INTERNATIONAL STANDARD

ISO 17972-3

First edition
2017-09

Graphic technology — Colour data exchange format (CxF/X) —

Part 3: Output target data (CxF/X-3)

Technologie graphique — Échange des données de couleur en utilisant CxF —

Partie 3: Données cibles sortantes

Reference number
ISO 17972-3:2017(E)

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

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 130, *Graphic technology*.

A list of all the parts in the ISO 17972 series can be found on the ISO website.

Introduction

The ISO 17972 series 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 multipart document where each part is intended to address different workflow requirements. The goal throughout the ISO 17972 series has been to maintain the degree of flexibility required while minimizing the uncertainty of the data exchanged.

ISO 17972-1 defines the use of the publicly available Color Exchange Format, version 3 (CxF3), for prepress data exchange and verification.

ISO 17972-2 defines the use of a CustomResource within the CxF/X structure for the creation of scanner target data.

This document covers the use of CxF3 when exchanging data from ISO 12642-1 and ISO 12642-2. This document is not designed to replace ISO 12642-2 but to define an updated and verifiable method of data exchange using CxF3, acting as a supplement to ISO 12642-2:2006, 4.3 and 4.4 and the informative information provided on layout of the targets. This document also provides a framework for reporting data and additional definitions that define the layout information of the target that is not defined in the ISO 12642 series. Provision has been made to extend the format beyond the ISO 12642 series targets, including those that have non-CMYK input values.

Output target data and the resultant measure of the printed target are some of the most commonly exchanged data in graphic arts and are used for calibration and characterization of all types of printing devices. Traditionally, data has been provided in ACSII format using a keyword file. The direct mapping of existing data to the updated CxF/X encoding was one of the primary concerns in writing this document. In addition, there have been a number of proprietary vendor-specific formats for these files. With the introduction of this document, it is hoped that a common format can be implemented across vendors. X-Rite Inc., the original creator of the CxF file format claims no intellectual property rights to the materials used in this document.

The following files are covered in this document and are included as electronic inserts:

— CxF3_Core.xsd;

— CxF3_Schema_Diagram.pdf;

— Example Chart 400 Patches 17972-3.cxf;

— Printer target CxF/X-3.cxf;

— Printer target CxF/X-3.txt.

Graphic technology — Colour data exchange format (CxF/X) —

Part 3: Output target data (CxF/X-3)

1 Scope

This document defines an exchange format for target input values, colour and process control data relating output targets for printers of all types (and the associated metadata necessary for its proper interpretation) in electronic form. This document includes the use of a CustomResource element within the CXF framework to define a minimum set of data for exchange and identify the data as being part of the ISO 12642 series. If this same framework is used for another defined target, provision is made for that use as well.

2 Normative references

There are no normative references in this document.

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:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

NOTE The spelling of terms and elements taken from Color Exchange Format v3.0 is not altered from that used in References [2], [3], [4] and [8]. A specific example is the word “color” instead of “colour”.

3.1
ColorSpecification
information about the *ColorValue* (3.2), including its source (measurement specifications), illuminant/observer calculation method (tristimulus specifications) and physical attributes of the *objects* (3.5) (size, quantity, finish, etc.)

[SOURCE: Color Exchange Format v3.0]

3.2
ColorValue
one of several 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]

3.3
CustomResources
“extensible” part of *CxF3* (3.7)

Note 1 to entry: Additional information is 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]

3.4
DeviceColorValue
one of several 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]

3.5
object
specific "colour item" that is being described

3.6
CxF/X
CxF3 (3.7) file which also conforms to requirements defined in this document

3.7
CxF3
exchange format for colour and process control data defined in Color Exchange Format v3.0

3.8
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", defined by the CxF3-Core namespace schema.

3.9
schema
XML (3.10) document, conforming to the specifications established by the World Wide Web Consortium (W3C), that defines the structure of a class of XML documents

3.10
XML
Extensible Markup Language
set of rules for encoding documents electronically

3.11
XSD
XML schema definition
definition that specifies how to formally describe the elements in an *XML* (3.10) document that define a shared vocabulary

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 General

This document primarily defines the use of CxF/X for the exchange of data for the ISO 12642 series. While not explicitly stated in all parts, the elements of CxF/X and this document allow the use of CxF/X-3 for additional targets with any number of colorants.

5.2 General description of a CxF/X file for the ISO 12642 series data exchange

The standard Color Exchange Format as presented in ISO 17972-1 captures file information such as creation and ownership, core colour information (the Resources) and any extended information (CustomResources). In this document, CustomResources is used to define the minimum required data for the ISO 12642 series data exchange using CxF/X-3. Any CxF/X file shall meet the following requirements.

— 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 CxF3 schema (see Annex B). In all cases, a CxF/X document should have the extension ".CxF".

A CxF/X file shall be structured as shown in Figure 1.

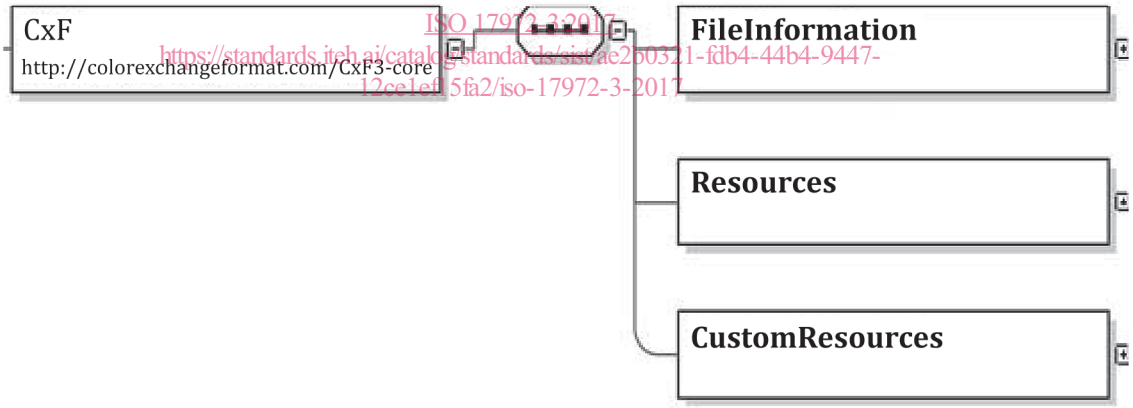

Figure 1 — CxF/X schema top-level structure

NOTE The spelling of terms and elements taken from Color Exchange Format v3.0 is not altered from that used in References [2], [3], [4] and [8]. A specific example is the word "color" instead of "colour".

5.3 Requirements of a CxF/X-3 file for the ISO 12642 series data exchange

There are several data requirements stated in ISO 12642-1:2011, 4.3. Originators of targets are required to provide:

— for all targets, batch-specific mean and standard deviation colorimetric data shall be available for each patch in the form of XYZ tristimulous values to two decimal places;

— calibrated targets shall supply the measured colorimetric data for all target patches.

Table 1 lists the required elements for CxF/X data exchange of output target data. Annex A provides a complete mapping of all keywords from ISO 28178 which is a superset of the keywords used in the ISO 12642 series.

Table 1 — ISO 12642 series/CxF/X-3 required fields

ISO 12642 series	CxF/X
Required fields	
Originator	**FileInformation/Creator**
Descriptor	**FileInformation/Description**
Created	**FileInformation/CreationDate**
Instrumentation	**MeasurementSpec/Device.Model**
Measurement_Source	**MeasurementSpec/Device/DeviceIllumination**
Manufacturer	**FileInformation/Tag/@“*Manufacturer*”**
Measurement_Geometry	**MeasurementSpec/GeometryChoice**
Filter	**MeasurementSpec/Device.DeviceFilter**
Print_Conditons	**FileInformation/Tag/@Print Conditions**
Sample backing	**MeasurementSpec/Backing**
Input values	
CMYK_C (M,Y,K)	**ColorCMYK**
Measured values (XYZ, Lab Spectral); One is required	
XYZ_X (Y,Z)	**ColorCIEXYZ**
LAB_L (A,B)	**ColorCIELab**
SPECTRAL_NM (DEC,PCT)	**ReflectanceSpectrum…**

5.4 Optional value fields for non-CMYK targets and transmissive targets

The elements shown in Table 2 from CxF/X can be used to describe the input values of a target that is not in the CMYK space. An example is provided in Annex C.

Table 2 — CxF/X-3 optional input device dependent values

CxF/X element	Description
ColorCMYKPlusN	Device-specific CMYK (plus additional colours) values; if no CMYK values are used, ColorCustom should be used. If not all channels of CMYK are filled, relevant channel shall have 0s entered as values.
ColorRGB	Device-specific RGB values.
ColorCustom	Device-specific custom colour values.
MeasurementSpec/MeasurementType	Enumerated choice of spectral type or colorimetric values (Spectral_Reflectance, Emissive, etc.).

5.5 Layout reporting

Layouts of the normative patch sets are informative in ISO 12642-1 and ISO 12642-2. This can lead to confusion when trying to verify the imaging of a target or how it should be measured. The values in Table 3 form a custom resource which shall be included when target layout information is required in addition to the input and measured values. By default, the patch sizes are assumed to be equal and the order is always assumed to be filled in from left to right, top to bottom. In addition, the expectation is that all rows have equal values of patches with the allowable exception of the last row.

Table 3 — ISO CxF/X-3 Layout Custom Resource Required fields

CxF/X-3 element	Description
DimensionUnit	“mm” “inch”
NumberPatchColumns	Number of columns on page
NumberPatchRows	Number of patches rows per page
PageHeight	Long dimension of page
NumberPatches	Total number of patches
NumberPages	Number of pages in the total chart
PageWidth	Narrow dimension of page
PaperOrientation	“Landscape”/“Portrait”
PatchSizeHeightPercent	Any expected scaling due to imaging
PatchSizeHeightValue	Input value of patch height
PatchSizeWidthPercent	Any expected scaling due to imaging
PatchSizeWidthValue	Input value of patch width
PrintMarginBottom	Bottom margin
PrintMarginTop	Top margin
PrintMarginRight	Right margin
PrintMarginLeft	Left margin
Chart Identifiers	
TitleString	Chart name
PrinterName	Imaging device name, manufacturer, model
PrinterType	Description of imaging type: inkjet, flexo, offset, etc.
SubstrateName	Commercial name of substrate or descriptive name