TECHNICAL REPORT

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Document management — Digital preservation — Analog recording to silver-gelatin microform

Gestion des documents — Conservation numérique — Enregistrement analogique au microforme sur gélatine-argent

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 ISO documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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

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The committee responsible for this document is ISO/TC 171, *Document management applications*, Subcommittee SC 1, *Quality*.

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Introduction

The perceived value of condensing information by optically filming documents, engineering drawings, and cartographic materials to microfilm has been well established along with a large collection of ISO standards that have provided standards and guidance for many years. As more and more information is generated in digital format, only concerns have arisen regarding preservation of digital data and images. History has shown that as long as preservation information is kept in analog format, the digital format becomes more usable, upgradable, and most importantly, safer. The National Micrographics Association (NMA) in 1943 started standardization of practices for the manufacture and use of microfilm, supplies, and equipment in conjunction with organizations such as, the National Bureau of Standards (later to become National Institute of Standards (NIST), National Archives of the US (NARA), Library of Congress (LOC), American National Standards Institute (ANSI), manufacturers such as, Eastman Kodak Company, 3M, Dupont, IBM, and many others.

These documents were introduced into the ISO environment and published as

— ISO 6199:2005, *Micrographics — Microfilming of documents on 16 mm and 35 mm silver-gelatin type microfilm — Operating procedures,* and

— ISO 9923:1994, *Micrographics — Transparent A6 microfiche — Image arrangements.*

In about 1960, Enterprise Report Management (ERM) recognized the value of directly recording computer data onto microfilm using Computer Output Microfilm (COM). These practices and documents all share the common practice of using optical techniques for information capture onto microfilm. The critical test element used in measuring quality in all these systems is based on the ISO test chart 3334 (see Figure 1).

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These were introduced into ISO as

— ISO 8514-1:2000, *Micrographics — Alphanumeric computer output microforms — Quality control — Part 1: Characteristics of the test slide and test data,* and

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— ISO 8514-2:2000, *Micrographics — Alphanumeric computer output microforms — Quality control — Part 2: Method.*

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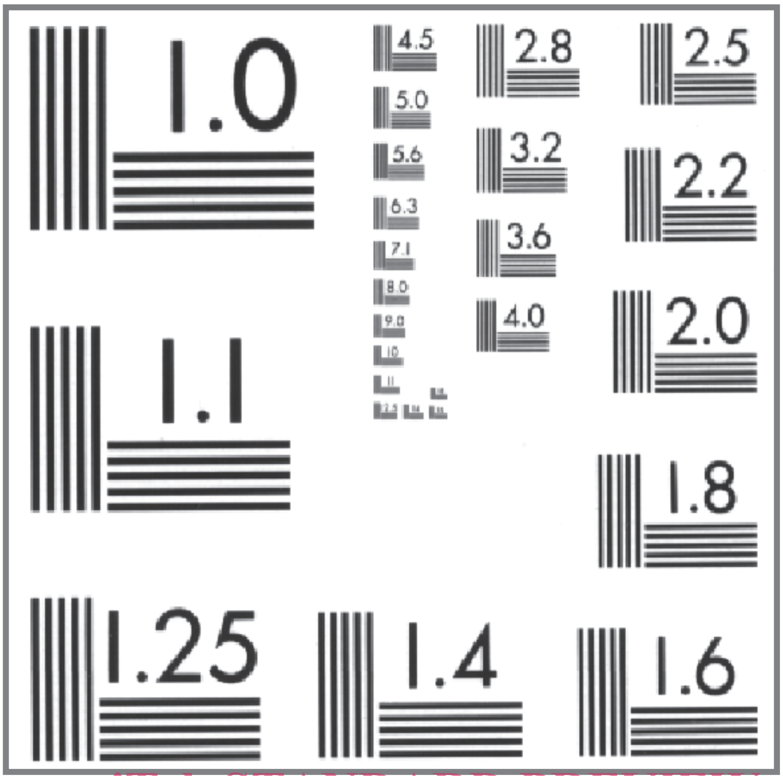

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Figure 1 — Reproduction of ISO test chart 3334

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The key features of this target are sets of five equally spaced lines and spaces that can be filmed at any optical reduction ratio; and by simply examining the resultant image, one can determine camera/film system resolution. The resolution is determined by multiplying the smallest readable element by the reduction ratio to determine line pairs per mm resolution.

In summary, there is a good body of standardized reference materials for measuring quality and ensuring good quality control for traditional optical microfilming or for recording digital data onto microfilm. ISO 11506 further demonstrated the value and gave some guidelines for formatting digital data and images to microfilm.

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Document management — Digital preservation — Analog recording to silver-gelatin microform

1 Scope

This Technical Report recommends test methods for evaluating the consistency of the digital images recorded onto black and white silver microfilm using input from both digitally born documents as well as digital documents created from document scanners. Quality control procedures to be used for optimizing and maintaining output quality onto film over time are described. This Technical Report stresses the use of both commercial and ISO approved standard test targets.

The test methods are based on the visual examination of the output of office document scanners and digitally born test targets on film image recorders.

It is applicable to assessing the output quality of document scanners used in the office and film image recorders used to record the resultant scanned images to microfilm. Microforms can be any common formats including 16 mm, 35 mm, and 105 mm roll microfilm, as well as microfiche depending on the film image recorder capability.

2 Normative references

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The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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ISO 6196 (all parts), *Micrographics — Vocabulary*

ISO 12651-1, *Electronic document management — Vocabulary — Part 1: Electronic document imaging*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6196 and ISO 12651-1 apply.

4 Document imaging

In the late 1980s, companies such as Anacomp Inc., Agfa Gevaert, and later on, Micrographic Technology Corporation [now Global Information Distributors (GlD)] introduced all points addressable imaging devices that no longer use fixed form slides, and thus, ISO 8514-1:2000 was no longer applicable. With the cooperation of manufacturers and users, ISO developed new standards for controlling quality produced on these all points addressable image recorders. These standards describe a digital target, which when called out by the software will write an image intended to verify the performance of the imaging device. This target is independent of the particular COM manufacturer as it is written from digital data only. The primary application of these devices at that time was still outputting Enterprise Report Management (ERM) data.

These were developed by ISO as

— ISO 14648-1:2001, *Micrographics — Quality control of COM recorders that generate images using a single internal display system — Part 1: Characteristics of the software test target,* and

— ISO 14648-2:2001, *Micrographics — Quality control of COM recorders that generate images using a single internal display system — Part 2: Method of use.*

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5 Archive storage media

With the advent of document scanners in the 1980s, document imaging allowed users to convert paper documents to digital images, dramatically increasing the access and communicability of information. However, many commercial, government, and academic institutions still prefer or require permanent records to be on microfilm for permanent preservation. The need to store digital information has precipitated the development of many digital media types and systems. Experts quickly realized that a significant portion of this information would be subject to digital obsolescence, if not preserved carefully. Thus, conversion of these images to digital film can provide this insurance.

In 1995, the introduction of the Kodak Digital Science Document Archive Writer Model 4800 provided a cost efficient manner of capturing these scanned images to digital film as analog images. The image recorder offered rapid conversion of scanned documents to LE 500 (minimum life expectancy 500 years) standard silver-gelatin microfilm. ISO 18901:2010 provides specifications and test requirements to verify that the storage media meets the requirements for LE 500. The first question to be asked was, of course, how does one measure quality control this device? Multiple commercial image recorders now dot the industry and quality control standards are needed for the entire process including digitization of the original documents and quality control of the process of recording them on film.

A simple answer would be to use a digitally created target such as that described in ISO 14648-1:2001 and ISO 14648-2:2001, as referenced above, but users associate these standards with COM rather than document imaging. Kodak chose to introduce its own test target to test all elements of the image recorder and included such a target in the software to do so. This is similar to digital targets offered by Microsoft and printing device manufacturers. The software test target for digital film image recorders should be considered in a similar concept as the printer test image found in office printers. An example of a typical office printer target is shown in Figure 2.

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Microsoft® Windows

Windows Printer Test Page

```
Congratulations!

If you can read this information, you have correctly installed your HP LaserJet
1200 Series PCL 5 on RBRESLAWSKI-T42.

The information below describes your printer driver and port settings.

Submitted Time: 1:37:46 PM 5/13/2014
Computer name:  RBRESLAWSKI-T42
Printer name:   HP LaserJet 1200 Series PCL 5
Printer model:  HP LaserJet 1200 Series PCL 5
Color support:  No
Port name(s):   DOT4_001
Data format:    RAW
Share name:
Location:
Comment:
Driver name:    UNIDRV.DLL
Data file:      HPMCPM25.GPD
Config file:    UNIDRVUI.DLL
Help file:      UNIDRV.HLP
Driver version: 6.00
Environment:    Windows x64

Additional files used by this driver:
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZLSLHN.DLL   (61.053.25.9)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZSSLHN.DLL   (61.053.25.9)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZUILHN.DLL   (61.053.25.9)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPCDMCLH.DLL   (1, 0, 2, 24)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZ5RLHN.DLL   (61.053.25.9)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZSMLHN.GPD
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZSTLHN.DLL   (61.053.25.9)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPMCPD25.CFG
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZ5CLHN.INI
 C:\Windows\system32\spool\DRIVERS\x64\3\HPMCPDP5.XML
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZSCLHN.DTD
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZEVLHN.DLL   (61.053.25.9)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZIDR12.DLL   (11,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZINW12.DLL   (11,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZIPM12.DLL   (11,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZIPR12.DLL   (11,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZIPT12.DLL   (11,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPZISN12.DLL   (11,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPBMIAPI.DLL   (2,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPBMINI.DLL    (61.053.25.4)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPBOID.DLL     (2,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPBOIDPS.DLL   (2,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPBPRO.DLL     (2,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPBPROPS.DLL   (2,2,2,31)
 C:\Windows\system32\spool\DRIVERS\x64\3\HPEACLHN.HPI
 C:\Windows\system32\spool\DRIVERS\x64\3\UNIRES.DLL      (6.1.7600.16385
(win7_rtm.090713-1255))
 C:\Windows\system32\spool\DRIVERS\x64\3\STDNAMES.GPD
 C:\Windows\system32\spool\DRIVERS\x64\3\STDDTYPE.GDL
 C:\Windows\system32\spool\DRIVERS\x64\3\STDSCHEM.GDL
 C:\Windows\system32\spool\DRIVERS\x64\3\STDSCHMX.GDL
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Figure 2 — Windows XP printer test page