



## MAM Archive Grade Gold Media Longevity

MAM-A Gold Archive grade media is subjected to high humidity and temperature in a controlled environment to determine the expected lifetime when kept in normal storage conditions (room temperature at a moderate humidity). MAM-A follows an industry standard test procedure based on solid scientific principles to get the most accurate estimation possible. Below is selected text from the ISO document describing the procedure:

### INTERNATIONAL STANDARD

ISO 18927:2002(E)

#### **Imaging materials - Recordable compact disc systems - Method for estimating the life expectancy based on the effects of temperature and relative humidity**

##### **1 Scope**

This International Standard specifies a test method for estimating the life expectancy of information stored on recordable compact disc systems. Only the effects of temperature and relative humidity on the media are considered.

This International Standard does not cover the effects of light, air pollution, or time-dependent flow

##### **Purpose**

The purpose of this International Standard is to establish a methodology for estimating the life expectancy of information stored on recordable compact disc systems. This methodology provides a technically and statistically sound procedure for obtaining and evaluating accelerated test data.

The methodology deals only with the effects of temperature and humidity on the retrievability of stored information. For this reason, this International Standard is primarily directed to those storage applications, e.g. libraries and archives, in which exposure to other influences potentially detrimental to information life expectancy, such as chemical agents, intense light sources and improper handling, is controlled and minimized.

##### **Assumptions**

The validity of the procedure defined by this International Standard relies on three assumptions:

- specimen life distribution is appropriately modeled by the lognormal distribution;
- the kinetics of the dominant failure mechanism is appropriately modeled by an Eyring acceleration model;
- the dominant failure mechanism acting at the usage condition is the same as that at the accelerated conditions.

Publications by Hamada and Stinson provide data indicating that these assumptions are applicable to compact disc-recordable (CD-R) systems (see references [6] and [7] in the Bibliography).

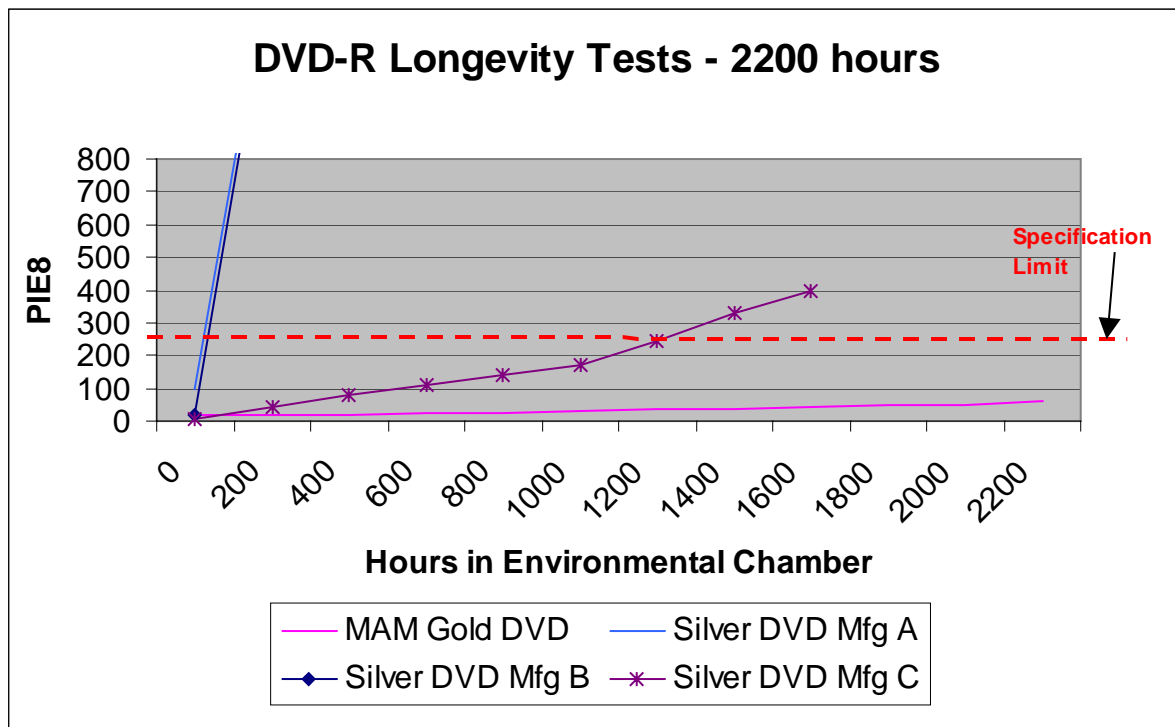
## Measurements Summary

A sampling of eighty recorded discs shall be divided into five groups according to a specified plan. Each group of discs (test cell) shall be subjected to one of five test stresses, combinations of temperature and relative humidity. Periodically during the stress conditions, all discs from each stress group shall have their block error rate (BLER) [or PIE8 for DVD] measured. Data collected at each time interval for each individual disc are then used to determine a lifetime for that disc.

The disc lifetimes at each stress level are fitted to a lognormal distribution to determine a mean lifetime for the stress. The resulting five mean lifetimes are regressed against temperature and relative humidity according to an Eyring acceleration model. This model is then used to estimate the distribution of lifetimes at a usage condition. (end ISO document)

The MAM Gold Archive Grade™ DVD and CD-R media is designed for applications requiring long-term storage of sensitive data, video or music files. The products use 24 karat gold as the reflective layer, offering maximum resistance to chemical breakdown -- one of the major causes of disc failure. Preliminary tests show that the MAM Gold Archive Grade™ DVD lasts significantly longer than ordinary silver recordable DVD discs. The chart below shows 2 silver DVDs that have failed in less than 500 hours and another silver DVD that did much better, but the MAM gold DVD still has error rates well below the upper limit of 280. Our most recent test results predict the **lifetime of the MAM Gold Archive DVD-R to be 116 years.**

The MAM Archive Grade™ Gold DVD is offered as the long awaited companion to the MAM Archive Grade™ **Gold CD-R** which according to recent tests, **has an expected lifetime of 329 years** and has earned a reputation as the highest quality storage media available today.





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## Longevity Test Procedures

In general, the test consists of placing samples in an environmental chamber at specified temperature and humidity levels for 5 different "stress conditions".

A stress condition is defined by, for example, 2000 hours (in 500 hour segments) at 85% relative humidity and 80° centigrade. Temperature and humidity "Incubation" periods are reached gradually with the use of ramp times. (This is done to avoid a shock condition where bubbles can form in the media due to rapid transition).

The 5 stress conditions are defined as follows:

Test Cell number	Test Stress	Number of samples	Incubation period (hours)	Minimum Total Time (hours)	Min Equilibration duration (hours)
1	80C, 85% RH	10	500	2000	6
2	80C, 70% RH	10	500	2000	5
3	80C, 55% RH	10	500	2000	4
4	70C, 85% RH	15	750	3000	8
5	60C, 85% RH	30	1000	4000	11

(Equilibration is the time spent at ambient humidity before removal from chamber)

Before beginning the test and after each incubation period the discs are tested for error rates. Max BLER for CD-R and Max PIE8 for DVD-R. Failure is defined by error rates that exceed Orange Book standards (defined by Sony/Philips) or DVD-R specifications (defined by the DVD Forum). The complete test using the stress conditions listed above takes approximately 6 months to complete.