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Graphic technology — Colour data exchange format —

Part 1: Relationship to CxF3 (CxF/X)

Technologie graphique — Format d'échange des données en couleur —

Partie 1: Relation avec le CxF3 (CxF/X)

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Contents

Page

Foreword

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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 meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary Information

The committee responsible for this document is ISO/TC 130, *Graphic technology*.

ISO 17972 consists of the following parts, under the general title *Graphic technology — Colour data exchange format (CxF/X)*:

— *Part 1: Relationship to CxF3(CxF/X)*

— *Part 4: Spot color characterisation data (CxF/X-4)*

The following parts are under development:

— *Part 2: Scanner target data (CxF/X-2)*

— *Part 3: Printer target data (CxF/X-3)*

Introduction

ISO 17972 (all parts) defines methods for the use of CxF3 to exchange measurement data and associated metadata within the graphic arts industry and for the exchange of these files between graphic arts users. It is a multi-part document where each part is intended to respond to different workflow requirements. The goal throughout the various parts of ISO 17972 has been to maintain the degree of flexibility required while minimizing the uncertainty of the data exchanged.

A number of International Standards used by the graphic technology community require the reporting of measured and/or computed data. Several of these standards, e.g. ISO 12642 and ISO 13655, have used the ASCII keyword-value pair approach and have been widely used by some industry segments. However, there has been a large degree of variability in implementation, which has not facilitated good automated data exchange creating uncertainty. ISO 28178 attempted to rectify this situation by creating a bridge between the ASCII Keywords approach and an XML flat file approach, but the flat file approach had limitations and has not been widely used. This part of ISO 17972 advances this process further by identifying the use of the publicly available Color Exchange Format version 3 (CxF3) for prepress data exchange and verification. In order to achieve a level of exchange that avoids any ambiguity in interpretation of the file. Each part defines a required and optional set of CxF elements that are permitted to be used. This first document will outline the mapping of CxF to the existing elements in ISO 28178 (provided in Annex A) and illustrate the underlying concepts of CxF.

NOTE X-Rite Inc., the original creator of the CxF file format, claims no intellectual property rights to the materials used in this part of ISO 17972.

This part of ISO 17972 is intended to support all existing and future graphic arts standards that require the exchange of measured, computed, or process control data and the associated metadata necessary for its proper interpretation.

In reviewing the needs of such a format, the following requirements were identified:

— existing applications using ISO 28178 formatted documents in ASCII format should not be rendered obsolete by the new standard;

— data needs to be in a form that is both human-readable (once the digital file has been displayed using standard editors or file readers) and machine-readable;

— data needs to be readable by automated programs to extract the necessary information;

— data files need to be extensible by end users in such a way as to allow additional information to be included without breaking automated readers of the file;

— data files need to be capable of being created by automated programs;

— the format needs to allow multiple language representation of data.

The following files are part of ISO 17972-1, and are included as electronic inserts:

— CxF3_Core.xsd;

— CxF3_Schema_Diagram.pdf;

— Scannertarget.cxf;

— Scannertarget.txt;

— Holidays_test.cxf.

Graphic technology — Colour data exchange format —

Part 1: Relationship to CxF3 (CxF/X)

1 Scope

This part of ISO 17972 defines an exchange format for colour and process control data (and the associated metadata necessary for its proper interpretation) in electronic form. It is the base document for describing the use of CxF3 for data exchange. Where required, this part of ISO 17972 also defines additional requirements for a valid CxF/X file. Using XML, all CxF3 and CxF/X documents also support the exchange of data outside of the graphic arts workflow and can support future standards with an extensible architecture using standard XML Names and Metadata tags which can be used with standard XML tools and pass XML validation.

Additional parts of ISO 17972 will use custom resources in conjunction with CxF3 to define the required and optional data for a particular workflow.

2 Normative references

Color Exchange Format v3.0 documents[1]

3 Terms and definitions

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

3.1 Terms

NOTE The spelling of terms taken from Color Exchange Format v3.0 is not altered from that used in the normative reference. A specific example is the word color instead of colour.

3.1.1
ColorSpecification
information about the *ColorValue* (3.1.2) including its source (measurement specifications), illuminant/observer calculation method (tristimulus specifications), and physical attributes of the *objects* (3.1.5) (size, quantity, finish, etc.)

[SOURCE: Color Exchange Format v3.0]

3.1.2
ColorValue
one of a number of defined colour space types that can hold values and associated information related to that specific type of device independent colour space

[SOURCE: Color Exchange Format v3.0]

1) Available at http://www.colorexchangeformat.com.

3.1.3
CustomResources
"extensible" part of *CxF3* (3.2.2); additional information not included in the CxF3 Core about colour objects and the file itself that is considered application specific in nature and not generally of use to all other applications"

[SOURCE: Color Exchange Format v3.0]

3.1.4
DeviceColorValue
one of a number of defined colour space types that can hold values and associated information related to that specific type of device dependent colour space

[SOURCE: Color Exchange Format v3.0]

3.1.5
Object
used to identify each specific "Colour item" that is being described

3.2 Definitions

3.2.1
CxF/X
CxF3 (3.2.2) file which also conforms to the requirements defined in this part of ISO 17972

3.2.2
CxF3
exchange format for colour and process control data defined in Color Exchange Format v3

3.2.3
profile
set of mathematical values or binary structure that allows transformation to/from one device colour space to another; profiles are stored in the ProfileCollection and are shared and referenced by the *ColorValues* (3.1.2)

3.2.4
resources
information about each colour object that is of interest to all readers of the CxF file

Note 1 to entry: This is also referred to as the "CxF3 Core". It is defined by the CxF3-Core namespace schema.

3.2.5
schema
XML document conforming to the specifications established by the World Wide Web Consortium that defines the structure of a class of XML documents

3.2.6
XML
Extensible Markup Language; a set of rules for encoding documents electronically

3.2.7
XSD
XML schema definition

4 Symbols and abbreviated terms

The following documentation conventions are used.

— Names of XML elements are shown in bold type, for example, **Resources**.

— Names of XML attributes are shown in italics, for example, *SpotColorName*.

— XML XPaths are used to identify XML elements. For example, **container/contained** refers to an element (**contained**) that is a child of another element (**container**).

— Similarly, XML XPaths are used to refer to XML attributes, for example, **element1**/@*Name* refers to an attribute (*Name*) of an element (**element1**).

5 Requirements

5.1 CxF/X specific requirements

A CxF/X file shall comply with all of the requirements specified in CxF3. It shall also comply with any additional requirements specified in this or other parts of ISO 17972. These may include required **Resources** or restrictions on the use of **Resources** or specification of **CustomResources.**

— The **FileInformation** element of a CxF/X file shall include **Creator**, **CreationDate,** and **Description**.

— The **Description** element of a CxF/X file shall include “CxF/X” and the number of the applicable International Standard with which the CxF/X file complies.

— If the file is to be used in support of an International Standard, it shall include the number of the International Standard in the **Comment** text.

A CxF/X file shall validate against the sA3 Schema (see Annex B). A CxF/X file that is converted from an ISO 28178 compliant text file should use Table A.1 to map the textual data into CxF/X elements and attributes. Additional parts of ISO 17972 can provide additional requirements for exchanging data from previous standards including ISO 28178.

NOTE The spelling of terms and elements taken from Color Exchange Format v3.0 are not altered from that used in the normative reference. A specific example is the word color instead of colour.

5.2 General description of a Color Exchange Format conforming file

5.2.1 General

The standard Color Exchange Format as presented in the CxF 3.0 captures file Information such as creation and ownership, core colour information (the Resources), and any extended information (CustomResources). A CxF document shall have the extension “.cxf”. A CxF/X file should use the extension “.cxf” for ease of file mapping with exising CxF aware applications.”

By using XML which is a standard for the digital representation of documents, CxF also speeds and simplifies the movement and reporting of data from its database collection to a web-ready representation. A common data exchange format used in the graphic arts is defined in ISO 28178:2008. Annex A provides the mapping from ISO 28178 to CxF (see 5.1 for additional requirements in using this for a CxF/X file).

A CxF3 file shall be structured as shown in Figure 1.

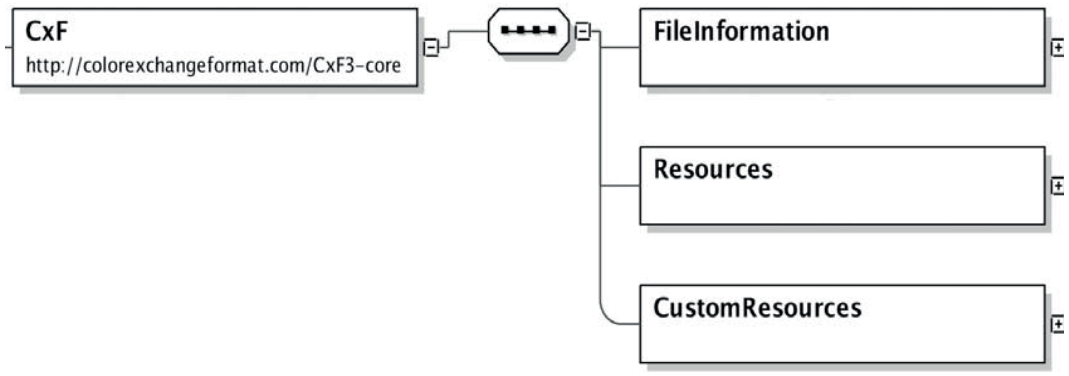

Figure 1 — CxF3 file structure

Every valid Color Exchange Format document shall contain, at a minimum, the required namespace information in the root CxF element.

(<CxF xmlns = "http://colorexchangeformat.com/CxF3-core">).

In addition, it can include FileInformation, Resources, and CustomResources. Further information on FileInformation is given in 5.2.2, on Resources in 5.2.3, and on CustomResources in 5.2.5.

NOTE CxF file structure diagrams use XML symbology.

5.2.2 FileInformation

This element contains the header data for a Color Exchange Format container that supports workflow management. Elements include the following:

— **Creator** - Name of the data creator, for example, program name used to generate file, company name, etc.;

— **CreationDate** - Date and time of the creation of this Color Exchange Format file. Date time format is CCYY-MM-DDThh:mm:ss.SSSZ. Optional time zone can be specified either as UTC or UTC offset;

— **Description** – Of the file or a data manifest;

— **Comment** – User entered comment for additional information;

— **Tag(s)** – Any named tag/value pairs for additional metadata regarding this file.

A valid CxF/X file shall have Creator, CreationDate, and Description in FileInformation. CxF/X and the applicable part shall be included in the Description. If the file is to be used in compliance with an ISO Standard, it shall include the standard number in the Comment text.

5.2.3 Resources

A typical file would include information within the appropriate Collections in the Resources:

The CxF element ObjectCollection stores all of the colour objects contained in the file.

Object elements contain identification attributes and data including ColorValues, DeviceColorValues, ColorDifferenceValues, PhysicalAttributes, and TagCollections. This is illustrated in Figure 2.

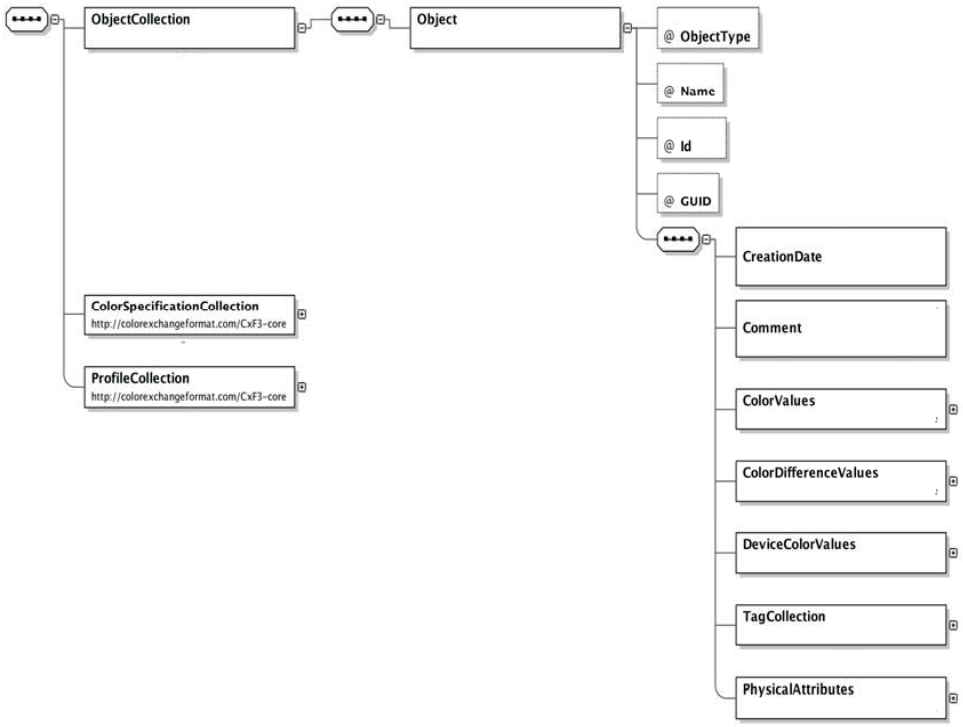

Figure 2 — Object elements

The CxF element ColorSpecificationCollection stores all of the ColorSpecifications contained in the file.

A ColorSpecification element has an id (used to reference this specification from each Object's ColorValue) and elements including TristimulusSpec, MeasurementSpec, and PhysicalAttributes. **MeasurementType and GeometryChoice within MeasurementSpec** are the only required data within MeasurementSpec. This is illustrated in Figures 3 and 4.

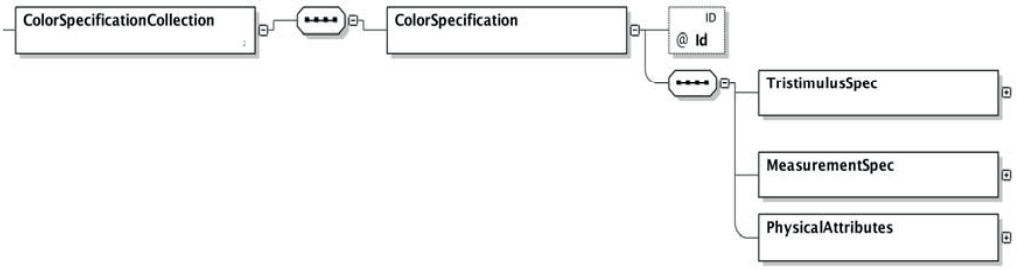

Figure 3 — ColorSpecificationCollection