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Document management — Portable document format —

Part 2: PDF 2.0

*Gestion de documents — Format de document portable —
Partie 2: PDF 2.0*



Reference number
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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 2, *Application issues*, in collaboration with Technical Committee ISO/TC 130, *Graphic technology*.

A list of all the parts of ISO 32000 can be found on the ISO website.

Introduction

0.1 PDF

PDF enables users to exchange and view electronic documents easily and reliably, independent of the environment in which they were created or the environment in which they are viewed or printed.

At the core of PDF is an advanced imaging model derived from the PostScript®¹ page description language. This PDF Imaging Model enables the description of text and graphics in a device-independent and resolution-independent manner at a complete, precise and professional level. Unlike PostScript, which is a programming language, PDF is based on a structured binary file format that is optimised for high performance in interactive viewing.

PDF includes objects such as annotations and hypertext links that are not part of the page content itself but are useful for interactive viewing and document interchange. PDF also includes data structures such as tagged PDF, XMP and an associated files mechanism, that are useful for document management and content reuse.

PDF files can be created natively in PDF form, converted from other electronic formats. Since PDF supports a wide range of image and compression technologies, it is a suitable format for documents digitised from paper, microform, or other hard copy formats. Businesses, governments, libraries, archives and other institutions and individuals around the world use PDF to represent considerable bodies of important information. Since its introduction in 1993, aided by the explosive growth of the Internet, PDF has become widely used for the electronic exchange of documents.

There are several specific applications of PDF that have evolved in which limiting the use of some features of PDF while requiring the use of others, enhances the usefulness of PDF. The following International Standards address specialised uses of PDF:

- PDF/X (ISO 15930) is the industry standard for the intermediate representation of printed material in electronic prepress systems for conventional printing applications.
- PDF/A (ISO 19005) is the industry standard for the archiving of digital documents.
- PDF/UA (ISO 14289) is the industry standard for accessible PDF documents and processors.
- PDF/E (ISO 24517) provides a mechanism for representing engineering documents and exchanging engineering data.
- PDF/VT (ISO 16612-2) is for high volume printing of personalised documents including variable data.

As corporations, government agencies, and educational institutions streamline their operations by replacing paper-based workflows with electronic exchange of information, the impact and opportunity for the application of PDF will continue to grow at a rapid pace.

PDF, together with software for creating, viewing, printing and processing PDF files in a variety of ways, fulfils a set of requirements for electronic documents including:

¹ PostScript® is a trademark of Adobe Systems Incorporated. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named..

- preservation of document fidelity independent of the device, platform, and software,
- merging of content from diverse sources — Web sites, word processing and spreadsheet programs, scanned documents, photos, and graphics — into one self-contained document while maintaining the integrity of all original source documents,
- an extensible metadata model at the document and object level,
- collaborative editing of documents from multiple locations or platforms,
- digital signatures to certify authenticity,
- security and permissions to allow the creator to retain control of the document and associated rights,
- accessibility of content to those with disabilities,
- extraction and reuse of content for use with other file formats and applications, and
- electronic forms to gather and/or represent data within business systems.

0.2 ISO 32000 and PDF

PDF was developed and specified by Adobe Systems Incorporated beginning in 1993 and continuing until 2007 when ISO 32000-1 was first prepared. The Adobe Systems version PDF 1.7 was the basis for ISO 32000-1. The ISO 32000 series has been created as a multi-part document, of which this is Part 2. This allows future parts to be created without rendering ISO 32000, or applications based on it, obsolete. See clause 5, "Version designations" for how the version numbers of PDF (1.0, 1.1, 1.2, [...] 2.0) relate to one another.

The primary purpose of this document is to define well-formed PDF documents (conforming PDF files).

In carefully specifying what constitutes a well-defined PDF document, it is natural to describe why a particular feature is to be included in the file and what effect it is designed to have on PDF processing software. So, although the primary objective of this document is to describe the content of conforming PDF documents, it also serves secondary purposes of defining exactly how a PDF component is constructed, suggesting why a producer might choose to use the various PDF constructs, as well as what behaviour is elicited from software consuming that PDF file. The choice of which specific set of features a particular PDF processor supports is not specified.

PDF files represent electronic documents. Over time, it was natural to add features that take advantage of PDF's nature, and the power of computer viewing devices. The size of the PDF documentation has more than quadrupled since its first introduction, and the number of features that a PDF processor is expected to support has grown to be large.

0.3 Changes introduced in this document

Starting with PDF 2.0 the term "conforming reader" is no longer used. The terms "interactive PDF processor", "PDF reader" and "PDF writer" are used instead, and have a conditional conformance definition. See 6.1, "Conforming PDF documents" for further discussion of this change.

This specification includes many changes from ISO 32000-1:2008, however only significant new features are marked as being new in PDF 2.0.

PDF 2.0 includes the following new features:

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- 7.6.7, "Unencrypted wrapper document"
- 8.6.5.9, "Use of black point compensation";
- 12.5.6.24, "Projection annotations";
- 12.8.3.4, "CAdES signatures as used in PDF";
- 12.8.4, "Long term validation of signatures";
- 12.8.4.3, "Document Security Store (DSS)" and 12.8.5, "Document timestamp (DTS) dictionary";
- 12.10, "Geospatial features";
- 13.7, "Rich media" annotations;
- 14.7.4, "Namespaces" for tagged PDF;
- 14.9.6, "Pronunciation hints";
- 14.12, "Document parts";
- 14.13, "Associated files";
- Support for PRC (see 13.6, "3D Artwork");
- Support for UTF-8.

PDF 2.0 adds many new capabilities to existing features in PDF, including:

- Transparency and blend mode attributes for annotations;
- Stamp Annot intent;
- Polygon/Polyline real paths;
- 256-bit AES encryption;
- ECC-based certificates;
- Unicode-based passwords;
- Document requirement extensions;
- New value for tab order of fields and annotations;
- Page-level OutputIntents;
- Referenced (external) OutputIntents;
- Thumbnails for embedded files;
- Halftone Origin (HTO);
- Measurement & Point Data for image & form XObjects;
- L (length) key for inline image data;
- Viewer preferences enforcement (of print scaling);
- 3D measurements;
- GoToDp action;
- RichMediaExecute action;
- Extension to GoTo and GoToR to support linking to a specific structure element;
- Extension to Signature Field Locks and Signature Seed Values;
- Extensions to 3D viewing conditions, incl. transparency;

- Ref (reference) structure elements;
- PageNum and Bates artifact types;
- New list types for structured lists;
- “Short” (short name) attribute for table header cells
- Extensions to OutputIntents (MixingHints and SpectralData).

The following clauses have been substantially rewritten for PDF 2.0:

- 7.4.7, "JBIG2Decode filter";
- 10.1 – 10.3, "Rendering";
- 11, "Transparency";
- 12.8, "Digital signatures";
- 14.3, "Metadata";
- 14.8, "Tagged PDF";
- 14.9, "Repurposing and accessibility support".

PDF 2.0 includes many important corrections, extensions and clarifications for existing features, including:

- Corrections for many typing errors including bad symbols and truncated formulae.
- Updates and changes in normative references and the bibliography.
- Improved cross referencing for clauses, tables and figures within this document.
- Clarification for processing dashed and degenerate lines, clarification for processing text objects and blending colour spaces within the transparency framework, clarifications and enhancements for annotation appearances, stamp annotations extension and polyline annotation enhancement.
- Strengthened encryption including introduction of elliptic curve cryptography, more control over forms tab ordering, enforced viewer preferences, rich text, improvements to digital signatures for long term signatures, 3D viewing improvements including 3D projections, revised blend formulae for **ColorBurn** and **ColorDodge**, additional structure tags to improve accessibility, requirement for metadata streams to be XMP and support for hyperlinks in rich text.
- Clarification for PDF version numbering, resource inheritance, required and optional signature dictionary **SubFilter** keys, artifacts, developer-defined extensions, word breaking and page sizes, which file to show when first opening a collection, scope of header attributes, precedence of CID font widths, when a **CIDToGIDMap** is used with Type 2 CID fonts, deprecate sound and movie actions and annotations in favour of newer methods, rendering intent and ImageMask, precedence of Type 1 encoding methods, the wording used to define delimiters with respect to << and >>, Identity CMaps and CIDFonts, a special case when closing and filling a path, that clipping follows filling rules and that operating on an undefined path generates an error.
- Clarification and terminology improvements among Type 1, TrueType, CFF and OpenType fonts; thumbnails for embedded files.
- Specification of XFA used for rich text in annotations.
- The rewrite of 14.8, "Tagged PDF" includes clarification of the child/parent/sibling relationships between tags, simplifies and extends the standard tag set, and adds the use of namespaces for custom tag sets (see also 14.7.4, "Namespaces" for new namespace functionality).

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A repository of referenced documents has been established by the PDF Association (<https://reference.pdfa.org/iso/32000>). Not all referenced documents can be found there due to copyright restrictions.

Some features present in earlier versions of PDF have been deprecated in PDF 2.0, including:

- XFA (incl. NeedsRendering);
- Movie, Sound and TrapNet annotations;
- Movie and Sound actions;
- Info dictionary;
- Assistive technology restrictions via DRM;
- ProcSet;
- OS-specific file specifications;
- OS-specific additions to Launch actions;
- Names for XObjects;
- Names for Fonts;
- Arrays of Blend Modes;
- Alternate Presentations;
- Open prepress interface (OPI);
- CharSet (For Type 1 fonts);
- CIDSet (for CID fonts);
- Prepress viewer preferences (ViewArea, ViewClip, etc.);
- NeedAppearances;
- adbe.pkcs7.sha1;
- adbe.x509.rsa_sha1;
- Encryption of FDF files;
- Suspects flag in MarkInfo dictionary
- UR signatures.

Document management — Portable Document Format — Part 2: PDF 2.0

IMPORTANT — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users who need a paper copy of this document will therefore benefit from using a colour printer.

1 Scope

This document specifies a digital form for representing electronic documents to enable users to exchange and view electronic documents independent of the environment in which they were created or the environment in which they are viewed or printed. It is intended for developers of software that creates PDF files (PDF writers), software that reads existing PDF files and (usually) interprets their contents for display (PDF readers), software that reads and displays PDF content and interacts with the computer users to possibly modify and save the PDF file (interactive PDF processors) and PDF products that read and/or write PDF files for a variety of other purposes (PDF processors). (PDF writers and PDF readers are more specialised classifications of interactive PDF processors and all are PDF processors).

This document does not specify the following:

- specific processes for converting paper or electronic documents to the PDF file format;
- specific technical design, user interface implementation, or operational details of rendering;
- specific physical methods of storing these documents such as media and storage conditions;
- methods for validating the conformance of PDF files or PDF processors;
- required computer hardware and/or operating system.

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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 or corrigenda) applies.

NOTE An attempt is being made to keep copies of all references without copyright restrictions available for free download on the following website: <https://reference.pdfa.org/iso/32000>.

ISO 3166-1:2013, *Codes for the representation of names of countries and their subdivisions – Part 1: Country codes*.

ISO/IEC 8824-1, *Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation*

ISO/IEC 10646, *Information technology – Universal Coded Character Set (UCS)*

ISO/IEC 10918 (all parts), *Information Technology – Digital Compression and Coding of Continuous-Tone Still Images: Requirements and guidelines* (informally known as the JPEG standard, for the Joint Photographic Experts Group, the ISO group that developed the standard)

ISO/IEC 14492:2001, *Information technology – Lossy/lossless coding of bi-level images*

ISO/IEC 14492:2001/Amd 1:2004, *Information technology – Lossy/lossless coding of bi-level images — Amendment 1: Encoder*

ISO/IEC 14492:2001/Amd 2:2003, *Information technology – Lossy/lossless coding of bi-level images — Amendment 2: Extension of adaptive templates for halftone coding*

ISO/IEC 14496-22:2015, *Information technology – Coding of audio-visual objects — Part 22: Open Font Format*

ISO/IEC 14496-22:2015/Amd 1:2017, *Updates for font collections functionality*

ISO 14739-1:2014, *Document management – 3D use of Product Representation Compact (PRC) format — Part 1: PRC 10001*

ISO 15076-1:2010, *Image technology colour management – Architecture, profile format and data structure — Part 1: Based on ICC.1:2010*

ISO/IEC 15444-1:2004, *Information technology — JPEG 2000 image coding system: Core coding system*

ISO/IEC 15444-2:2004, *Information technology — JPEG 2000 image coding system: Extensions*

ISO 15930 (all parts), *Graphic technology — Prepress digital data exchange — Use of PDF* (informally known as the PDF/X standards)

ISO/IEC 16262:2011, *Information technology — Programming languages, their environments and system software interfaces — ECMAScript language specification*. (Also known as JavaScript. Also available as ECMA-262 Edition 5.1 from ECMA)

ISO 16684-1, *Extensible metadata platform (XMP) specification — Part 1: Data model, serialization and core properties*

ISO 17972-4, *Graphic technology — Colour data exchange format (CxF/X) — Part 4: Spot colour characterisation data (CxF/X-4)*

ISO 18619, *Image technology colour management – Black point compensation*

ISO 19162, *Geographic information – Well known text representation of coordinate reference systems*

ISO 19444-1:2016, *Document management – XML Forms Data Format – Part 1: Use of ISO 32000-2 (XFDF 3.0)*

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IEC 61966-2-1 ed1.0 (1999-10), *Multimedia systems and equipment — Colour measurement and management — Part 2-1: Colour management — Default RGB colour space — sRGB* (with Amendment 1 IEC 61966-2-1-am1 ed1.0 (2003-01))

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ANSI X9.62-2005, *Public Key Cryptography For The Financial Services Industry: The Elliptic Curve Digital Signature Algorithm (ECDSA)*, American National Standards Institute

PostScript Language Third Edition, (February, 1999), Adobe Systems Incorporated¹

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Adobe Glyph List, 2015, Adobe Systems Incorporated¹

Adobe Glyph List for New Fonts, Version 1.6, (January 2006), Adobe Systems Incorporated¹

Adobe JavaScript for Acrobat API Reference, Version 9.1, (August 2009), Adobe Systems Incorporated¹

Adobe PDF Signature Build Dictionary Specification v.1.4, (March 2008), Adobe Systems Incorporated¹

Adobe TIFF Revision 6.0, Final, (June 1992), Adobe Systems Incorporated¹

Adobe Type 1 Font Format, Version 1.1, (February 1993), Addison-Wesley, ISBN 0-201-57044-0¹

Adobe XML Architecture, XML Forms Architecture (XFA) Specification, version 3.3, (January 2012), Adobe Systems Incorporated¹

Adobe XMP: Extensible Metadata Platform, Part 2: Standard Schemas, (July 2010), Adobe Systems Incorporated. (Refer to ISO 16684-1 for the XMP core standard.)¹

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Adobe Technical Note #5014, *Adobe CMap and CID Font Files Specification, Version 1.0*, (8 October 1996), Adobe Systems Incorporated¹

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¹ These documents can be found at the PDF Association at <https://reference.pdfa.org/iso/32000> as well as at the Adobe Systems Incorporated Web site http://partners.adobe.com/public/developer/pdf/index_bibliography.html.

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Adobe Systems Incorporated¹

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Systems Incorporated¹

Adobe Technical Note #5176, *The Compact Font Format Specification, version 1.0*, (December 2003),
Adobe Systems Incorporated¹

Adobe Technical Note #5177, *The Type 2 Charstring Format*, (March 2000), Adobe Systems
Incorporated¹

Adobe Technical Note #5620, *Portable Job Ticket Format, Version 1.1*, (April 1999), Adobe Systems
Incorporated¹

Adobe Technical Note #5660, *Open Prepress Interface (OPI) Specification, Version 2.0*, (January 2000),
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Processing Standards²

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Task Force (IETF)³

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Engineering Task Force (IETF)³

RFC 2045, *Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies*,
(November 1996), Internet Engineering Task Force (IETF)³

¹ These documents can be found at the PDF Association at <https://reference.pdfa.org/iso/32000> as well as at the Adobe Systems
Incorporated Web site http://partners.adobe.com/public/developer/pdf/index_bibliography.html.

² These FIPS documents are available from NIST at <http://www.nist.gov/itl/fipscurrent.cfm>.

³ These documents are available as Internet Engineering Task Force RFCs at <https://www.ietf.org/>.

- RFC 2046, *Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types*, (November 1996), Internet Engineering Task Force (IETF)³
- RFC 2083, *PNG (Portable Network Graphics) Specification, Version 1.0*, (March 1997), Internet Engineering Task Force (IETF)³
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- RFC 3161, *Internet X.509 Public Key Infrastructure Time-Stamp Protocol (TSP)*, (August 2001), Internet Engineering Task Force (IETF)³
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⁴ These documents are available from <http://www.etsi.org>

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

approval signature

one or more digital signatures applied to a document, each one allowing the detection of changes to the document and which confirms a signer of the document

3.2

array object

one-dimensional collection of objects arranged sequentially and implicitly numbered starting at 0

3.3

ASCII

American Standard Code for Information Interchange

widely used convention for encoding a specific set of 128 characters as binary numbers defined in ANSI X3.4-1986

3.4

ASN.1

means of reference to ISO/IEC 8824-1

3.5

binary data

sequence of bytes

3.6

boolean objects

either the keyword **true** or the keyword **false**

3.7

byte

group of 8 binary digits (an 8-bit value) which collectively can be configured to represent one of 256 different values

3.8

CAdES

means of reference to ETSI EN 319 122-1 V1.1.1 and ETSI EN 319 122-2 V1.1.1

3.9

certification signature

one and only one digital signature applied to a document which allows the detection of changes to the document and which confirms the origin or the author of the document and that is able to allow or to block specified actions to be performed when using conformant signatures handlers or PDF processors