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Graphic technology - Process control for the production of half-tone colour separations, proofs and production prints - Part 3: Coldset offset lithography on newsprint

Technologie graphique - Contrôle du processus de confection de sélections couleurs tramées, d'épreuves et de tirages - Partie 3: Impression offset sans sécheur sur papier journal

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Graphic technology — Process control for the production of half-tone colour separations, proofs and production prints —

Part 3: Coldset offset lithography on newsprint

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Partie 3: Impression offset sans sécheur sur papier journal

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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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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*.

This third edition cancels and replaces the second edition (ISO 12467-3:2005), which has been revised due to demands from customer experience. The revision introduces grey reproduction and grey balance calculation, a printing condition for standard newsprint, normative ΔE * tolerances for primary and secondary colours, one general tone value increase curve, a change in the colouration of magenta, options to monitor the printing characteristics and a general clean up.

ISO 12647 consists of the following parts, under the general title *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints*:

— *Part 1: Parameters and measurement methods*

— *Part 2: Offset lithographic processes*

— *Part 3: Coldset offset lithography on newsprint*

— *Part 4: Publication gravure printing*

— *Part 5: Screen printing*

— *Part 6: Flexographic printing*

— *Part 7: Proofing processes working directly from digital data*

— *Part 8: Validation print processes working directly from digital data*

Introduction

When producing a half-tone colour reproduction it is important that the colour separator and printer have previously specified a minimum set of parameters that uniquely define the visual characteristics and other technical properties of the planned print product. Such an agreement enables the correct production of suitable separations (without recourse to “trial-and-error”).

For more information on the technical background refer to ISO 12647-1.

It is the purpose of this part of ISO 12647 to list and explain the minimum set of process parameters required to uniquely define the visual characteristics and related technical properties of a half-tone production print produced by coldset offset lithography on newsprint from a set of half-tone separation data.

It is a further purpose of this part of ISO 12647 to list values or sets of values of the primary parameters specified in ISO 12647-1 and related technical properties of a half-tone newspaper print produced from a set of half-tone colour separation data. When deemed useful, secondary parameters are also recommended for specification.

Provisions for flexographic printing can be found in informative Annex D.

Graphic technology — Process control for the production of half-tone colour separations, proofs and production prints —

Part 3: Coldset offset lithography on newsprint

1 Scope

This part of ISO 12647 specifies a number of process parameters and their values to be applied when producing colour separations and printing forms for newspaper single or four-colour printing. The parameters and values are chosen in consideration of the process, covering the process stages: "colour separation", "making of the printing formed", "OK print or proof" and "production printing".

This part of ISO 12647 is intended to enhance communication between printers, publishers and advertisers and to make print buyers aware of the expected printed result in advance, enabling them to plan accordingly. This part of ISO 12647 defines tolerances, allowing for objective quality evaluations and raising the competitiveness of newspapers compared to other media.

This part of ISO 12647 is applicable:

— to coldset offset production printing on newsprint that use colour separation data;

— by analogy to press printing from printing surfaces produced by direct imaging;

— to line screens and non-periodic screens, parameters given can be applied by analogy.

Although this International Standard does not specify process control for flexographic printing, digital printing systems or letterpress production printing, the production aims defined by this International Standard may be applied when these printing technologies are used and where the printing result is intended to be similar to that produced by coldset offset lithography.

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 5-3, *Photography and graphic technology — Density measurements — Part 3: Spectral conditions*

ISO 2846-2, *Graphic technology — Colour and transparency of printing ink sets for four-colour printing — Part 2: Coldset offset lithographic printing*

ISO/TS 10128, *Graphic technology — Methods of adjustment of the colour reproduction of a printing system to match a set of characterization data*

ISO 12647-1:2013, *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints — Part 1: Parameters and measurement methods*

ISO 12647-7, *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints — Part 7: Proofing processes working directly from digital data*

ISO 13655:2009, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12647-1 and the following apply.

3.1
coldset offset lithography
method of offset lithographic printing (conventional or waterless) where the inks set "dry" primarily by absorption into the print substrate

3.2
digital proof print
digital print of high colour accuracy, useable as reliable visual colour reference for printing, and as a part of a commercial agreement as defined in ISO 12647-7

4 Requirements

4.1 General

Digital data files delivered for printing should be accompanied by a digital proof print, a press proof print, or an OK print from a previous print run. An OK-print from a previous print run (or a press proof), being in conformance with the requirements for an OK-print stipulated in 4.3 and stored under appropriate conditions, shall be used as the reference for the OK-print.

Digital proofs using an electronic display and digital proof prints shall not be used to gather measurement values to be used as reference in this part of ISO 12647.

NOTE On-press proof prints are test prints of the data files on a printing press. Most proofs are digital proof prints. However, for colour or content critical work sometimes there is a request for press proof prints using the same setup as the production print.

4.2 Data files and printing forms

4.2.1 Data files

Data delivered for printing shall be in the colour formats CMYK or three components and should be exchanged in PDF/X data formats as defined in ISO 15930 (all parts).

The intended printing condition shall be indicated in case of PDF/X data exchange. In case of PDF/X the mechanisms provided by the specified data format shall be used. In case of other data formats, a printing condition description, a characterization data set, or an International Colour Consortium (ICC) output profile shall be communicated.

Data other than CMYK shall be defined by colorimetric description using an ICC profile or other mechanism. An ICC CMYK output profile should be included. The rendering intent to be used with the output profile shall be communicated.

If the characterization data or ICC output profile provided conflict with the printing conditions defined in this part of ISO 12647 one of the methods defined in ISO/TS 10128 shall be used for data adjustment toward the printing conditions defined in this International Standard.

Checks are recommended to ensure the conformance of the data with the requirements of the printing standard.

4.2.2 Printing form quality

The resolution of the plate setter shall be set to a minimum frequency of $393 cm^{-1}$ and should be set to a minimum frequency of $500 cm^{-1}$.

The deviation of similar tone values of the data file in different areas of the printing form shall not exceed ± 1,5 tone value %.

4.2.3 Screen frequency (periodic screens)

For all half-tone elements, the screen frequency should be between 40 cm^{-1} and 54 cm^{-1}. Within the same print product the screen ruling shall be the same for colour and black-and-white printing. If other screen rulings are used the tone value increase shall be adjusted such that it agrees with Table 7 and Figure 3.

NOTE 1 Older Raster Image Processor (RIP) software might not be able to produce the requested screen angle at the requested screen ruling exactly. This is why with computer-generated screens, the parameters screen ruling and screen angle can be varied slightly.

NOTE 2 Screen frequencies are often required or given in lpi (lines per inch). To convert between lines per centimetre and lines per inch a conversion factor of 2,54 should be used. For example the requirement of 40^{-1} and 54^{-1} given in lpi will read as follows (rounded to commonly used integral numbers): for all half-tone elements, the screen frequency should be between 100 lpi and 140 lpi.

4.2.4 Screen dot size (non-periodic screens)

The screen dot size for non-periodic screens should be 40 µm ± 10 µm, depending on substrate requirements.

4.2.5 Screen angle (periodic screens)

For half-tone dots without a principal axis, the nominal difference between the screen angles for cyan, magenta and black should be 30°, with the screen angle of yellow separated at 15° from another colour. The screen angle of the dominant colour should be 45°. The dominant colour is defined as the one that contains most of the image information compared to the others. For typical newspaper applications the dominant colour will be black. Refer to Figure 1 for an example of a screen angle combination for a screen with a principal axis and with black as the dominant colour.

For half-tone dots with a principal axis (elliptical half-tone dot shape), the nominal difference between screen angles for cyan, magenta and black should be 60°, with the screen angle of yellow at 0° and 15° off from the next screen angle. The screen angle of the dominant colour should be 45° or 135°.

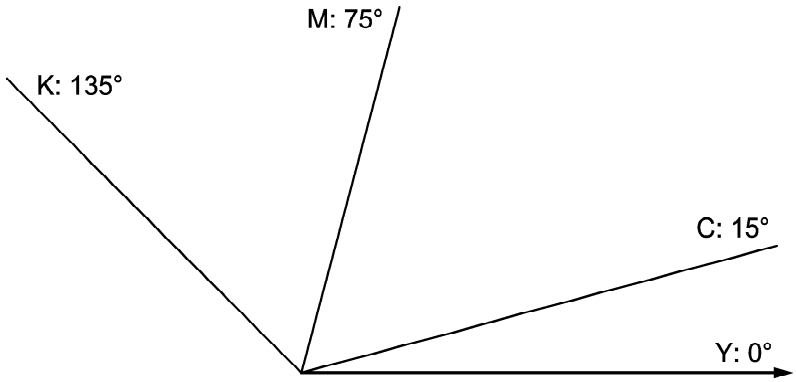

Figure 1 — Example of a screen angle combination for a screen with a principal axis and with black as the dominant colour

NOTE The dominant colour is defined as that which contains most of the image information compared to the others. For typical newspaper colour separations with GCR the dominant colour will be black.

4.2.6 Dot shape and its relationship to tone value (periodic screens)

For periodic screens, elliptical half-tone dot shapes should be used. For half-tone dots with a principal axis, the first link-up should occur no lower than at 40 % tone value (data) and the second link-up no higher than at 60 % tone value (data).

4.2.7 Tone value sum

Unless otherwise specified, the tone value sum should not exceed 220 % and shall not exceed 240 %. Where the maximum tone value sum approaches this limit, the tone value of black should be at least 90 %.

NOTE Any colour that is reproduced using all three chromatic process inks can be thought of as having a neutral component. This is defined by the lowest tone value and its grey balance equivalents of the other two inks. It is possible to replace all or some of the neutral component by black ink. Under colour removal (UCR) limits the tone value sum by replacing chromatic colour ink with black ink in the neutral shadows. Grey component replacement (GCR) replaces chromatic colour ink with black ink in the entire colour space. GCR is recommended for newspaper colour separations because it reduces colour variations caused by poor ink trapping, back transfer, set-off during the print run, and eases registration.

4.2.8 Grey reproduction and grey balance

The grey balance in printing can effectively be used for print quality control in newspaper print production. Since typical newsprint does not have a neutral but a yellowish colour, the following calculation method of grey balance in printing should be applied for coldset printing.

The tone values of cyan, magenta and yellow leading to a visually neutral grey should be calculated from the standard printing condition or actual printing condition or the associated profiles by the following formula describing the grey reproduction (L^*, a^*, b^*) with respect to a given paper colour $(L^*_{paper}, a^*_{paper}, b^*_{paper})$ and CMY-overprint (L^*_{cmy}) for each L^* in the range from L^*_{paper} to L^*_{cmy}:

$$a^* = a^*_{paper} \times \left[1 - 0{,}85 \times \left(L^*_{paper} - L^*\right) / \left(L^*_{paper} - L^*_{cmy}\right)\right]$$

$$b^* = b^*_{paper} \times \left[1 - 0{,}85 \times \left(L^*_{paper} - L^*\right) / \left(L^*_{paper} - L^*_{cmy}\right)\right]$$

NOTE 1 A single grey balance condition is usually not sufficient to ensure an achromatic colour for all print substrates and printing inks that may be used with a given printing process. Therefore the grey balance has to be determined for each printing condition separately based on a well-defined grey reproduction.

NOTE 2 The grey balance of a given printing process can be used for process calibration and process control as long as the tolerances for tone value increase and mid-tone spread as defined in Table 7 are not exceeded.

NOTE 3 The multiplying factor of 0,85 represents a visual adaptation of 85 % to the paper white.

NOTE 4 See Annex B for more information on specifying grey balance values.

4.3 Proof or production print

4.3.1 General

A printing condition for coldset offset printing shall be described by a print substrate, a colorant description, a screening description, an ink set, and a printing sequence. In all printing conditions described in this part of ISO 12647, the ink set shall be according to ISO 2846-2 and the printing sequence shall be Cyan – Magenta – Yellow – Black or Black - Cyan – Magenta – Yellow. See specifications of printing conditions for typical print substrates in Table 1. See Annex E for information on additional printing conditions.

NOTE 1 Characterization data are based on CMYK which is generally the preferred printing sequence.

