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Document management — Engineering document format using PDF —

Part 2:
Use of 32000-2 including support for long-term preservation (PDF/E-2)

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 24517-2 was prepared by Technical Committee ISO/TC 171, *Document Management Applications*, Subcommittee SC 2, *Application Issues*.

ISO 24517 consists of the following parts, under the general title *Document management — Engineering document format using PDF*:

— *Part 1: Use of PDF 1.6 (PDF/E-1)*

— *Part 2: Use of ISO 32000-2 including support for long-term preservation (PDF/E-2)*

Introduction

ISO 24517 (all parts) defines a file format for the exchange of engineering documents based on the PDF format for various communities working with engineering documentation. It is a multi-part standard with subsequent parts expected to address future workflow and data requirements. This standard improves document exchange, collaboration, and print accuracy within engineering workflows, both inside companies and with extended enterprises of partners, suppliers, customers, government organisations, and citizens. It will enable organisations to streamline engineering workflows that incorporate diverse sets of complex documents, resulting in improved productivity and the ability to more quickly deliver better products to market. It defines the features of PDF that are required, recommended, restricted, or prohibited when creating, viewing, marking up, printing, analyzing, and distributing engineering documents. It takes into consideration the differing needs of both interactive and non-interactive readers.

ISO 24517 specifies the proper use of PDF for on-screen display and printing of engineering documents. Printed engineering documents are assemblies of a page (or pages) created by different organisations, which can be inter-departmental or inter-company. It also defines a framework for representing the logical structure and other semantic information of engineering documents within conforming files.

ISO 24517 is intended to provide a format for the development of various applications, such as products that read, render, write, print, and validate conforming PDF documents. Different products will incorporate various capabilities to prepare, interpret, and process conforming objects. However, the inclusive, feature-rich nature of the format requires that additional constraints be placed on its use to make it suitable for engineering workflow documents.

PDF/E allows engineering professionals to reliably create, exchange, and review engineering documentation, including large format documents. PDF/E enables organisations to work more effectively when creating or exchanging engineering documentation.

This part of ISO 24517 is intended to lead to the development of various applications that read, render, write and validate conforming files. Different applications will incorporate various capabilities to prepare, interpret and process conforming files based on needs as perceived by the suppliers of those applications. However, it is important to note that a conforming application needs to be able to read and process appropriately all files complying with a specified conformance level.

This part of ISO 24517 introduces the new “Encrypted Document” conformance level, otherwise referred to as PDF/E-2s. PDF/E-2 documents are not permitted to be encrypted in order to enable proper archiving, however, there are some engineering workflows where content needs to be encrypted in order to protect the rights of the authors. For this particular use case, a user may choose to use the PDF/E-2s conformance level.

This part of ISO 24517 extends the capabilities of Part 1. It is based on PDF version 2.0 (as defined in ISO 32000-2) rather than PDF version 1.6 (which is used as the basis of Part 1). These added capabilities are through compliance with ISO 32000-2 and include:

- Support for numerous enhancements to 3D including support for PRC
- Support for Geospatial information (GIS) in both 2D and 3D
- Compressed Object and XRef streams (for smaller file sizes)
- Transparency
- JPEG 2000 compression

The following terms, referring to this specification or parts thereof, are recommended when the full ISO name is not being used:

— “PDF/E” – a synonym for the ISO 24517 family of standards;

— “PDF/E-1” – a synonym for ISO 24517-1;

— “PDF/E-2” – a synonym for ISO 24517-2;

This part of ISO 24517 (in conjunction with its normative references) provides sufficient information to interpret any conforming PDF/E-2 file.

AIIM (an accredited standards developing organisation) may maintain an ongoing series of application notes for guiding developers and users of this part of ISO 24517. These application notes are available at <http://www.aiim.org/pdfa/>. AIIM will also retain copies of the specific non-ISO normative references of this part of ISO 24517 which are publicly available electronic documents.

Document management — Engineering document format using PDF — Part 2: Use of ISO 32000-2 including support for long-term preservation (PDF/E-2)

1 Scope

This part of ISO 24517 specifies the use of the Portable Document Format (PDF) 2.0, as formalized in ISO 32000-2, for the creation and preservation of documents used in engineering workflows.

This part of ISO 24517 does not apply to:

— specific processes for converting paper or electronic documents to the PDF/E 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;

— required computer hardware and/or operating systems.

2 Normative references

The following referenced documents are indispensable for the application 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/IEC 646, *Information technology — ISO 7-bit coded character sets for information interchange*

ISO 32000-2, *Document management — Portable document format — Part 2: PDF 2.0*

Extensible Markup Language (XML) 1.0 (Third Edition), W3C Recommendation, 4 February 2004. Available from the Internet <http://www.w3.org/TR/2004/REC-xml-20040204>

Namespaces in XML 1.0 (Second Edition), W3C Recommendation, 16 August 2006. Available from Internet <*http://www.w3c.org/TR/2006/REC-xml-names-20060816/*>

Adobe Glyph List, 20 September 2002, Adobe Systems Incorporated. Available from the Internet <http://partners.adobe.com/public/developer/en/opentype/glyphlist.txt>

3 Terms and definitions

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

3.1
conformance level
identified set of restrictions and requirements to which files and readers are required to comply

3.2
electronic document
electronic representation of a page-oriented aggregation of text, images and graphic data, and metadata useful to identify, and understand that data, that can be reproduced on paper or other substrates, as well as rendered electronically on display devices, without significant loss of its information content

3.3
end-of-file marker
five character sequence **%%EOF** marking the end of a PDF file

3.4
end-of-line marker
EOL marker
one or two character sequence marking the end of a line, consisting of a **CARRIAGE RETURN** character (0Dh) or a **LINE FEED** character (0Ah) or a **CARRIAGE RETURN** followed immediately by a **LINE FEED**

3.5
engineering workflow
the process that a document goes through when used by engineers

3.6
font
identified collection of graphics that may be glyphs or other graphic elements. [ISO 32000-2]

3.7
font program
software program written in a special-purpose language, such as the *Type 1*, *TrueType*, or *OpenType* font format, that is understood by a specialized font interpreter. [ISO 32000-2]

3.8
interactive reader
reader that requires or allows human interaction with the content and other objects contained in the document during the software's processing phase

NOTE A file viewing tool is an example of an interactive reader; a raster image processor is an example of a reader that is not interactive.

3.9
long-term
period of time long enough for there to be concern about the impacts of changing technologies, including support for new media and data formats, and of a changing user community, on the information being held in a repository, which may extend into the indefinite future

3.10
PDF
Portable Document Format
file format defined in ISO 32000-2

3.11
reader
software application that is able to read and process PDF/E files

3.12
writer
software application that is able to write PDF/E files

4 Notation

PDF operators, PDF keywords, the names of keys in PDF dictionaries, and other predefined names are written in bold sans serif font; operands of PDF operators or values of dictionary keys are written in italic sans

serif font. Some names can also be used as values, depending on the context, and so the styling of the content will be context specific.

EXAMPLE 1 The *Default* value for the **TR2** key.

Token characters used to delimit objects and describe the structure of PDF files, as defined in ISO 32000-2, 7.2.1, may be identified by their ISO/IEC 646 character name written in upper case in bold sans serif font followed by a parenthetic two digit hexadecimal character value with the suffix “h”.

EXAMPLE 2 **CARRIAGE RETURN** (0Dh).

Text string characters, as defined by ISO 32000-2, 7.9.2, may be identified by their ISO/IEC 10646-1 character name written in uppercase in bold sans serif font followed by a parenthetic four digit hexadecimal character code value with the prefix “U+”.

EXAMPLE 3 **EN SPACE** (U+2002).

5 Conformance

5.1 General

This part of ISO 24517 defines a file format for representing electronic documents known as “PDF/E-2”. Conforming PDF/E-2 files shall adhere to all requirements of ISO 32000-2 as modified by this part of ISO 24517. A conforming file may include any valid and non-deprecated ISO 32000-2 feature that is not explicitly forbidden by this part of ISO 24517. Features described in PDF specifications prior to Version 2.0 which are not explicitly described in ISO 32000-2 should not be used.

NOTE 1 A conforming file is not obligated to use any PDF feature other than those explicitly required by ISO 32000-2 or this part of ISO 24517.

As described in 6.1.2, the version number of a file may be any value from 1.0 to 1.7, or 2.0 and the value shall not be used in determining whether a file is in conformance with this part of ISO 24517.

NOTE 2 The proper mechanism by which a file can presumptively identify itself as being a PDF/E-2 file of a given conformance level is described in 6.6.4.

Specific requirements for conformance with PDF/E-2s are given in Annex A.

5.2 Conforming readers

A conforming reader shall comply with all requirements regarding reader functional behaviour specified in this part of ISO 24517. The requirements of this part of ISO 24517 with respect to reader behaviour are stated in terms of general functional requirements applicable to all conforming readers. This part of ISO 24517 does not prescribe any specific technical design, user interface or implementation details of conforming readers.

The rendering and other processing of conforming files shall be performed as defined in ISO 32000-2 subject to the additional restrictions specified by this part of ISO 24517. Features described in PDF specifications that are not explicitly described in ISO 32000-2 shall be ignored by conforming readers.

Conforming PDF/E-2 readers shall read and process appropriately all PDF/E-2 files. In addition, conforming PDF/E-2 readers shall read and process appropriately all PDF/E-1 files as defined by ISO 24517-1.

6 Technical requirements

6.1 File structure

6.1.1 General

6.1.2 to 6.1.11 address overall file format issues and the base elements that form the general structure of a conforming file.

Any data contained in a conforming file that is not described in ISO 32000-2 or this part of ISO 24517 should be ignored by a conforming reader and shall not be used to render content on a page.

6.1.2 File header

The file header shall begin at byte zero and shall comply with ISO 32000-2, 7.5.2.

6.1.3 File trailer

The file trailer dictionary shall contain the **ID** keyword whose value shall be File Identifiers as defined in ISO 32000-2, 14.4.

NOTE 1 No data can follow the last end-of-file marker except a single optional end-of-line marker as described in ISO 32000-2, 7.5.5.

The keyword **Encrypt** shall not be present in the trailer dictionary.

NOTE 2 The explicit prohibition of the **Encrypt** keyword has the implicit effect of disallowing encryption and password-protected access permissions.

NOTE 3 A file that complies with the PDF/E-2s conformance level (Annex A) will have such an Encrypt key.

6.1.4 Cross reference table

The **xref** keyword and the cross reference subsection header shall be separated by a single EOL marker.

Any indirect object whose offset is not referenced in any cross reference table nor in any cross-reference stream shall be exempt from all requirements of this part of ISO 24517 and may be ignored by a conforming reader. If a conforming reader chooses not to ignore such indirect objects, they shall never influence the way content is rendered.

6.1.5 String objects

The number of hexadecimal digits in a hexadecimal string shall always be even.

NOTE This avoids the provision in ISO 32000-2 about the absence of the final hexadecimal digit.

6.1.6 Stream objects

6.1.6.1 General

The **stream** keyword shall be followed either by a **CARRIAGE RETURN** (0Dh) and **LINE FEED** (0Ah) character sequence or by a single **LINE FEED** (0Ah) character. The **endstream** keyword shall be preceded by an EOL marker.

The value of the **Length** key specified in the stream dictionary shall match the number of bytes in the file following the **LINE FEED** (0Ah) character after the **stream** keyword and preceding the EOL marker before the **endstream** keyword.

A stream dictionary shall not contain the **F**, **FFilter**, or **FDecodeParams** keys.