INTERNATIONAL STANDARD

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Graphic technology — Laboratory preparation test prints —

Part 2: Liquid printing inks

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

Partie 2: Encres d'impression liquides

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Contents

Page

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 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 second edition cancels and replaces the first edition (ISO 2834-2:2007), which has been technically revised.

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 printing inks*

— *Part 3: Screen printing inks*

Introduction

This part of ISO 2834 describes the test print preparation of liquid inks (gravure and flexography). These test prints have a homogeneous distribution of ink on a substrate, a reproducible ink composition and relative ink coverage. Therefore, they are suitable for optical tests so that the measured reflectance can be assigned to a known ink coverage. If tests are done only for mechanical and chemical resistance, the user may apply less accurate methods. The preparation of test prints for paste inks (lithography) is described in ISO 2834-1, while screen inks are covered in ISO 2834-3.

In ISO 2834-1, specific operational settings for the “round-to-round” and the “round-to-flat” offset ink printability testers are provided. Printability testers for liquid inks encompass a much wider array of operating processes and associated settings. Therefore, the guidelines included in ISO 2834-2 are more general and will, of necessity, result in more opportunities for operator error in making the test prints.

This revised version of ISO 2834-2 was developed to incorporate an ink coverage and an dry ink film thickness determination and to remove the references to ISO 2846-3 and ISO 2846-5.

Graphic technology — Laboratory preparation test prints —

Part 2: Liquid printing inks

1 Scope

This part of ISO 2834 specifies a test method for preparation of test prints produced with liquid water-based or solvent-based printing inks as used in flexography and gravure printing. These test prints are intended primarily for optical tests, such as gloss, colorimetry, transparency and reflection density. They can also be used for testing light fastness and the chemical, physical and mechanical resistance to mechanical and chemical attack regarding either printing ink and/or substrate. Flexographic inks with higher viscosity, such as those cured by radiation, are also covered. This part of ISO 2834 is not applicable to inks for ink jet printing.

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

ISO 2431, *Paints and varnishes — Determination of flow time by use of flow cups*

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.

3.1
anilox roller
chromium plated or a ceramic roller with evenly distributed small cells generally mounted on a flexographic printing press to control the quantity of ink transferred to the printing forme

3.2
extender
transparent material (varnish or polymer solution) used to reduce the colorant concentration while maintaining viscosity to adapt ink colour concentration to print substrates

3.3
printing forme for flexography
cylinder or sleeve covered with a relief type rubber or photopolymer plate for application of printing ink to print substrate

3.4
printing forme for gravure
mechanically engraved or laser-engraved or chemically etched cylinder, sleeve or plate for application of printing ink to a print substrate

3.5
printing ink
composite material containing colorants, functional components, vehicle and additives

Note 1 to entry: In most cases, it is applied as a fluid to a substrate by a printing process and setting or drying by either physical (evaporation) and/or chemical (polymerizations e.g. oxidation, radiation induced, or other) processes in order to form an image for decorative, informative or technical purposes.

3.6
printability tester
device for uniformly applying a reproducible amount of ink to a substrate under specified conditions

3.7
retarder
additive to reduce the evaporation speed of the solvent in a liquid ink to prevent drying during the application of ink to the substrate

3.8
test-ready ink
printing ink of the appropriate composition and viscosity for the purpose of the test

4 Test method

4.1 Principle

Using a printability tester, the gravure or flexographic printing ink is applied consistently and uniformly on the chosen substrate.

NOTE 1 Test samples for mechanical and chemical resistance tests can be prepared using any technique resulting in a uniform ink film in a desired thickness range. Ink film thicknesses different from those used in practice will have a strong influence on the results of such tests. These methods are not covered by this part of ISO 2834.

NOTE 2 Due to differences between a printing press and a laboratory printability tester, prints produced on a laboratory printability tester can be different in appearance and in ink film thickness from commercial prints. To reach the same colour strength or print density, different settings from the actual press settings are generally required.

4.2 Apparatus and quality requirements

4.2.1 Apparatus

Any printability tester specifically designed for liquid printing inks of the type to be tested, liquid printing ink (solvent, water or radiation cured), substrate and drying apparatus may be used as long as the resulting printed ink film is uniform and at the required ink film thickness. Test conditions and variables associated with such equipment and materials shall be agreed upon between parties since variations in design and process have a strong influence on the test results and comparability of the properties of the test sample.

4.2.1.1 Printability tester

To ensure repeatable operation, the printability tester shall provide motorized control of the ink transfer function. It is not practical to duplicate exactly a commercial production printing process in the laboratory. However, it is possible to duplicate results between two laboratories. The chosen laboratory printability tester must provide a consistent, uniform printed ink film at the required ink film thickness. To achieve this control, the printing speed and the pressure or impression (for flexography) between the printing forme and printing substrate shall be adjustable and shall be constant and uniform during the printing process.

For gravure, the Shore hardness of the pressure roller as well as the use of an electrostatic printing aid shall be agreed upon and specified. For flexography, the anilox roller (see also 4.2.1.3) and the type of blade or doctoring device shall be agreed upon and specified.

4.2.1.2 Printing formes

4.2.1.2.1 Gravure printing forme

These may be produced by electromechanical engraving, laser engraving or etching. Printing formes can contain solid and tinted areas. The design of printing formes can either be of a standard layout with a designation of the supplier of the printability tester or special with respect to customer needs. Printing formes shall have a designation.

It is not practical to duplicate commercial production printing in the laboratory, and therefore, it is not necessary for the lab printability tester to have the same gravure engraved cylinder as a commercial printing press. The ink transfer process of the lab printability tester shall produce a printed ink film with a thickness that is representative of the industry. This can be evaluated by the use of a reflection densitometer or colourimeter using aim values that are agreed upon between parties. It is in this way possible to duplicate results between two laboratories. Where different laboratories use the same or comparable laboratory testing equipment, the following parameters are important to specify and should be exchanged.

Electromechanically engraved and etched formes, solid and tint areas, shall be specified by

— screen frequency, expressed in inverse centimetres (cm^{-1}),

— screen angle, expressed in degrees, and

— cell volume, expressed in millilitres per metres squared (ml/m^2) or both cross-diagonal of cells, expressed in micrometres (µm); and depth, expressed in micrometres (µm) or both diameter, expressed in micrometres (µm); and depth, expressed in micrometres (µm).

For electromechanically engraved formes, the width of channel, expressed in micrometres (µm) and the angle of the engraving stylus (in degrees) shall be specified additionally.

Laser-engraved formes shall be specified by cell shape, diameter(s), depth, (diameter/depth ratio), bottom shape, type of laser used and cell volume for solid areas and diameter(s), depth and cell volume for each gradation step.

NOTE 1 The cell volume can be calculated using shape and dimensions of cells or measured directly by applying definite volumes of liquids.

NOTE 2 There is no reliable relation between tone values and cell volumes or dimensions.

NOTE 3 Gravure printing formes can be cylinders, sleeves or plates. The precise measurement of cell volumes of gravure printing formes is difficult. There are several possible methods, all having their drawbacks regarding accuracy and reproducibility. Therefore, it might be useful to obtain a sufficient number of printing formes of a single lot to be shared between parties to ensure comparability of test prints.

NOTE 4 The typical thickness of ink films applied by the gravure process is 6 µm ± 1 µm.

4.2.1.2.2 Flexographic printing forme

Flexographic printing formes shall be relief type formes. The design of printing formes can either be of a standard layout with a designation of the supplier of the printability tester or special with respect to customer needs. Printing formes shall have a designation.

It is not practical to duplicate exactly commercial production printing in the laboratory, and therefore, it is not necessary for the lab printability tester to have the same relief plate as a commercial printing press. The ink transfer process of the lab printability tester shall produce a printed ink film at a thickness that is representative of the industry. It is in this way possible to duplicate results between two laboratories.

