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Graphic technology — Processless lithographic plates — Evaluation methods for characteristics and performance

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

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

This first edition of ISO 24487 cancels and replaces ISO 24487-1:2021, which has been technically revised.

The main changes are as follows:

— the title and ISO number have been changed to remove the part number;

— the scope has been expanded to include evaluation points both specific to processless indicator and those common to the conventional indicator:

  — scratch resistance (see 5.4, A.7 and C.3);

  — image visibility (see 5.8, A.8 and C.7);

  — run length (see 5.9, A.9 and C.8)

— new terms have been added to Clause 3.

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 tack 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.

This document specifies evaluation methods for lithographic plate characteristics, on press development performance, usability and print image quality. These evaluation methods are primarily intended for processless lithographic plates but some can be used for the evaluation of all classes of lithographic plate, however, it should be noted that quality and performance may be significantly affected by the development process and its stability.

Graphic technology — Processless lithographic plates — 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.

NOTE Some of these methods can be used for the evaluation of all classes of lithographic plate.

This document 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.

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 terminology 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

Note 1 to entry: The pre-dampening step is part of the printing process.

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

3.4
plate tone value
percentage area coverage for process and spot colour scales on the printing plate

3.5
printed tone value
apparent intensity of a printed single colour scale or 3-colour neutral

Note 1 to entry: Applies to density tone value, colour tone value, near-neutral CMY tone value.

Note 2 to entry: Adapted from ISO 12647-2.

4 Test procedure

4.1 General

Offset 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, test procedures described in this document may be used for both individual testing and comparative testing.

4.2 Test environment

When comparative testing is conducted, the following conditions shall apply. When individual testing is conducted the temperature and humidity should be held constant and as close to these values as is possible.

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

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

Plates should be kept in the test environment for a minimum of four hours for single packs (12 hours for bulk material) before imaging and subsequent testing is carried out. Plates should not be exposed to light during this period.

4.3 Plate imaging

4.3.1 General

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.

When printing CMYK, all test forms shall be prepared and printed to meet the requirements of ISO 12647-2 for solid patches. The plate tone value should be adjusted so that the printed tone value is the same for all plates being evaluated.

Additional content necessary for process control should be added as required.

When conducting individual testing, a halftone ruling and paper type that are typically used by the printer should be selected, and these same selections should be used when testing multiple times.

When comparative testing is performed, a half-tone screen ruling of 60 cm^{-1} (approximately 150 lines per inch) should be used.

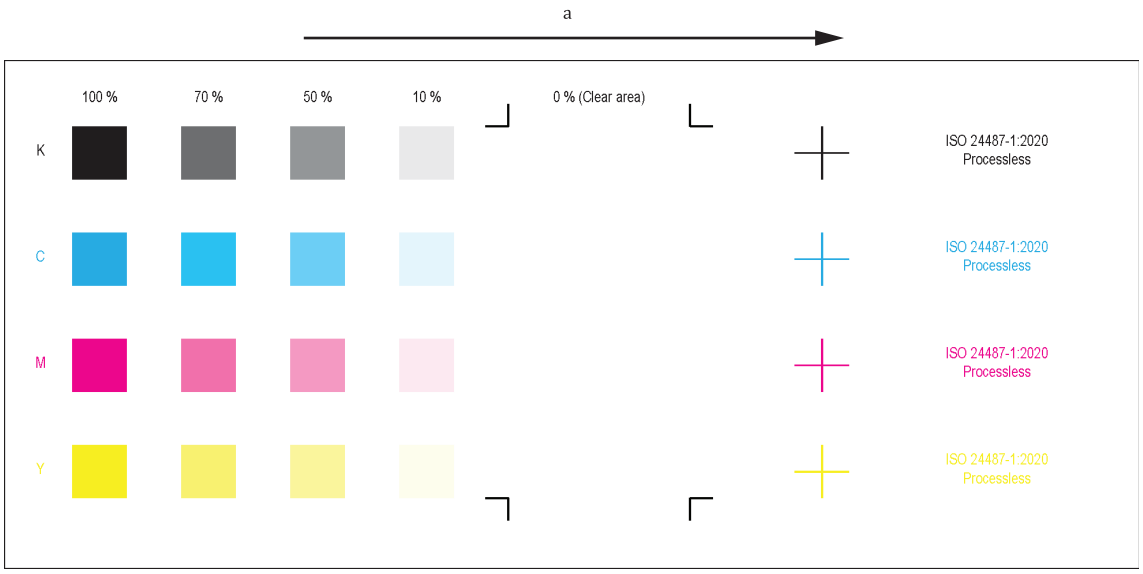
Additional strips with different screen rulings and area coverage may be added and where these are added, details should be provided in the report. A paper conforming to the requirements for the reference print substrate should be used and the paper used shall be identified in the test report.

4.3.2 Colour test form

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.



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. If direct measurements on plate are not possible, indirect measurement via the dot% on the print should be made.

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.

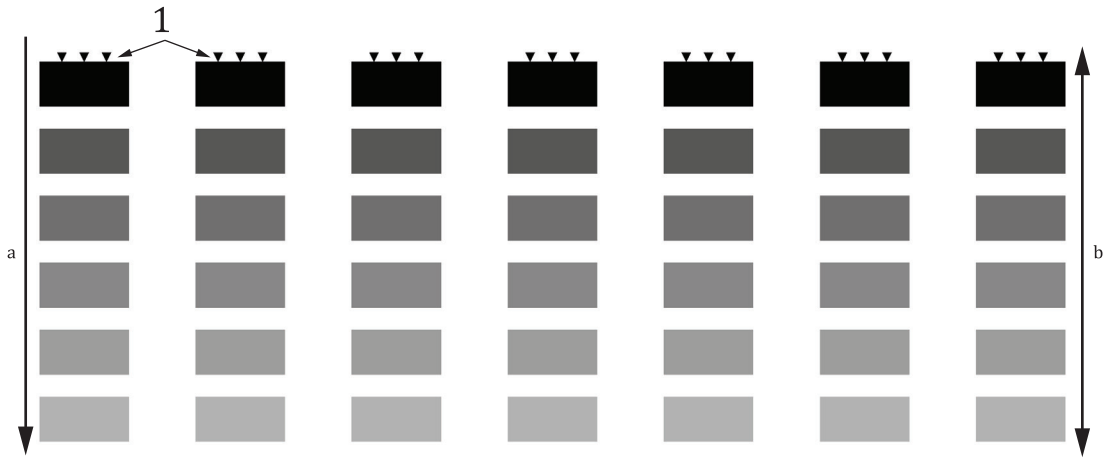
4.3.3 Abrasion and scratch resistance test form

For abrasion resistance tests, an abrasion and scratch 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.

For scratch tests, scratches are applied to the plate after it has been imaged.

An example of a suitable test form is shown in Figure 2. Sets of patches shall be separated sufficiently to allow abrasion and scratch 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

1 scratch markers

a Preferred printing direction.

b Abrasion and scratch direction.

Figure 2 — Example abrasion and scratch resistance test form

4.3.4 Image visibility test form

When using processless plates, it is important to be able to identify the colour separation imaged on the plate. This is usually done by marking each plate with text that uniquely identifies the colour separation. The text imaged as part of the colour test form in Figure 1 may be used for this purpose. A more extensive text element D is shown in Figure 3.

Where it is important to be able to see more information on the printing plate, the test form in Figure 3 should be used. This form is designed to test image contrast and resolution.

An example of a test chart that may be used to assess visibility of content is shown in Figure 3. This chart comprises three sections labelled A, B, C and D. Sections A, B and D are used for visual assessment.

Section A comprises 20 sets of concentric square elements each with a different tone value from 100 % (element 1) to 5 % (element 20) decreasing by 5 % at each step designed to test visual contrast.

Section B comprises 20 sets of concentric square elements each with a different stroke width from 4 points (element 1) to 0,2 points (element 20) decreasing in 0,2 points at each step designed to test visual resolution.

Section C is not used for visual evaluation. Each patch has the same tone value as the element with the same number in Section A and can be used when a tone value measurement is needed.

Section D comprises 11 lines of text each with a different point size from 6 to 11 points in 0,5 points intervals designed to test readability of small text elements.

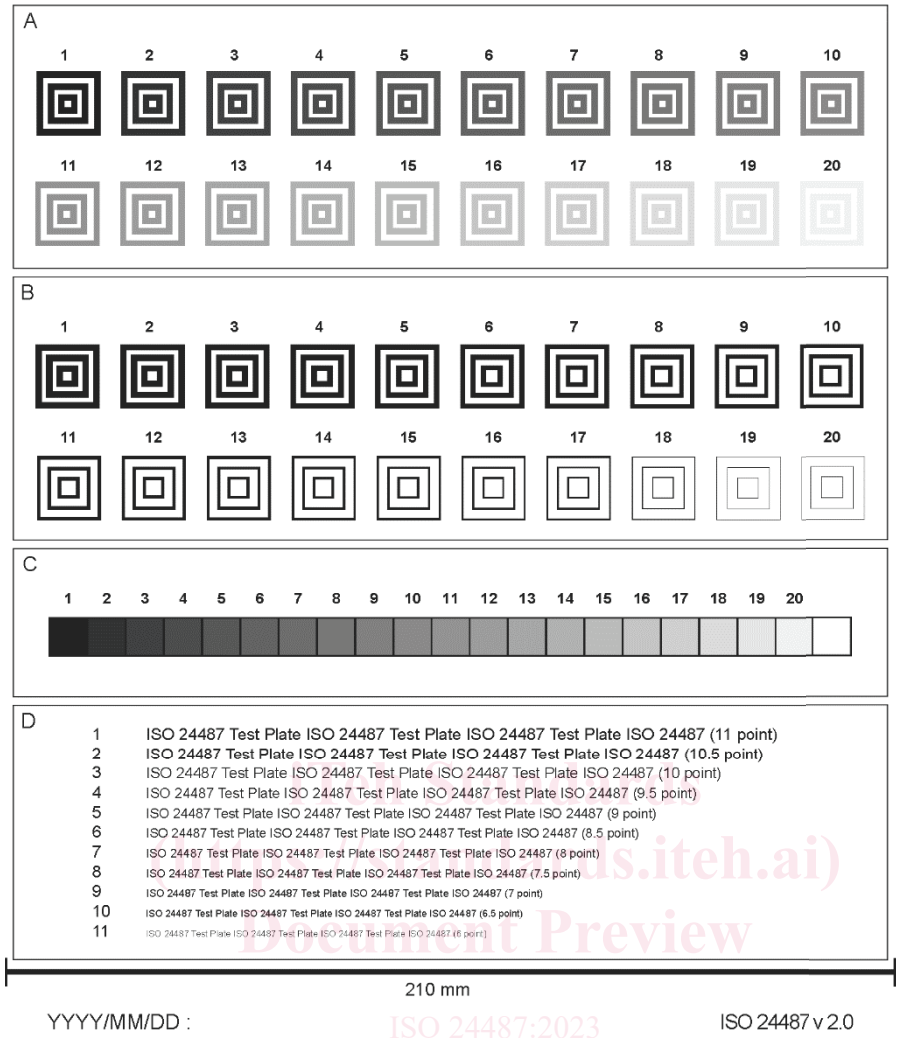


Figure 3 — Example image visibility test form

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.