
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

Technologies de l'information — Supports pour l'échange d'informations et le stockage enregistrés numériquement — Méthode d'essai pour l'estimation de la durée de vie de disques optiques pour le stockage à long terme

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/IEC JTC 1, *Information technology, SC 23, Digitally recorded media for information interchange and storage*.

This second edition cancels and replaces the first edition (ISO/IEC 16963:2011), which has been technically revised.

Introduction

Markets and industry have developed a common understanding that the property referred to as the lifetime of data recorded to optical disks plays an increasingly important role in many applications. Disparate standardized test methodologies exist for Magneto-Optical disks vs recordable compact disks and DVD systems. The first edition of this International Standard provided a common methodology applicable for various purposes that included lifetime testing of then available writable CD and DVD optical disks.

ISO/IEC JTC 1/SC 23/JWG 1, which is a Joint working group comprising ISO/TC 42, ISO/TC 171/SC 1 and ISO/IEC JTC 1/SC 23, initiated work on this subject and developed initial drafts with assistance from Ecma International TC 31.

After the issuance of the first edition of this International Standard, ISO/IEC standards for the physical formats of BD Recordable and Rewritable disks were published. Accordingly, ISO/IEC JTC 1/SC 23/JWG 1 started work again to include testing of writable BD optical disks in this second edition of the International Standard. Additional details for lifetime estimation are also incorporated.

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1 Scope

This International Standard specifies an accelerated aging test method for estimating the lifetime of the retrievability of information stored on recordable or rewritable optical disks.

The method is based on the theoretical assumption that the lifetime of data recorded on an optical disk has a lognormal distribution.

Detailed testing is specified for the following formats: DVD-R/RW/RAM disks, +R/+RW disks, CD-R/RW disks and BD recordable / rewritable disks. The testing can be applied to additional optical-disk formats with substitution of the appropriate specifications and can also be updated by committee in the future as required.

This International Standard includes:

- stress conditions
 - Basic and Rigorous stress-conditions for testing and subsequent analysis using both the Eyring and Arrhenius methods;
- ambient storage conditions in which the lifetime of data stored on optical disk is estimated
 - a Controlled storage-condition, 25 °C and 50 % RH, representing full-time air conditioning. The Eyring method is used to estimate the lifetime under this storage condition;
 - a Harsh storage-condition, 30 °C and 80 % RH, representing the most severe conditions in which users handle and store optical disks. The Arrhenius method is used to estimate the lifetime under this storage condition;
- a description of the evaluation system;
- procedures for specimen preparation and data acquisition;
- definitions and methods used in testing specific disk types;
- analysis of test results to determine the lifetime of stored data;
- a format for reporting the estimated lifetime of stored data.

The methodology includes only the effects of temperature and relative humidity. It does not attempt to model degradation due to complex failure mechanism kinetics, nor does it test for exposure to light, corrosive gases, contaminants, handling, or variations in playback subsystems. Disks exposed to these additional sources of stress or higher levels of temperature and relative humidity are expected to experience shorter usable lifetimes.

2 Conformance

A disk tested by this methodology shall conform to all normative references specific to that disk format.

3 Normative references

The following referenced documents in whole or in part, are normatively referenced in this document and 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/IEC 10149, *Information technology — Data interchange on read-only 120 mm optical data disks (CD-ROM)*

ISO/IEC 16448, *Information technology — 120 mm DVD — Read-only disk*

ISO/IEC 16449, *Information technology — 80 mm DVD — Read-only disk*

ISO/IEC 17592, *Information technology — 120 mm (4,7 Gbytes per side) and 80 mm (1,46 Gbytes per side) DVD rewritable disk (DVD-RAM)*

ISO/IEC 17342, *Information technology — 80 mm (1,46 Gbytes per side) and 120 mm (4,70 Gbytes per side) DVD re-recordable disk (DVD-RW)*

ISO/IEC 23912, *Information technology — 80 mm (1,46 Gbytes per side) and 120 mm (4,70 Gbytes per side) DVD Recordable Disk (DVD-R)*

ISO/IEC 12862, *Information technology — 120 mm (8,54 Gbytes per side) and 80 mm (2,66 Gbytes per side) DVD recordable disk for dual layer (DVD-R for DL)*

ISO/IEC 13170, *Information technology — 120 mm (8,54 Gbytes per side) and 80 mm (2,66 Gbytes per side) DVD re-recordable disk for dual layer (DVD-RW for DL)*

ISO/IEC 25434, *Information technology — Data interchange on 120 mm and 80 mm optical disk using +R DL format — Capacity: 8,55 Gbytes and 2,66 Gbytes per side (recording speed up to 16X)*

ISO/IEC 17344, *Information technology — Data interchange on 120 mm and 80 mm optical disk using +R format — Capacity: 4,7 Gbytes and 1,46 Gbytes per side (recording speed up to 16X)*

ISO/IEC 17341, *Information technology — Data interchange on 120 mm and 80 mm optical disk using +RW format — Capacity: 4,7 Gbytes and 1,46 Gbytes per side (recording speed up to 4X)*

ISO/IEC 26925, *Information technology — Data interchange on 120 mm and 80 mm optical disk using +RW HS format — Capacity: 4,7 Gbytes and 1,46 Gbytes per side (recording speed 8X)*

ISO/IEC 29642, *Information technology — Data interchange on 120 mm and 80 mm optical disk using +RW DL format — Capacity: 8,55 Gbytes and 2,66 Gbytes per side (recording speed 2,4X)*

ISO/IEC 30190, *Information technology — Digitally recorded media for information interchange and storage — 120 mm Single Layer (25,0 Gbytes per disk) and Dual Layer (50,0 Gbytes per disk) BD Recordable disk*

ISO/IEC 30191, *Information technology — Digitally recorded media for information interchange and storage — 120 mm Triple Layer (100,0 Gbytes per disk) and Quadruple Layer (128,0 Gbytes per disk) BD Recordable disk*

ISO/IEC 30192, *Information technology — Digitally recorded media for information interchange and storage — 120 mm Single Layer (25,0 Gbytes per disk) and Dual Layer (50,0 Gbytes per disk) BD Rewritable disk*

ISO/IEC 30193, *Information technology — Digitally recorded media for information interchange and storage — 120 mm Triple Layer (100,0 Gbytes per disk) BD Rewritable disk*

ECMA-394, *Recordable Compact Disc Systems CD-R Multi-Speed*

ECMA-395, *Recordable Compact Disc Systems CD-RW Ultra-Speed*