INTERNATIONAL STANDARD

ISO 2834-1

First edition
2006-06-01

Graphic technology — Laboratory preparation of test prints —

Part 1: Paste inks

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

Partie 1: Encres compactes

Reference number
ISO 2834-1:2006(E)

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Published in Switzerland

Foreword

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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 2834-1 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

This first edition of ISO 2834-1, together with ISO 2834-2 and ISO 2834-3, cancels and replaces ISO 2834:1999. It also incorporates the Technical Corrigendum, ISO 2834:1999/Cor 1:2003. It is both a revision and an expansion of ISO 2834:1999 which only was applicable to lithographic and letterpress inks. The revised series of ISO 2834 makes provision for test print preparation for all ink types and this part of ISO 2834 covers paste inks. In addition, this part of ISO 2834 was adapted to include a larger range of commercially available ink printability testers.

ISO 2834 consists of the following parts, under the general title *Graphic technology — Laboratory preparation of test prints*:

— *Part 1: Paste inks*

— *Part 2: Liquid inks*

— *Part 3: Screen inks*

Introduction

This part of ISO 2834 specifies the test print preparation for paste inks, i.e. lithographic and letterpress inks. These test prints have a homogeneous distribution of ink on a specified substrate and a known ink coverage and/or ink layer thickness. Therefore, they are suitable for optical tests so that the measured reflectance can be assigned to a known ink layer thickness. If test prints are prepared only for mechanical and chemical resistance tests, where the accuracy of the known ink layer thickness is different, it may be possible to apply other less accurate methods, e.g. using coaters or drawdown bars.

The methods described in this part of ISO 2834 are used in other International Standards, e.g. ISO 2846-1, ISO 2846-2 and ISO 2836.

Graphic technology — Laboratory preparation of test prints —

Part 1: Paste inks

1 Scope

This part of ISO 2834 specifies a laboratory method for the preparation of printed samples made with paste inks (such as inks used for lithographic and letterpress printing). Such printed samples are intended to be used for reflection based measurements, such as colorimetry and reflection density as well as for testing light fastness, and the resistance of printing inks to mechanical and chemical attack regarding either printing ink and/or substrate.

2 Terms and definitions

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

2.1
printability tester
device for uniformly inking a printing forme and transferring a known amount of ink on a substrate under specified conditions

2.2
printed area
area of a substrate that is printed on, given by the surface area of the printing forme

3 Test method

3.1 Principle

Using a printability tester, a known quantity of ink is printed uniformly on a known area of the paper or any other chosen substrate. The ink coverage is expressed in grams per square metre or, taking into account the mass density of the ink, by the ink layer thickness in micrometres.

For ease of operation, an ink pipette may be used for metering the amount of ink supplied to the inking unit. The actual amount of ink transferred to the substrate is only determined by weighing the printing forme immediately before and after printing.

Additional to printing, test samples for mechanical and chemical resistance tests may be prepared using any technique resulting in a uniform ink film in a desired thickness range, for example using a hand roller, coater or drawdown bar.

3.2 Apparatus

3.2.1 Printability tester

The printability tester allows for the uniform inking of the printing forme and the uniform transfer of the ink to the substrate at a constant speed and pressure.

3.2.2 Printing forme

The printing forme shall have either a smooth metallic and non-porous surface or shall be covered by an elastomer or rubber blanket. The type of the printing forme shall be mentioned in the report.

3.2.3 Analytical balance

The analytical balance shall be accurate to 0,1 mg.

3.3 Materials

3.3.1 Printing ink

Printing inks for the preparation of test prints shall be ready for use.

3.3.2 Substrate

For the purpose of optical tests, the assessment of light fastness of an ink and any other test, there shall be prior agreement as to the substrate to be used.

4 Procedure

4.1 Printing

4.1.1 Inking of the printing forme

An appropriate amount of ink shall be applied to the inking unit. Appropriate time for distribution on the inking unit and inking of the printing forme shall be chosen to ensure a homogeneous distribution of the ink.

It is important to keep the distribution time and the inking time of the forme as short and as constant as possible, preferably controlled by the inking unit itself. If the unit is not equipped with this facility, a separate timer shall be used. Leaving the ink too long on the inking unit and/or running at high speed may change the properties due to misting, drying and evaporation of solvents. Distribution and inking times are specified in Annex A.

The inking time does not include the weighing time.

Solvent used to clean the printing forme and the ink distribution roller can penetrate into the coverage of the rollers. Time needs to be allowed to ensure full evaporation of the solvent. Using two or more formes and inking sections alternatively is recommended.

NOTE Several low inflammable, low odour and/or environment-friendly solvents leave an oily or greasy deposit on the forme. This deposit can evaporate only after a long time or needs to be wiped off before using the forme to prevent the next print from being influenced by residues of the solvent.

Evaporation of the solvents draw most of the energy required from the surface of the roller, therefore the rollers may cool several degrees while drying. They should be allowed to reach temperature equilibrium again before the next use, by letting them run dry on the inking unit or giving them sufficient time on the inking unit.

Separate distribution rollers and printing formes with suitable material properties, as specified by the manufacturer, should be used for radiation-cured inks.

Before using any printability tester for the preparation of test prints, it is important to contact the supplier to confirm compliance with this part of ISO 2834.

Calibration of the printing device is very important for obtaining correct, reliable and repeatable results. For details on calibration, consult the supplier and the documentation supplied with the instrument.

The lifetime of the rubber- or elastomer-covered parts is limited, if properly handled, to a maximum of approximately 3 years. For rubber blankets this may be only three to twelve months. To prevent sudden change in printing results it is recommended to replace the rubber rollers after one to two years and before differences in results can be observed.

The transfer characteristics of rubber rollers can change for a variety of reasons. Among these are:

— using them for different applications or ink types;

— bad cleaning;

— unsuitable cleaning solvents;

— ageing.

If tests are made using different distribution rollers it is important that the distribution rollers are identical, a test to determine the ink transfer may have to be performed.

For details concerning distribution and inking, see Annex A.

4.1.2 Prints for optical tests

Test prints shall be prepared as follows:

— the print shall be made using a printability tester using a printing forme in accordance with 3.2.2;

— in case of applying an ink coverage of more than 1 g/m^2 a metal forme can be used; this is to be mentioned in the report;

— printing shall be directly from the printing forme to the substrate;

— the temperature of the inking unit shall be (24 ± 1) °C;

— prints shall be produced with an appropriate printing line pressure (see Annex A);

— the inking unit and the printing forme shall be cleaned after each print;

— for radiation curing inks, suitable ink distribution rollers and printing formes shall be used.

4.1.3 Evaluation of the ink film thickness

The amount of ink transferred to the substrate shall be determined by measuring the difference in mass of the printing forme before and after printing. Determine the printed area by measuring the length and the width of the print and calculate the area A. The ink coverage shall be expressed in grams per square metre and is calculated according to Equation (1):

$$C = \frac{m_1 - m_2}{A} \tag{1}$$

where

C is the ink coverage;

m_1 is the mass of the inked forme before printing;

m_2 is the mass of the forme after printing;

A is the printed area.

Conversion of the ink coverage C to ink film thickness shall be made by using the mass density of the ink according to Equation (2):

$$d = \frac{C}{\rho} \tag{2}$$

where

d is the ink layer thickness;

C is the ink coverage;

ρ is the mass density of the ink.

4.1.4 Provisions for heat-set and waterless inks

If problems in ink transfer arise, a small amount of oil (e.g. linseed oil or a suitable alkyd) may be added to the ink prior to ink distribution. The volume amount of oil added should be kept as low as possible and shall not exceed 5 %. The volume percentage of oil added shall be noted and be used to correct the ink film thickness.

4.2 Ink film thickness

4.2.1 Optical tests

For optical tests, the ink film thickness shall be reported in micrometres (µm) to one decimal place.

4.2.2 Resistance tests

For testing the resistance of printing inks to mechanical or chemical attack, the ink film thickness shall be (1,5 ± 0,5) µm on coated paper and (2,2 ± 0,8) µm on uncoated paper.

4.3 Drying

Prior to testing, the prints shall be thoroughly dry. If necessary, appropriate drying equipment should be used.

4.4 Other method

Test samples for mechanical and chemical resistance tests may also be prepared using any technique resulting in a uniform ink film in a desired thickness range, for example using a hand roller.

5 Test report

The test report shall contain the following information:

a) reference to this part of ISO 2834 (ISO 2834-1:2006);

b) manufacturer and type of the printing apparatus;

c) type and material of the printing forme;

d) distribution and inking times;

e) temperature of the inking unit;

f) ink layer thickness in micrometres;

g) printed area;

h) method of ink application if other than printing;

i) substrate (type, supplier, mass per area);

j) ink (designation, supplier, mass density);

k) any operations not specified in this part of ISO 2834 which might have influenced the print result.

