



# SLOVENSKI STANDARD

## oSIST prEN IEC 62702-1-2:2022

01-januar-2022

---

**Sistem zvočnega arhiva - 1-2 del: BD disk in migracija podatkov za dolgoročno shranjevanje zvočnih podatkov**

Audio archive system - Part 1-2 : BD disk and data migration for long-term audio data storage

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

**Ta slovenski standard je istoveten z: prEN IEC 62702-1-2:2021**

oSIST prEN IEC 62702-1-2:2022  
<https://standards.iteh.ai/catalog/standards/sist/71505537-727d-4e62-971d-7693a8db1d04/osist-pren-iec-62702-1-2-2022>

---

**ICS:**

33.160.30	Avdio sistemi	Audio systems
35.220.30	Optične shranjevalne naprave	Optical storage devices

**oSIST prEN IEC 62702-1-2:2022**

**en,fr,de**

## **iTeh STANDARD PREVIEW** **(standards.iteh.ai)**

[oSIST prEN IEC 62702-1-2:2022](https://standards.iteh.ai/catalog/standards/sist/71505537-727d-4e62-971d-7693a8db1d04/osist-pren-iec-62702-1-2-2022)

<https://standards.iteh.ai/catalog/standards/sist/71505537-727d-4e62-971d-7693a8db1d04/osist-pren-iec-62702-1-2-2022>



100/3671/CDV

## COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: <b>IEC 62702-1-2 ED2</b>	
DATE OF CIRCULATION: <b>2021-11-19</b>	CLOSING DATE FOR VOTING: <b>2022-02-11</b>
SUPERSEDES DOCUMENTS: <b>100/3605/CD, 100/3646/CC</b>	

IEC TA 6 : STORAGE MEDIA, STORAGE DATA STRUCTURES, STORAGE SYSTEMS AND EQUIPMENT	
SECRETARIAT: Japan	SECRETARY: Mr Koji Tsukada
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING <input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING <b>Attention IEC-CENELEC parallel voting</b> The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE:

**Audio archive system - Part 1-2 : BD disk and data migration for long-term audio data storage**

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

## CONTENTS

1		
2	CONTENTS .....	2
3	FOREWORD .....	4
4	INTRODUCTION .....	6
5	1 Scope .....	7
6	2 Normative references .....	7
7	3 Terms and definitions .....	7
8	4 Disk and lifetime for long-term audio data storage .....	9
9	4.1 Disk for long-term audio data storage .....	9
10	4.2 Lifetime estimation .....	9
11	4.3 $B_{\text{migl}}$ life for long-term audio data storage .....	10
12	4.4 Estimated-lifetime rank and display colour .....	10
13	4.4.1 Estimated-lifetime rank and display colour identification .....	10
14	4.4.2 $B_{\text{migl}}$ life and display colour indication on disks and packages .....	10
15	5 Test condition, test methods and disks for audio data .....	11
16	5.1 Ambient conditions of maximum data error measurement .....	11
17	5.2 Test methods .....	11
18	5.2.1 Playback test drive .....	11
19	5.2.2 Test area and sample disk .....	11
20	5.2.3 Recording test drive .....	11
21	5.2.4 Test drive check .....	11
22	6 Test result evaluation .....	11
23	6.1 Initial performance test result evaluation .....	11
24	6.2 Periodic performance test result evaluation .....	12
25	6.3 Reporting items .....	13
26	6.3.1 Initial performance test result .....	13
27	6.3.2 Periodic performance test result .....	13
28	6.4 Management of reporting items .....	13
29	6.5 Test and migration intervals .....	13
30	7 Prevention of deterioration .....	14
31	Annex A (informative) Guideline of usage and indication .....	15
32	A.1 Usage of lifetime rank .....	15
33	A.2 Lifetime rank indication and place .....	15
34	A.2.1 Lifetime rank indication .....	15
35	A.2.2 Indication example .....	15
36	Annex B (informative) Recommendations on handling, storage and cleaning conditions for BD writable disks .....	16
38	B.1 Handling .....	16
39	B.2 Storage .....	16
40	B.3 Cleaning .....	17
41	Annex C (informative) Causes of deterioration for BD disks for long-term data storage .....	18
42	C.1 Deterioration .....	18
43	C.2 Disk structure .....	18
44	C.3 Causes of deterioration .....	18
45	C.4 Nature of deterioration .....	19
46	C.5 Effects of deterioration .....	19
47	C.6 Unexpected deterioration .....	19

48	Bibliography.....	20
49		
50	Figure 1 – Data migration flow for the initial and the periodic performance tests .....	13
51	Figure A.1 – Indication example.....	15
52		
53	Table 1 – Category of initial recording performance .....	12
54	Table 2 – Category of recording performance at periodic performance test .....	12
55	Table B.1 – Recommended conditions for general storage.....	16
56	Table B.2 – Recommended conditions for controlled storage .....	16
57		
58		

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN IEC 62702-1-2:2022](https://standards.iteh.ai/catalog/standards/sist/71505537-727d-4e62-971d-7693a8db1d04/osist-pren-iec-62702-1-2-2022)

<https://standards.iteh.ai/catalog/standards/sist/71505537-727d-4e62-971d-7693a8db1d04/osist-pren-iec-62702-1-2-2022>

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## AUDIO ARCHIVE SYSTEM –

## Part 1-2: BD disk and data migration for long-term audio data storage

## FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
  - 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
  - 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
  - 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
  - 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
  - 6) All users should ensure that they have the latest edition of this publication.
  - 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
  - 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
  - 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.
- IEC 62702-1-2 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 2017-11-07. This edition constitutes a technical revision.
- Reflect the update of the reference standard ISO/IEC 29121 4<sup>th</sup> 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;
  - a) the ambient conditions for the measurement of maximum data error have been added;
  - b) the requirements for test drives have been changed considering the use condition of users;
  - c) the requirements for the estimated lifetime have been defined more clearly;
  - d) the requirements for the periodic performance test have been defined more clearly.

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

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

113  
114 Full information on the voting for its approval can be found in the report on voting indicated in  
115 the above table.

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

117 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in  
118 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available  
119 at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are  
120 described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

121 The committee has decided that the contents of this document will remain unchanged until the  
122 stability date indicated on the IEC website under [webstore.iec.ch](http://webstore.iec.ch) in the data related to the  
123 specific document. At this date, the document will be

- 124 • reconfirmed,  
125 • withdrawn,  
126 • replaced by a revised edition, or  
127 • amended.

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

**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.**

129 <https://standards.iteh.ai/catalog/standards/sist/71503537-727d-4e62-971d-7693a8db1d04/osist-pr-en-iec-62702-1-2-2022>

130

## INTRODUCTION

Sound recordings such as music, speech, and storytelling are an important human heritage and should be preserved for a long term as much 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 lifetime is limited and the sound quality deteriorates when it is transferred to the next generation storage device.

The progress of LSI (Large-Scale Integrated Circuit) 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 document 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 digitized content, content information and media inspection.

ITEH STANDARD PREVIEW  
(standards.iteh.ai)

[oSIST prEN IEC 62702-1-2:2022](https://standards.iteh.ai/catalog/standards/sist/71505537-727d-4e62-971d-7693a8db1d04/osist-pren-iec-62702-1-2-2022)

<https://standards.iteh.ai/catalog/standards/sist/71505537-727d-4e62-971d-7693a8db1d04/osist-pren-iec-62702-1-2-2022>



## AUDIO ARCHIVE SYSTEM –

### Part 1-2: BD 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 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 BD recordable disk and BD rewritable disk.

#### 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 disks 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

##### **$B_{\text{mig}}$ 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

##### **$B_5$ life**

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  $B_5\text{life}$  (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 BD recordable disk and BD rewritable disk, the long-distance code (LDC) + burst-indicating subcode (BIS) defined in ISO/IEC 30190, ISO/IEC 30191, ISO/IEC 30192, and ISO/IEC 30193 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* (3.16)

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

### 3.11

#### 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.]

### 3.12

#### RSER<sub>max</sub>

greatest level of random symbol error rate measured on the signal in one of the relevant areas on a disk at the input of error-correction decoder, which excludes burst errors of length greater than or equal to 40 bytes

Note 1 to entry: See ISO/IEC 30190, ISO/IEC 30191, ISO/IEC 30192, ISO/IEC 30193 and ISO/IEC 16963.

### 3.13

#### 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]

**3.14****retrievability**

ability to recover physical information as recorded

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

**3.15****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]

**3.16****system**

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

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

**3.17****uncorrectable error**

error in the read-out data that cannot be corrected by the error correction decoders

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

**3.18****X<sub>mig</sub> 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).

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

$$B_{50 \text{ life}} = \exp(\ln \hat{B}_{50}) = \exp(\hat{\beta}_0 + \hat{\beta}_1 x_{10} + \hat{\beta}_2 x_{20})$$

$$B_5 \text{ life} = \exp(\ln \hat{B}_5) = \exp(\hat{\beta}_0 + \hat{\beta}_1 x_{10} + \hat{\beta}_2 x_{20} - 1,64\hat{\sigma})$$

where

$B_{50 \text{ life}}$  is the variable for  $B_{50}$ life;

$B_5 \text{ life}$  is the variable for  $B_5$ life;

$x_{10}$  and  $x_{20}$  are the temperature-dependent factor and the relative-humidity-dependent factor at the controlled storage conditions (25 °C/50 % relative humidity) respectively.

Also, the 95 % lower confidence bound of  $B_5$ life becomes

$$B_{(5 \text{ life})_L} = \exp\left[(\ln \hat{B}_5)_L\right] = \exp\left[\ln \hat{B}_5 - 1,64 \sqrt{\text{var}(\ln \hat{B}_5)}\right]$$