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Graphic technology - Process control for the production of half-tone colour separations, proof and production prints - Part 7: Proofing processes working directly from digital data

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Graphic technology — Process control for the production of half-tone colour separations, proof and production prints —

Part 7:
Proofing processes working directly from digital data

Technologie graphique — Contrôle des processus de confection de sélections couleurs tramées, d'épreuves et de tirages —

Partie 7: Processus d'épreuve travaillant directement à partir de données numériques

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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.

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 12647-7 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

ISO 12647 consists of the following parts, under the general title *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints*:

— *Part 1: Parameters and measurement methods*

— *Part 2: Offset lithographic processes*

— *Part 3: Coldset offset lithography on newsprint*

— *Part 4: Publication gravure printing*

— *Part 5: Screen printing*

— *Part 6: Flexographic printing*

— *Part 7: Proofing processes working directly from digital data*

Introduction

Part 1 of ISO 12647 serves to provide definitions, the general principles, the general order, the material to be covered in the subsequent parts 2 to 7 of ISO 12647, the definition of the data, the measurement conditions and the reporting style.

This part of ISO 12647 relates to the subject of digital proofing and establishes proofing requirements for the most stringent part of the printing and publishing market.

This part of ISO 12647 mainly lists values or sets of values, and their tolerances, of the primary parameters specified in ISO 12647-1, especially for digital proof printing. Primary parameters that define a printing condition include the screening parameters, where applicable, the colours of the solids, the colour of the print substrate, colours intermediate between these and the tone value increase curve. Adherence to these values essentially ensures that a grey, which at the colour separation stage was composed for a particular printing condition, also prints as a grey colour in proofing and printing. Remaining deviations from grey due to differences in trapping can then be removed by adjusting the coloration within the tolerances provided. This part of ISO 12647 further specifies test methods for those properties of digital proof prints and their substrates that are considered relevant for stable and reliable conditions, and thus for a certification procedure.

The graphic technology industry makes extensive use of proofing to predict the rendering of digital data files by a wide variety of high-definition high-quality off-press printing processes and applications. Each such prediction is based on a characterization data set that defines a particular printing condition.

Typically, the specified printing condition is defined through an International Color Consortium (ICC) profile or the associated characterization data set, both of which relate source data and colorimetrically defined printed colour. Such data may be derived from printing conditions conforming to the pertinent process standard of the ISO 12647 series by industry trade groups or individuals.

The purpose of a proof print is to simulate the visual characteristics of the finished production print product as closely as possible. In order to visually match a particular printing condition, proofing processes require a set of parameters to be specified that are not necessarily identical to those put forward in ISO 12647-1 or another part of ISO 12647. This is caused by differences in colorant spectra or phenomena such as gloss, light scatter (within the print substrate or the colorant), and transparency. In such cases, it is also found that spectrocolorimetry takes precedence over densitometry.

Another problem area is the matching of a double-sided production print on a lightweight printing substrate, such as often used in heat-set web and publication gravure printing, to a digital proof on a nearly opaque substrate. If the proof was produced using a colour management profile based on measurements with white backing, there will be an unavoidable visual and measurable difference between the proof on the one hand and the production print placed on black on the other hand. A black backing is required for double-sided production printing on non-opaque prints, as specified in the pertinent parts of ISO 12647. The possible occurrence of such differences needs to be well communicated, in advance, to all parties concerned.

Historically there has been no consistency in the way that either the characterization data or the criteria and limits for a satisfactory match have been provided. This has led to significant redundancy and inconsistencies in the evaluation of proofing systems for different, but similar, applications, and a cost and time burden on the industry. This International Standard therefore attempts to provide guidance in this area by providing specifications and associated testing procedures.

Annex A gives the requirements for the digital proof prints listed in the main body of this part of ISO 12647; these are weighted with respect to their relevance in two typical situations:

— requirements with which a proof print, made for a particular printing condition, must comply if it is to be referenced in a contract between the printer and the provider of the digital data ("Certified Proofing System");

— requirements with which a vendor's proofing system, comprising hardware and software, must comply if it is to be considered capable of reliably producing digital contract proofs for a particular printing condition ("Certified Proofing System").

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Graphic technology — Process control for the production of half-tone colour separations, proof and production prints —

Part 7:
Proofing processes working directly from digital data

1 Scope

This part of ISO 12647 specifies requirements for systems that are used to produce hard-copy digital proof prints intended to simulate a printing condition defined by a set of characterization data. Recommendations are provided with regard to appropriate test methods associated with these requirements. In addition, guidance with respect to the certification of proofing systems related to specific printing condition aims is also included.

This part of ISO 12647 is independent of the method used to produce a digital proof print.

2 Normative references

The following referenced documents are indispensable for the application 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 3664, *Viewing conditions — Graphic technology and photography*

ISO 8254-1, *Paper and board — Measurement of specular gloss — Part 1: 75° gloss with a converging beam, TAPPI method*

ISO 12040, *Graphic technology — Prints and printing inks — Assessment of light fastness using filtered xenon arc light*

ISO 12639, *Graphic technology — Prepress digital data exchange — Tag image file format for image technology (TIFF/IT)*

ISO 12640-1, *Graphic technology — Prepress digital data exchange — Part 1: CMYK standard colour image data (CMYK/SCID)*

ISO 12642-2, *Graphic technology — Input data for characterization of 4-colour process printing — Part 2: Expanded data set*

ISO 12647-1:2004, *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints — Part 1: Parameters and measurement methods*

ISO 13655:1996, *Graphic technology — Spectral measurement and colorimetric computation of graphic arts images*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12647-1 and the following apply.

3.1
digital proof
soft proof or hard-copy proof produced directly from digital data, on a display or a substrate

3.2
digital proof print
digital hard-copy proof
digital proof produced as a reflection copy on a proofing substrate

3.3
proofing substrate
printing substrate used for hard-copy proofing processes

3.4
half-tone proof print
proof print made using the same screening technology (generally centre-weighted half-tone dots) as the intended production printing

NOTE   This is done to attempt to produce (and therefore check for the existence of) the same screening artefacts, such as rosettes, moiré or aliasing patterns, as expected in the corresponding production print. One possibility is to base proofing on the bitmap produced on the production plate or film setter.

3.5
print stabilization period
time elapsed since the production of a proof print until a stable colour is achieved

NOTE   This property is to be specified by the manufacturer.

4 Requirements

4.1 Data files, simulation of screens

4.1.1 Data delivery

Digital proofing systems should accept digital data delivered as PDF/X data files as defined in ISO 15930 or TIFF/IT files as defined in ISO 12639. Where TIFF/IT files are used, colour information shall be included using tag 34675 or tag 34029 as defined in ISO 12639.

NOTE   PDF/X requires that the intended printing condition be indicated. Where the intended printing condition is included in the registry of characterizations maintained by the International Color Consortium (ICC) and the digital data is cyan-magenta-yellow-key (black) (CMYK), the name used in the ICC registry is usually used for identification in lieu of including an ICC output profile. If the intended printing condition is not included in said registry, PDF/X requires that an ICC output profile be included. If the data is other than CMYK, the data is required to be defined colorimetrically using an ICC input profile or another mechanism and an ICC CMYK output profile is required to be included; the rendering intent to be used with the output profile is required to be communicated.

4.1.2 Screen frequency

Half-tone proofs should have the same nominal screen frequencies (screen rulings) as the production press print to be simulated.

4.1.3 Screen angle

Half-tone proofs should have the same screen angles as the production print to be simulated.

4.1.4 Dot shape and its relationship to tone value

Half-tone proofs should have the same general dot shape as the production print to be simulated.

4.2 Proof print

4.2.1 Proofing substrate colour and gloss

The digital proofing substrate should, if possible, be the same as the substrate to be used for production printing. Where this is not possible, the digital proofing substrate should have the same gloss and CIELAB $a*$ and $b*$ values as the intended production printing substrate within the tolerances listed in Table 1. Where the characteristics of the printing substrate to be used for production printing are not exactly known, a suitable proofing substrate conforming to one of the three types given in Table 1 shall be used.

The proof and production printing substrates should ideally have similar UV responses under the recommended measurement conditions.

Annex A gives requirements for a digital proof print that are weighted with respect to their relevance.

Where the production printing substrate is not identical to the proofing substrate, the colour of the latter shall not vary by more than a CIELAB 1976 colour difference of 1,5 when successively subjected to the following keeping conditions in the dark:

a)   24 h at 25 °C and a relative humidity of 25 %;

b)   24 h at 40 °C and a relative humidity of 80 %;

c)   one week at 40 °C and a relative humidity of 10 %.

For the same proofing substrate, the variability of colour under light exposure is limited by the condition that the light fastness, as determined in accordance with ISO 12040, shall not be less than 3.

NOTE 1   A light fastness step of 3 corresponds approximately to a 300 d exposure to normal office lighting.

NOTE 2   In production printing, if the final print product is subjected to surface finishing, this might significantly affect the gloss and often also the colour. In critical cases, the result of the colour separation stage is best judged by means of a proof that closely matches the gloss of the final surface-finished print product. For processes with off-press finishing, in order to facilitate the matching of the production image to the proof image at the make-ready stage, it is useful to provide the press operator with two proof prints:

⎯   a proof print whose gloss matches that of the (unfinished) production print substrate;

⎯   a proof print which closely matches the gloss of the final surface-finished print product.

NOTE 3   If the substrate fails this test, it is in all likelihood not environmentally stable and thus not eligible for certification.

Table 1 — CIELAB coordinates, gloss and tolerances for unprinted proofing substrate types

Proofing substrate type	$L*$ a	$a*$ a	$b*$ a	Gloss b %
Glossy white	⩾ 95	0 ± 2	0 ± 2	61 ± 15
Semi-matte white	⩾ 95	0 ± 2	0 ± 2	35 ± 10
Matte white	⩾ 95	0 ± 2	0 ± 2	< 25
NOTE The data specified in this table pertain to unprinted proofing substrates, not to be confused with data pertaining to unprinted production substrate which are given in other parts of ISO 12647.				
a Measurement in accordance with 5.3.				
b Measurement in accordance with 5.5.				