SLOVENSKI STANDARD
oSIST prEN IEC 62702-1-1:2022

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Sistem zvočnega arhiva - 1-1. del: DVD disk in migracija podatkov za dolgoročno shranjevanje zvočnih podatkov

Audio archive system - Part 1-1: DVD disk and data migration for long term audio data storage

Système d'archivage audio - Partie 1-1: Disque DVD et migration de données pour le stockage à long terme des données audio

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TITLE:

Audio archive system - Part 1-1: DVD disk and data migration for long term audio data storage

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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AUDIO ARCHIVE SYSTEM –

Part 1-1: DVD disk and data migration for long-term audio data storage

FOREWORD

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IEC 62702-1-1 has been prepared by technical area 6: Storage media, storage data structures, storage systems and equipment, of IEC technical committee 100: Audio, video and multimedia systems and equipment. It is an International Standard.

This 2nd edition cancels and replaces the 1st edition published in 2016-05-12, Corrigendum 1: 2018-02-21. This edition constitutes a technical revision.

Reflect the update of the reference standard ISO/IEC 29121 4th edition that has been published, this edition includes the following significant technical changes with respect to the previous edition:

a) ISO/IEC 16963 has been identified as the referee test method for the lifetime estimation;
b) the ambient conditions for the measurement of maximum data error have been added;
c) the requirements for test drives have been changed considering the use condition of users;
d) the requirements for the estimated lifetime have been defined more clearly;
e) the requirements for the periodic performance test have been defined more clearly.

The text of this International Standard is based on the following documents:

Draft	Report on voting
XX/XX/FDIS	XX/XX/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Sound recordings such as music, speech, and storytelling are an important human heritage and should be preserved for as long as possible. However, we were not able to record sounds in order to preserve them in the past. The first recoding was achieved by Edison in 1877.

Although various technologies were invented later, most of them have limitations for audio archives because storage life time is limited and the sound quality deteriorates when it is transferred to the next generation storage device.

The progress of LSI technology made digital recording of recorded sound possible. The digital recording is very suitable for audio archiving because the migration is performed by copying digital data.

For this purpose, various recording materials exist, such as optical disks, magnetic disks, magnetic tape and non-volatile memory such as a phase change memory.

This International Standard specifies physical and logical aspects for a standard of audio archives of various storage types which are typically used for audio archives in markets.

The IEC 62702 series currently consists of:

Part 1 specifies the minimum requirements on physical aspects of optical disks for digital sound recordings. Part 1-1 specifies DVD optical disks, and Part 1-2 specifies BD optical disks.

Part 2 specifies the minimum requirements for digitization of content, format of digitised content, content information and media inspection.

AUDIO ARCHIVE SYSTEM –

Part 1-1: DVD disk and data migration for long-term audio data storage

1 Scope

This part of IEC 62702 specifies a method of data-quality assurance for writable DVD disks (hereinafter disks) which are specified for long-term data storage, and a data migration method which can sustain the recorded data on disks for long-term audio data preservation. The writable disks include recordable disks such as DVD-R, and +R format, and rewritable disks such as DVD-RW, +RW format and DVD-RAM.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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/IEC 16963:2017, *Information technology – Digitally recorded media for information interchange and storage – Test method for the estimation of lifetime of optical media for long-term data storage*

ISO/IEC 29121:2021, *Information technology – Digitally recorded media for information interchange and storage – Data migration method for optical disks for long term data storage*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
B_{mig}life
lifetime (3.10) for use of *data migration* (3.6) and identical to $B_{0,000\ 1}$life which is 0,000 001 quantile of the lifetime distribution (i.e. 0,000 1 % failure time) or 99,999 9 % survival lifetime

[SOURCE: ISO/IEC 29121:2021, 3.1]

3.2
B_5life
5 percentile of the *lifetime* (3.10) distribution (i.e. 5 % failure time) or 95 % survival lifetime

[SOURCE: ISO/IEC 16963:2017, 3.4]

3.3
$(B_5\text{life})_L$
95 % lower confidence bound of B_5life (3.2)

[SOURCE: ISO/IEC 16963:2017, 3.5]

3.4
B_{50}life
50 percentile of the *lifetime* (3.10) distribution (i.e. 50 % failure time) or 50 % survival lifetime

[SOURCE: ISO/IEC 16963:2017, 3.6]

3.5
controlled storage condition
well-controlled storage conditions with full-time air conditioning (25 °C and 50 % relative humidity) in which the *lifetime* (3.10) of data stored on optical disks

[SOURCE: ISO/IEC 16963:2017, 3.7]

3.6
data migration
process to copy data from one storage device or medium to another

[SOURCE: ISO/IEC 29121:2021, 3.5]

3.7
error correction code
ECC
mathematical computation yielding check bytes used for the detection and correction of errors in data

Note 1 to entry: For DVD-R, DVD-RW, DVD-RAM, +R format, and +RW format disks, the Reed-Solomon product code defined in ISO/IEC 16448:2002 for DVD-ROM systems is applied.

[SOURCE: ISO/IEC 29121:2021, 3.6 modified — Note 1 to entry is modified.]

3.8
error rate
rate of errors or error count measured on the signal at the input of error-correction decoder, which represents raw-error rate of data recorded on a disk

[SOURCE: ISO/IEC 29121:2021, 3.7]

3.9
initial performance test
first test of the *error rate* (3.8) of data recorded on a disk before storing

[SOURCE: ISO/IEC 29121:2021, 3.8]

3.10
lifetime
time that information is retrievable in a *system* (3.17)

[SOURCE: ISO/IEC 29121:2021, 3.9]

3.11
maximum byte-error-rate
BER_{max}
greatest level of byte error rate at any consecutive 32 *error correction code* (3.7) blocks in one of relevant area of the disk as measured in the first pass of the decoder before correction

Note 1 to entry: BER_{max} is applied to DVD-RAM disks.

[SOURCE: ISO/IEC 29121:2021, 3.10]

3.12
maximum data error
greatest level of *error rate* (3.8) anywhere in one of the relevant areas on the disk

[SOURCE: ISO/IEC 16963:2017, 3.13, modified — Note 1 to entry has been deleted.]

3.13
maximum parity inner sum 8
$PI_{sum\ 8,max}$
greatest level of parity (of the) inner code error count at any consecutive 8 *error correction code* (3.7) blocks in one of the relevant areas of the disk as measured in the first pass of the decoder before correction

Note 1 to entry: See ISO/IEC 16448, ISO/IEC 23912, ISO/IEC 17341, ISO/IEC 17342 and ISO/IEC 17344.

[SOURCE: ISO/IEC 29121:2021, 3.13 modified — Note 1 to entry is modified.]

3.14
periodic performance test
periodic test of the *error rate* (3.8) of data recorded on a disk during the storage

[SOURCE: ISO/IEC 29121:2021, 3.15]

3.15
retrievability
ability to recover physical information as recorded

[SOURCE: ISO/IEC 16963:2017, 3.14]

3.16
substrate
transparent layer of the disk, provided for mechanical support of the recording or recorded layer, through which the optical beam accesses the recordable/recorded layer

[SOURCE: ISO/IEC 16448:2002, 4.18]

3.17
system
combination of hardware, software, storage medium and documentation used to record, retrieve and reproduce information

[SOURCE: ISO/IEC 16963:2017, 3.20]

3.18
uncorrectable error
error in the read-out data that could not be corrected by the error correcting decoders

[SOURCE: ISO/IEC 29121:2021, 3.18]

3.19
X_{mig} interval
migration interval (year) which is determined by user

[SOURCE: ISO/IEC 29121:2021, 3.19 modified — Note 1 to entry has been deleted.]

4 Disk and lifetime for long-term audio data storage

4.1 Disk for long-term audio data storage

A disk with a specified lifetime should be used for long-term audio data storage. A disk with an unspecified lifetime should not be used.

4.2 Lifetime estimation

For the purposes of this part, the lifetime of a disk shall be derived from the measurements specified in ISO/IEC 16963. The Eyring method is used for lifetime estimation under controlled storage-conditions (25 °C and 50 % relative humidity).

In ISO/IEC 16963, the estimated lifetime can be defined variously as B_{50}life, B_5life and the 95 % lower confidence bound of B_5life [equals $(B_5\text{life})_L$] and described as follows.