
**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*

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Published in Switzerland

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Tape pack integrity	5
4.1 General	5
4.2 Common pack problems	5
4.3 Pack tension	6
4.4 Tape winding speed	7
4.5 Tape, hub and reel design	8
5 Contamination	8
5.1 General	8
5.2 Particulate contaminants	10
5.3 Gaseous contaminants	10
5.4 Organic contaminants	10
5.5 Protective cases	10
5.6 Field usage	10
6 Handling techniques	11
6.1 General	11
6.2 Vertical/horizontal tape orientation	11
6.3 Handling access	11
6.4 Use of force	12
6.5 Tape condition	12
6.6 General handling	13
7 Environment	13
7.1 General	13
7.2 Temperature and humidity	13
7.3 Air quality	14
7.4 Magnetic fields	14
7.5 Light exposure	15
7.6 Acclimatization	15
7.7 Marginal environments	15
8 Inspection	16
8.1 General	16
8.2 Seven-step physical inspection	16
9 Cleaning and maintenance	17
9.1 General	17
9.2 Tape cleaning indicators	18
9.3 Tape cleaning frequency	18
9.4 Debris removal from tape	18
9.5 Adhesive contaminants on tape	18
9.6 Biological contaminants on tape	19
9.7 Record/playback machine maintenance	19
9.8 Transports for master tapes	19
9.9 Manufacturers' recommendations	19
9.10 Cleaning cassettes	19
9.11 Hand cleaning	19
10 Transportation	19
10.1 General	19
10.2 Tape preparation before transport	19

10.3	Transport methods.....	20
10.4	General exposure.....	21
10.5	External fields and security scanning of material.....	21
11	Disasters.....	21
11.1	General.....	21
11.2	Water.....	22
11.3	Fire.....	22
11.4	Dry debris.....	22
11.5	Disaster response.....	22
12	Staff training.....	23
12.1	Purpose.....	23
12.2	Training paths.....	23
12.3	Schedule for training.....	24
12.4	Update of training.....	24
12.5	Content of training.....	24
13	Minimum handling requirements checklist.....	24
13.1	General.....	24
13.2	Do's.....	24
13.3	Do not's.....	25
	Bibliography.....	26

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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*.

This second edition cancels and replaces the first edition (ISO 18933:2006), of which it constitutes a minor revision with the following changes:

- 1) Annex A has been removed, to be consistent with same change made in other ISO/TC 42 standards.
- 2) In Clause 2, the titles of ISO 14644-1 and ISO 14644-2 have been updated to reflect the latest versions.
- 3) In the definition for *backcoat* (3.2), “increase friction” has been changed to “modify friction”.
- 4) The terminological entry for *class 100 000 cleanroom* (formerly 3.10) has been removed and the remaining terms re-numbered. The reference to a “class 100 000” cleanroom has been added to 7.3.3 *Cleanroom specifications*. <http://www.iso.org/iso/catalog/standards/sist/56c13cfd-c5e8-4204-90a0-bab83e4b4078/iso-18933-2012>
- 5) In the definition for master (now 3.26; formerly 3.27), “e.g. camera master, edited master, foreign language master” has been moved into an example.
- 6) In the definition for *tape pack* (now 3.43; formerly 3.44), “length of magnetic tape” has been changed to “magnetic tape wound on a reel or hub”.
- 7) The terminological entry for *wind* (formerly 3.45) included two separate definitions; it has been split into two entries (3.44 and 3.45), differentiated by the use of parts of speech.
- 8) The terminological entry for *windows* (formerly 3.46) included three definitions; the first has been retained and the singular tense has been used.
- 9) In 4.5.2 *Backcoat surface of the tape*, “increases friction” has been changed to “modifies friction”.

Introduction

This International Standard is one of a series of International Standards dealing with the physical properties and stability of imaging materials.

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.

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

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.

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.

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, *Cleanrooms and associated controlled environments — Part 1: Classification of air cleanliness by particle concentration*

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

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

3 Terms and definitions

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

- 3.1**
acclimatization
staging
process of conditioning material from one set of temperature/moisture conditions to another
- 3.2**
backcoat
<magnetic tape> rough surface layer added to the back of the basefilm to modify friction and minimize slippage between tape strands
- 3.3**
basefilm
base
plastic (polymer) substrate to which the magnetic layers are attached
- 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**
conditioning
exposure of a specimen to air at a given relative humidity and temperature until equilibrium is reached
- 3.11**
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.
- 3.12**
copy
reproduction of the information from a master
- 3.13**
domain
magnetic domain
cluster of the embedded magnetic particles which all align in the same north-south direction

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3.14**extended-term storage conditions**

storage conditions suitable for the preservation of recorded information having permanent value

3.15**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** (3.33).

3.16**flange pack**

condition where the whole tape pack rests against one flange

3.17**format**

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

3.18**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

3.19**hub**

cylindrical object around which the recording material is wound

3.20**hydrolysis**

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

3.21**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.

3.22**leafing**

multiple popped strands in a magnetic-tape wind

See **popped strand** (3.31) and **stepped pack** (3.40).

3.23**library wind**

low-speed rewind at controlled tension to achieve a smooth tape pack

NOTE The low speed rewind is typically 1 m/s to 3 m/s.

3.24**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

3.25**magnetic field intensity**

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

3.26

master

original or primary recording of the data or any version of the data

EXAMPLE Camera master, edited master, foreign language master.

3.27

medium

media, pl

material on which information is recorded

See **carrier** (3.5).

3.28

medium-term storage conditions

storage conditions suitable for the preservation of recorded information for a minimum of 10 years

3.29

migration

transferring information from one format to another

3.30

oligomer

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

3.31

popped strand

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

See **leafing** (3.22) and **stepped pack** (3.40).

3.32

print-through

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

3.33

reel

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

3.34

shell

outer housing of a cassette or cartridge

3.35

slot

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

3.36

splice

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

3.37

splicing tape

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

3.38

spoking

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

3.39**staging acclimatization**

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

3.40**stepped pack**

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

See **leafing** (3.22) and **popped strand** (3.31).

3.41**storage environment**

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

3.42**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

3.43**tape pack**

magnetic tape wound on a reel or hub

3.44**wind, noun**

physical appearance and tension of the magnetic tape pack

3.45**wind, verb**

process of transferring a roll of recording material from one spool or reel to another

3.46**window**

windage hole

opening in the flanges of a tape reel

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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 (3.31)].

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.

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4.3.2 Tension control

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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.

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