INTERNATIONAL STANDARD

ISO 17972-4

Second edition
2018-01

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

Part 4: Spot colour characterisation data (CxF/X-4)

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

Partie 4: Données de caractérisation des points de couleur (CxF/X-4)

Reference number
ISO 17972-4:2018(E)

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

Published in Switzerland

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.*

This second edition cancels and replaces the first edition (ISO 17972-4:2015), which has been technically revised.

The main changes compared to the previous edition are as follows:

— electronic files for Annexes A and B, available at http://standards.iso.org/iso/17972/-4/ed-2/en, have been corrected;

— 5.3.2 has been clarified that the same set of patches shall be printed on black and substrate;

— that the black region may now be printed with a combination of inks has been added;

— minor clarifications and editorial corrections have been added.

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

Introduction

The ISO 17972 series defines methods for the exchange of measurement data and associated metadata within the graphic arts industry and for the exchange of 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.

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

ISO 17972-2 defines the use of a CustomResource for the creation of scanner target data.

ISO 17972-3 defines the use of a CustomResource when exchanging data from ISO 12642-1 and ISO 12642-2.

Communication of printing characteristics of inks is essential in order to ensure that a printed product has the appearance desired by a print buyer or brand manager. Traditionally, inks are thought of as being either process inks or spot inks. The term “process inks” is used to describe a set of inks that are frequently used in combination on a printing press (often cyan, magenta, yellow and black). Process inks are generally characterised in combination and the measurement data for combinations of inks is the subject of ISO 17972-3.

This document covers the use of CxF when exchanging spot colour characterisation data. There are many proprietary formats for this communication and it is hoped that this document will provide a more reliable means for the communication of spot colour characterisation data. It is usually impractical to print and measure combinations of spot colour inks. Instead, each ink is characterised in conjunction with a print substrate by means of its spectral characteristics and ink opacity.

In some cases, multiple impressions of single or multiple spot inks can be used; details of these inks and the production method used are not provided in this document. Similarly, the way in which an ink is produced is also outside of the scope. Information of this kind can be included using standard CxF extension mechanisms.

The measurement of metallic, pearlescent or fluorescent colours might require additional or extended data fields in addition to those described in this document in order to be sufficient to fully characterise these types of ink.

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 part of this document and are available at http://standards.iso.org/iso/17972/-4/ed-2/en:

— CxF3_Core.xsd;

— CxF3_Core_Schema_diagram.pdf;

— ISO17972-4_CxFX-4_Example 1.xml;

— ISO17972-4_CxFX-4_Example 2.xml;

— ISO17972-4_CxFX-4_schema.xsd.

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

Part 4:
Spot colour characterisation data (CxF/X-4)

1 Scope

This document defines an exchange format for spectral measurement data of inks to provide a means to characterise spot colour inks to allow reliable printing and proofing of products that have been designed using these inks. Only isotropic (paper-like) substrates are within the scope of this document, which is limited to application areas where the same ink and paper combination that has been characterised is used when printing.

This document describes the use of a CustomResource element within the CxF framework to define a minimum and recommended set of data for exchange.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 17972-1:2015, *Graphic technology — Colour data exchange format — Part 1: Relationship to CxF3 (CxF/X)*

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:

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

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

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: ISO 17972-1:2015, 3.1.1]

3.2
ColorValue
defined colour space type that can hold values and associated information related to that specific type of device independent colour space

[SOURCE: ISO 17972-1:2015, 3.1.2 — modified to comply with ISO/IEC Directives, Part 2, 2016, 16.5.5.]

3.3
CustomResources
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: ISO 17972-1:2015, 3.1.3 — modified to comply with ISO/IEC Directives, Part 2, 2016, 16.5.5.]

3.4
element content
XML text between the start tag and end tag of an element

[SOURCE: ISO 16684-1:2012, 3.2]

3.5
object
thing used to identify each specific "colour item" that is being described

[SOURCE: ISO 17972-1:2015, 3.1.5 — modified to comply with ISO/IEC Directives, Part 2, 2016, 16.5.5.]

3.6
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.

[SOURCE: ISO 17972-1:2015, 3.2.4]

3.7
schema
XML document conforming to the specifications established by the World Wide Web Consortium that defines the structure of a class of XML documents

[SOURCE: ISO 17972-1:2015, 3.2.5]

3.8
spot colour
non-process colour that is used in addition to, or in place of, a process colour and is normally applied with a single impression

3.9
tint level
percentage value in the range 0 to 100 that indicates how much of a marking substance (e.g. ink, toner) should be applied to a printed region

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

[SOURCE: ISO 17972-1:2015, 3.2.6 — modified]

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

CxF/X-4 files conform to the requirements of ISO 17972-1 and the CoreResource element may be validated as described in Annex C.

Details as to how the CustomResource element may be validated are provided in Annex A and some examples are described in Annex B.

The status of Annexes A, B and C is informative.

5.2 Conformance levels

This specification defines three conformance levels identified as CxF/X-4, CxF/X-4a and CxF/X-4b. These conformance levels allow different methods of spot colour communication in common use to be described.

a) CxF/X-4 Full Characterisation. The data provided by CxF/X-4 allows the colour and opacity of the ink to be specified. This is particularly important in situations where an accurate proof of the spot ink printed on top of other content is to be made.

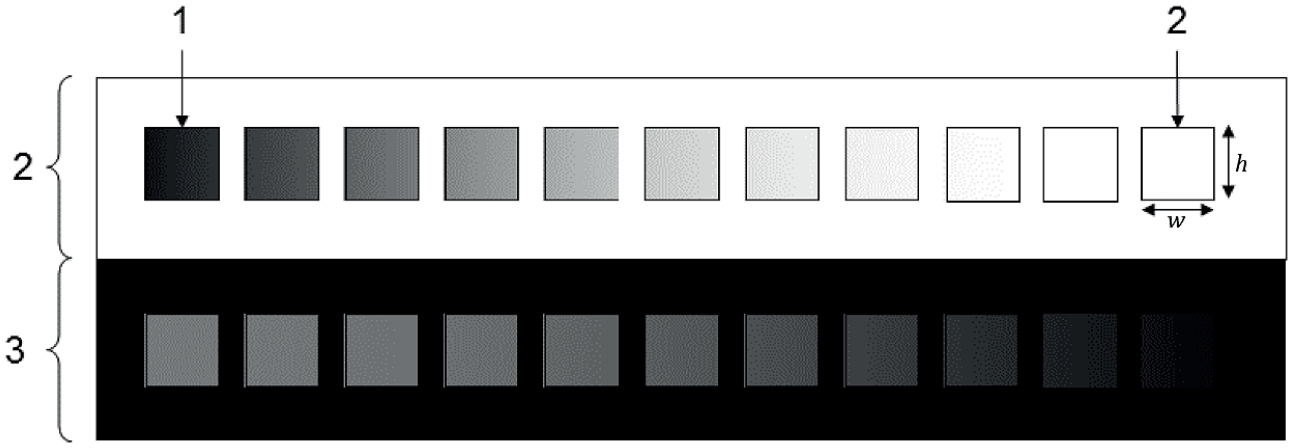
b) CxF/X-4a Single Background Characterisation. There are situations where it is useful to be able to communicate characterisation data for an ink where the ink will only be printed on a single background and so can be characterised using a single set of spectral measurements.

c) CxF/X-4b Single Patch Characterisation. There are situations where it is useful to be able to communicate characterisation data for an ink where the ink will always be printed as a solid and so can be characterised using a single spectral measurement.

5.3 Characterisation chart preparation

5.3.1 General

Measurement data in a conforming CxF/X-4 file should be taken from a spot ink characterisation chart as shown in Figure 1. This measurement data provides the characteristic colour response for the combination of ink and substrate.



Key

1 solid
2 substrate
3 region printed with black

Figure 1 — Example characterisation chart

5.3.2 Printed patches

For all conformance levels, patches of 0 % and 100 % shall be printed on the unmarked substrate.

The printing system to be characterised shall be suitably configured and calibrated to match normal operating conditions before the characterisation chart is printed.

Tint levels recorded in the CxF data shall be those requested by the characterisation chart, which is not guaranteed to match the percentage area covered on the print because of tone value increase or other factors.

Tint levels recorded in the CxF data shall be as percentage values in the range of 0 to 100, where 0 means no ink was requested and 100 means that the chart requested that the area be completely covered with ink.

For conformance levels CxF/X-4 and CxF/X-4a, the set of patches printed on the unmarked substrate shall include at least one patch with an intermediate tint level, for example 50 %, and should include a minimum of 11 patches in total.

For conformance level CxF/X-4, a second set of patches shall be printed on the region printed with black ink. This set of patches shall have the same tint levels as the set of patches printed on the unmarked substrate.

This document does not provide guidance as to how to measure patches and users shall ensure that measurements are made in line with measurement instrument manufacturers' guidelines.

NOTE Most spot measurement systems use a patch width (w) and height (h) of at least 1 mm larger than the aperture size of the measuring device. See ISO 13655 for additional guidance.

The only difference in the ink characterisation data files for these conformance levels is the number and type of measurements required, as shown in Table 1.