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ISO 12642-3

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Graphic technology — Input data for characterization of 4-colour process printing —

Part 3: Extended data set including near neutral scale

Reference number
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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).

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).

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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

A list of all parts in the ISO 12642 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The characterization target ink value combinations defined in ISO 12642-2, have proven very effective for use in characterizing various printing processes. When the ISO 12642-2 and its predecessor the ISO 12642-1 target were introduced, there was a need for a visual layout and manual reading of the target. This led to the need to have some ink value combinations repeated in both single-colour scales and in various overprint combinations. This resulted in 29 duplicate patches in the ISO 12642-2 data sets.

Although a totally revised and/or expanded target has been proposed at various times, the size of the existing ISO 12642-2 target and its patch size have been accepted by the industry and most scanning spectrophotometers contain drivers that accept this format. This led to the decision that the most useful way forward was to simply replace the duplicate patches with new ink value combinations. Because of the increased use of neutral scale calibration, it was felt that these patches would be more useful as additional black only patches and near-neutrals. The ISO 12642-3 target described in this document represents the implementation of these proposals. Some of the removed patches were used in other systems, while duplicate patches were used to verify consistency. The use of multiple targets, averaged measurements and printing of targets along with the ISO 12642-3 are processes that can be used for the capture of the desired data.

There is no required layout or patch size defined for this data set. Users are free to randomize the layout and/or “fit” it to the space available. However, the members of the graphic arts community believe strongly that an example layout should be provided as a guide to the user. Because of the removal of the 29 patches that “filled out” the symmetrical colour layout, no “visual” layout is provided. One randomized example layout is provided.

The needs of publication, commercial, and package printing with offset lithography, gravure, flexography, and other printing processes have been considered.

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Graphic technology — Input data for characterization of 4-colour process printing —

Part 3:
Extended data set including near neutral scale

1 Scope

This document defines a data set of ink value combinations that can be used to characterize four-colour process printing. This data set is not optimized for any printing process or application area but is robust enough for all general applications. While it is primarily aimed at process colour printing with CMYK inks, it can also be used with any combination of three chromatic inks and a dark ink.

This document is an alternative to the ISO 12642-2 data set where more neutral scale data are desired. It is not designed as a replacement for ISO 12642-2.

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 12642-2, *Graphic technology — Input data for characterization of 4-colour process printing — Part 2: Expanded data set*

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 https://www.electropedia.org/

3.1
data set
total collection of independently identified ink value sets

Note 1 to entry: The terms “patch” and “target” are deliberately avoided because they imply a physical object or layout. This document only defines the data values that users are free to arrange in any target layout that meets their needs, using patches of any size compatible with their measuring equipment.

3.2
ink values
digital value that represents the amount of a colorant required in a rendering process, which, for the halftone printing process, is equivalent to the tone value/dot area expressed as a percentage

3.3
ink value set
set of four *ink values* (3.2) representing the amount of the four colours to be used in a process colour area

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4 Technical requirements

4.1 Background

The technical requirements and data set definitions that apply to the data set elements of this document shall be in accordance with ISO 12642-2.

The key additional requirement that has been identified by the users of the existing target is the need for more black and near-neutral combinations of C, M, Y ink values. In addition, the use of the visual layout of the target has diminished with the increased use of automated scanning spectrophotometers. These two factors have allowed the 29 duplicate ink value sets (patches) to be removed and replaced with 29 new ink value sets (patches) to improve CMY neutral (23 samples) and K-only (6 samples) aspects of printing characterization and profile computation.

4.2 Tone value precision

The tone values listed in this document are expressed as whole integer percentages, except for magenta and yellow in the CMY grey scale, which are rounded to one decimal place from the grey balance formulae in CGATS TR 015[2], as shown in Formula (1).

$$M = Y = 0{,}747\,0C - 4{,}100\times10^{-4}\,C^2 + 2{,}940\times10^{-5}\,C^3 \tag{1}$$

This precision can be important in very light grey patches between 0 and 20 %.

Many commercial ICC profiling software generates printable target images from the supplied ISO 28178 text files with 8 bit-per channel precision, which is adequate for most purposes. Printable targets are available that have an precision of 16 bits per channel (when integrated by a 3 mm spectrophotometer aperture) thanks to the use of LSB error diffusion when the original 16 bit images were flattened to 8 bits. This is the approach taken in the example target in Annex A.

4.3 Data set definition

Table 1 lists the ink value sets that have been deleted from the ISO 12642-2 target and shows the IDs of the retained patches with identical values.

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Table 1 — Deleted patches and retained equivalents

Deleted	Equivalent	C	M	Y	K
1287	73	100	0	0	0
1291	64	85	0	0	0
1294	55	70	0	0	0
1297	37	40	0	0	0
1298	28	30	0	0	0
1300	19	20	0	0	0
1302	10	10	0	0	0
1307	9	0	100	0	0
1311	8	0	85	0	0
1314	7	0	70	0	0
1317	5	0	40	0	0
1318	4	0	30	0	0
1320	3	0	20	0	0
1322	2	0	10	0	0
1327	649	0	0	100	0
1331	568	0	0	85	0
1334	487	0	0	70	0
1337	325	0	0	40	0
1338	244	0	0	30	0
1340	163	0	0	20	0
1342	82	0	0	10	0
1347	1260	0	0	0	100
1352	1096	0	0	0	80
1355	1071	0	0	0	60
1357	946	0	0	0	40
1360	730	0	0	0	20
1367	1	0	0	0	0
1368	647	100	85	85	0
1486	1362	0	0	0	10

The new ink value combinations have been assigned ID numbers 1618 through 1646 as shown in Table 2.

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Table 2 — New INK value combinations and their IDs

ID	C	M	Y	K
1618	25,0	18,9	18,9	0,0
1619	20,0	15,0	15,0	0,0
1620	15,0	11,2	11,2	0,0
1621	10,0	7,5	7,5	0,0
1622	8,0	6,0	6,0	0,0
1623	6,0	4,5	4,5	0,0
1624	4,0	3,0	3,0	0,0
1625	65,0	54,9	54,9	0,0
1626	60,0	49,7	49,7	0,0
1627	55,0	44,7	44,7	0,0
1628	45,0	35,5	35,5	0,0
1629	40,0	31,1	31,1	0,0
1630	35,0	26,9	26,9	0,0
1631	30,0	22,8	22,8	0,0
1632	0,0	0,0	0,0	4,0
1633	95,0	92,5	92,5	0,0
1634	90,0	85,3	85,3	0,0
1635	85,0	78,6	78,6	0,0
1636	80,0	72,2	72,2	0,0
1637	75,0	66,1	66,1	0,0
1638	70,0	60,4	60,4	0,0
1639	0,0	0,0	0,0	65,0
1640	0,0	0,0	0,0	55,0
1641	0,0	0,0	0,0	45,0
1642	0,0	0,0	0,0	35,0
1643	0,0	0,0	0,0	8,0
1644	2,0	1,5	1,5	0,0
1645	98,0	96,9	96,9	0,0
1646	0,0	0,0	0,0	6,0

The accompanying files, available from https://standards.iso.org/iso/12642/-3/ed-1/en, shall represent a complete listing of the ink value combinations and their assigned ID numbers that constitute the ISO 12642-3 characterization data set. Information about the relationship of this data set and ISO 12642-2 can be found in Annex B.

4.4 Layouts for printing

The ink value sets of this document may be printed in any arrangement desired. Any arrangement shall include all 1617 ink value sets and shall include a reference to this document to be a valid ISO 12642-3 data set.

For any specific arrangement, a table defining the relationship between position (typically row-column) and ID number shall be provided.

One example layout is shown in Annex A along with their layout data and image files.

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4.5 Compatibility with data based on the ISO 12642-2 target

Where it is necessary to compare data to earlier data generated with the ISO 12642-2 target, the ID values of the deleted and equivalent ink value sets in Table 1 can be used to recreate a full ISO 12642-2 data set.

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Annex A
(informative)

Example layout and image file

A.1 General

Although there is no requirement that any particular arrangement of these data be used for printing characterization targets, it was felt that for many users an example layout was desirable to facilitate use of the target and familiarize the user with the placement of the neutral ramps. Accordingly, one example layout is provided along with a caution on the layout of the grey ramps in any target design.

A.2 Design

Unlike ISO 12642-2, ISO 12642-3 should only be used in randomized layouts (this is why there is no "visual" example), however the CMY and K-only grey patches should not be randomized, but rather arranged as two contiguous grey ramps along the edge of the target. This helps reduce small tonality or colour variations throughout the grey ramps due to in-line ink starvation effects or uneven inking that would be magnified if the grey patches were randomized throughout the target. Target orientation should be positioned to best optimize grey ramp in line with print technology.

A.3 Layout and cross reference data

The file 12642-3_ID_and_Layout_Crossreference.xls provides a table of the ISO 12642-3 IDs and ink value data sets as well as a sort index as row column identification for the example layouts.

Figure A.1 shows a reduced size image of the example layout.

Image files for example layout 12642-3-DH include both TIFF and PDF formats.

These files are available for download here: https://standards.iso.org/iso/12642/-3/ed-1/en/.

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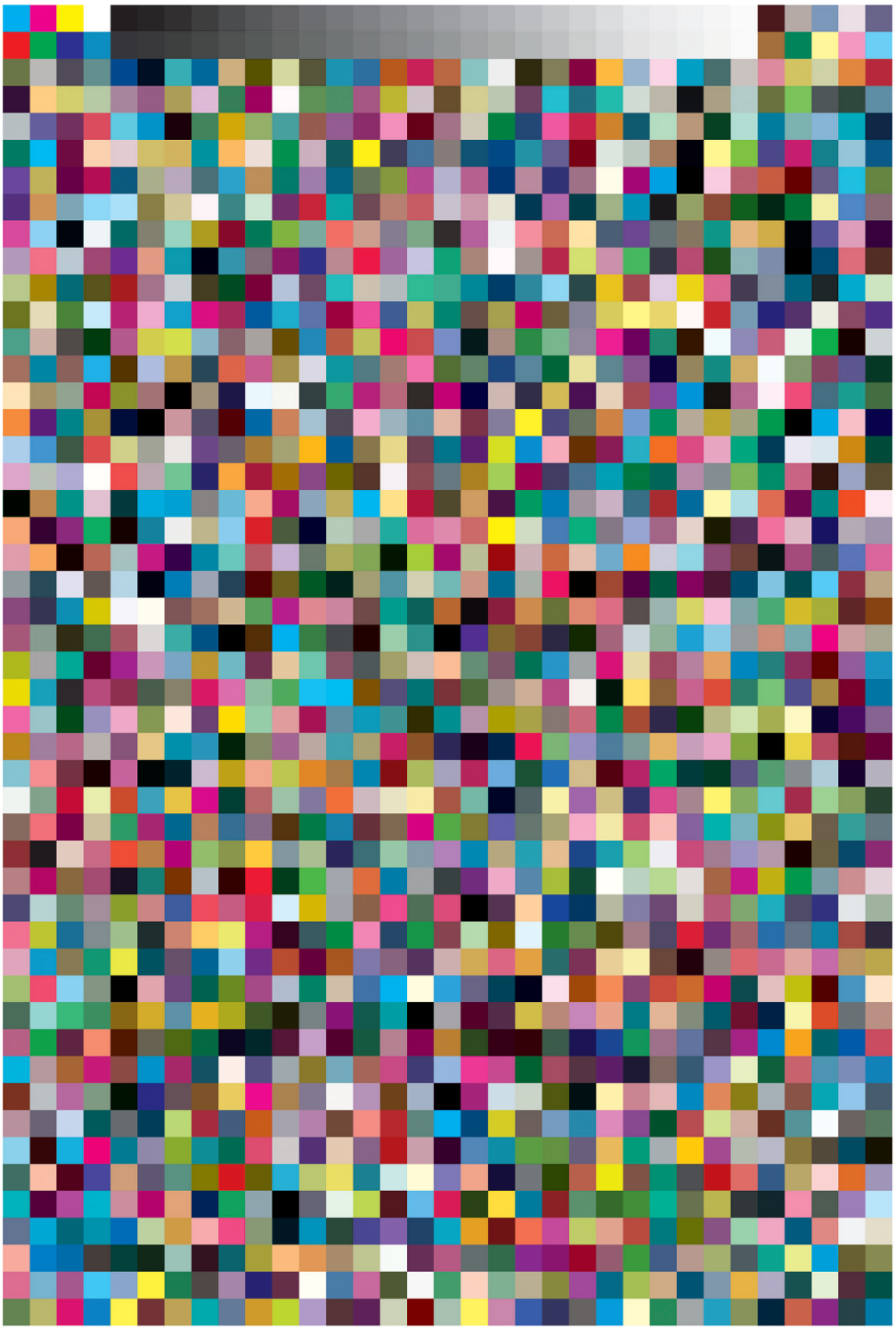

Figure A.1 — 12642-3-DH

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Annex B
(informative)

ID and ink values of the ISO 12647-3 data set

Table B.1 shows the corresponding ID and ink values of the ISO 12647-3 data set. The ID's are not contiguous as the duplicate values from the ISO 12647-2 data set have been removed with the new neutral patches are seen from ID's 1618 to 1646.

Table B.1 — ISO 12642-3 Target definition

ID	C	M	Y	K
1	0,0	0,0	0,0	0,0
2	0,0	10,0	0,0	0,0
3	0,0	20,0	0,0	0,0
4	0,0	30,0	0,0	0,0
5	0,0	40,0	0,0	0,0
6	0,0	55,0	0,0	0,0
7	0,0	70,0	0,0	0,0
8	0,0	85,0	0,0	0,0
9	0,0	100,0	0,0	0,0
10	10,0	0,0	0,0	0,0
11	10,0	10,0	0,0	0,0
12	10,0	20,0	0,0	0,0
13	10,0	30,0	0,0	0,0
14	10,0	40,0	0,0	0,0
15	10,0	55,0	0,0	0,0
16	10,0	70,0	0,0	0,0
17	10,0	85,0	0,0	0,0
18	10,0	100,0	0,0	0,0
19	20,0	0,0	0,0	0,0
20	20,0	10,0	0,0	0,0
21	20,0	20,0	0,0	0,0
22	20,0	30,0	0,0	0,0
23	20,0	40,0	0,0	0,0
24	20,0	55,0	0,0	0,0
25	20,0	70,0	0,0	0,0
26	20,0	85,0	0,0	0,0
27	20,0	100,0	0,0	0,0
28	30,0	0,0	0,0	0,0
29	30,0	10,0	0,0	0,0
30	30,0	20,0	0,0	0,0
31	30,0	30,0	0,0	0,0
32	30,0	40,0	0,0	0,0
33	30,0	55,0	0,0	0,0

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Table B.1 *(continued)*

ID	C	M	Y	K
34	30,0	70,0	0,0	0,0
35	30,0	85,0	0,0	0,0
36	30,0	100,0	0,0	0,0
37	40,0	0,0	0,0	0,0
38	40,0	10,0	0,0	0,0
39	40,0	20,0	0,0	0,0
40	40,0	30,0	0,0	0,0
41	40,0	40,0	0,0	0,0
42	40,0	55,0	0,0	0,0
43	40,0	70,0	0,0	0,0
44	40,0	85,0	0,0	0,0
45	40,0	100,0	0,0	0,0
46	55,0	0,0	0,0	0,0
47	55,0	10,0	0,0	0,0
48	55,0	20,0	0,0	0,0
49	55,0	30,0	0,0	0,0
50	55,0	40,0	0,0	0,0
51	55,0	55,0	0,0	0,0
52	55,0	70,0	0,0	0,0
53	55,0	85,0	0,0	0,0
54	55,0	100,0	0,0	0,0
55	70,0	0,0	0,0	0,0
56	70,0	10,0	0,0	0,0
57	70,0	20,0	0,0	0,0
58	70,0	30,0	0,0	0,0
59	70,0	40,0	0,0	0,0
60	70,0	55,0	0,0	0,0
61	70,0	70,0	0,0	0,0
62	70,0	85,0	0,0	0,0
63	70,0	100,0	0,0	0,0
64	85,0	0,0	0,0	0,0
65	85,0	10,0	0,0	0,0
66	85,0	20,0	0,0	0,0
67	85,0	30,0	0,0	0,0
68	85,0	40,0	0,0	0,0
69	85,0	55,0	0,0	0,0
70	85,0	70,0	0,0	0,0
71	85,0	85,0	0,0	0,0
72	85,0	100,0	0,0	0,0
73	100,0	0,0	0,0	0,0
74	100,0	10,0	0,0	0,0
75	100,0	20,0	0,0	0,0
76	100,0	30,0	0,0	0,0
77	100,0	40,0	0,0	0,0

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Table B.1 *(continued)*

ID	C	M	Y	K
78	100,0	55,0	0,0	0,0
79	100,0	70,0	0,0	0,0
80	100,0	85,0	0,0	0,0
81	100,0	100,0	0,0	0,0
82	0,0	0,0	10,0	0,0
83	0,0	10,0	10,0	0,0
84	0,0	20,0	10,0	0,0
85	0,0	30,0	10,0	0,0
86	0,0	40,0	10,0	0,0
87	0,0	55,0	10,0	0,0
88	0,0	70,0	10,0	0,0
89	0,0	85,0	10,0	0,0
90	0,0	100,0	10,0	0,0
91	10,0	0,0	10,0	0,0
92	10,0	10,0	10,0	0,0
93	10,0	20,0	10,0	0,0
94	10,0	30,0	10,0	0,0
95	10,0	40,0	10,0	0,0
96	10,0	55,0	10,0	0,0
97	10,0	70,0	10,0	0,0
98	10,0	85,0	10,0	0,0
99	10,0	100,0	10,0	0,0
100	20,0	0,0	10,0	0,0
101	20,0	10,0	10,0	0,0
102	20,0	20,0	10,0	0,0
103	20,0	30,0	10,0	0,0
104	20,0	40,0	10,0	0,0
105	20,0	55,0	10,0	0,0
106	20,0	70,0	10,0	0,0
107	20,0	85,0	10,0	0,0
108	20,0	100,0	10,0	0,0
109	30,0	0,0	10,0	0,0
110	30,0	10,0	10,0	0,0
111	30,0	20,0	10,0	0,0
112	30,0	30,0	10,0	0,0
113	30,0	40,0	10,0	0,0
114	30,0	55,0	10,0	0,0
115	30,0	70,0	10,0	0,0
116	30,0	85,0	10,0	0,0
117	30,0	100,0	10,0	0,0
118	40,0	0,0	10,0	0,0
119	40,0	10,0	10,0	0,0
120	40,0	20,0	10,0	0,0
121	40,0	30,0	10,0	0,0

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