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BSI Standards Publication

Document management applications — Archiving of electronic data — Computer output microform (COM)/Computer output laser disc (COLD)

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National foreword

This British Standard is the UK implementation of ISO 11506:2017. It supersedes BS ISO 11506:2009, which is withdrawn.

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Document management applications — Archiving of electronic data — Computer output microform (COM)/ Computer output laser disc (COLD)

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CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
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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 voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 171, *Document management applications*, Subcommittee SC 1, *Quality, preservation and integrity of information*.

This second edition cancels and replaces the first edition (ISO 11506:2009), which has been technically revised.

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Introduction

Businesses, administrations and organizations of all shapes and sizes are becoming more and more electronic in the way they operate, either by digitizing their paper documents, or by doing business purely electronically (networked procedures and declarations, on-line administrative forms, creating contracts electronically, etc.). In addition to facilitating the process of using, processing and transferring information, these practices reduce the volume of written information in relation to their paper equivalent.

The change towards electronic resources concerns information of all levels of importance or seriousness, from internal documents to medical files to accounting records, tax declarations, banking transactions and e-commerce. Questions concerning the authenticity and traceability of legal documents are therefore of critical importance. Many countries have made changes to their legislation in order to regulate the use of electronic processes in the presentation of evidence. The implication of questions of evidence regarding archiving techniques can therefore not be ignored, in an increasingly connected world, where cross-border transactions are common, and where the use of processes described as "paper free" only fuels the need for solutions that offer sufficient guarantees in terms of information integrity and durability.

Thus, and regardless of the motives, this new situation is creating a major problem: how to archive reliably and potentially for a very long period of time, data that have been created, converted to, or received in, electronic form. In effect, with regard to archiving techniques, it should be noted that an electronic document is linked to the software and hardware that is capable of interpreting it, displaying it and making it intelligible. This means that preserving an electronic document cannot be limited to storing, bit by bit, the digital data as a stored physical object due to the rapid obsolescence of computer hardware, software and peripherals. Archiving needs to make this information independent of the originating software and hardware storage platform, so as to guarantee its preservation during the required retention periods.

While this document recognizes the need to preserve documents using micrographic technology, significant advances have been made with standardization of file formats like PDF, PDF/A, as well as others. This document supports the continued use of film and emerging new kinds of micrographic media as a deep reference archive to electronic formats and media.

For centuries, paper was the preferred material for the archiving of written work, allowing information to be saved, managed, transmitted and proved. A single medium is not conceivable for electronic data, since accessing and consulting on-line is a dynamic approach, while archiving and presentation of evidence is a static approach, and these are thus antinomic. It then becomes necessary to analyse separately correlative technical resources to avoid confusing the "consumable" part of the electronic information with the part whose durability is essential for saving work.

The questions relating to the conditions in which the electronic data concerning nominative or sensitive information are stored are part of this issue. Dynamically storing such data presents a potential danger for privacy (see Annex A).

This demonstrates a real need for clarification and this document has been prepared to help economic and social partners to archive their electronic data with great care. It will help them answer questions relating to legal aspects as and when they arise, as well as those relating to the preservation of privacy and individual rights.

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Document management applications — Archiving of electronic data — Computer output microform (COM)/ Computer output laser disc (COLD)

1 Scope

This document specifies techniques for archiving electronic data to ensure their long-term integrity, accessibility, usability, readability and reliability, in order to protect the evidential value of the data.

In this document, long term is considered to be a period of time lasting more than a century (see ISO 18911).

Black-and-white microforms processed with liquid chemicals are used in this document because the result is always an irreversible record and because of the proven quality of microforms as a long-term preservation media.

This document also specifies procedures for the parallel recording, by a single production unit, of COM and COLD output from the same data.

It applies to many different types of electronic data, such as text and two-dimensional graphic data which can be represented as a black-and-white image.

It is not applicable to the following:

— animated images or sounds;

— three-dimensional images;

— images in shades of grey or in colour;

— X-ray images.

Neither is this document applicable to microforms created from dry thermal processes, since they offer insufficient guarantees in terms of irreversibility and longevity.

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 6196-1, *Micrographics — Vocabulary — Part 1: General terms*

ISO 6196-2, *Micrographics — Vocabulary — Part 2: Image positions and methods of recording*

ISO 6196-3, *Micrographics — Vocabulary — Part 3: Film processing*

ISO 6196-4, *Micrographics — Vocabulary — Part 4: Materials and packaging*

ISO 6196-7, *Micrographics — Vocabulary — Part 7: Computer micrographics*

ISO 6196-8, *Micrographics — Vocabulary — Part 8: Use*

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

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

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ISO 11928-1, *Micrographics — Quality control of graphic COM recorders — Part 1: Characteristics of the test frames*

ISO 11928-2, *Micrographics — Quality control of graphic COM recorders — Part 2: Quality criteria and control*

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

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

ISO 18901:2010, *Imaging materials — Processed silver-gelatin-type black-and-white films — Specifications for stability*

ISO 18911, *Imaging materials — Processed safety photographic films — Storage practices*

ISO 18917, *Photography — Determination of residual thiosulfate and other related chemicals in processed photographic materials — Methods using iodine-amylose, methylene blue and silver sulfide*

ISO/IEC 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6196-1, ISO 6196-2, ISO 6196-3, ISO 6196-4, ISO 6196-7 and ISO 6196-8 and the following 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
integrity
quality of being complete and unaltered

[SOURCE: ISO 13008:2012, 3.11]

3.2
irreversibility
result of a recording process depending on the chemical and/or physical transformation of a recordable medium into a non-recordable medium

3.3
computer output microform
COM
<process> structuring and recording of electronic documents on microforms

Note 1 to entry: Equipment for the production of microforms can use a generator of graphics (e.g. CRT, LED, laser and plasma screen), allowing the recording of electronic images on silver halide film.

Note 2 to entry: The official definition of the term COM in ISO 6196-7 does not take into account important evolutions of this technique in recent years.

3.4
computer output laser disc
COLD
process in which electronic data is structured and stored on WORM media or in WORM systems

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3.5
COLD medium
electronic data storage medium, created from a *COLD* (3.4) production

3.6
COM-COLD dual recording
parallel recording, by a single production unit, producing a double *COM* (3.3) and *COLD* (3.4) output from the same file

3.7
modular COM-COLD system
COM (3.3) production unit with a COLD module, capable of structuring and performing a *COM-COLD dual recording* (3.6)

3.8
evidentiary copy
reproduction made by technical means specially chosen so as not to interrupt the evidentiary effects of the reproduced document

4 Electronic data archiving

4.1 Archiving functions

The archiving of electronic data is based on a few important functions. In this document, the following functions are explained:

a) memorization;

b) accessibility;

c) usability;

d) legibility;

e) integrity.

These functions are interlinked. They have technical consequences and can also have legal consequences.

4.2 Functional specifications

a) The memorization function requires the use of durable media with quantifiable longevity.

b) The accessibility function requires the use of processes containing ways of retrieving information and making it available and transmittable.

c) The usability function requires the use of methods that have no risk of being rendered impracticable or incompatible due to tools becoming obsolete or operational methods disappearing.

d) The legibility function requires the use of signs or symbols that have a clear and consistent meaning.

e) The integrity function requires the use of recording and memorization methods that reveal any change in the information after it has been recorded.

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5 Specifications related to micrographics options

5.1 Choice of principles

Computer micrographics can be used to archive electronic data to ensure their authenticity and/or meet the need for long-term archiving.

— Using computer micrographics is recommended, even in the very short term, when the identity and the integrity of the electronic data need to be guaranteed.

— Using computer micrographics is recommended for data which is to be archived for more than 3 years.

— Intent to re-digitize should be considered in choice of microform used.

5.2 Choice of microform type

The choice of the type of microform shall be based on technical essentials and constraints specific to the application chosen, as well as on organizational preferences or constraints (see Table 1).

The choice of microform type should be linked to the level of miniaturization that it implies, so that the capacities to produce all the significant details within the file are real.

NOTE See Annex B.

Table 1 — Main characteristics of COM microforms

Microform type	Direct or sequential access	Segmentation[a]	Chaining[b]	Immediate processing[c]
Microfiche	Direct	Yes	Yes	Yes
16 mm roll	Sequential	No	Yes	No
35 mm roll	Sequential	No	Yes	No
Aperture card[d]	Direct	Yes	No	No

[a] Segmentation: facilitating breaks, dispatching, accessibility and selective mobility of information.

[b] Chaining: linking together a large number of pages.

[c] Immediate processing: linking recording and processing in one machine.

[d] Aperture cards: designed for archiving of technical drawings.

6 Specifications related to micrographic recording

6.1 Encoding formats

6.1.1 General

Files to be archived are created in formats based on the software used. The diversity of these code formats often requires converting them into a format recognized by COM systems.

NOTE This conversion is comparable to one which is carried out from a paper print. Paper printing, however, has only one unique production format. When printing on paper, the print driver starts by converting the file's original format (e.g. ".doc", ".pdf", ".jpg") into one single format recognized by the printer (e.g. ".pcl"). This operation is carried out automatically and is not visible to the user.

For production in COM, two large file categories shall be defined: files in line mode and files in image mode.

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6.1.2 Line mode

Alphanumeric COM recorders typically use ASCII as the internal code for 8-bit character sets (such as the Latin alphabet).

Files created in ASCII shall be sent directly to the COM recorder without any conversion.

Files using 8-bit character encoding, but encoded in a code other than ASCII, shall be converted into ASCII prior to COM production.

16-bit coded character sets (also known as "unicode characters"), such as the Oriental and Asian alphabets, raise two distinct issues:

a) they are supported by specific versions of COM systems (a Kanji COM recorder, for example). These shall be sent directly to the COM recorder without any conversion;

b) they require a conversion in image mode (see 6.1.3).

6.1.3 Image mode

Graphic COM recorders typically support image files in black-and-white TIFF format.

The characteristics of the image in TIFF format shall take into account the requirements of the graphics COM recorder used for recording, especially concerning compression and resolution.

ITU[1)] G3 or ITU G4 compression is generally accepted by graphic COM recorders.

The resolution shall be adapted to the COM recorder resolution capacities. Since individual models of COM recorders can have different resolution capabilities, the selection of the COM recorder shall be based on the requirement of the resolution for the data being archived. When the resolution of the file differs from the COM recorder resolution capacities, it might be necessary to convert the file in order to avoid changing the scale of the images in relation to the expected reduction ratio.

Files in black-and-white TIFF format accepted by a COM recorder shall be sent directly to the COM recorder without any conversion.

Files in a different image format, as well as text files, the coding of which is not supported by the COM recorder, shall be converted into compatible black-and-white TIFF format so that they can be recorded on microforms.

6.1.4 Form overlays

6.1.4.1 General

The processing of certain files requires the use of form overlays, which may be in optical or electronic format.

6.1.4.2 Optical form overlays

These are made up of the physical image produced by a photographic image on a glass (or other transparent) plate. The image of the form is flashed simultaneously when each page in the file is created, with the two types of data being combined on the same image using a prism.

6.1.4.3 Electronic form overlays

This is the image of the form produced as a file stored in the memory of the COM recorder. The image of the form overlay is recreated by the COM recorder at the same time as the data from the production file,

1) Formerly CCITT.

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with the two types of data being combined on the same image. Electronic form overlay systems enable the recording of files requiring multiple form overlay formats within the same file.

6.2 Conversion

6.2.1 General

When necessary, any conversion into text format or image format recognized by a COM recorder shall be carried out with the help of tools which retain the integrity of the content of the original data. Conversion processes shall not significantly affect the presentation of the data.

6.2.2 Conversion of files in line mode

For converting files with 8-bit encoded characters, the file's external code (e.g. EBCDIC) shall be converted into the COM recorder's internal code (ASCII) by conversion tables contained in the COM recorder. ISO/IEC 8859-1 shall be applied to ensure an exact "sign by sign" conversion.

6.2.3 Conversion of files in image mode

Files that only contain image data (which can be an image of text), files mixed with line mode and image mode or files in line mode requiring a transfer into image mode so they can be recorded on microform, shall be converted. The conversion procedure shall be identical in the three cases.

For formats requiring this type of conversion, the transfer shall be carried out, either by using the "export" or "save as" function in the original software or by using dedicated conversion software for this format.

When the image file is created by word processor software, the character font tables shall be taken into account in the conversion parameters.

6.3 COM recording process

6.3.1 Production parameters

All the elements that characterize the processing of a given application shall be put together and stored in the form of a set of commands and parameters (a program commonly known as a "JOB").

Each "JOB" shall integrate the description of the format of the file to be processed, the management of electronic form overlay, if any, titling and indexing, breaks, the reduction ratio and recording or page direction, as well as other additional elements (banner pages, links with other JOBs, etc.).

6.3.2 Form overlays

Form overlays are typically only used in the production of microfiche and 16 mm microfilm.

Form overlays (optical or electronic) shall reproduce all the significant elements of the form they represent and shall ensure the correct reciprocal alignment of the form with the associated data.

Form overlay quality shall be good enough for it to be read efficiently.

6.3.3 Data reception

6.3.3.1 Transmission

Electronic data for COM recording can be transmitted by network or by exchangeable computer media.

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