
**Graphic technology — Laboratory
preparation of test prints —**

**Part 1:
Paste inks**

*Technologie graphique — Préparation en laboratoire des impressions
d'essai —*

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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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 (standards.iteh.ai)

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

This second edition cancels and replaces the first edition (ISO 2834-1:2006), which has been technically revised.

The main changes compared to the previous edition are as follows.

- The document has been rewritten to a general procedure for prints on many substrates for the use by several standards which require a well-defined print.
- The instruments and materials required for tests are specified, only electrically driven instruments are now included.
- A detailed procedure for conditioning and test execution is provided.
- Annexes are added regarding reference materials, preparation of rubber rollers and maintenance of elastomer rollers.

A list of all parts in the ISO 2834 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

This document exclusively describes the laboratory test print preparation for paste inks. The methods described in this document can be used in several other International Standards, such as ISO 2846-1, ISO 2846-2 and ISO 2836, and will be the basis for several printability standards to be developed by ISO/TC 6/SC 2 with TC 130. This document provides the tools to make uniform prints with a well-defined ink film thickness which can be used for analysis of the printed surface properties, fastnesses and which can be used for subsequent tests on the substrate or the printed image.

This document describes the procedure to be adopted when using IGT-type and prüfbau-type printability testers to prepare prints on papers, boards, metals, foils and other suitable substrates, for the main targets: reference optical density and reference ink film in g/m^2 on the substrate. Other inks, such as liquid inks for gravure or flexographical printing specified in ISO 2834-2 and screen print ink specified in ISO 2834-3, are developed with a similar structure to this document.

In this method, a procedure has been added to perform a periodic test with reference material to check deterioration of the used materials like rubbers and inks.

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Graphic technology — Laboratory preparation of test prints —

Part 1: Paste inks

1 Scope

This document specifies a test procedure for the preparation of test prints on paper, board, metals, foils and other suitable substrates using paste inks, such as for offset and letterpress printing, using electrically driven IGT-type and prüfbau-type printability testers.

This document describes the procedure for reference optical density and reference ink film thickness.

This document describes the method as used on the current models of testers. Most of the described procedures are also applicable in analogy to the older models but can require additional steps to be executed or recalculation of the settings to make them conform to 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 5-4, *Photography and graphic technology — Density measurements — Part 4: Geometric conditions for reflection density*

ISO 187, *Paper, board and pulps — Standard atmosphere for conditioning and testing and procedure for monitoring the atmosphere and conditioning of samples*

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 5631 (all parts), *Paper and board — Determination of colour by diffuse reflectance*

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 <http://www.electropedia.org/>

**3.1
breaking-in**

roller conditioning

preparation process for new rollers or before using another *ink system* (3.4)

Note 1 to entry: Run rollers in an (or another) ink system to condition the elastomer until constant readings are achieved. See [Annex B](#) for the procedure.

**3.2
ink**

<printability> fluid to be printed under the conditions of this document

Note 1 to entry: It can be a commercial printing ink, a modified ink for the purpose of the test, a simulant like pick test oil, a varnish and other materials which create a print under the conditions as specified in this document.

**3.3
inking device**

separate or integrated part of the *printability tester* (3.6) used to distribute the ink in a uniform way on a roller system from where the *printing forme* (3.7) can be inked with a known amount of ink

**3.4
ink system**

range of inks which are comparable with regards to varnish system and liquid base

Note 1 to entry: For paste inks there are e.g. oxidative, setting and UV curing systems.

**3.5
packing**

underlayment under the sample to be printed

Note 1 to entry: This is used for mechanical protection or to simulate the hardness of the impression in printing practice or to accentuate the effects of the test on the printed image.

**3.6
printability tester**

printing device, with or without integrated *inking device* (3.3), able to print the inked *printing forme* (3.7) in conformance with the requirements of the test

Note 1 to entry: Depending on the type of test, the speed may be constant over the full print or may have to follow a specified speed profile.

**3.7
printing forme
printing disc**

roller with metallic, elastomer or rubber blanket coverage, used to transfer the ink film to a substrate to create a print

Note 1 to entry: The print may contain a solid tone or an image or halftone pattern.

**3.8
reference material**

ink (3.2) or *substrate* (3.10) with well-known properties

Note 1 to entry: Used to execute a reference test on a regular basis or for comparative testing. Inks and rubbers change properties in time. To prevent jumps in results between current and new materials; they should be tested at least once together.

Note 2 to entry: A distinction can be made between reference material, as material with well-known and publicly available specifications, and control material which is kept for comparison only and for which the absolute values do not have to be known.

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3.9 rubber elastomer

elastomeric materials covering *printing forms* (3.7), *top rollers* (3.12), *packings* (3.5) and *substrate carriers* (3.11)

Note 1 to entry: In practice, some of the materials are not rubber.

3.10 substrate

material to be printed on

3.11 substrate carrier

mounting plate for the sample to be printed

Note 1 to entry: With on top a specific material for mechanical protection or to simulate the hardness of the impression in printing practice or to accentuate the effect of the test on the printed image.

3.12 top roller

soft, elastomer covered roller

Note 1 to entry: Used in a three-roller inking system for ink distribution and as ink transfer roller to the printing form.

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4 Apparatus

4.1 Inking device

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An electrical driven device, used to generate a uniform ink film on the printing form, consisting of two inking drums or rollers having contact with a top roller covered with a rubber or other elastomer with specific quality for the test and the ink system. At least one of the inking drums shall oscillate to induce a sideways distribution of the ink. The ink distributing surface area A of the rollers shall be known to the nearest 0,1 cm². Each inking arrangement shall incorporate one or more holders on which the printing forme can be mounted to be inked.

The distributing surface area, A , is calculated as shown in [Formula \(1\)](#):

$$A = \sum_{1}^{n} (\pi \times d_n \times l_n) \quad (1)$$

where

d_n is the diameter of roller or drum number (n);

l_n is the effective (ink containing) length of roller or drum number (n);

n is the number of rollers excluding the printing form.

NOTE The terms “inked” and “ink” are used here to conform to general usage even when a pick test oil or other simulant is used instead of an ink.

4.2 Printing form

4.2.1 IGT-type

4.2.1.1 Aluminium

One or more aluminium printing forms, of specified width, with smooth edges, a diameter of $(65,0 \pm 0,2)$ mm and a temperature-insulating handgrip. The weight of the disc shall be low enough to weigh it on an analytical balance with an accuracy of 0,1 mg. An aluminium printing forme shall always be used in combination with a packing.

4.2.1.2 Elastomer

One or more rollers with a specific elastomer covered printing form, of specified width, a diameter of $(67,0 \pm 1,5)$ mm, a hardness of the covering of (80 ± 7) Shore A and a temperature-insulating handgrip. The weight of the disc shall be low enough to weigh it on an analytical balance with an accuracy of 0,1 mg. An elastomer covered printing forme shall not be used in combination with a packing. Different rollers/elastomers for conventional or energy curing applications are required.

Under certain circumstances, it can be required to use a dedicated type of printing form, e.g. coated, to prevent penetration of ink into the elastomer or with lower shore hardness, to get a good print quality of the ink on the substrate to be used. In this case, this shall be mentioned in the report.

See [Annex C](#) for maintenance of elastomer printing forms.

4.2.1.3 Rubber blanket

One or more rollers with a specific rubber blanket covered printing forme of specified width, a diameter of $(67,0 \pm 1,5)$ mm and a temperature-insulating handgrip. The weight of the disc shall be low enough to weigh it on an analytical balance with an accuracy of 0,1 mg. A rubber blanket printing forme shall not be used in combination with a packing.

See [Annex C](#) for maintenance of rubber blanket printing forms.

4.2.2 prüfbau-type

4.2.2.1 Aluminium

One or more aluminium printing forms, of specified width and a diameter of $(65,0 \pm 0,2)$ mm. The weight of the disc shall be low enough to weigh it on an analytical balance with an accuracy of 0,1 mg.

4.2.2.2 Elastomer

One or more rollers with a specific elastomer covered printing form, of specified width, with a diameter of $(65,0 \pm 0,2)$ mm and a hardness of the covering of 85 Shore A. The weight of the printing forme shall be low enough to weigh it on an analytical balance with an accuracy of 0,1 mg. Different rollers/elastomers for conventional or energy curing applications are required.

See [Annex C](#) for maintenance of elastomer printing forms.

4.2.2.3 Rubber blanket

One or more rollers with a specific rubber blanket covered printing form, of specified width and a diameter of $(65,0 \pm 0,2)$ mm. The weight of the disc shall be low enough to weigh it on an analytical balance with an accuracy of 0,1 mg. Different rollers for conventional or energy curing applications are required.

See [Annex C](#) for maintenance of rubber blanket printing forms.

4.2.3 Ink pipette

To apply an accurate quantity of ink to the inking device an ink pipette having a minimum volume of 2 ml and a resolution of at least 0,01 ml, but preferably 0,001 ml or other device to apply the ink volume with the required accuracy shall be used.

NOTE 1 If the inking device is equipped with a dispensing system with sufficient accuracy, or the applied amount of ink is weighted, no ink pipette is required.

NOTE 2 In principle, it is also possible to use the analytical balance to weigh the required amount of ink. In that case, the required ink film thickness can be calculated considering the mass density of the ink.

4.2.4 Top roller

One or more elastomer covered top rollers, with a specified diameter in accordance with the roller system, a hardness of the covering of (33 ± 7) Shore A. Different rollers for conventional or energy curing applications are required or in case a hybrid rubber is used it shall be broken-in according to [Annex B](#).

See [Annex C](#) for maintenance of top rollers.

4.2.5 Substrate carrier

In case a round-flat principle is used, the substrate is mounted on a carrier to be fed through the nip of the printability tester. The carrier is covered with a rubber blanket of specific quality and shall be chosen for the sample thickness to be used in the test.

A substrate carrier shall only be used for the printing forme for which it is used the first time.

See [Annex C](#) for maintenance of elastomer substrate carriers.

4.3 Printability tester

4.3.1 IGT-type

4.3.1.1 Round-round printing principle

An electrical driven printing device having an impression cylinder or sector with a radius of $(85,0 \pm 0,2)$ mm. If the tests require the use of a packing the sector shall incorporate a facility enabling a packing to be mounted on the sector under defined tension and a test piece to be mounted on or over the packing. The sector shall be capable of being driven over a distance of at least 200 mm at a constant speed. For some tests, the speed may have to be adjustable as well.

The force with which the printing forms contacts the test piece on the sector shall be adjustable. The actual force shall not deviate by more than ± 10 N or 5 % from the set force.

Depending on the test to be executed, the tester shall be equipped with one or more printing nips.

It is important that the printing device is properly calibrated with regard to printing speed and printing force between the printing forme and the sector. Check the instruction manual or contact your supplier for correct calibration.

This document describes the method as used on the current models IGT testers printing according to the round-round principle, most of the described procedures are also applicable in analogy to the older models but can require additional steps to be executed or recalculation of the settings to make them conform to this document. Before using devices of (very) old age or of non-standard construction for inking and testing, it is important to contact the supplier to confirm conformance with this document.