INTERNATIONAL STANDARD

ISO 18934

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Imaging materials — Multiple media archives — Storage environment

Matériaux pour l'image — Archives multimédia — Environnement de stockage

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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 18934 was prepared by Technical Committee ISO/TC 42, *Photography*.

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).

Introduction

Over the years, technical committees ISO/TC 36 and ISO/TC 42 of the International Organization for Standardization have published ISO storage standards specific to individual materials. Many of these temperature/relative humidity recommendations are based on laboratory studies using Arrhenius type projections that allow extrapolation of high temperature incubation tests to recommended storage environments at reduced temperatures. This also allows a prediction of the life expectancy of materials. This approach and the resulting analysis are logical when each medium is considered by itself. The individual ISO storage standards are sound and the predicted life expectancies have been consistent with practical experience. However, the storage conditions can differ widely for various media and reflect differences in their inherent stability. The extended-term storage conditions recommended in the various standards provide wide humidity ranges and set only a maximum temperature limit with considerable overlap in allowed environmental conditions across several media types.

In the real world, archivists and curators frequently are faced with the task of storing many types of material, such as film, prints, tapes, etc. Archives often contain media that cannot be separated without destroying the integrity of the collection. In other archives, one collection can consist primarily of one medium, but there are many collections each with different media. In either situation, it may not be practical or realistic for the archivist to provide a number of different storage environments that are optimized for each material. The cost and inconvenience would be prohibitive; moreover, records of the same or similar subject matter are usually stored in close proximity to facilitate reference, not by the type of medium. The archivist of a multiple media collection may be forced to limit the number of storage environments that can be provided. In some cases, this means some deviation from the ISO storage recommendations and can compromise the life expectancies specified in the standards. This compromise can be based on the value, physical size, quantity, or legal requirements to maximize life expectancy of some collections relative to others.

This International Standard provides an assessment of the keeping qualities for four storage environments. As such, it is most useful for storage facilities which house different types of materials, but does not override the ISO recommendations for single medium collections.

This International Standard does not discuss the various strategies to upgrade substandard environments that deviate from those recommended by ISO standards. However, institutions with substandard environments and restricted budgets should plan for the improvement of these environments as resources allow by judicious use of air conditioning, dehumidifiers (or humidifiers), air circulation and filtration. Although practicalities can force compromises, any improvement of poor conditions will add to the longevity of materials, even if they do not attain the life expectancies possible with the environments recommended in the ISO standards. A discussion of basic air conditioning principles, the various options and the associated costs are outside the scope of this International Standard. There are many references on this subject.

Imaging materials — Multiple media archives — Storage environment

1 Scope

This International Standard provides suggested guidelines for four temperature and humidity macroenvironments for archives that contain a variety of recording media, based on the corresponding ISO storage standards for those media. Whenever possible, it is advisable to follow the storage environments in the ISO storage standards. This International Standard does not replace these ISO storage standards. In addition to environment recommendations, those standards also include other vital information pertinent for the long-term keeping of recording materials, such as inspection, housing, and handling guidelines. Although microenvironments within a storage enclosure can be dependent upon the macroenvironment, they are not the focus of this International Standard.

The storage of traditional paper collections is not within the scope of this International Standard. However, many archives containing mixed recording media also include such collections. Archivists are encouraged to review the appropriate standards (see References [1] and [2] in the Bibliography) for those materials. Nitrate-base photographic films are also included in this International Standard, since they are often stored together with other materials in spite of the fact that nitrate films represent a fire hazard and they need to be stored in accordance with the National Fire Protection Association standard[3] in the United States, or other applicable national standards. Moreover, fumes from decomposing nitrate film and acetate-base film can have very detrimental effects on other materials stored in the same area.[11] It is necessary to isolate such films in a separate storage area.

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 10356, *Cinematography — Storage and handling of nitrate-base motion-picture films*

ISO 18911, *Imaging materials — Processed safety photographic films — Storage practices*

ISO 18918, *Imaging materials — Processed photographic plates — Storage practices*

ISO 18920, *Imaging materials — Processed photographic reflection prints — Storage practices*

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

ISO 18925, *Imaging materials — Optical disc media — Storage practices*

3 Terms and definitions

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

3.1
conditioning
exposure of a specimen to air at a given relative humidity and temperature until equilibrium is reached

3.2
extended-term storage conditions
storage conditions suitable for the preservation of recorded information having permanent value

3.3
relative humidity
RH
ratio, defined as a percentage, of the existing partial vapour pressure of water to the vapour pressure at saturation

NOTE It is usually, but not always, equal to the percentage of the amount of moisture in the air to that at saturation.

3.4
life expectancy
LE
length of time that information is predicted to be acceptable in a system after dark storage at 23 °C and 50 % RH

3.5
LE designation
rating for the "life expectancy" of recording materials and associated retrieval systems

NOTE The number following the LE designation is a prediction of the minimum life expectancy in years, for which information can be retrieved without significant loss when stored at 23 °C and 50 % RH, e.g. LE-100 indicates that information can be retrieved after at least 100 years storage.

3.6
macro-environment
atmospheric conditions (temperature, relative humidity, and pollutants) in a large area in which records are kept

3.7
magnetic tape
material consisting of a magnetic-sensitive layer coated on a thin plastic support that can produce a magnetic recording

3.8
medium-term storage conditions
storage conditions suitable for the preservation of recorded information for a minimum of 10 years

3.9
micro-environment
atmospheric conditions (temperature, relative humidity, and pollutants) inside a storage enclosure in which records are kept

3.10
optical disc
disc that will accept and retain information in the form of marks or density modulations in a recording layer that can be read with an optical beam

3.11
photographic film
material consisting of one or more radiation-sensitive layers coated on transparent or translucent plastic that yields a visible image

3.12
photographic paper
material consisting of one or more image-forming layers coated on plain paper, paper with a white pigmented layer, paper sandwiched between white opaque resin layers or on other opaque supports

3.13
photographic plate
material consisting of one or more radiation-sensitive layers coated on a rigid support, such as glass or metal, that yields a visible image

3.14
photographic print
a photographic copy, usually made from a negative, consisting of a layer (or layers) containing a positive image

NOTE The image layers can be coated on a white opaque, semi-transparent, or transparent support and the images viewed by reflected or transmitted light.

3.15
recording material
medium that receives images, text or audio information which can subsequently be viewed or retrieved

3.16
storage environment
conditions for storing materials, i.e. temperature, relative humidity, cleanliness of facilities and atmospheric pollutants

4 Recommendations

4.1 Temperature range

The guidelines for extended-term storage conditions given in this International Standard specify four different temperature ranges for the storage of mixed media collections:

— room;

— cool;

— cold;

— subzero (see Table 1).

“Room” conditions are satisfactory for materials that are considered to be chemically stable, such as black-and-white silver and carbon images on polyester base, glass, and paper. “Cool” conditions are suitable for materials whose stability may be compromised at cold temperatures (magnetic media) and for unstable materials (e.g. black-and-white acetate film) provided a low RH can be maintained. “Cold” conditions are recommended for unstable materials, such as colour photographs of all types and cellulosic based films. “Subzero” conditions should be used to obtain the maximum life for all materials that can tolerate this environment. It should also be used for unstable materials which have little tolerance for higher temperatures. In some situations, chemical degradation may have already started as evidenced by the vinegar odour of deteriorating acetate-base photographic films, by rusted cans or image degradation for nitrate base films, or by colour deterioration. These materials should always be stored in the “subzero” environment.

The archivist should choose the temperature range which is most suitable for the specific collection with the objective of obtaining a temperature range as close as possible to the ISO recommendations. Comparisons of the ISO storage conditions given in the standards for specific materials with the corresponding guidelines in this International Standard are given in Table 2. Consideration should be given to maintaining a lower set point temperature during normally cool periods of the year. This may offset slightly higher temperatures in other seasons where it is impractical to maintain the low temperature.