

International Standards and off line archiving through the use of recordable optical discs

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1. Introduction

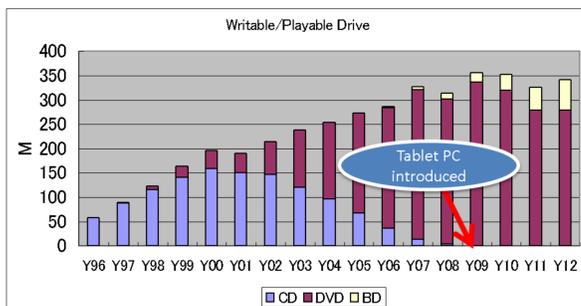
How to create safe redundant copies while securing authenticity, longevity and minimum technology obsolescence risks?

2. Comparison of data medium

Criteria	Optical Disc	Hard Disc	Magnetic Tape
Capacity	X 650MB to 100GB	⊗	⊗
International Standard	⊗	X	X
Authenticity	⊗ Physical WORM	X	X
Migration/Longevity	⊗ 30 years	X 5 years	Δ 10 years
Disaster Recovery	⊗	X	X
Obsolescence Risk	⊗	⊗	Δ
Storage Condition(Temp)	⊗ -20 -50C	Δ 20 -30C	Δ 15 -32C
Cost	⊗ \$	Δ \$\$\$	Δ
Virus Risk	⊗	Δ X	Δ+
Energy Consumption	⊗	X	Δ

Optical discs are ideal choice for off-line archiving

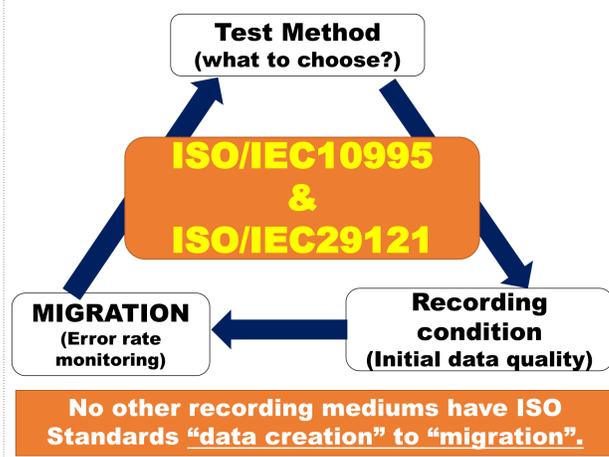
3. Technology obsolescence risk



Number of shipment of optical drives and players

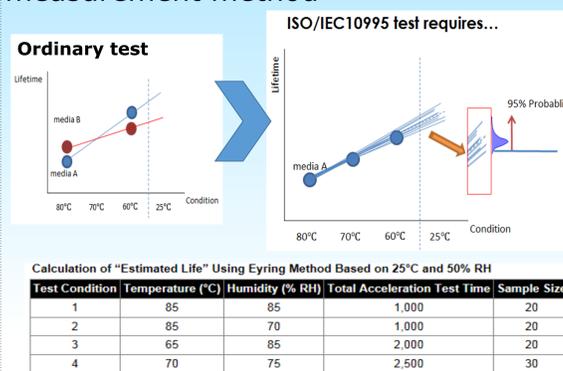
- This technology is used for servers, medical equipment, etc.
- Approximately 300 million units were shipped in 2012 (total shipped is 4 billion units).
- Blu-ray drives are also capable of playing CDs and DVDs. No compatibility problems in generation.

4. Benefit of optical discs



5. ISO standards for optical disc archiving

A) ISO/IEC 10995 defines the life measurement method

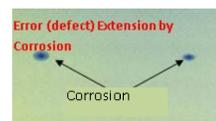


B) ISO/IEC 29121 defines the safe error rate levels for writing and storage.

Initial Occurrence Of Error Rate			Periodical test during storage		
Level	DVDR & RW	Status	Level	DVDR & RW	Status
1	< 140	Recommended	4	< 200	Keep Storing
2	140 - 280	Should not be used	5	200 - 280	Migrate /Refresh
3	> 280	Shall not be used	6	> 280	Migrate /Refresh IMMEDIATELY

6. Basic Disc Design for Archiving

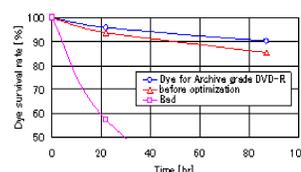
A) Recording layer (Dye design)



Disc defects after 80°C 80% chamber test.

- Since the recording layer uses an organic dye, it is important to use **the stable and high purity raw materials.**
- The defects of a recording layer with insufficient purity design may accelerated deformation.

B) Light Stability



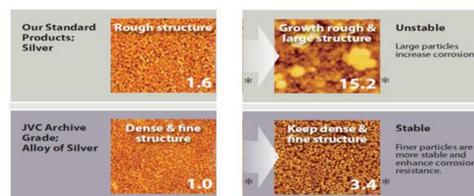
Dye degradation test results by solar simulator

Some dyes have very low ("Bad") light stability. At JVC, we have improved the light stability by tuning up the dye layer during development and trial manufacturing process.

C) Reflective layer

Material	Reflectivity	Impact from Environment	Benefit
Silver	48%	weak	Drives are designed on this technology
Gold	40%	good	Stable material in sever environment

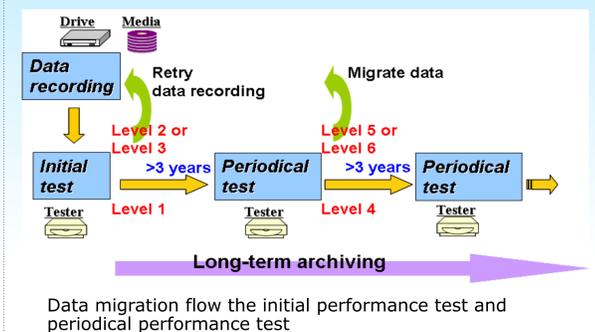
Answer: Silver + Alloying = No reflectivity drop



The higher the reflectivity, the higher the stability of reproduction on the drive.

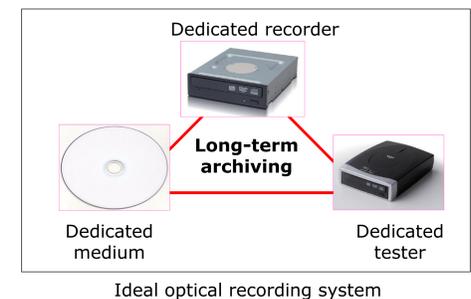
7. Methods of long-term data preservation and disc migration with the international standards

A) Data migration flow making use of ISO/IEC29121



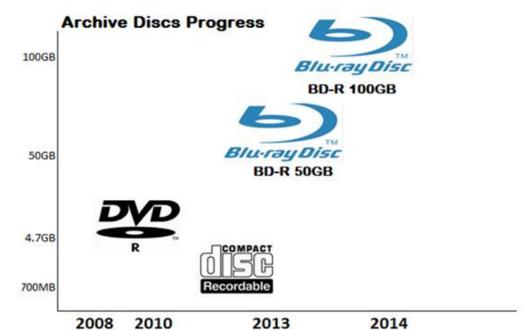
Data migration flow the initial performance test and periodical performance test

B) Ideal System to comply with ISO standards.



It is desirable to use an archive-dedicated product with an appropriate level of basic performance and variance characteristics. ISO/IEC 29121 also mentions the necessity of test drive calibration using a calibration disc to ensure the drive's performance.

8. Technology road map of JVC



9. Conclusion

By utilizing these standards together with properly designed tools, users can create safe archives without complex IT knowledge while minimizing obsolescence risks and the efforts are minimum.