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Graphic technology — Processless lithographic plates —

Part 1: Evaluation methods for characteristics and performance

Technologie graphique — Plaques lithographiques sans traitement — Partie 1: Méthodes d'évaluation des caractéristiques et des performances

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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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 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 24487 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.

Introduction

Processless plates represent a simple way to prepare plates in prepress. Once a plate has been imaged, it is mounted directly on the press where the plate coating is removed on start-up of the press. This approach eliminates the plate processor, associated chemistry, energy required to power the processor, water, and waste from plate preparation.

Perceived benefits of processless plates include ease of use and improved speed of production compared to traditional plate preparation systems since there is no need for a plate processor or finishing unit. Processless plates are mounted directly on press once imaged. Since costs associated with processors and finishing units, including developer and cleaning solution, time and labour are eliminated, printing using processless plates is perceived as a low-cost method.

The unique characteristic of processless plates is on-press development. After the exposure process by computer to plate (CTP) exposing equipment, the non-image area of the photosensitive layer is physically removed along with the ink and the fountain solution of the press.

The removal procedure is as follows.

— When the press is started, fountain solution and ink are applied. The fountain solution permeates the unexposed (non-image) area of the photosensitive layer. The unexposed photosensitive layer is then peeled from the base material by the viscosity of the printing ink.

— This peeled photosensitive layer is finely dispersed into the ink which is discharged on paper from the press in the usual way. Parts of the peeled layer are also discharged into the fountain solution.

Graphic technology — Processless lithographic plates —

Part 1:
Evaluation methods for characteristics and performance

1 Scope

This document applies to processless lithographic plates and specifies evaluation methods for lithographic plate characteristics, on-press development performance, usability and print image quality.

It specifies measurement conditions for materials and equipment and provides guidelines for the selection of suitable processless lithographic plates by a printing organization and requirements for comparative assessment tests.

The assessment of waterless lithographic plates is out of scope of this document.

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 2846-1, *Graphic technology — Colour and transparency of printing ink sets for four-colour printing — Part 1: Sheet-fed and heat-set web offset lithographic printing*

ISO 12647-2, *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints — Part 2: Offset lithographic processes*

ISO 13655, *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.

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
processless plate
plate loaded directly on to a printing press following exposure without any intermediate processing step other than mechanical processes such as plate punching and bending

Note 1 to entry: Intermediate processing steps typically include plate development, cleaning, fixing (or desensitization) and other treatments

Note 2 to entry: Strictly speaking, these plates are 'processed' on press using the press fountain solution and ink.

3.2
pre-dampening amount
fountain solution amount used to wet plates prior to printing

3.3
pre-inking amount
ink amount applied to plates prior to printing

4 Test procedure

4.1 General

Printing machines in use today differ in physical structure, fountain technology and ink delivery systems. The test conditions in this document are designed to be practical and to show significant differentiation between performance of different processless plate technologies.

Test conditions have been chosen to control key factors that have an impact on processless plates performance.

Two categories of testing are anticipated by this document.

a) Individual test: testing by a printer who wishes to choose the most suitable plate for his purpose and for this category of test, the production methods and materials used for testing should be those used by the printer for print production.

b) Comparative test: scientific testing to allow the performance of printing plates to be compared to one another and for this category, the testing requires the use of specified test materials and methods which in some cases may be specified by the press or plates manufacturer.

Unless explicitly indicated, requirements shall be applied to both testing categories.

4.2 Test environment

The temperature of the printing room shall be 24 °C ± 2 °C.

The relative humidity of the printing room shall be (55 ± 10) % RH.

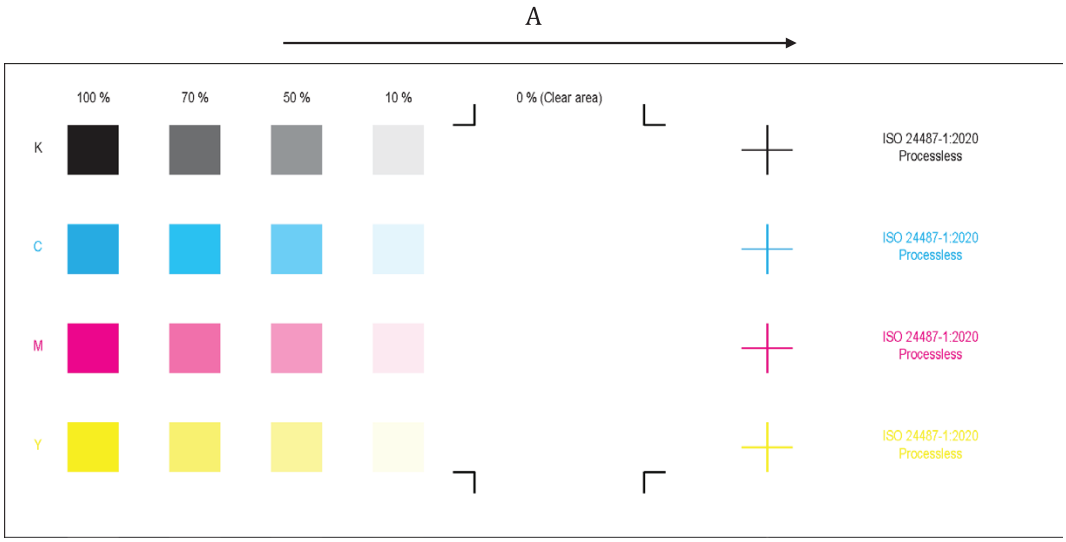
4.3 Plate imaging

Printing plates shall be prepared to include the following content. Additional inked content shall be added in such a way as to ensure approximately equal inking across the plate of between 20 % to 40 % coverage.

A CMYK test form with a set of rectangular or square patches shall be prepared comprising: a solid (100 %) patch in each process colour, and patches of intermediate tones from 10 % to 70 % tone value in each process colour. A region of at least 100 mm × 150 mm of the sheet shall be left blank (the non-image area).

Each patch should have a minimum size of 10 mm × 10 mm and patches should be spaced by a minimum of 5 mm. Where visual assessment is required, patches should have a minimum size of 40 mm × 40 mm. The plate image area shall have a large region of approximately half the total image size where no marks are imaged. An example test form is shown in Figure 1.

NOTE 1 The minimum size for each patch has been specified so that the patches can be measured easily. The minimum spacing of patches is required to allow visual assessment of toning between printed elements.



Key

A preferred printing direction

Figure 1 — Example CMYK test form

The test form should be imaged in several positions and with different orientations. When oriented in the press direction, it shall be aligned with the preferred printing direction as indicated.

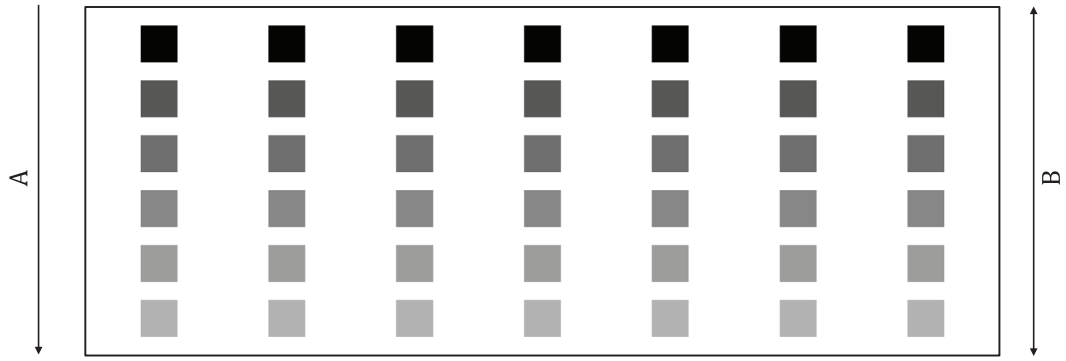
NOTE 2 Where a subset of the process inks is to be tested, not all plates need to be imaged. For example, to test the performance with cyan ink, only the cyan plate needs to be imaged.

The plates shall be exposed as recommended by the manufacturer for optimum image sensitivity and should be adjusted to ensure that the halftone dot area on plate corresponds to patch tone value.

When printing is not 4-colour (CMYK), for example monochrome printing or printing of spot inks or varnish, a test chart comprising the set of process colours generally used in print production shall be used.

Where abrasion resistance tests are to be performed, a monochrome test form comprising seven sets of the patches shall be imaged. This test is generally performed on the black plate, but the same monochrome image may also be used to image the cyan, magenta or yellow plate. An example of a suitable test form is shown in Figure 2. Sets of patches shall be separated sufficiently to allow abrasion resistance testing to be performed on one set without affecting any other set.

This test form may also be used when testing chemical resistance.



Key

A preferred printing direction

B abrasion direction

Figure 2 — Example abrasion resistance test form

When printing CMYK, all test forms shall be prepared and printed to meet the requirements of ISO 12647-2 with the exception of the tone value increase which should not be adjusted from the natural behaviour of the printing press. Additional content necessary for process control should be added as required. The reference paper type that is closest to the paper actually used for printing shall be identified and reported. When comparative testing is performed, a half-tone screen ruling of 60 cm^{-1} (approximately 150 lines per inch) should be used.

4.4 Pre-dampening amount

The pre-dampening amount should be as small as possible and shall be no greater than the recommended value from the press vendor.

4.5 Pre-inking amount

The pre-inking amount shall be set to the recommended value from the plate manufacturer or press vendor.

4.6 Ink selection

When individual testing is performed to determine whether the plate is suitable for a printing operation, the inks used for testing should be the same as are typically used for production.

When comparative testing is performed, inks conforming to ISO 2846-1 shall be used.

For the evaluation of resistance to toning, a low viscosity and low tack ink with a large content of varnish should be used.

Details of the inks used shall be reported.

NOTE Low viscosity and low tack inks show more differences when comparing processless plates.

4.7 Substrate selection

When individual testing is performed to determine whether the plate is suitable for a printing operation, the substrates used for testing should be the same as are typically used for production.

When comparative testing is performed, paper for the appropriate ISO 12647-2 printing condition shall be used. Where possible, an environmentally friendly paper such as recycled paper and FSC certified paper should be used.

Details of the substrate used shall be reported.

4.8 Fountain solution

When individual testing is performed to determine whether the plate is suitable for a printing operation, the fountain solution used for testing should be the same as are typically used for production.

When comparative testing is performed, a fountain solution recommended by the press manufacturer shall be used. Where possible, an environmentally friendly fountain solution should be used. A list of fountain concentrates tested by Fogra and approved by the printing press manufacturers is given in Reference [2].

Dilution of the fountain solution shall be made as recommended by the printing press manufacturer.

The fountain solution and dilution amount used shall be reported.

4.9 Press preparation and control

4.9.1 Press preparation print run

The number of sheets required for plate development depends on the press condition when the print run starts and can vary by more than a factor of two. To avoid this problem, two sets of identical plates shall be prepared. The first set shall be used for a press preparation print run of at least 300 sheets during which ink key settings are established and the second set shall be used for the test print run.

During the press preparation press run, the press settings should be established according to the press and plate manufacturer's recommendation. The blanket shall then be washed and dried before the plates to be tested are fitted to the press and the testing begins.

NOTE The start-up procedure according to the plate manufacturer's and the press manufacturer's recommendation can be different for each press or plate.

The press shall be adjusted to achieve the printing aims within the deviation tolerances as specified in ISO 12647-2 for the solid cyan, magenta, yellow and black process colorants and all patches are within the variation tolerances.

Printing speed shall be the speed generally used for print production or a standard setting as recommended by the press manufacturer. Press speed shall be reported.

Other press parameters such as fountain solution cooling temperature, ink roller cooling temperature, blanket, water supply system, slip ratio between fountain solution rollers and impression throw-in should be operated as recommended by the press manufacturer. In cases where the press is operated differently from that recommended by the manufacturer, the differences shall be reported.

Where available, press manufacturer recommended programs for processless plates should be used. Where no such recommendation exists, the same press condition as is used for printing using conventional plates shall be used.

All settings and materials necessary to repeat the result of the press preparation print run shall be reported.

4.9.2 Reference printing aim values

A set of sheets shall be selected from the end of this press preparation print run that are within the specified tolerance and shall be measured to establish reference aim values for all coloured patches and for the unprinted substrate.

4.10 Printing method

Using the printing procedure recommended by the printing press manufacturer or, when individual tests are performed, by the standard printing method used by the printing operation, approximately 100 sheets should be printed after on-press development is observed by the press operator to be complete.

NOTE Printing procedures include adjustment of ink roller and dampening roller settings, adjustment of spacing between plate and blanket cylinder, balance between water and ink, and blanket freshening.

Where assessment of toning, chemical resistance and press stop-and-restart is performed, additional prints shall be made as follows. Print an additional 1 000 sheets using the standard printing procedure before stopping the press. The last 30 sheets before stopping shall be collected. The press shall be stopped for one hour. The press shall be restarted and at least 100 additional sheets printed.

The press state during the period where the press is stopped can affect the stop-and-restart testing. The best result can be different for each press or plate type and so where they exist, the manufacturers' recommendations for press stop-and-restart should be used.

The last 30 sheets collected before the press is stopped are used to evaluate toning performance.

The last 30 sheets collected before the press is stopped, along with sheets 70 to 100 printed following the restart, are used to evaluate chemical resistance and stop-and-restart performance.

4.11 Plate exposure to light

The performance of some plates is affected when exposed to light. This can happen when plates are prepared and placed next to the press during a previous print run as is often done.

In order to test the effect of light exposure on the plates, a set of plates shall be produced and exposed to typical pressroom lighting for a period of 1 h.

Where comparative testing is performed, the lighting condition of ISO 3664 P2 should be used.

Plates for this test should be new and stored in a dark place before the test begins.

5 Assessment methods

5.1 General

The following test methods are designed to evaluate processless plates. Measurements shall be made in accordance with ISO 13655. ISO 3664 viewing condition P2 should be used for visual assessment.

NOTE Some of these test methods can also be used to evaluate standard process plate properties.

Examples of reporting of results are shown in Annex B.

5.2 On-press development

5.2.1 Number of sheets required for on-press development

Figure 3 shows the typical relationship between the number of sheets printed and the CIELAB colour change for each region of the plate.

NOTE The curve shapes shown in Figure 3 can vary significantly from one press to another, can depend on the processless plates, and can depend on the start-up condition of the press.