INTERNATIONAL STANDARD

ISO 12647-7

Second edition
2013-07-01

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

Reference number
ISO 12647-7:2013(E)

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Published in Switzerland

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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. www.iso.org/directives

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The committee responsible for this document is ISO/TC 130, *Graphic technology*.

This second edition cancels and replaces the first edition (ISO 12647-7:2007), of which it constitutes a minor revision with the following changes:

— clear up the subject matter on certification issues to comply with the ISO requirements;

— update of references.

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*

— *Part 8: Validation print processes working directly from digital data*

Introduction

ISO 12647-1 serves to provide definitions, the general principles, the general order, the material to be covered in ISO 12647-2 to ISO 12647-7, 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 colouration 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 prediction is based on a characterisation 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 characterisation data set, both of which relate source data and colourimetrically 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 colourant spectra or phenomena such as gloss, light scatter (within the print substrate or the colourant), and transparency. In such cases, it is also found that spectrocolourimetry 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 characterisation 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”).

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 characterisation data. Recommendations are provided with regard to appropriate test methods associated with these requirements.

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

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 3664, *Graphic technology and photography — Viewing conditions*

ISO 8254-1, *Paper and board — Measurement of specular gloss — Part 1: 75 degree 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, *Graphic technology — Spectral measurement and colorimetric computation for 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 1 to entry: 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 stabilisation period
time elapsed since the production of a proof print until a stable colour is achieved

Note 1 to entry: 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 (all parts) 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 characterisations maintained by the International Color Consortium (ICC) and the digital data are 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 are other than CMYK, the data are required to be defined colourimetrically 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 storage 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.

4.2.2 Colouration of printed parts

The measurement conditions shall be as specified in 5.3; the digital control strip specified in 5.1 shall be used.

The CIELAB colour coordinates of the process colour solids shall agree with the pertinent aim values of the printing condition to be simulated as given by the data (see 4.1.1), within a CIELAB difference of 5; the contribution of the CIE hue difference to the total CIELAB difference shall not exceed 2,5.

The variability of the colouration across the proof print format is limited by the provision that the colours of nine measurement locations evenly spaced on the test object (see 5.2.4), which has been printed without prior modification in view of the printing condition, shall have

— a standard deviation of less than 0,5 each for values of L^*, a^*, and b^*;

— a maximum CIELAB colour difference of 2 between the average value and any one point.

The print stabilisation period shall be specified by the manufacturer. The variability ("fading") of the primary and secondary colour solids over time, in the dark, shall be limited by the condition that the CIELAB colour difference that occurs in the first 24 h after the print stabilisation period has elapsed shall not exceed 1,5.

The light fastness, as determined according to ISO 12040, of the primary colour solids shall not be less than 3.

The CIELAB colour coordinates of the control patches, defined in 5.1 or ISO 12642-2, shall agree with the pertinent aim values of the printing condition to be simulated as given by the data (see 4.1.1) within the tolerances specified in Table 2.

If the proofing conditions are such that the simulation of the production printing substrate patch (C = M = Y = K = 0, i.e. all the components are equal to zero) does require overprinting of the proofing substrate, the CIELAB deviation tolerance for that patch shall be 3, irrespective of what the pertinent part of ISO 12647 stipulates for this tolerance.

4.2.3 Repeatability of proof printing

The variability of the proof print primary and secondary colour solids and primary colour midtone patches from one day to the following shall not exceed a CIELAB colour difference ΔE of 1,5 when the patches are being measured at the same position on the sheet, and after the vendor-specified warming-up period and, if necessary, recalibration.

NOTE For certain proofing systems, the same point on a proof print may be formed from a different source on different days; strictly speaking, this is testing variability not repeatability. For these systems, there is no true test of repeatability.

4.2.4 Colourant rub resistance

Using the test apparatus and method specified in Annex B, the time required by printed solids to reach mechanical stability against a rubbing action should not exceed 30 min or the print stabilisation period, whichever is longer. This test shall be performed for each combination of materials and operating conditions for which the proofing system is to be certified.

NOTE A period of 30 min was chosen because this is believed to represent the expectation of the average user. Where the colour (as distinct from the rub resistance of the colourant) takes longer to stabilise, this requirement can be relaxed.

Table 2 — Additional tolerances for control patches

Control patch description	Tolerance
Simulated print substrate colour of the production printing condition[a]	$\Delta E^*_{ab} \leq 3$
All patches specified in 5.1	Maximum $\Delta E^*_{ab} \leq 6$ Average $\Delta E^*_{ab} \leq 3$
Second half-tone scale composed of the primaries C, M, Y, roughly replicating the colours of the first scale for an average printing condition ("grey balance") (same number of patches as for colours of the first scale)	Average $\Delta H \leq 1{,}5$
Outer gamut patches	Average $\Delta E^*_{ab} \leq 4$
All patches of ISO 12642-2	Average $\Delta E^*_{ab} \leq 4$ 95 % percentile $\Delta E^*_{ab} \leq 6$

NOTE 1 The tolerances pertain to the deviation of the proof values from the values of the characterization data of the printing condition to be simulated.

NOTE 2 The specification of ΔE^*_{ab} tolerances lower than 3 is presently not practical due to poor inter-instrument agreement.

NOTE 3 If the final proof print is subjected to surface finishing, the final colours might deviate significantly from those of the unfinished print. See also Note 2 in 4.2.1. In this case, a new proofer or simulation profile or other adjustments are required.

[a] Required only where the proofing substrate is not identical with the production printing substrate.

4.2.5 Ink set gloss

The gloss of solid tone colours should be visually similar to that of the production print to be simulated. The ink set gloss may be specified if deemed necessary; see 5.5 for the method.

NOTE If the gloss of the proof print is substantially changed by the applied colourants, a surface-finishing step might improve the situation. See 4.2.2.

4.2.6 Tone value reproduction limits

Tints intermediate between the (simulated) substrate white and solid shall transfer onto the proof in a consistent and uniform manner over a tone value range that includes at least the tone reproduction limits of the printing condition to be simulated; see the pertinent part of ISO 12647 for this information.

NOTE It is good prepress practice that no image parts need to rely on tone values outside of the tone value reproduction limits of the production printing process.

4.2.7 Tone value

In addition to the requirements of 4.2.2, the single-colour CMYK patches shall not deviate in tone value (measured colourimetrically) from those of the aim characterisation data by more than 5 % in tone value. For the calculation of tone values from measured and characterisation CIE data, use the method described in 5.4.

4.2.8 Reproduction of vignettes

The test objects specified in 5.2.2 shall show no easily visible steps within the tone value reproduction limits (see 4.2.6), if viewed under ISO viewing condition P1 in accordance with ISO 3664.

4.2.9 Image register and resolving power

The maximum deviation between the image centres of any two printed colours shall not be larger than 0,05 mm. The resolving power of the proof print shall be such that C, M, K positive, non-serif, type of 2-point size, reverse (negative) of 8-point size, and 2-point reverse line are legibly reproduced; the test object specified in 5.2.3 shall be used. The above requirements shall not apply to rough or mechanically unstable substrates such as newsprint and to cases where the tolerances for production printing are substantially greater than 0,05 mm.

NOTE 1 This condition usually corresponds to an output addressability of at least 100 pixels per centimetre.

NOTE 2 This condition includes the effects of colourant migration, if at all present.

4.2.10 Margin information

Every digital proof shall bear a human-readable commentary line printed on a margin where the proofing system designation, the colourant and substrate material types, the printing condition to be simulated, the colour management profile(s) used, and the time and date are given.

NOTE 1 For ink-jet printers, it is useful to print a nozzle test line next to the commentary line so that it is possible to ascertain in retrospect that all nozzles were working.

NOTE 2 In some cases of recalibration, it is useful to reprofile the proofer.

4.2.11 Gamut

For each printing condition to be simulated, the 226 outer gamut patches of ISO 12642-2 shall be proof printed. The average CIELAB 1976 colour difference between actual and aim values for those patches shall not exceed 4; see also Table 2. See Annex C for the list of outer gamut patches of ISO 12642-2.

5 Test methods

5.1 Control strip

On every proof, print a CMYK digital control strip at the output intent of the printing condition to be simulated. The control elements identified in the list below should be included while keeping the total number of patches within reasonable limits. To provide compatibility with characterisation data, as many control patches as possible should be selected from ink value combinations of ISO 12642-2. Select the control patches such that the following control patch types are covered:

a) solid tones of the chromatic primaries and their secondaries C,M,Y,R,G, and B (6 patches);

b) mid- and shadow tones of the chromatic primaries and their secondaries C,M,Y,R,G, and B (12 patches);

c) black (K) only half-tone scale with a minimum of six steps that includes the solid;

d) CMY overprint half-tone scale having the same number of steps as the scale in c) that approximately replicates, for an average printing condition, the CIELAB values of the black only scale defined in c);

e) selection of critical tertiary colours such as flesh tones, brown, aubergine, violet (e.g. 15 patches);

f) simulated print substrate colour of the production printing condition (1 patch).

NOTE 1 There are two practical definitions for grey which are sometimes contradictory:

— “A colour having the same a* and b* CIELAB values as the print substrate”;

— “A colour having the same a* and b* CIELAB values as a half-tone tint of similar L* value printed with black ink”.

The latter definition is believed to be useful in the midtone and upwards whereas the former is believed to work best with highlight tones.

NOTE 2 Grey balance patches composed of suitable CMY mixtures serve a useful purpose for quick visual checks of whether the CMY tone values have changed, for example from one proof print to the next. A single grey balance condition is usually not sufficient to ensure an achromatic colour for all print substrates and printing inks that are used for a given printing condition. In addition, it usually depends on the particular black composition used.

5.2 Additional test objects

5.2.1 For the visual determination of resolving power of the proofing process, take the resolution charts S2 and S3 defined in ISO 12640-1.

5.2.2 For checks of the primary and secondary process colours C, M, Y, K, R, G, B, and C+M+Y, take vignette targets such as the test image S6 of ISO 12640-1. Dimension the length of the vignettes, such that they are just below the length where less than smooth behaviour would set in with normal production printing.

5.2.3 For checks on the resolving power with type material, take positive and reverse (negative) type of a non-serif font with point sizes of 2, 3, 4, 5, 6, 7, and 8. Also use reverse lines with the point sizes of 2, 3, and 4.

5.2.4 For checks on uniformity, create three formes, each with an even tint area that fills the printable format of the proof printer, using the following tone value combinations:

a) C: 65 %, M: 50 %, Y: 50 %, K: 50 %;

b) C: 40 %, M: 30 %, Y: 30 %, K: 30 %;

c) C: 20 %, M: 15 %, Y: 15 %, K: 15 %.

NOTE The most popular format for proof printing is A3+.

5.3 Colour measurement

Colour measurements shall be made using an instrument (such as a colourimeter or a spectrophotometer from which colourimetric values can be calculated) that is capable of repeatedly producing measured values well within the tolerances specified in this part of ISO 12647. The CIELAB colour coordinates L^*, a^*, b^* shall be calculated as detailed in ISO 13655. The ISO 13655 measurement condition and backing should be selected based on correspondence with the press and proof viewing condition. The CIELAB 1976 colour difference shall be calculated as detailed in ISO 13655.

Black backing shall be in accordance with ISO 13655. Standard white backing shall have the following characteristics:

a) It shall be opaque (e.g. ceramic, plastic, or paper).

b) It shall be diffuse-reflecting (i.e. no perceptible specular reflection when viewed at any angle under typical office room illumination conditions).

c) Its CIELAB C^* value shall not exceed 3,0.

d) It shall be non-fluorescing (no emission in the response band of interest when excited by the instrument source).

e) The spectral reflectance factor values shall exceed those of Table 3 but the CIE L^* value shall not exceed 96,4.

Table 3 — Spectral reflectances

Wavelength nm	Spectral reflectance
400	0,30
410	0,30
420	0,75
450	0,75
460	0,80
670	0,80
680	0,75
700	0,75
NOTE These spectral reflectance values correspond to a CIE L^* value greater than 92.	

NOTE If the viewing condition is ISO 3664 condition P1 with white backing, as recommended in Annex D, the most appropriate measurement condition will be ISO 13655 measurement condition with white backing.

5.4 Measurement of tone values by tristimulus colourimeter or spectrocolourimeter

Measure single-process-colour half-tone patches as directed in 5.3. Calculate tone values in accordance with the method given in ISO 12647-1:2004, 5.3.2.

5.5 Measurement of gloss

Measure the specular gloss of the print substrate or ink set single print solid areas with light incident at 75° (15° from the plane of the print substrate) and measurement at 75°. Use an instrument that conforms to ISO 8254-1. Report values in percent, quoting “ISO 8254-1, TAPPI gloss” as the method.

5.6 Visual appraisal of proof-press-print matches

See Annex D for a typical set of guidelines used for visual evaluations.

NOTE 1 Although industry is struggling to develop metrologically based techniques for the evaluation of the quality of proof-to-print matches, unfortunately most industry trade groups still rely on visual comparisons. It is recognised that these evaluations are highly dependent on both the subject matter chosen and on the observers participating.

Annex A
(normative)

Certification

A.1 Digital hard-copy proof production in the field

A.1.1 General provisions

Production sites for digital proofs may be considered capable of delivering certified ("contract") proofs for a chosen printing condition in conformance with this part of ISO 12647 if it can be reliably demonstrated that the proof prints conform to the requirements listed in A.1.2 or A.1.3 for the chosen printing condition.

A.1.2 Half-tone type proof prints

Half-tone type proof prints shall conform to the following requirements of Clause 4:

— 4.1.2, screen frequency;

— 4.1.3, screen angle;

— 4.1.4, half-tone dot shape;

— 4.2.1, proofing substrate colour and gloss; conformance to Table 1 is the only requirement;

— 4.2.2, colouration of printed parts, except the light fastness and 24 h colour fading tests;

— 4.2.7, tone value;

— 4.2.8, reproduction of vignettes;

— 4.2.9, image register and resolving power;

— 4.2.10, margin information;

— 4.2.11, gamut.

A.1.3 Non-half-tone type proof prints

Non-half-tone type proof prints shall conform to all requirements of A.1.2 except those for screen frequency (4.1.2), screen angle (4.1.3), and half-tone dot shape (4.1.4).

A.2 Production system for digital hard-copy proofing

A.2.1 General provisions

Production systems for digital proofing provided by vendors may be considered capable of delivering certified ("contract") proofs for a given printing condition in conformance with this part of ISO 12647 if it can be reliably demonstrated that the proofing system, comprising hardware and workflow components, if tested under the environmental conditions specified by the vendor, conforms to the requirements listed in A.2.2 or A.2.3 for said printing condition. In addition, the system shall be capable of accepting and processing data files conforming to 4.1.1.

A.2.2 Half-tone type proof prints

Half-tone type proof prints shall conform to the following requirements of Clause 4:

— 4.1.2, screen frequency;

— 4.1.3, screen angle;

— 4.1.4, half-tone dot shape;

— 4.2.1, proofing substrate colour and gloss; conformance to Table 1 is the only requirement;

— 4.2.2, colouration of printed parts, except the light fastness and 24 h colour fading tests;

— 4.2.3, repeatability of proof printing;

— 4.2.4, colourant rub resistance;

— 4.2.6, tone value reproduction limits;

— 4.2.7, tone value;

— 4.2.8, reproduction of vignettes;

— 4.2.9, image register and resolving power;

— 4.2.10, margin information;

— 4.2.11, gamut.

A.2.3 Non-half-tone type proof prints

Non-half-tone type proof prints shall conform to all requirements of A.1.2 except those for screen frequency (4.1.2), screen angle (4.1.3), and half-tone dot shape (4.1.4).

Annex B
(normative)

Rub resistance of the proof colourant

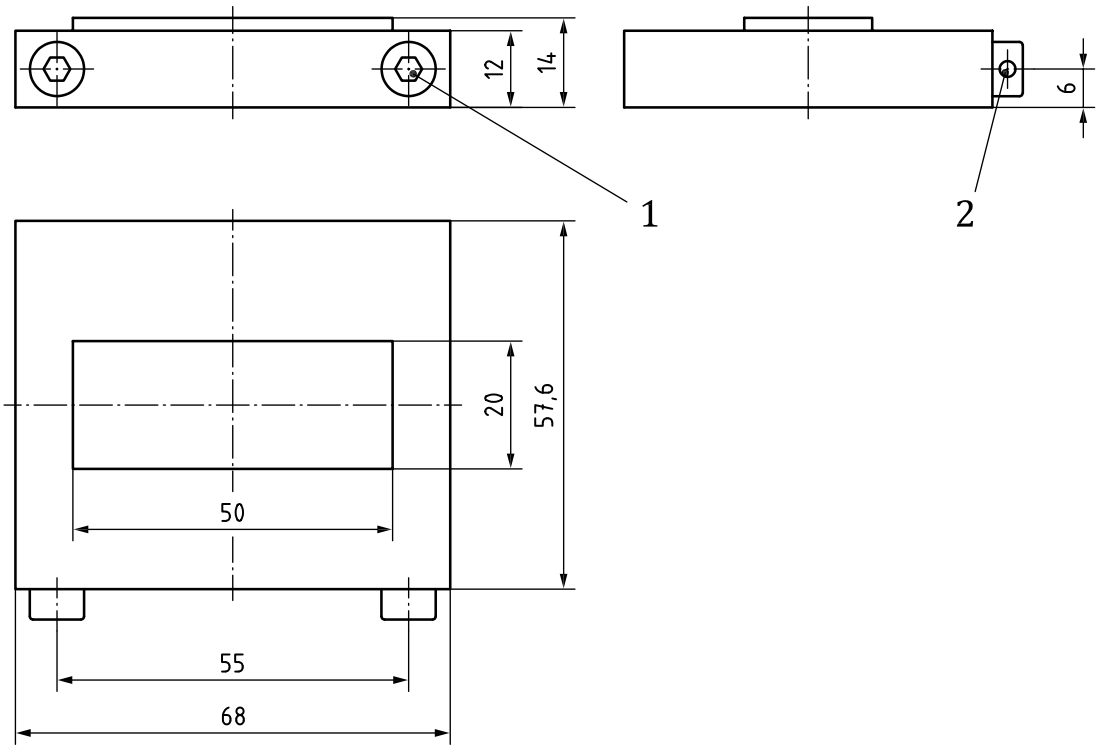
B.1 Apparatus

B.1.1 Slab

For the procedure, a stainless steel slab is used, having dimensions according to Figure B.1, with a mass of approximately 400 g, a protruding wipe area of 10 cm^2, and hence a ratio of mass per area of 0,4 N/cm^2. A pull string is attachable to the front of the slab by means of two screws whose heads have a hole (see item 1 of Figure B.1).

NOTE This procedure is modelled after method A of DIN 53131-2.[6]

Dimensions in millimetres



Key

1 screw M5

2 hole, of 2 mm to 3 mm in diameter, for fastening of pull string

Figure B.1 — Slab

B.1.2 Rubber mat

Rubber mat with the following properties:

— thickness: 2 mm;

— length: 340 mm;

— width: 250 mm;

— Shore-A hardness: 65 A;

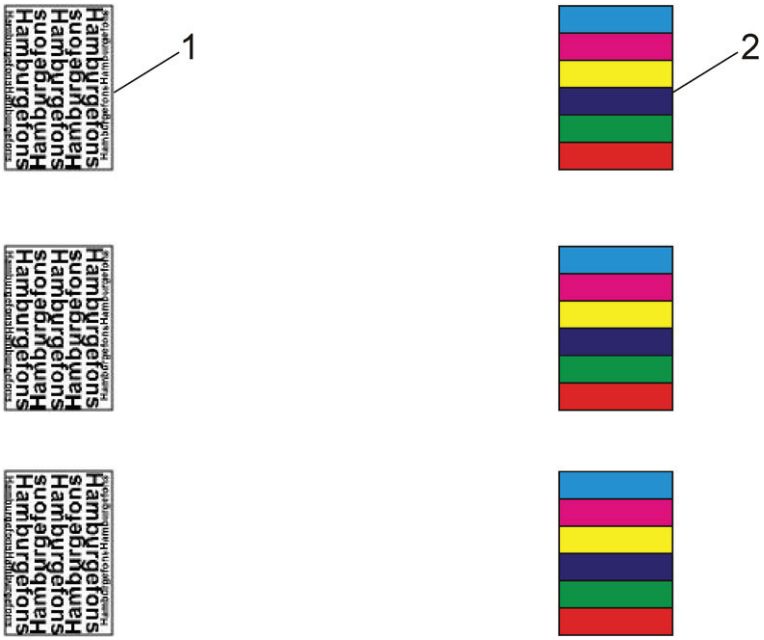
— smooth matte surface.

B.2 Proofing system

The results of this test only pertain to the particular combination of proofing system, hardware, firmware, driver setting and software, and the particular proofing substrate and colourant material used.

B.3 Printed test area

Prepare a test forme with six printed rectangular test areas having an approximate size of 25 mm by 36 mm. Fill three rectangles with black ink type and the rest each with 6 strips of C100, M100, Y100, C100+M100, C100+Y100, M100+Y100, each strip parallel to the shorter side of the rectangles. See Figure B.2 for an example layout.



Key

1 text sample area

2 colour sample area

Figure B.2 — Example layout for printed test objects

B.4 Rub test

B.4.1 Climatic conditions

Strictly observe the temperature and relative humidity ranges specified by the vendor. Place all materials and test devices in that environment at least 24 h prior to the test.

B.4.2 Preparation of the slab

Fasten a piece of unprinted proofing substrate of the type to be tested, 40 mm by 80 mm, to the front part of the slab such that it extends rearwards over the protruding part of the slab. Orient the normal printing side of the proofing paper away from the slab so that this surface will come in contact with the printed test area.

B.4.3 Test

Attach a 40 cm pull string to the screws of the slab (item 1 in Figure B.1) so that the slab may be pulled to slide over the table surface. Place the rubber mat on a flat table. Firmly attach the proof print (with its six rectangular test objects, see Figure B.2) to the rubber mat, printed side up.

Place the prepared slab on the proof print behind a rectangular printed object, with the protruding part facing the proof print. Orient the slab such that longer sides of the protruding part of the slab and those of the printed test area are parallel. At a speed of approximately 5 cm/s, pull the slab fully across the chosen test area in the direction perpendicular to its longer side. Do not apply vertical forces to the slab. While pulling the slab, keep the string parallel to the table surface. Inspect the substrate attached to the bottom of the slab. If it is marked by transferred colourant, replace it with a fresh piece of proofing substrate. Repeat the rubbing pulls for the remaining five test areas.

B.4.4 Evaluation

Visually scrutinise the printed test areas and the adjacent unprinted parts for traces of the rubbing action. Visually examine the proofing substrate that was attached to the slab for traces of transferred colourant. For the striped test areas, note which colourant is affected most by the rubbing.

B.4.5 Mechanical stabilisation period of colourant

Determine the colourant mechanical stabilisation period as follows. Make a series of tests according to B.4.3, starting immediately after the proof print fully emerges from the proofing system. Repeat at least three times, at evenly spaced intervals of approximately 10 min. The time elapsed after printing till the point when no visual traces of the rubbing action can be seen is the colourant mechanical stabilisation period.

B.5 Test report

The test report shall include the following details:

a) a reference to this part of ISO 12647 (i.e. ISO 12647-7:2013);

b) the proofing substrate (vendor, type, article number);

c) the colourant (vendor, type, article number);

d) the proof printer (vendor, type, article number);

e) the printer driver and setting (vendor, type, version);

f) the application program (vendor, type, version);

g) the raster image processor (RIP) (type and version);

h) the operating system (vendor, type, version);

i) the test conditions and any deviations from this part of ISO 12647 that might have influenced the results;

j) the test results;

k) the date and name of person carrying out the test.

Annex C
(normative)

Outer gamut patches

Table C.1 contains a selected subset of outer gamut patches of ISO 12642-2. The outer gamut patch set is also a subset of the patches defined in ISO 12642-2. The first column of Table C.1 gives the order number used in ISO 12642-2. The remaining columns give the data tone values of the patches.

Table C.1 — 226 outer gamut patches of ISO 12642-2

No.	C	M	Y	K
1	0	0	0	0
2	0	10	0	0
3	0	20	0	0
4	0	30	0	0
5	0	40	0	0
7	0	70	0	0
9	0	100	0	0
10	10	0	0	0
11	10	10	0	0
12	10	20	0	0
14	10	40	0	0
16	10	70	0	0
18	10	100	0	0
19	20	0	0	0
20	20	10	0	0
21	20	20	0	0
23	20	40	0	0
25	20	70	0	0
27	20	100	0	0
28	30	0	0	0
37	40	0	0	0
38	40	10	0	0
39	40	20	0	0
41	40	40	0	0
43	40	70	0	0
45	40	100	0	0
55	70	0	0	0
56	70	10	0	0
57	70	20	0	0
59	70	40	0	0
61	70	70	0	0

Table C.1 *(continued)*

No.	C	M	Y	K
63	70	100	0	0
73	100	0	0	0
74	100	10	0	0
75	100	20	0	0
77	100	40	0	0
79	100	70	0	0
81	100	100	0	0
82	0	0	10	0
83	0	10	10	0
84	0	20	10	0
86	0	40	10	0
88	0	70	10	0
90	0	100	10	0
91	10	0	10	0
100	20	0	10	0
118	40	0	10	0
136	70	0	10	0
154	100	0	10	0
163	0	0	20	0
164	0	10	20	0
165	0	20	20	0
167	0	40	20	0
169	0	70	20	0
171	0	100	20	0
172	10	0	20	0
181	20	0	20	0
199	40	0	20	0
217	70	0	20	0
235	100	0	20	0
244	0	0	30	0
325	0	0	40	0
326	0	10	40	0
327	0	20	40	0
329	0	40	40	0
331	0	70	40	0
333	0	100	40	0
334	10	0	40	0
343	20	0	40	0
361	40	0	40	0
379	70	0	40	0
397	100	0	40	0

Table C.1 *(continued)*

No.	C	M	Y	K
487	0	0	70	0
488	0	10	70	0
489	0	20	70	0
491	0	40	70	0
493	0	70	70	0
495	0	100	70	0
496	10	0	70	0
505	20	0	70	0
523	40	0	70	0
541	70	0	70	0
559	100	0	70	0
649	0	0	100	0
650	0	10	100	0
651	0	20	100	0
653	0	40	100	0
655	0	70	100	0
657	0	100	100	0
658	10	0	100	0
667	20	0	100	0
685	40	0	100	0
703	70	0	100	0
721	100	0	100	0
735	0	100	0	20
741	10	100	0	20
747	20	100	0	20
753	40	100	0	20
759	70	100	0	20
760	100	0	0	20
761	100	10	0	20
762	100	20	0	20
763	100	40	0	20
764	100	70	0	20
765	100	100	0	20
771	0	100	10	20
796	100	0	10	20
807	0	100	20	20
832	100	0	20	20
843	0	100	40	20
868	100	0	40	20
879	0	100	70	20
904	100	0	70	20

Table C.1 *(continued)*

No.	C	M	Y	K
910	0	0	100	20
911	0	10	100	20
912	0	20	100	20
913	0	40	100	20
914	0	70	100	20
915	0	100	100	20
916	10	0	100	20
922	20	0	100	20
928	40	0	100	20
934	70	0	100	20
940	100	0	100	20
950	0	100	0	40
955	20	100	0	40
960	40	100	0	40
965	70	100	0	40
966	100	0	0	40
967	100	20	0	40
968	100	40	0	40
969	100	70	0	40
970	100	100	0	40
975	0	100	20	40
991	100	0	20	40
1 000	0	100	40	40
1 016	100	0	40	40
1 025	0	100	70	40
1 041	100	0	70	40
1 046	0	0	100	40
1 047	0	20	100	40
1 048	0	40	100	40
1 049	0	70	100	40
1 050	0	100	100	40
1 051	20	0	100	40
1 056	40	0	100	40
1 061	70	0	100	40
1 066	100	0	100	40
1 075	0	100	0	60
1 080	20	100	0	60
1 085	40	100	0	60
1 090	70	100	0	60
1 091	100	0	0	60
1 092	100	20	0	60

Table C.1 *(continued)*

No.	C	M	Y	K
1 093	100	40	0	60
1 094	100	70	0	60
1 095	100	100	0	60
1 100	0	100	20	60
1 116	100	0	20	60
1 125	0	100	40	60
1 141	100	0	40	60
1 150	0	100	70	60
1 166	100	0	70	60
1 171	0	0	100	60
1 172	0	20	100	60
1 173	0	40	100	60
1 174	0	70	100	60
1 175	0	100	100	60
1 176	20	0	100	60
1 181	40	0	100	60
1 186	70	0	100	60
1 191	100	0	100	60
1 199	0	100	0	80
1 203	40	100	0	80
1 207	70	100	0	80
1 208	100	0	0	80
1 209	100	40	0	80
1 210	100	70	0	80
1 211	100	100	0	80
1 215	0	100	40	80
1 224	100	0	40	80
1 231	0	100	70	80
1 240	100	0	70	80
1 244	0	0	100	80
1 245	0	40	100	80
1 246	0	70	100	80
1 247	0	100	100	80
1 248	40	0	100	80
1 252	70	0	100	80
1 256	100	0	100	80
1 262	0	100	0	100
1 266	100	0	0	100
1 268	100	100	0	100
1 278	0	0	100	100
1 280	0	100	100	100

Table C.1 *(continued)*

No.	C	M	Y	K
1 284	100	0	100	100
1 290	90	0	0	0
1 292	80	0	0	0
1 295	60	0	0	0
1 296	50	0	0	0
1 299	25	0	0	0
1 301	15	0	0	0
1 303	7	0	0	0
1 305	3	0	0	0
1 310	0	90	0	0
1 312	0	80	0	0
1 315	0	60	0	0
1 316	0	50	0	0
1 319	0	25	0	0
1 321	0	15	0	0
1 323	0	7	0	0
1 325	0	3	0	0
1 330	0	0	90	0
1 332	0	0	80	0
1 335	0	0	60	0
1 336	0	0	50	0
1 339	0	0	25	0
1 341	0	0	15	0
1 343	0	0	7	0
1 345	0	0	3	0
1 405	100	0	0	70
1 406	0	100	0	70
1 407	0	0	100	70
1 408	100	100	0	70
1 409	100	0	100	70
1 410	0	100	100	70

Annex D
(informative)

Organisational certification routines for visual appraisal of proof-print press-print matches

It is useful to complement the measurements and visual checks listed in the normative Annexes A and B by visual judgements of a panel of colour experts. The difficulty resides in trying to exclude the influences of subjectiveness, observer fatigue, and varying viewing conditions. In view of these well-known sources of error, the following guidelines[1)] are offered.

Visual evaluations are to be made by a group of industry colour experts whose position within their company requires them to release either colour proofs or press sheets. A minimum of four experts is considered to be essential.

Especially at the start of the evaluations, but also throughout the entire event, once observer fatigue sets in, the colour experts are presented with a press print and a set of training proofs that have, by previous continual experience, been assessed as

— "passed",

— "passed by a small margin",

— "failed by a small margin",

— "failed",

with respect to their visual agreement with the press print. This procedure is an attempt to ensure that the appraisal process is applied consistently and that the experts have the same relative expectations of what is considered to be an acceptable proof or proofing system. If an expert judging the set of training proofs appears to be applying expectations that notably differ from the given appraisal results of the set, then this expert should be excused from the evaluation. It is important to note that this set of training proofs should not have any identifying marks as to previous evaluations; only the person responsible for implementing the evaluations has that information and thus is in a position to evaluate the expectations of a given expert.

During each system evaluation, the experts are requested to rotate their position relative to the viewing booth so that they have the opportunity to view proofs from multiple locations around the viewing booth.

All hard copy proofs should be compared to a high-quality press print which represents the intended printing condition that is to be simulated by the proof print. Viewing should be in accordance with ISO 3664. A viewing booth conforming to ISO 3664, ISO viewing conditions P1, and with a viewing area of at least 100 cm in width and 75 cm in depth should be used. The light source of the viewing booth should be allowed to stabilise in colour temperature for at least 30 min or until measurement demonstrates stabilisation. All extraneous materials should be removed from the sides and back of the viewing booth so as to not affect the evaluations. All room lights are to be reduced in order to ensure that no extraneous light different from D50 is disturbing the visual appraisal.

All proofs are first checked to make sure no identifying marks are present that could identify the source of the proofs. Proofs being evaluated should not be turned over so that identifying marks on the back side might be readable. The evaluation is intended to be "blind", i.e. without knowledge of the origin of the proof.

The press print is placed in the viewing booth on a white backing. All proofs being evaluated against the press print are placed close to it. The colour experts are generally given no more than 10 min to

1) Adapted from the SWOP Certification Program[7], with the kind permission of IDEAlliance.

assess each proofing system's set of proofs (normally there are three pages of proofs to be compared to a press sheet). During that time, comments are recorded by the person overseeing the visual inspection and, if necessary, after clarification of imprecise judgements. The comments recorded are tested for consensus of the group and, if necessary, comments outside of consensus are recorded also. At the end of the evaluation period of at most 10 min, the colour experts are asked for a consensus judgment on pass/fail for the proofing system being evaluated and this result is recorded.

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[7] SWOP Certification Program. www.swop.org

2) Withdrawn.

ICS 37.100.01

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