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Graphic technology — Prepress digital data exchange — Use of PDF— Part 3: Blind exchange suitable for colour managed workflows (PDF/X-3)

Technologie graphique — Échange de données numériques de préimpression — Utilisation de PDF— Partie 3: Échange aveugle de fichiers complets

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Contents

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 3.

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.

This part of ISO 15930 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

ISO 15930 consists of the following parts, under the general title *Graphic technology — Prepress digital data exchange — Use of PDF :*

— Part 1: Complete exchange using CMYK data (PDF/X-1 and PDF/X-1a);

— Part 2: Partial exchange of printing data (PDF/X-2);

— Part 3: Blind exchange suitable for colour-managed workflows (PDF/X-3);

Annexes A and B of this part of ISO 15930 are for information only.

Introduction

This International Standard defines methods for the exchange of digital data within the graphic arts industry and for the exchange of files between graphic arts establishments. It is a multi-part document where each part is intended to respond to different workflow requirements. These workflows differ in the degree of flexibility required. However, increasing flexibility can lead to the possibility of uncertainty or error. The goal throughout the various parts of this standard has been to maintain the degree of flexibility required while minimising the uncertainty.

Many printed documents are assemblies of partial pages and/or pages created at different locations and by different organizations. The merging of these individual elements into the final printing form and the subsequent printing may take place at different locations. Some of these elements may also be routed to multiple sites for incorporation into other documents. Each of these elements is referred to in this International Standard as a compound entity.

A variety of data formats and structures are used for the creation of this type of material, but with two prevalent kinds of underlying data structures. These are vector-based data for the encoding of line art and textual information; and raster-based data for the encoding of image information, including previously rasterized line art and textual information. Both kinds of data structures are required along with page description information in an open electronic workflow. The exchange of raster-based data using the TIFF/IT file format is defined in ISO 12639. The subject of this standard is a format for the exchange of object-based data where individual objects may be in either vector or raster data structures.

Part 3 (PDF/X-3) of this International Standard complements the other parts by defining a data format and its usage to permit the predictable dissemination of a compound entity to one or more locations, as either colour managed data and/or CMYK data, in a form ready for final print reproduction, by transfer of a single file. This file must contain all the content information necessary to process and render the document, as intended by the sender, coded inside a single PDF file. No other parts ñneither external files nor internally embedded files ñare required or permitted. This exchange requires no prior knowledge of the sending and receiving environments and is sometimes referred to as "blind" exchange. It is platform and transport independent.

These goals are accomplished by defining a specific use of the publicly available Adobe Portable Document Format specified by Portable Document Format Reference Manual Version 1.3. In order to achieve a level of exchange that avoids any ambiguity in interpretation of the file, it identifies a limited set of PDF objects which may be used and adds restrictions to the use, or form of use, of those objects, and/or keys within those objects.

Whereas PDF/X-3 and PDF/X-1 specify the exchange of complete material, with all elements present, there are occasions where this is not appropriate. In certain workflows some or all of the referenced elements may be more logically present at the receiving site, or may be exchanged at a different time. These include fonts, high resolution contone image files, or line art files. These exchanges will generally require prior agreement between sender and receiver. The requirements for such situations are addressed in Part 2 (PDF/X-2) and other later parts of this International Standard. All of the various types of PDF/X exchanges assume the document elements identified or exchanged represent compound entities prepared for the intended printing condition. It is important to note, however, that only self-contained exchanges as described by PDF/X-1 or PDF/X-3 are recommended in an open or broadcast environment.

It is anticipated that a variety of products will be developed around PDF/X-3, such as readers (including viewers) and writers of PDF/X files, and products that offer combinations of these features. Different products will incorporate various capabilities to prepare, interpret and process conforming files based on the application needs as perceived by the suppliers of the products. However, it is important to note that a conforming reader must be able to read and appropriately process all files conforming to a specified conformance level.

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

Graphic technology — Prepress digital data exchange — Use of PDF — Part 3: Blind exchange suitable for colour-managed workflows (PDF/X-3)

1 Scope

This part of ISO 15930 specifies the use of the Portable Document Format (PDF) for the dissemination of complete digital data, in a single exchange, that contains all elements necessary for final print reproduction. These exchanges will support both colour managed workflows and traditional CMYK workflows.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 15930. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 15930 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. National standards bodies that are members of ISO and IEC maintain registers of currently valid standards.

ICC.1:1998-09 File Format for Color Profiles, International Color Consortium

Adobe Portable Document Format, Version 1.3, second edition, 2000, Adobe Systems Incorporated (ISBN 0-201-61588-6)

PostScript Language Reference Manual, third edition, 1999, Adobe Systems Incorporated (ISBN 0-201-37922-8)

Adobe Technical Note #5413 - Recording OutputIntents for color critical workflows, Adobe Systems

3 Definitions

For the purpose of this part of ISO 15930 the following definitions apply:

3.1
bleed
additional printing area outside the nominal printing area necessary for the allowance of mechanical tolerance in the trimming process.

NOTE The bleed area includes the area that may be printed but does not include printers' marks of any kind.

3.2
characterized printing condition
printing condition (offset, newsprinting, publication gravure, flexographic, direct, etc.) for which process control aims are defined and for which the relationship between printing tone values (usually CMYK) and the colorimetry of the printed image is documented.

NOTES
1 The relationship between printing tone values and the colorimetry of the printed image is commonly referred to as characterization.
2 It is generally preferred that the process control aims of the printing condition and the associated characterization data be made publicly available via the accredited standards process or industry trade associations.

3.3
complete exchange
exchange of compound entities in which all elements and element resources are present as part of a single PDF file.

3.4
compound entity
unit of work with all text, graphics and image elements prepared for final print reproduction. A compound entity can represent a single page for printing, a portion of a page or a combination of pages.

3.5
element
substructure of a compound entity relative to the current processing environment, such as a block of text, a contone picture or an outline graphic that, by itself, comprises the smallest logical composed unit of a compound entity.

3.6
font
identified collection of graphics that may be glyphs or other graphic elements.

3.7
glyph
a recognisable abstract graphic symbol that is independent of any specific design **[ISO/IEC 9541 1].**

3.8
glyph metrics
the set of information in a glyph representation used for defining the dimensions and positioning of the glyph shape **[ISO/IEC 9541 1].**

3.9
PDF (Portable Document Format)
file format defined in the Portable Document Format Reference Manual

3.10
trapping
modification of boundaries of colour areas to account for dimensional variations in the printing process by overprinting in selected colours at the boundaries between colours that might inadvertently be left uncoloured due to normal variations of printing press registration

NOTE Alternately referred to as chokes and spreads or grips. Not to be confused with the term ink trapping.

3.11
PDF/X-3 file
file with features according to this part of ISO 15930

3.12
writer
software application that is able to write files

3.13
reader
software application that is able to read and appropriately process files

4 Notations and abbrevations

PDF operators, PDF keywords, the names of keys in PDF dictionaries, and other predefined names are written in a bold sans serif type font; for example, the key **Trapped**.

Operands of PDF operators or values of dictionary keys are written in an italic sans serif font; for example the *False* value for the **Trapped** key.

Placeholders for normally variable information are written in an italic serif font, for example *intended printing condition name*.

For the purpose of this standard, references to the PDF Reference Manual are to the Adobe Portable Document Format, as identified in clause 2.

5 Conformance

This standard defines the use of the PDF file format for the exchange of digital data representing a compound entity.

NOTE See 3.4 for a definition of a compound entity

A conforming PDF/X-3 file is a PDF file in which those features necessary for the exchange of a compound entity adhere to this standard. A conforming file may also include other valid PDF features that do not affect final print reproduction of the compound entity.

A conforming writer is a software application that shall be able to write conforming files.

A conforming reader is a software application that shall be able to read and appropriately process all conforming PDF/X-3 files. A conforming reader shall parse all PDF files but may ignore those features not required by this standard.

Rendering conforming files shall be performed as defined in the PDF Reference Manual.

6 Requirements

6.1 Data structure

All components of a complete exchange shall be contained in the body of a single PDF/X-3 file. No component or resource that is required to process the complete exchange shall be contained in the PDF/X-3 file as an embedded file. An output profile identifying the intended printing condition sent with the compound entity shall be embedded as an **DestOutputProfile** stream object in the **OutputIntent** dictionary.

”Complete” means the exchanged file shall include:

— all PDF resources (as described in the section “Resource Dictionaries” of the PDF Reference Manual) used in the file including all fonts, font metrics, font encodings, full resolution images, ICC profiles etc.;

— all print elements properly aimed at the intended printing condition.

6.2 Colour

6.2.1 Use of colour spaces

DeviceRGB shall not be used unless a **DefaultRGB** colour space that is not a **DeviceRGB** or **DeviceN** colour space is defined as described in the section “Default Color Spaces” of the PDF Reference Manual. Any other colour space that is legal for a PDF 1.3 file as described in the PDF Reference Manual may be used in a PDF/X-3 file. Where **DeviceCMYK**, **DeviceGray** or **Separation** colour spaces are used the tone values for these shall be adjusted for the intended printing condition prior to exchange.

Annotations and Acrobat Forms elements may make use of any PDF colour space.

6.2.2 Identification of intended printing condition

The intended printing condition for which data has been prepared is identified by use of an **OutputIntent** array in the **Catalog** object as described in Adobe Technical Note #5413. The **OutputIntent** array shall contain exactly one **OutputIntent** object in which the value of the **Subtype** key is the name **/GTS_PDFX**, henceforth referred to as the PDF/X OutputIntent object. Additional **OutputIntent** objects may be present; if so they shall use different values for the **Subtype** key and shall be ignored by a PDF/X-3 compliant reader.

The PDF/X OutputIntent object shall include the **NamedPrintCondition** key. Where the intended printing condition is a printing condition included in the registry of characterizations maintained by the ICC the value of the **NamedPrintCondition** key should be exactly the same as the name used in the ICC registry.

The PDF/X OutputIntent object shall include the **DestOutputProfile** key, unless no other colour spaces than **DeviceCMYK**, **DeviceGray** or **Separation** – as well as **DeviceN**, **Indexed** or **Pattern** as long as they only make use of **DeviceGray**, **DeviceCMYK** or **Separation** - are used in the page description of the PDF/X-3 file.

If present in the **DestOutputProfile** stream object, the **Alternate** key shall be ignored by a PDF/X-3 compliant reader.

The values of the **profileDescriptionTag** and **charTargetTag**, if present in the ICC profile, shall be ignored.

The PDF/X OutputIntent object should include the **Info** key. If the **Info** key is present its value should be a string describing the intended printing condition in a form that will be meaningful to a human operator at the site receiving the exchanged file.

NOTES

1 It is recommended that the ICC profile in the **DestOutputProfile** stream object is the same ICC profile that was used by the sender of the PDF/X-3 file for simulating the printing condition on a proofing device. This ICC profile typically will be, but is not required to be, used in output rendering.

2 It is well recognised that not identifying the intended printing condition creates significant uncertainty about how such a file may be reliably imaged. However, it has to be acknowledged that the graphics arts industry has in the past been able to operate successfully without specifying the intended printing condition in a standard way. PDF/X-3 files using only **DeviceGray**, **DeviceCMYK** or **Separation** colour spaces may therefore be used without including an ICC output profile to enable it to be used even by those who have not yet implemented a fully colour managed workflow.

6.2.3 Separation and DeviceN colour spaces

For the *altenateSpace* of all **Separation** and **DeviceN** colour space resources all the restrictions of 6.2.1 shall apply.

A PDF/X-3 compliant reader shall treat process separations specified using a **Separation** colour space, or as values within the names array of a **DeviceN** colour space as having been prepared for the intended printing condition identified in the PDF/X **OutputIntent** object.

In situations where spot colour separations specified in **Separation** or **DeviceN** colour spaces are to be printed using process colorants the *alternateSpace* and *tintTransform* supplied in the **Separation** or **DeviceN** colour space shall be used to perform that transformation. If the *alternateSpace* is **DeviceCMYK** a PDF/X-3 compliant reader shall treat that as being the same CMYK as identified by the PDF/X **OutputIntent** object. If the *alternateSpace* is **DeviceGray** a PDF/X-3 compliant reader shall treat that as meaning the black separation of the CMYK identified by the PDF/X **OutputIntent** object.

A conforming reader is not required to reassemble data expressed in **Separation** colour spaces into a process colour image.

6.2.4 Single tonal range files and spot colours

Printing tone values of spot colours shall be specified using **Separation** or **DeviceN** colour spaces. “Black” may be printed using the **DeviceGray** colour space or by using the Black **Separation** colour space. However, if **Separation** or **DeviceN** colour spaces are used, all the restrictions of 6.2.3 shall apply.

NOTE The use of the Black **Separation** colour space may cause a different overprinting behaviour than does that of the **DeviceGray** colour space unless the **OPM** key in the extended graphics state has a value of 1.

Separation and/or **DeviceN** colour spaces may be used for CMYK colours, for spot colours, and for information that is not colour related (e.g., varnishes, die cutting and other overlays).

NOTE It is the responsibility of the originator of the PDF/X-3 compliant file to assure consistent use of spot colour names across all objects in the file. Industry recognised names should be used wherever possible. It is recommended that colour names "Red", "Green", or "Blue" not be used as names for spot colours.

6.3 Fonts

Fonts that contain glyphs, related metrics, and font encodings for at least all the characters used shall be embedded within the file. The receiver shall use the embedded fonts (rather than other locally resident, substituted, or simulated fonts) for rendering and display. Unless special agreements are in place with the font copyright holder, only fonts that are publicly identified as legally embeddable in a file for display and rendering shall be used.

6.4 Page description

All contents that are to be imaged onto the printed page shall be encoded in the page description as described in the section ”Content Streams and Resources” of the PDF Reference Manual. All mechanisms described in the PDF Reference Manual relating to such a page description are acceptable, including **XObjects** of type **Image** or **Form**. No alternate images shall be used.

6.5 Data compression

Data compression may be used as defined in the PDF Reference Manual except for LZW compression which shall not be used.

6.6 Trapping

The **Trapped** key contained in the **Info** dictionary shall be used when exchanging files. The **Trapped** key indicates the state of trapping within the file. If the entire file has not been trapped then the value of the **Trapped** key shall be set to *False*. Otherwise, the entire file shall have been trapped as necessary, and the value of the **Trapped** key shall be set to *True*. Partially trapped files are not permitted. A value of *Unknown* for the **Trapped** key is prohibited in PDF/X-3 files.

If a file contains a **TrapNet** annotation, the value of the **Trapped** key in the **Info** dictionary shall be *True*. The **FontFauxing** key in a **TrapNet** annotation shall either not be present, or shall be an empty array.

6.7 PDF file identification

A PDF/X-3 file shall be so identified using the **GTS_PDFXVersion** key in the **Info** dictionary. The type of the value of the **GTS_PDFXVersion** key is string.

The value of the **GTS_PDFXVersion** key for files prepared in accordance with this standard is *(PDF/X-3:2001)*.

All PDF/X-3 files shall contain the following key value pairs in the **Info** dictionary:

— The **CreationDate**, **ModDate**, and **Title** keywords in the **Info** dictionary shall be filled in prior to exchange.

— The **ID** key in the trailer shall be used.

— The **Creator** and **Producer** keywords in the Info dictionary should be filled in prior to exchange.

6.8 Bounding boxes

Each Page object of a PDF/X-3 file shall include a **MediaBox** and one of **TrimBox** or **ArtBox**. A Page object shall not include both an **ArtBox** and a **TrimBox**. The **MediaBox** may be included by inheritance.

If the **BleedBox** is present, the **ArtBox** or the **TrimBox** shall not extend beyond the boundaries of the **BleedBox**. If the **CropBox** is present, the **ArtBox** or the **TrimBox** shall not extend beyond the boundaries of the **CropBox**.

NOTES

1 Some industry practices may require the use of the **BleedBox**. Appropriate trade practices should be followed.

2 The use of **TrimBox** is recommended over the use of **ArtBox**.

6.9 Extended Graphics state

A conforming PDF/X-3 file shall not contain the transfer function key (**TR** or **TR2**) or halftone phase (**HTP**) keys within an **ExtGState** resource.

A conforming reader may ignore the halftone key (**HT**).

Use of the halftone key (**HT**) shall be consistent with the intended printing conditions and shall make use of the **TransferFunction** key in a halftone dictionary only as required by the *PDF Reference Manual*.

Halftones in a conforming PDF/X-3 file shall not contain a **HalftoneName** key.

6.10 PostScript XObject and the PS operator

A PDF/X-3 file shall not contain instances of the **PostScript XObject** and/or the **PS** operator.

6.11 Use of the Encrypt dictionary

The **Encrypt** dictionary shall not be used and shall not be present in the PDF/X-3 file.

NOTE Encryption is sometimes used in the exchange of prepress files to ensure the integrity of the file. Nevertheless, encrypted PDF files – even those not requiring a password to open or print the file – may interfere with automated processing environments or tools. Use of digital signatures is less obtrusive and provides a much safer way to guarantee a file's integrity while not interfering with any processing of a digitally signed file.

6.12 Alternate Images

An **Image XObject** shall not contain the **Alternate** key.

6.13 Annotations

All Annotations other than PDF Trapping annotations shall have extensions lying completely outside the **BleedBox** (or the **TrimBox** or **ArtBox** if no **BleedBox** is present). A PDF/X-3 reader may completely ignore annotations except for PDF trapping annotations.

NOTES

1 A list of annotation types can be found in the section "Annotations" of the PDF Reference Manual.

2 This provision guarantees that when a page from a PDF/X-3 file is rendered on a screen by a PDF viewing application, the visual impression of the actual page is not obscured by such annotations. Also, this provision avoids unexpected behaviour of PDF files viewed on screen by using invisible interactive elements inside the page area.

3 As Acrobat Forms elements are a special case of annotations, the same rules apply as for other annotation types,,

6.14 Actions and Java Scripts

Actions and JavaScripts shall not be used.

6.15 Use of digital signatures

A PDF/X-3 file may contain digital signatures as defined in the section ”Signature Fields” in the PDF Reference Manual. A PDF/X-3 reader may ignore digital signatures.

6.16 Use of the BX/EX operators

A conforming PDF/X-3 file shall not include operators in a **Contents** stream that are not described in the *PDF Reference Manual*, even if they are encapsulated between BX and EX operators.

A conforming PDF/X-1 reader shall process every page operator according to the PDF Reference Manual, even when they are encapsulated between BX and EX operators.

NOTES

1 The operators **BX** (Begin section where undefined page operators are not reported) and **EX** (End section where undefined page operators are not reported) designate areas in a page description that according to the PDF Reference Manual may be ignored and not rendered by a reader that does not understand some or all of the page operators inbetween BX and EX.

2 It is recommended that a PDF/X-3 writer does not make use of the BX/EX operators,

Annex A
(informative)

Clarifications

A.1 Copydot information included as bilevel data

Copydot scans of pre-screened data (high resolution scans of halftone films) or equivalent electronically generated bit-mapped files are included as bilevel data, that is as inline images or **Image XObjects**. Unless the resolution of the copydot data has an integer relationship with the imaging device resolution, undesirable imaging artifacts may occur.
The resolution of a bilevel image in a PDF file can be extracted, if desired, for preflight or other verification applications.
The reproduction characteristics of any copydot information should be prepared to conform to the intended printing condition specified for the PDF/X-3 file.

A.2 Specification of screening parameters

The general approach envisioned for PDF/X-3 data exchanges is that the receiving system is responsible for the screening of the data consistent with the intended printing condition specified for the file. However, in some workflows there is a need to specify specific screening parameters for certain elements. As noted in this part of ISO 15930, it may be appropriate for some applications to ignore these parameters if present. Where an originator of a PDF/X-3 file feels that screening parameters are important to achieve a particular imaging requirement, and should not be ignored, that requirement should be communicated to the receiver of the file as part of the business data relating to the particular advertisement or printing job.
The reproduction characteristics of any copydot information should be prepared to conform to the intended printing condition specified for the PDF/X-3 file.

A.3 Fonts

This specification requires the embedding of fonts needed for output. The licence agreements for some fonts do not permit their embedding. This prohibits the use of these fonts in PDF/X-3 files. The creator of the file should ensure that all fonts are used in compliance with their licensing agreements.

Annex B
(informative)

Minimal requirements for OutputIntent objects

The International Color Consortium (ICC) has established a registry for characterization data of standard printing processes. Recognised standards organizations may provide data for inclusion in the registry. This registry is maintained by the ICC Secretariat.

The ICC does not endorse any data referenced by the registry.

Each printing process is identified by a short name (the Reference name in the ICC characterization data registry). The registry provides full details of the printing system and indicates where and how measurement data may be obtained. The format of the measurement data is not specified by the ICC, but it is anticipated that a simple format such as IT8 or ISO formats for measurement data will be used. Such data formats are fully identified in the registry.

It is recommended that the short name of a characterization printing condition be used as the value of the **NamedPrintingCondition** key in a PDF/X **OutputIntent** object wherever possible.