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Graphic technology — Printing from digital data across multiple technologies —

Part 2: Characterized reference printing conditions, CRPC1 - CRPC7

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*Technologie graphique — Impression à partir de données numériques
via des technologies multiples —*

*Partie 2: Conditions d'impression de référence caractérisées, CRPC1 -
CRPC7*

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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.

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).

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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 15339 consists of the following parts, under the general title *Graphic technology — Printing from digital data across multiple technologies*:

- Part 1: Principles
- Part 2: Characterized reference printing conditions, CRPC1 – CRPC7

Introduction

This International Standard is based on the premise that in the printing and publishing industries, electronic data are the intermediary for content storage and exchange throughout production including copy preparation, job assembly, proofing, and process printing. It further assumes that data preparation can be largely process independent and that choice of the printing process or processes to be used for final production will be based primarily on run length requirements and substrates to be used. There are various tools in place to both define the relationship of digital data to printed colour for specific instances of printing and to manipulate data such that similar results can be obtained between and among different printing processes (see ISO/TS 10128:2009). These specific instances of printing are typically described by colour characterization data, which are the relationship between CMYK input data and colour measured on the printed sheet. Where such a set of colour characterization data are used as a reference it is referred to as a characterized reference printing condition (CRPC).

ISO 15339-1¹⁾ describes the principles involved in developing and working with CRPCs.

This part of ISO 15339 defines a set of CRPCs associated with the initial publication of this International Standard. It is the intent of ISO/TC 130 that if changes in, or additions to, these data sets are needed in the future, they will be documented in added parts of this International Standard so that changes in the data sets are possible without losing traceability to earlier data sets.

Not all printing processes that can achieve the same colour gamut are subject to the same limitations. Offset, gravure, flexography, electrophotographic, ink-jet, etc., each have limitations that may have to be considered in the final data preparation. These typically include limitations of total ink coverage, minimum and maximum printable dot sizes, etc. Should general guidance be needed, additional parts of ISO 15339 can be prepared to assist in the communication or standardization of the handling of such limitations.

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Graphic technology — Printing from digital data across multiple technologies —

Part 2: Characterized reference printing conditions, CRPC1 - CRPC7

1 Scope

This part of ISO 15339 specifies a limited number of characterized reference printing conditions that span the expected range of colour gamuts used for the production of printed material from digital data, regardless of printing process used. Their use is described in ISO 15339-1²⁾.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 15339-1²⁾, *Graphic technology — Printing from digital data across multiple technologies — Part 1: Principles*

ISO 28178, *Graphic technology — Exchange format for colour and process control data using XML or ASCII text*
ISO/FDIS 15339-2
https://standards.iteh.ai/catalog/standards/sist/304032f0-5516-4455-9ee1-6d31bcbb7f50/iso-fdis-15339-2

ANSI/CGATS/IDEAlliance TR 015-2013, *Graphic technology — Methodology for Establishing Printing Aims Based on a Shared Near-neutral Gray-scale*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 15339-1²⁾ apply.

4 Requirements

As defined in ISO 15339-1²⁾, unless otherwise agreed between sender and receiver, the characterized reference printing condition (CRPC) used for data preparation and data exchange shall be one of the data sets defined in this or subsequent parts of this International Standard.

The characterization data associated with the characterized reference printing conditions identified in this part of ISO 15339 are normative and are included as data files ISO15339-CRPC1.txt through ISO15339-CRPC7.txt. Although a normative part of this International Standard, they may be freely used and distributed provided that the header of all distributed files shall indicate that they are part of this International Standard.

NOTE 1 When additional CRPCs are published in subsequent parts of this International Standard, it is expected that they will follow the same sequential naming scheme to avoid confusion, i.e. 15339-CRPC-8 would be the next named data set.

The characterized reference printing conditions included in these tables have been selected to be near the middle of both the general class of printing that is expected to make use of each characterized

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reference printing condition and the colour of the substrates used. It is expected that adjustments for substrate colour [see ISO 15339-1³⁾] will allow each characterized reference printing condition to meet a wide variety of needs and be independent of the actual printing process to be used.

The tone reproduction curves used are based on the procedures defined in ANSI/CGATS/IDEAlliance TR 015-2013 and are dependent on the reflectance of the substrate and of the black and three-colour solids. The formulae of ANSI/CGATS/IDEAlliance TR 015-2013 provide the CIE Y tristimulus value corresponding to a particular cyan tone value of a near neutral scale.

To provide a consistent relationship between the substrate corrected neutral scales of the various data sets created for this part of ISO 15339, the CMY triplets defined by Formula (1) were mapped to the substrate corrected neutral scale of all data sets.

$$M = Y = 0,7470C - 4,100 \times 10^{-4}C^2 + 2,940 \times 10^{-5}C^3 \quad (1)$$

In addition, the densitometric tone value curves (computed according to A.3) for the three chromatic colourants were adjusted to have the same tone value increase (see Table A.1).

The data shown in Tables 1 to 3 are taken from the CRPC data files and are shown in these tables and figures for information. The CIELAB a*-b* projection of the characterization data of each of these characterized reference printing conditions is shown in Figure 1.

All colourimetry is defined to be ISO 13655 M1 with white backing.

NOTE 2 To facilitate the use of the correction of colourimetric data for variations in substrate colour as described in ISO 15339-1³⁾, the header of each file contains the CIELAB values for both the substrate and a reference black point of the data set. The values for the substrate are ID 1 in each data set and as described in ISO 15339-1³⁾ the value in ID 1286 (the four-colour solid) is used as a reference black point.

The substrate, single colour solids, and two-colour overprints that are the aims for the characterization data set are as shown in Table 1 and Table 2.

The colourimetrically computed mid-tone TVI for each of the single colour scales of each of the characterized reference printing conditions is listed in Table 3 for information. More extensive TVI curves can be computed directly from the CRPC data if desired. Annex A shows the computed densitometric TVI and provides the computations used to derive both densitometric and colourimetric TVI.

NOTE 3 A spreadsheet, which extracts process control data from a CRPC data set, does substrate correction computations, and derives both densitometric and colourimetric TVI curves, is available at <http://www.npes.org/Programs/StandardsWorkroom/ToolsBestPractices.aspx>.

Table 4 lists typical use conditions, and a convenient name, for each of these characterized reference printing conditions. These characterized reference printing conditions have been selected to be near the middle of both the general class of printing that is expected to make use of each characterized reference printing condition and the colour of the substrates used. It is expected that adjustments for substrate colour [see ISO 15339-1³⁾] will allow each characterized reference printing condition to meet a wide variety of needs and be independent of the printing process to be used.

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Table 1 — Characterized reference printing conditions: primary colour aims (informative)

CRPC	Substrate colour			Printed solid colours											
				Cyan			Magenta			Yellow			Black		
	L*	a*	b*	L*	a*	b*	L*	a*	b*	L*	a*	b*	L*	a*	b*
1	85	1	5	59	-24	-26	56	48	0	80	-2	60	37	1	4
2	87	0	3	57	-28	-34	52	58	-2	82	-2	72	30	1	2
3	96	1	-4	60	-26	-44	56	61	-2	89	-3	76	32	1	1
4	89	0	3	55	-36	-38	47	66	-3	83	-3	83	23	1	2
5	92	0	0	57	-37	-44	48	71	-4	87	-4	88	19	0	1
6	95	1	-4	56	-37	-50	48	75	-4	89	-4	93	16	0	0
7	97	1	-4	54	-42	-54	47	79	-10	90	-4	103	14	0	0

Table 2 — Characterized reference printing conditions: two-colour overprint aims (informative)

CRPC	Red			Green			Blue		
	L*	a*	b*	L*	a*	b*	L*	a*	b*
1	54	44	25	55	-35	17	42	7	-22
2	51	55	32	51	-44	19	36	9	-32
3	54	56	28	54	-43	15	38	10	-31
4	46	62	39	49	-54	24	28	14	-39
5	48	65	45	51	-62	26	27	17	-44
6	47	68	48	50	-66	26	25	20	-46
7	47	75	54	50	-72	29	20	26	-53

Table 3 — Colourimetric TVI (informative)

Values in percent

CRPC	Colourimetric TVI at 50 % input TV			
	C	M	Y	K
1	24,3	26,1	26,1	26,2
2	17,3	19,2	19,2	22,0
3	16,8	19,1	19,0	22,1
4	15,9	19,1	19,0	22,1
5	15,0	16,0	16,0	19,1
6	13,4	16,0	16,0	19,0
7	11,6	16,1	16,1	19,1