scope

This International Standard concerns the care and handling of magnetic recording tape during use. It addresses the issues of physical integrity of the medium necessary to preserve access to the data (information) recorded on the tape. This International Standard recommends handling procedures to maximize the effective life of magnetic tape. Faulty handling, packing and transporting techniques and methods often cause damage to magnetic tape and the content recorded thereon. Extending the longevity of magnetic tape requires the identification of appropriate handling methods and well-developed training programmes.

While some of the recommendations in this International Standard, such as staff training, apply specifically to large-scale or archival usage, the basics of all recommendations in this document can and should be applied in all circumstances where the desired result is long-term usage of the medium whether archival, commercial or personal.

This International Standard addresses the following subjects:

— handling techniques, including common hazards and methods to mitigate those hazards;

— handling environments, including pollutants, temperature and humidity, lighting, magnetic fields and robotics;

— use of tape, including inspection, playback, mounting/loading and removing, winding speed, tension and robotic systems;

— cleaning and maintenance techniques, including contaminants, cleaning methods and frequency;

— transportation, both in-house and shipping outside the storage facility;

— disasters, including water, fire, construction and post-disaster procedures;

— staff training, including schedule for training and contents of the training programme;

— archival issues.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14644-1:1999, *Cleanrooms and associated controlled environments — Part 1: Classification of air cleanliness*

ISO 14644-2:2000, *Cleanrooms and associated controlled environments — Part 2: Specifications for testing and monitoring to prove continued compliance with ISO 14644-1*

ISO 18923:2000, *Imaging materials — Polyester-base magnetic tape — Storage practices*

AES22:1997, *AES recommended practice for audio preservation and restoration — Storage and handling — Storage of polyester-base magnetic tape*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
acclimatization
process of conditioning material from one set of temperature/moisture conditions to another

NOTE Sometimes called “staging”.

3.2
backcoat
⟨magnetic tape⟩ rough surface layer added to the back of the basefilm to increase friction and minimize slippage between tape strands

3.3
basefilm
plastic (polymer) substrate to which the magnetic layers are attached

NOTE Sometimes called “the base”.

3.4
binder
⟨magnetic tape⟩ plastic (polymer) in which the magnetic particles are bound in order to create the recording layers of the tape and which binds the recording layers to the basefilm

3.5
carrier
medium upon which the information is recorded

3.6
carton box
outer container that can hold one or more individual units and may be a fabrication of paper, card stock or plastic

3.7
cartridge
housing for a roll of recording material, such as photographic film or magnetic tape, wound on a single hub or reel

SEE **cassette** (3.8)

3.8
cassette
housing for a roll of recording material, such as photographic film or magnetic tape, whose ends are attached to two hubs or reels

3.9
cinching
tape folding back upon itself within the tape pack

3.10
class 100 000 cleanroom
controlled environment in which the levels of airborne contaminants meets the requirements of ISO 14644-1

NOTE The number of particles larger than one micrometre (one micron) in one cubic foot (0,028 3 cubic meters) of air shall not exceed 100 000. Class 100 000 is like a dust-free office. Class 10 000 requires cleanroom clothing.)

3.11
conditioning
exposure of a specimen to air at a given relative humidity and temperature until equilibrium is reached

3.12
container
box, can or carton used for storage and shipping of recording materials

NOTE Reels, cassettes, cartridges, or shells are not containers; the box into which a reel, cassette, cartridge or shell is placed is defined as a container.

3.13
copy
reproduction of the information from a master

3.14
domain
cluster of the embedded magnetic particles which all align in the same north-south direction

NOTE Sometimes referred to as a “magnetic domain”.

3.15
extended-term storage conditions
storage conditions suitable for the preservation of recorded information having permanent value

3.16
flange
fixed or removable circular disc that is connected to the hub to make a reel for the purpose of protecting the roll of recording materials

SEE **reel** (3.34)

3.17
flange pack
condition where the whole tape pack rests against one flange

3.18
format
dimensions of the magnetic recording and its assembly as well as the physical and magnetic specifications of the recording on the tape

3.19
heads out
configuration of magnetic tape stored on its reel or in its cassette such that the tape is positioned to play from the beginning of the recorded information

3.20
hub
cylindrical object around which the recording material is wound

3.21
hydrolysis
decomposition involving a reaction with water that results in the splitting of chemical bonds

3.22
leader
flexible plastic or paper strip which can be spliced to either end of a roll of recording material

NOTE This practice is not recommended for extended-term storage.

3.23
leafing
multiple popped strands in a magnetic-tape wind

SEE **popped strand** (3.32) and **stepped pack** (3.41)

3.24
library wind
low-speed rewind at controlled tension to achieve a smooth tape pack (typically 1 m/s to 3 m/s)

3.25
loose pack
undesirable pack condition in a roll of recording material, such that the outer portion of the roll can be moved and tightened by pulling on the end

3.26
magnetic field intensity
magnitude of the magnetic field, in amperes per meter, at a point in space

3.27
master
the original or primary recording of the data or any version of the data (e.g. camera master, edited master, foreign language master)

3.28
medium
media, pl
material on which information is recorded

SEE **carrier** (3.5)

3.29
medium-term storage conditions
storage conditions suitable for the preservation of recorded information for a minimum of 10 y

3.30
migration
transferring information from one format to another

3.31
oligomer
low molecular-weight polymer which can be produced by degradation of the magnetic tape binder

3.32
popped strand
lateral displacement of a single strand or wrap of magnetic tape extending beyond the plane of the tape pack

SEE **leafing** (3.23) and **stepped pack** (3.41)

3.33
print-through
unintentional magnetic transfer of the recording on one layer of magnetic tape to the adjacent layers during storage on a reel/hub

3.34
reel
metal or plastic hub or core with flanges (protective sides) onto which recording material is wound

3.35
shell
outer housing of a cassette or cartridge

3.36
slot
space or slit in the winding surface of a reel or hub

3.37
splice
union of two pieces of recording or leader material to form a single piece

3.38
splicing tape
paper or plastic strip coated with a thermal or pressure-sensitive adhesive, used in splicing

3.39
spoking
deformations in a roll pack that appear radially outward and disrupt the circular nature of the wind

3.40
staging acclimatization
process of conditioning material from one set of temperature/moisture conditions to another

3.41
stepped pack
multiple adjacent strands of magnetic tape extending beyond the level of a tape pack

SEE **leafing** (3.23) and **popped strand** (3.32)

3.42
storage environment
conditions for storing materials, i.e., temperature, relative humidity, cleanliness of facilities and atmospheric pollutants

3.43
tails out
configuration of magnetic tape stored on its reel, or in its cassette, such that the tape must be fully rewound in order to correctly play from the beginning of the recorded information

3.44
tape pack
length of magnetic tape wound on a reel or hub

3.45
wind
physical appearance and tension of the magnetic tape pack
or
process of transferring a roll of recording material from one spool or reel to another

3.46
windows
openings in the flanges of a tape reel, sometimes called “windage holes”
or
physical spacings in the tape pack
or
clear viewing port of a cassette

4 Tape pack integrity

4.1 General

The physical integrity of the tape pack shall be maintained to avoid damage to the tape and allow for proper retrieval of the recorded content. Tape pack integrity is dependent on several variables and loss of pack integrity can have a variety of negative effects.

4.2 Common pack problems

4.2.1 Pack deformation

Edge damage and tape deformation will alter the quality of the tape pack, resulting in spoking or a lipped-edged pack (see Figure 1).

4.2.2 Flange pack

If the tape pack is against one flange, then there is a misalignment between the tape reel and the tape edge guide nearest the tape reel.

4.2.3 Pack slippage

Vibration or impact will often result in slippage of the pack causing edge damage if the winding tension is too low. The pack is most susceptible to slippage while a tape is held horizontally.

4.2.4 Pack penetration or abrasion

Any portion of the tape pack that is exposed is especially vulnerable to damage. Fingers shall not be inserted through the window of a flange except in an empty reel when threading an open reel tape.

4.2.5 Edge compression

Mounting and unmounting large reels of tape requires special care. Tape reels shall be handled by the hub and the flanges shall not be squeezed. Compressing the flanges can crack the magnetic coating on tape edges and deform the basefilm resulting in poor head-to-tape contact. Tape with laterally misaligned strands is extremely susceptible to edge compression damage [see popped strand (3.32)].

4.3 Pack tension

4.3.1 General

If a tape is not wound at the proper tension, the tape pack is likely to become distorted during storage. When a distorted pack is unwound, tape surface deformation will be noticed at spacings equal to the circumference of the tape pack at that point. Tape surface deformation is likely to cause poor head-to-tape contact.

NOTE Most tape deformation can be returned to normal by a knowledgeable tape restoration professional – except where a tape layer has been folded.

4.3.2 Tension control

The tape tension is controlled by the design and maintenance of the tape machine. Tape tension can be measured by a technician with a special tape tension gauge.