INTERNATIONAL STANDARD

ISO 2846-2

Second edition
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Graphic technology — Colour and transparency of printing ink sets for four-colour printing —

Part 2: Coldset offset lithographic printing

Technologie graphique — Couleur et transparence des gammes d'encre d'impression en quadrichromie —
Partie 2: Impression lithographique offset rotatif coldset

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 2846-2 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

This second edition cancels and replaces the first edition (ISO 2846-2:2000), of which Clauses 4 and 5 have been technically revised and the colorimetric properties of the inks were adjusted to be compatible with actual commercial requirements and to the process standard ISO 12647-3[1]. Details for test print preparation, which are now specified in ISO 2834-1, have been deleted.

ISO 2846 consists of the following parts, under the general title *Graphic technology — Colour and transparency of printing ink sets for four-colour printing*:

— *Part 1: Sheet-fed and heat-set web offset lithographic printing*

— *Part 2: Coldset offset lithographic printing*

— *Part 3: Publication gravure printing*

— *Part 4: Screen printing*

— *Part 5: Flexographic printing*

Introduction

The initial draft of ISO 2846-2 was prepared by ISO/TC 130 for materials and process control. They examined the colorimetric properties of commercial coldset web offset inks from around the world and found that a single set of colour coordinates could adequately represent these, within reasonable tolerances. Since the initial publication of this part of ISO 2846, additional coordination between the various national bodies participating in ISO/TC 130 has suggested that some minor refinements of the colorimetric aims would make them more compatible with actual commercial printing requirements and to the process standard ISO 12647-3 [1].

This part of ISO 2846 will allow printers to obtain sets of process inks from various sources which will produce a similar colour when printed on the reference substrate at the appropriate film thickness. This will allow colour separations for coldset web offset printing to be based on known colour standards. The colorimetric characteristics specified in this part of ISO 2846 may only be obtained when the inks are printed on the reference substrate. However, similarity of two inks on the reference substrate will ensure similarity on another substrate.

Graphic technology — Colour and transparency of printing ink sets for four-colour printing —

Part 2:
Coldset offset lithographic printing

1 Scope

This part of ISO 2846 specifies the colour and transparency to be produced by inks intended for four-colour coldset web offset printing when printed under specified conditions on a printability tester. It also describes the test method to ensure conformance.

This part of ISO 2846 is not applicable to fluorescent inks and does not specify pigments (or spectral reflectance) so as not to preclude the use of future suitable pigment combinations and still claim compliance with its colorimetric requirements.

2 Normative references

The following referenced documents are indispensable for the application 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 536, *Paper and board — Determination of grammage*

ISO 2471, *Paper and board — Determination of opacity (paper backing) — Diffuse reflectance method*

ISO 2834-1, *Graphic technology — Laboratory preparation of test prints — Part 1: Paste inks*

ISO 8791-4, *Paper and board — Determination of roughness/smoothness (air leak methods) — Part 4: Print-surf method*

ISO 13655, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

ANSI/CGATS.5:2003, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

3 Terms and definitions

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

3.1
coldset printing
web offset printing without accelerated drying

NOTE Ink sets by absorption into the substrate.

3.2
standard ink
ink, intended for four-colour printing, which, when printed on the reference substrate and within the applicable range of ink film thicknesses, complies to the colorimetric and transparency specifications of this part of ISO 2846

3.3
primary colours
colours of individual prints from yellow, magenta and cyan inks

NOTE If the prints are produced as specified in this part of ISO 2846 and conform to the colorimetric characteristics specified, they are standard primary colours.

3.4
transparency
ability of an ink film to transmit light, generally expressed as some measure of the unwanted scattering

3.5
transparency measurement value
T
reciprocal of the slope of the regression line between ink film thickness and colour difference for overprints of chromatic inks over black

4 Test method

4.1 Principle

Each ink is printed on the reference substrate described in Annex A at a range of ink film thicknesses. The colours which result are measured colorimetrically.

Transparency is evaluated by printing each of the three primary colours on a black substrate at a range of film thicknesses. The CIELAB colour difference is determined for each sample, between the printed and unprinted black, and the linear regression coefficient (slope of the regression line) between ink film thickness and colour difference is calculated for each colour.

For a detailed description of procedures, together with examples, see the informative Annex B.

4.2 Test print preparation

4.2.1 Prints for colorimetric evaluation

For each of the inks to be evaluated, a number of test prints shall be made using a printability tester, each produced at a different ink film thickness in accordance with the conditions specified in ISO 2834-1. They shall be made on the reference substrate as specified in Annex A. The sample material shall be kept in the dark under standard conditions of 23 °C and 50 % RH. The range of ink film thicknesses produced shall encompass that specified in 5.3. In cases where the approximate ink film thickness is known to result in the closest match of the target colorimetric values, a minimum of three prints shall be made. Otherwise, a minimum number of five prints should be made covering the full range of specified film thicknesses.

4.2.2 Prints for transparency evaluation

Test prints for transparency evaluation shall be produced by printing the inks to be tested on a black substrate using a printability tester. Measurements of the CIELAB values of the black substrate shall be made prior to overprinting. The black shall have a lightness (L^*) less than 30 when determined in accordance with ISO 13655.

The ink to be tested shall then be printed on the black substrate[1)] in accordance with the conditions specified in ISO 2834-1, such that a range of samples, each with a different ink film thickness, is achieved. The range should approximate that defined in 5.3.

4.2.3 Setting of test prints

Prior to colour measurement, all printed samples shall be left for at least 12 h to enable setting of the ink.

4.2.4 Colour measurement procedure

Test prints shall be measured in accordance with ISO 13655 with the exception that a white backing, in accordance with ANSI/CGATS.5:2003, shall be used.

NOTE 1 The requirements for white backing given in ANSI/CGATS.5:2003 are consistent with the future revision of ISO 13655.

NOTE 2 The colorimetric values are related to the measurement procedure specified in ISO 13655. This means that the samples are measured spectrally, with a 0°:45° (0°:45° indicates the relationship between incident light and reflected light measurement angles) or 45°:0° geometry instrument. For the calculation of CIELAB values and for the colour difference, the CIE 1931 (2°) standard colorimetric observer data are used together with CIE standard illuminant D50.

5 Requirements for colour, transparency and ink film thickness range

5.1 Colour

For an ink to conform to this part of ISO 2846, it shall meet the following requirements:

a) when printed as specified in 4.2.1, at some ink film thickness within the range specified in 5.3, the ink shall meet the colorimetric target value and tolerance specified in Table 1;

b) it shall meet the transparency requirements specified in 5.2.

NOTE Typical spectral data for inks conforming to this part of ISO 2846 are provided in Annex C.

Table 1 — Colorimetric values

Ink	CIELAB values			Tolerances			
	L^*	a^*	b^*	ΔE^*_{ab}	L^*	Δa^*	Δb^*
Yellow	80,4 (78,0)	−1,4 (−3,0)	61,6 (58,0)	4,0 (4,0)			
Magenta	55,5 (54,0)	47,6 (44,0)	0,7 (−2,0)	4,0 (4,0)			
Cyan	59,1 (57,0)	−23,9 (−23,0)	−27,1 (−27,0)	4,0 (4,0)			
Black	36,8 (36,0)	1,5 (1,0)	4,5 (4,0)		⩽ 36,8 [a] (⩽ 36,0 [a])	± 1,0 (± 1,0)	± 2,0 (± 2,0)
Values in brackets pertain to measurement on black backing in accordance with ISO 13655 and are given for information only.							
[a] This means that for black there is no symmetrical tolerance for L^* but an upper limit.							

1) Contact the ISO/TC 130 Secretariat (DIN) for the source of a suitable substrate.