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Imaging materials — Optical disc media — Storage practices

Matériaux pour l'image — Milieux pour disque optique — Pratiques 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 18925 was prepared by Technical Committee ISO/TC 42, *Photography*.

This third edition cancels and replaces the second edition (ISO 18925:2008), of which it constitutes a minor revision.

The following change has been made to the second edition:

— an update of the bibliographical references.

Introduction

Use of optical disc material is becoming widespread in audio, video, and computer applications. Preservation of this information is becoming of increasing concern to society, particularly as the recorded information becomes older and frequently of greater value to libraries, archives, museums, government agencies, and commercial organizations.

The stability of optical discs is dependent upon that of the complete system. This includes the stability of the material itself, the equipment on which it is run and, in systems, upon the necessary software. ISO 18921 specifies a methodology for estimating the life expectancy of the CD-ROM. Other optical discs will be addressed in future International Standards. These standards consider only the effects of temperature and humidity and do not include other factors such as light, corrosive gases, and particulates. International Standards are not available on the life expectancy of hardware and the problems associated with hardware wearing out or becoming obsolete.

It is advisable that optical disc users store discs under conditions that will extend their life and handle the material so that it will not be subjected to stress and undergo physical breakdown during use. This International Standard addresses the concerns of long-term storage.

A major component of a large number of optical discs is the polycarbonate substrate. Polycarbonate is a very durable material, but it does absorb moisture and there is always an equilibrium between the ambient humidity and the moisture content of the disc. Polycarbonate is susceptible to decomposition under certain conditions and given a suitable catalyst.

The second component of most optical discs is the reflective layer. This layer is usually some highly reflective metal such as aluminium, silver, or gold. Each of these materials is subject to reaction with various chemicals that can be found in the environment. Aluminium, for example, combines readily with oxygen to form aluminium oxide. Silver combines with sulfur to tarnish and form silver sulfides. Gold is known to react with chlorine to form gold chlorides.

A third component of these discs is some type of seal coat. This is typically a UV-cured polymer whose purpose is to protect the reflective layer and any other material layers in the disc.

A fourth component, in the case of some recordable optical discs, is the dye layer. For magneto-optic or phase change discs, additional layers are also included.

Regardless of the inherent stability of the various disc layers, it is known that good storage conditions will extend the life of all optical discs. While a good storage environment cannot reverse any degradation that has already occurred, it can slow down additional deterioration.

A single storage condition is described in this International Standard. This condition is intended for discs that contain recorded information of long-term value. Various manufacturers' studies indicate that the life expectancy of well-manufactured optical discs is in excess of 50 years under typical room ambient conditions (see References [1] and[2]).

Imaging materials — Optical disc media — Storage practices

1 Scope

This International Standard establishes extended-term storage conditions for optical discs and provides recommendations concerning the storage conditions, storage facilities, enclosures, and inspection for optical discs. It is applicable to discs made for audio, video, instrumentation, and computer use.

Recommendations are general in nature and it is advisable that the manufacturer's cautions for specific material be considered. Relaxation from these recommendations, whether before or after recording, will generally result in shortened life expectancy.

2 Normative references

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

ISO/IEC 15486, *Information technology — Data interchange on 130 mm optical disk cartridges of type WORM (Write Once Read Many) using irreversible effects — Capacity: 2,6 Gbytes per cartridge*

NFPA 75, *Standard for the Protection of Electronic Computer/Data Processing Equipment*

3 Terms and definitions

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

3.1
blister
localized delamination that looks like a bubble

3.2
compact disc
CD
optical disc format in which the information layer is located at one surface of a substrate and the data can be read by an optical beam

Note 1 to entry: CD is the subject of IEC 60908.

3.2.1
compact disc-recordable
CD-R
recordable optical disc in which information can be recorded to certain areas in the compact disc format

Note 1 to entry: Information can be recorded once and read many times.

3.2.2
compact disc read-only memory
CD-ROM
optical disc to which information is transferred during manufacture to certain areas in the compact disc format

Note 1 to entry: Information can be read many times.

Note 2 to entry: CD-ROM is the subject of ISO/IEC 10149.

3.2.3
compact disc-rewritable
CD-RW
recordable optical disc in which information can be recorded to certain areas in the compact disc format

Note 1 to entry: Information can be erased and new information recorded many times and read many times.

3.3
container
box, can, or carton used for storage and shipping of recording materials

3.4
digital versatile disc
DVD
digital video disc (deprecated)
optical disc format in which one or more information layers are located between two substrates and the data can be read by an optical beam

3.5
delamination
separation of a laminate into its constituent layers

3.6
dew point
temperature at which moisture begins to condense on a surface

Note 1 to entry: See *relative humidity* (3.16).

EXAMPLE The more humid the air, the higher the dew point temperature.

3.7
enclosure
folder, envelope, sleeve, or clam shell intended for physical protection against mechanical damage

3.8
extended-term storage conditions
storage conditions suitable for the preservation of recorded information having permanent value

3.9
fire-protective storage
facilities designed to protect records against excessive temperatures, water and other fire-fighting agents, and steam developed by insulation of safes or caused by the extinguishing of fires and collapsing structures

3.10
insulated record container
storage box designed to withstand elevated temperatures and conforming to national standards and regulations

3.11
isoperm lines
lines of constant life plotted as a function of temperature and relative humidity

3.12
life expectancy
LE
length of time that information is predicted to be retrieved in a system at 23 °C and 50 % relative humidity (RH)

3.13
magnetic field intensity
level of the magnetic field at a point in space

3.14
medium
material on which the information is recorded

3.15
MO disc
optical disc in which the information is recorded using magneto-optical technology in some specified format

Note 1 to entry: Information can be recorded, read many times, and overwritten many times.

3.16
relative humidity
RH
ratio, defined as a percentage, of the existing partial vapour pressure of water to the vapour pressure at saturation

Note 1 to entry: It is usually, but not always, equal to the percentage of the amount of moisture in the air to that at saturation.

3.17
storage environment
conditions for storing materials, i.e. temperature, relative humidity, cleanliness of facilities, and atmospheric pollutants

3.18
storage housing
physical structure supporting materials and their enclosures

Note 1 to entry: It can consist of drawers, racks, shelves, or cabinets.

3.19
system
combination of material, hardware, software, and documentation necessary for recording and/or retrieving information

3.20
WORM disc
optical disc in which the data in specified areas can be written only once and read multiple times by an optical beam

4 Environmental conditions

4.1 Humidity and temperature limits

The average relative humidity of an extended-term storage environment shall be maintained between 20 % RH and 50 % RH. Cycling of relative humidity shall not be greater than ± 10 %. Ideally, the maximum temperature for extended periods should not exceed 25 °C, and a temperature below 23 °C is preferable. The peak temperature shall not exceed 32 °C. Generally, useful life will be increased by storing discs at low temperature and low relative humidity since chemical degradation is reduced at these conditions (see Annex A). Storage of discs below –10 °C and below 10 % RH is not recommended.

Specific manufacturer's recommendations, when available, should take precedence over the above general recommendations.

For any facility, it is impossible to specify what the best relative humidity and storage temperature should be, since it depends upon the value of the material, the past storage history, the length of time the disc is to be kept, the size of the vault, the cost of various options, and the climate conditions where the facility is located.