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Graphic technology — Prepress digital data exchange — Use of PDF —

Part 3:
Complete exchange suitable for colour-managed workflows (PDF/X-3)

[Revision of first edition (ISO 15930-3:2002)]

Technologie graphique — Échange de données numériques de préimpression — Emploi de PDF —
Partie 3: Échange de fichiers complets aptes à la gestion des couleurs (PDF/X-3)

ICS 35.240.30; 37.100.99

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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.

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.

Attention is drawn to the possibility that some of the elements of this part of ISO 15930 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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 and spot colour data (PDF/X-1a)

Part 2: Partial exchange (PDF/X-2)

Part 3: Complete exchange suitable for colour-managed workflows (PDF/X-3)

Annexes A and B are for information only.

This second edition cancels and replaces the first edition (ISO 15930-3:2002) which has been technically revised as follows:

- The referenced version of the *Adobe Portable Document Format* has been changed from 1.3 to 1.4.
- The following features introduced in PDF 1.4 have been disallowed in PDF/X-3:2003: JBIG2, Transparency, and Referenced PDF

Introduction

ISO 15930 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 ISO 15930 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 ISO 15930 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 ISO 15930 is a format for the exchange of object-based data where individual objects may be in either vector or raster data structures.

This part of ISO 15930 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 colour-managed data, CMYK data , and/or spot colour 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 – neither external files nor internally embedded files – are 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* as specified in Version 1.4. 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 that may be used and adds restrictions to the use, or form of use, of those objects, and/or keys within those objects.

Whereas this part of ISO 15930 specifies 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 high resolution contone image files, line art files, etc. These exchanges will generally require prior agreement between sender and receiver. The requirements for such situations are addressed in other parts of ISO 15930. Other exchanges may be more appropriately restricted to CMYK data only; such exchanges are addressed in Part 1 of this International Standard.

Although re-purposing of data is not a primary consideration or requirement of this part of ISO 15930, maximum flexibility will be maintained so that future requirements for re-purposing may be accommodated.

It is anticipated that a variety of products will be developed based on PDF/X, 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.

The PDF/X-1a conformance level of this version of this part of ISO 15930 is generally similar to that defined in the earlier version of this International Standard, which was based on the *Adobe Portable Document Format* Version 1.3. This version is based on the *Adobe Portable Document Format* Version 1.4.

Users are cautioned that there are several different conformance levels that may be associated with PDF/X readers and writers. Two of these are generally referred to as PDF/X-3. These are defined in ISO 15930-3:2002 and ISO 15930-3:2003. It is recommended that these be referred to as PDF/X-3:2002 and PDF/X-3:2003, respectively.

An ongoing series of Application Notes [1] is maintained for the guidance of developers and users of the ISO PDF/X family of International Standards. They are available from NPES The Association for Suppliers of Printing, Publishing and Converting Technologies in the standards section at http://www.npes.org/standards/workroom.html.

Graphic technology — Prepress digital data exchange — Use of PDF —

Part 3:
Complete 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. Colour-managed, CMYK, and spot colour data are supported in any combination.

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 15930-1:2001 *Graphic technology — Prepress digital data exchange — Use of PDF — Part 1: Complete exchange using CMYK data (PDF/X-1 and PDF/X-1a)*

ISO 15930-1:2003 *Graphic technology — Prepress digital data exchange — Use of PDF — Part 1: Complete exchange using CMYK data (PDF/X-1a)*

ISO 15930-3:2002 *Graphic technology — Prepress digital data exchange — Use of PDF — Part 3: Complete exchange suitable for colour-managed workflows (PDF/X-3)*

PDF reference : Adobe portable document format, Version 1.4, Adobe Systems Incorporated. — 3rd ed. (ISBN 0-201-75839-3)

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

3 Terms and definitions

For the purposes of this part of this International Standard, the following terms and 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 area that may be printed but does not include printers' marks of any kind.

3.2
blind exchange
exchange of compound entities that requires no exchange of technical information between sender and receiver in order for the receiver to render the printed page as intended by the sender

3.3
characterized printing condition
printing condition (offset, gravure, flexographic, direct, etc.) for which process control aims are defined and for which the relationship between input data (printing tone values, usually CMYK) and the colorimetry of the printed image is documented

NOTE 1 The relationship between input data (printing tone values) and the colorimetry of the printed image is commonly referred to as characterization.

NOTE 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.

3.4
CMYK
cyan-magenta-yellow-black used as a modifier of printing tone values, colours, process colorants, etc.

3.5
complete exchange
exchange of compound entities in which all elements and element resources are present as part of a single exchange and all of the information needed to process the compound entity is either in the compound entity or is specified within the applicable standard and its normative references

3.6
compound entity
unit of work with all text, graphics and image elements prepared for final print reproduction and that may represent a single page for printing, a portion of a page or a combination of pages

3.7
conformance level
identified set of restrictions and requirements to which files, readers and writers must comply

3.8
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

3.9
font
identified collection of graphics that may be glyphs or other graphic elements

3.10
glyph
recognizable abstract graphic symbol that is independent of any specific design
[ISO/IEC 9541-1]

3.11
glyph metrics
set of information in a glyph representation used for defining the dimensions and positioning of the glyph shape

3.12
ICC
International Color Consortium, an industry association formed to develop standardized mechanisms for colour management

3.13
ICC profile
set of colorimetric transforms prepared in accordance with ICC.1

3.14
job ticket
electronic specification of process control for print production in either a published or proprietary format

NOTE Job tickets as defined here include only data intended to affect the rendered appearance of the file. See bibliography items [4] and [5].

3.15
non-print element
an element not intended for final print reproduction, including previews, preview images and all annotations other than **TrapNet** or **PrinterMarks**

3.16
PDF (Portable Document Format)
file format defined in the *PDF reference*

3.17
PDF dictionary
associative table containing key-value pairs, specifying the name and value of an attribute for objects which is generally used to collect and tie together the attributes of a complex object

3.18
preview
visible placeholder representing at least the size and shape of the area to be replaced by the referenced object

NOTE A visible placeholder may be something as basic as a rectangle of the appropriate size containing no image content, or may be a partial or complete representation of the intended content. See 3.19.

3.19
preview image
preview consisting of a raster image representing a compound entity at a resolution suitable for viewing on a computer display

3.20
print element
an element intended for final print reproduction

3.21
printing tone value
data value corresponding to the relative area of a printing surface that is intended to transfer ink to the substrate being printed

NOTE See 3.3, characterized printing condition

3.22
process colorant
one of a set of colorants that, when printed together, produce a range of colours able to reproduce the values specified by a colour coordinate system.

3.23
reader
software application that is able to read and appropriately process files

3.24
spot colour
single colorant, identified by name, whose printing tone values are specified independently from colour values specified in a colour coordinate system

3.24
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 Trapping is sometimes colloquially referred to as chokes and spreads or grips. This is not the same as ink trapping.

3.25
writer
software application that is able to write files

4 Symbols and notations

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.

For the purpose of this part of ISO 15930, references to the "*PDF Reference*" are to the *PDF reference: Adobe portable document format* as identified in clause 2..

5 Conformance

This part of ISO 15930 defines the use of the PDF file format for the exchange of digital data representing 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 part of ISO 15930. A conforming file may also include other valid PDF features that do not affect final print reproduction of the compound entity.

Neither the version number in the first line of a PDF file, nor the value of the **Version** key in the **Catalog** of a PDF file shall be used in determining conformance with this part of ISO 15930.

A conforming writer is a software application that shall be able to write files conforming to the requirements of this part of ISO 15930.

A conforming PDF/X-3 reader is a software application that shall be able to read and appropriately process all conforming PDF/X-3 files as defined in this part of ISO 15930. A conforming PDF/X-3 reader shall also be able to read and process all files conforming to all of the following that also conform to 6.16 of this part of ISO 15930:

• *ISO 15930-3:2002* having a value of *(PDF/X-3:2002)* for the **GTS_PDFXVersion** key in the **Info** dictionary.

• *ISO 15930-1:2001* having a value of *(PDF/X-1:2001)* for the **GTS_PDFXVersion** key and *(PDF/X1a:2001)* for the **GTS_PDFXConformance** in the **Info** dictionary.

• *ISO 15930-1:2003* having a value of *(PDF/X-1a:2003)* for the **GTS_PDFXVersion** key in the **Info** dictionary.

NOTE The ability to read files prepared in accordance with ISO 15930-3:2002, the predecessor to this part of ISO 15930, is important to preserve upward compatibility. Further, because PDF/X-1a is technically a subset of PDF/X-3 it is important that a PDF/X-3 reader also recognise the PDF/X conformance keys that point to PDF/X-1a.

Although *PDF reference* permits compliance with earlier versions of PDF, features described in versions of the PDF specification earlier than 1.4, but which are not described in *PDF reference*, should not be used in a conforming PDF/X-3 file. Such features may be ignored by a PDF/X-3 reader.

All conforming readers shall parse all PDF files but may ignore those features not required by this part of ISO 15930. A reader may ignore an annotation's **Print** flag except for those in a **TrapNet** annotation.

Rendering of conforming files shall be performed as defined in the *PDF reference* and as restricted by this part of ISO 15930. To the extent that the *PDF reference* and this part of ISO 15930 permit more than one rendering of a conforming file, a conforming reader may use embedded job ticket or metadata information to control the rendering of the file more precisely.

EXAMPLE 1 (Trapping) If a conforming PDF/X-3 file specifies **Trapped**=*False*, a conforming reader may use job ticket information to determine details of how the file is to be trapped. If the file specifies **Trapped**=*True*, a conforming reader must ignore any trapping information in an embedded job ticket.

EXAMPLE 2 (Screening) A conforming reader may use embedded job ticket information to determine the screening to be used to render the file. Note that a conforming PDF/X-3 reader is permitted to ignore screening information in the PDF/X-3 file (see 6.9). A conforming reader may use screening data from the PDF/X-3 file, from the job ticket, or from local system defaults.

6 Technical requirements

6.1 Data structure

A PDF/X-3 file consists of four sections: header, body, cross-reference table, and trailer. The body of a PDF/X-3 file contains a sequence of numbered objects such as numbers, names, strings, dictionaries and streams representing the text characters, graphics, images and their associated resources describing the compound entity being exchanged. The specific PDF features required by this part of ISO 15930 are summarized in Annex A and are defined in 6.2 to 6.17, inclusive. These features shall be used as prescribed in the *PDF reference* and as further specified by this part of ISO 15930.

In order to achieve the requirements of a blind exchange, the use of a pre-separated PDF file (where the separations for each page are described as separate page objects, each painting only a single colorant) shall not be permitted.

NOTE This does not prohibit the use of pre-separated workflows in which the separations of a page are combined into a single PDF page object.

A PDF/X-3 file may contain two classes of elements: those intended for final print reproduction (print elements), and those not intended for final print reproduction (non-print elements). All components of a compound entity shall be contained in the body of a single PDF/X-3 file.

"Complete" means the exchanged files shall include:

— all PDF resources (listed in the *PDF reference*) used in the file including all fonts, font metrics, font encodings, and colour space resources; and

— all print elements, properly prepared for a single characterized printing condition.

NOTE For partial exchange of compound entities refer to ISO 15930-2 [3]. For complete exchange using CMYK data refer to ISO 15930-1.

6.2 Colour

6.2.1 General

A PDF/X-3 file makes provision for exchanging data either as output device code values or as colorimetrically defined data. Colorimetrically defined data shall be described either using an ICC profile in an ICCBased colour space or using an equivalent mechanism, namely a CalGray, CalRGB or Lab colour space.

However, both types of data, if present in a PDF/X-3 file, shall be prepared for a single characterized printing condition prior to exchange. This characterized printing condition is defined by either a named condition or an ICC output profile.

Non-print elements may make use of any PDF colour space.