INTERNATIONAL STANDARD

ISO 12647-8

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

Part 8: Validation print processes working directly from digital data

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

Partie 8: Processus d'impression de maquette couleur produite à partir de données numériques

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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.

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 12647-8 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*

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

Introduction

This part of ISO 12647 specifies the properties, and associated test methods, required for digital prints and printing processes to meet the criteria established for “validation prints”.

In most printing workflows, there is a requirement for a visual representation of the expected appearance of the document being printed that can be used as part of the agreement between the customer and printer. Where this visual representation is produced such that its characteristics (colour fidelity, tone reproduction, registration, size, etc.) simulate those of the expected printing within tight tolerances, it is usually referred to as a “contract proof”. As the name implies, contract proofs are used as part of the contractual relationship between customer and printer and are used as a visual aim for the press operator during printing as well as the absolute reference against which the finished production is compared. Not unexpectedly, systems that can produce contract proofs are usually expensive and require careful operation and maintenance. ISO 12647-7 specifies the requirements for contract proofs and systems used to produce contract proofs directly from digital data.

Recently, other visualizations of the final printed product have found a place in the printing/proofing workflow because designers and print buyers prefer not go to the expense of using an ISO 12647-7 compliant contract proof any earlier in the process than necessary. In many situations, participants in the work flow require a hardcopy visual reference of lesser quality than a contract proof. In the past, those prints varied widely in quality and were often referred to as design proofs, concept proofs, layout prints, etc. That quality level is here being referred to as a “validation print”.

Because data are exchanged electronically and visualizations of those data are produced at multiple sites, there is a requirement for defined requirements for validation prints to allow a degree of consistency throughout the workflow. One of the goals of having less stringent requirements, particularly on colour fidelity, is to allow the production of validation prints on less elaborate and less costly devices than are required for contract proofs. The requirements for validation prints and the systems used to produce validation prints are documented in this part of ISO 12647.

Validation prints are not intended to replace “contract proofs” for predicting colour on production printing devices. It is expected that the modifications of the requirements for validation prints, along with the requirements for contract proofs, will continue in the future as industry requirements and imaging technologies develop.

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

Part 8:
Validation print processes working directly from digital data

IMPORTANT — The electronic file of this document contains colours which are considered to be useful for the correct understanding of the document. Users should therefore consider printing this document using a colour printer.

1 Scope

This part of ISO 12647 specifies requirements that can be used for determining the conformance of systems that produce a hard-copy validation print, directly from digital data, which is intended to simulate the expected appearance of material printed in accordance with a characterized printing condition.

It is not intended for use in determining the conformance of production printing systems (digital or conventional) since many aspects of production printing are not covered in this part of ISO 12647.

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 reference document (including any amendments) applies.

ISO 3664:2009, *Graphic technology and photography — Viewing conditions*

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

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

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

ISO 12640-1:1997, *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, *Graphic technology — Process control for the production of half-tone colour separations, proof and production prints — Part 1: Parameters and measurement methods*

ISO 13655:2009, *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
validation print substrate
printing substrate used for validation print processes

NOTE A validation print substrate is usually characterized by its light fastness or permanence properties, with only essential requirements dictated by the printing process.

3.2
ICC
International Color Consortium

3.3
print stabilization period
time after which the colour does not change anymore

NOTE It is necessary that this property of the validation print system be specified by the manufacturer.

3.4
digital contract proof
digital print of high colour accuracy, useable as reliable visual colour reference for printing, and as a part of a commercial agreement as defined in ISO 12647-7

3.5
validation print
print produced directly from digital data early in the production chain meeting the requirements of this part of ISO 12647 representative of the concept for the final product

NOTE A validation print can have reduced accuracy compared to contract proof.

3.6
production print substrate
intended substrate to be used for production printing

3.7
PDF/X
title of a series of ISO standards regarding the use of the Portable Document Format (PDF) for the dissemination of digital data intended for print reproduction

3.8
TIFF/IT
Tagged Image File Format for Image Technology
format for exchanging raster-based data in accordance with ISO 12639

4 Requirements

4.1 Data requirements for validation print systems

Validation print systems shall accept digital data delivered as PDF/X data files in accordance with ISO 15930 (all parts) or TIFF/IT files in accordance with ISO 12639. Where the digital data is delivered as PDF/X data files, the intended printing condition being simulated shall be that defined in the *OutputIntents* array of the PDF/X file. Where a profile is required for data conversion, the profile that is the value of the *DestOutputProfile* key in the PDF/X file shall be used. Where TIFF/IT files are used, colour information shall be included using tag *34675* or tag *34029*.

4.2 Validation print

4.2.1 Validation print substrate colour and gloss

The choice of the substrate used for the creation of a validation print is based on a combination of the user's knowledge of the intended production printing substrate and the capabilities of the equipment used to create the validation print. In cases where the production print substrate is not used for the validation print or is unknown, then the substrate used for the validation print shall be white on both the front and the back and shall not have any print on the back that influences the resulting measurements.

In applications where the substrate that will be used for the production print is known and the equipment used to create the validation print is compatible with that substrate, the unmarked production print substrate shall be used to create the validation print.

In applications where the substrate used for the production print is known, but is not compatible with the equipment being used to create the validation print, a substrate shall be selected whose colour, measured in accordance with ISO 13655:2009 M0 with white backing, simulates the unprinted substrate within a CIELAB 1976 colour difference of 3.0 computed in accordance with ISO 13655. This simulation should be determined using ISO 13655:2009 M1 with white backing, when available. This simulation of substrate colour may be accomplished using uniform coloration of the unprinted area during creation of the validation print. In addition, the gloss of the validation print substrate should be that of the production print substrate within 15 gloss units as measured according to 5.6. The validation print and production print substrates should ideally have similar levels of OBA (optical brightening agents) present and exhibit the same amount of fluorescence under an M1 illumination source.

NOTE 1 This does not imply that under other measurement conditions the simulation will be the same. The paper industry provides methods that do not conform to ISO 13655 M0 or M1 for estimating the similarity of OBA levels but not image colour between production print and validation print.

This part of ISO 12647 addresses situations that can occur very early in the creative process where the intended printing production substrate is not known. In such situations, a substrate shall be selected whose colour simulates the production substrate colour, as obtained from the characterization data set being used to create the validation print. The tolerance on the simulation shall be a CIELAB colour difference of 3 units. The measurement conditions targeted shall be those specified for the characterization data set being used. This simulation of substrate colour may be accomplished using uniform coloration of the unprinted area during creation of the validation print. In such a case, the unprinted areas of the substrate shall be removed in order to assure adaptation to the correct white point. The gloss of the substrate shall be selected to simulate the general type of printing expected based on the reference values of Table 1.

NOTE 2 In cases where the colour of the substrate being used to create the validation print differs from the substrate colour in the characterization data set by more than a CIELAB colour difference of 3 and uniform coloration of the unprinted area during creation of the validation print is not possible, the characterization data set can be adjusted to simulate the substrate colour using the tristimulus correction technique detailed in ISO 13655. It is recommended that all parties agree to any such change.

Table 1 — Nominal gloss of various substrate types

Substrate type	Nominal gloss[a]
Unit	1
Glossy white (e.g. glossy paper coated paper, grade 1)	> 60
Semi-matte white (e.g. coated paper, grade 3 coated paper, grade 5 super-calendared paper)	20 to 60
Matte white (e.g. uncoated paper, liner board, improved newsprint, newsprint)	< 20
[a] Measurement according to 5.6.	

Where the intended production print substrate is not used to create the validation print, the colour of the simulated substrate, including any uniform coloration of the unprinted area, shall not vary by more than 2,5 CIELAB colour difference units when successively subjected to the following conditions in a dark environment:

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

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

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

In addition, its light-fastness rating as determined according to ISO 12040 shall not be less than 3.

NOTE 3 This is intended to exceed the upper level of exposure for any validation print, and any production print substrate with significant levels of optical brightening agents is likely to fail this test. While validation prints made with the production print substrate are exempt from this test, it is the responsibility of the user to weigh the options of simulating the fluorescence of the validation print substrate, as noted above, to the production substrate against the requirement for colour permanence indicated by this test.

4.2.2 Coloration of printed parts

4.2.2.1 Validation print system within sheet uniformity

The variability of the coloration across the validation print format shall be verified by printing each of the three test forms described in 5.4. Each test form shall be measured at nine locations on each sheet as follows. Divide the printed area into thirds both horizontally and vertically and measure at the centre of each area. All selected locations across the printed test area for each test tint, after the stabilization period, shall have the following:

a) standard deviation less than or equal to 1,5 for CIE L^*, a^* and b^*;

b) maximum CIELAB colour difference of 2 units between the average of the 9 readings and any one reading.

NOTE The requirements specified in a) and b) are not statistically consistent but have been observed to be achievable in a well-controlled digital printing system.

4.2.2.2 Colour simulation requirements for validation prints

The CIELAB colour coordinates of the patches of the ISO 12642-2 target and the validation print control strip defined in 5.2 shall agree with the aim values of the printing condition being simulated as given by the data (see 4.1) within the appropriate tolerances specified in Table 2.

NOTE 1 The colorimetric aim values for all patches are included in, or can be derived from, the colorimetric values of the reference characterization data set.

Table 2 — Tolerances for reproduction of all patches in the validation print described in Clause 5 by comparison to the values of the characterization data of the printing condition being simulated

Unit: 1

Patch in validation print form	Tolerance	
All patches described in 5.2	Maximum: Average:	$\Delta E^*_{ab} \leq 8$ $\Delta E^*_{ab} \leq 3$
Patches described in 5.2 a) (C,M,Y,R,G,B)	Maximum:	$\lvert \Delta H^*_{ab} \rvert \leq 4$[a]
Patches described in 5.2 c)	Average:	$\Delta C_h \leq 2{,}5$[b]
Selected surface gamut patches as listed in Annex B (taken from ISO 12642-2)	Average:	$\Delta E^*_{ab} \leq 4$
All patches described in ISO 12642-2	Average: 95 % percentile:	$\Delta E^*_{ab} \leq 3$ $\Delta E^*_{ab} \leq 6$

[a] Due to the sign character of ΔH, the absolute values are used.

[b] ΔC_h is the CIELAB chromaticness difference between two colours of approximately the same lightness projected onto a constant lightness plane in the CIELAB colour space. This is calculated the same way as ΔE_c, stipulated in ISO 12646.

NOTE 2 These tolerances apply only to conformance of validation printing systems. They can also be used to determine if sites are capable of producing validation prints. They are inappropriate as tolerances for validation prints in daily use at production sites due to the increased production costs required to maintain the equipment in this optimum state. Experience indicates that a factor of approximately 1,5 times these tolerances is a reasonable starting point for setting daily validation print production tolerances modified by individual user requirements.

NOTE 3 ISO/TC 130 has determined that DE2000 tolerances are now preferable to CIELAB tolerances, but exact conversion factors are not available for this edition of this part of ISO 12647.

4.2.3 Short- and long-term repeatability

Three validation prints containing at least the primary and secondary colour solids, and primary colour mid-tones shall be produced. There shall be a 1 h time difference between the production of the first and second print and a one day time difference between the first and third validation print. Recalibration before production of each print is permitted. For each print, measurements shall be made on the first print produced after the vendor-specified warm-up period. The maximum CIELAB colour difference between any two of the three samples of each colour shall not exceed the values shown in Table 3.

Table 3 — Repeatability of primary and secondary colour solids and primary colour mid-tones (CIELAB 1976 colour differences)

Unit: 1

Type	Solids	**Mid-tones** (40 % to 50 %)
Validation print	2,5	3,0

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

4.2.4 Permanence

4.2.4.1 Print stabilization period

A test should be performed and reported to verify that the print colorant has sufficient resistance to a defined mechanical abrasion after any manufacturer's defined stabilization period. One optional test method is specified in Annex A. In any test, the time required for the validation print solids to reach mechanical stability shall not exceed 30 min. This test should be performed for each separate combination of materials, driving software, colorant and printing condition that potentially can change the print stabilization time. If the validation print has been coated, this shall be reported.

4.2.4.2 Fading and light fastness

Fading and light fastness testing shall use the solid tones of the chromatic primaries and their secondaries C,M,Y,R,G,B plus K (7 patches). The measurement condition shall be in accordance with ISO 13655:2009 M0 with white backing, and should be as specified in ISO 13655 M1 with white backing. Colorimetric calculation shall be in accordance with ISO 13655.

The validation print stabilization period shall be specified by the manufacturer. The variability (“fading”) of the primary and secondary colour solids over time, in the dark, shall not exceed 2 CIELAB colour difference units during the first 24 h after the print stabilization period.

The light fastness of the primary and secondary colour solids when tested in accordance with ISO 12040 shall meet a light fastness rating of 3 or greater. This test shall be performed for each separate combination of materials, driving software, colorant, printing condition and coating. The test shall begin immediately following the validation print stabilization period specified by the manufacturer and shall be completed within weeks.

4.2.5 Ink set gloss

The gloss of solid tone colours should be identical to that of the production print to be simulated. The ink set gloss may be specified if deemed necessary; see 5.6 for the method.

NOTE If the gloss of the final validation print is substantially different from the expected production print, a surface-finishing step (e.g. surface laminate) to raise or lower the gloss can improve the situation.

4.2.6 Tone value reproduction limits

Tints intermediate between the (simulated) substrate white and solid shall transfer onto the validation print in a consistent and uniform manner over a tone value range that includes at least the tone reproduction limits of the printing condition being simulated; see the pertinent part of ISO 12647 for this information. If the target characterization data set makes no direct reference to ISO 12647, the tone value reproduction limits shall lie between 2 % and 98 %.

NOTE It is good practice to ensure that no significant image part is reliant on tone values outside of the tone value reproduction limits of the expected production printing process.

4.2.7 Tonality assessment

The single-colour CMYK patches (ramps), between 30 % and 70 %, described in ISO 12642-2 should be measured. The absolute CIE L^* difference between the measured ramps and those of the reference characterization data should be equal to or less than 2.

NOTE The usage of ΔCIE L^* has a better correlation to the perceived tonality than the differences in colorimetrical tone values.

4.2.8 Reproduction of vignettes

Reproductions of the CMYK data in accordance with image S6 of ISO 12640-1:1997 shall show no visible steps within the tone value reproduction limits (see 4.2.6) if viewed under ISO viewing condition P1 in accordance with ISO 3664:2009.

4.2.9 Image resolving power

The resolving power of the validation print shall be such that C, M, K positive, sans-serif type (such as Helvetica or Arial) of 2 point size, reverse (negative) of 8 point size and 2 point reverse line are legibly reproduced; the test object specified in 5.3 shall be used.

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

4.2.10 Margin information

4.2.10.1 Every validation print shall bear a human-readable comment that includes at least the following information:

- conformance level (“validation print according to ISO 12647-8”);
- file name;
- validation printing system designation;
- substrate material type;
- printing condition being simulated;
- time and date of production;
- time and date of last calibration.

4.2.10.2 Every validation print should also include the following:

- colorant types;
- colour management profile(s) used;
- RIP name and version;
- scaling (if applied);
- type of coating;
- dedicated data preparation;
- type of paper/structure simulation, such as noise or patterning (if applied);
- document ID (if a PDF/X document); if a document ID is included, this shall be printed as two hex strings and the last 6 digits of each string should be highlighted in some way in order to assist identification.

This information shall be printed on a sticker and applied to either the front or reverse side of the validation print or shall be printed directly in a margin of the validation print.

4.2.11 Applying conformance requirements

4.2.11.1 Validation prints produced at a validation print site shall conform to the following requirements of this clause:

— validation print substrate colour and gloss, excluding any permanence and light fastness test; see 4.2.1;

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

— tone value reproduction limits; see 4.2.6;

— tonality difference; see 4.2.7;

— reproduction of vignettes; see 4.2.8;

— image resolving power; see 4.2.9;

— margin information; see 4.2.10.

4.2.11.2 Validation print systems shall conform to the following requirements of this clause:

— validation print substrate colour and gloss; see 4.2.1;

— coloration of printed parts; see 4.2.2;

— repeatability; see 4.2.3;

— permanence; see 4.2.4;

— tone value reproduction limits; see 4.2.6;

— tonality difference; see 4.2.7;

— reproduction of vignettes; see 4.2.8;

— image resolving power; see 4.2.9.

5 Test methods

5.1 System validation

The system being tested shall first digitally print a test form minimally consisting of the control strip described in 5.2 and all the patches in accordance with ISO 12642-2. Printing shall be targeted at a specific printing condition with a known characterization data set (see 4.1).

5.2 Validation print control strip

The control elements of the CMYK control strip, as identified in the list below, shall be included while keeping the total number of patches within reasonable limits. To provide compatibility with characterization data, as many control patches as possible should be selected from ink value combinations of ISO 12642-2. The control patch types being used are a selection of critical tertiary colours, such as flesh tones, brown, aubergine, violet (e.g. 15 patches).

A CMYK digital control strip shall be printed on every validation print. That control strip shall consist of at least the following patches:

a) solid tones of the chromatic primaries, their secondaries and black C,M,Y,R,G,B,K (7 patches);

b) mid-tones of the chromatic primaries and black C,M,Y,K;

c) a minimum 5-step near-neutral tone scale composed of the primaries C, M, Y which is approximately equally spaced in CIE L^* from substrate (or simulated substrate) to the 3-colour minimum L^* and shall have a chroma less than 2;

d) tone step scale, composed of the primary colour K (of the target printing condition) such that the L^* approximately matches the steps of the previously defined 3-color scale;

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

NOTE 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 print to the next.

5.3 Additional test objects

The following test objects are suggested for diagnostic testing.

a) For the visual determination of resolving power of the validation print process, the resolution charts S2 and S3 in accordance with ISO 12640-1:1997 can be used.

b) For checks of vignettes of the primary and secondary process colours C, M, Y, K, R, G, B, and C+M+Y, vignette targets such as the test image S6 described in ISO 12640-1:1997 can be used.

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

5.4 Uniformity measurement

For checks on uniformity, create three forms, each with an even tint area that fills the printable width (minimum format of A3) of the printer, using the following tone value combinations from the selected characterization data set:

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 %.

5.5 Colour measurement

Colour measurements shall be made using a spectrocolorimeter that is in accordance with ISO 13655 and standardized correctly to its factory settings, and that takes accurate and repeatable measurements within the specified tolerances. The CIELAB colour co-ordinates L^*, a^*, b^* shall be calculated as detailed in 5.3 of ISO 13655:2009. The ISO 13655 measurement condition and backing should be selected based on correspondence with the measurement condition used in the characterization of the intended printing condition. Where the intended printing condition requirements are not known or measurements are being made of the substrate alone, measurement conditions shall be in accordance with ISO 13655 for M0 and white backing, and should be as specified in ISO 13655 for M1 and white backing. The CIELAB colour differences shall be calculated in accordance with ISO 13655:2009, 5.3.

All colour measurements and computed colour differences shall be reported, accompanied by an associated total uncertainty (using the coverage factor $k = 1$). The evaluation method should be performed as outlined in ISO 15790. It should include an estimate of the inter-instrument agreement between two different measurement instruments, both believed to be conforming to ISO 13655. The value may also be extracted from the manufacturer's specification, a certificate of calibration from the manufacturer. The inter-instrument agreement uncertainty should be added in quadrature to the uncertainty determined by experimental readings, as outlined in ISO 15790. If not defined otherwise, this criterion can be considered as having been fulfilled when the tolerance limit(s) occupy no more than 50 % of the covered uncertainty. All colour measurements shall be rounded with the same precision as the defined tolerance value.

NOTE A colour difference of $\Delta E = 5{,}4$ is rounded to 5 if the tolerance is defined as $\Delta E \leq 5$ where the same colour difference is not in conformance when the tolerance is stipulated as $\Delta E \leq 5{,}0$.

5.6 Measurement of gloss

Measure the gloss of the unprinted substrate and the 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 is in accordance with ISO 8254-1. Report values, expressed in percent, quoting “ISO 8254-1 TAPPI gloss” as the method.

NOTE Other angles can be used for additional assessment. For example, ASTM D7163 allows only the three primary angles, 20°, 60°, and 85°, found in common multi-angle gloss meters.

Annex A
(informative)

Determination of print durability after stabilization

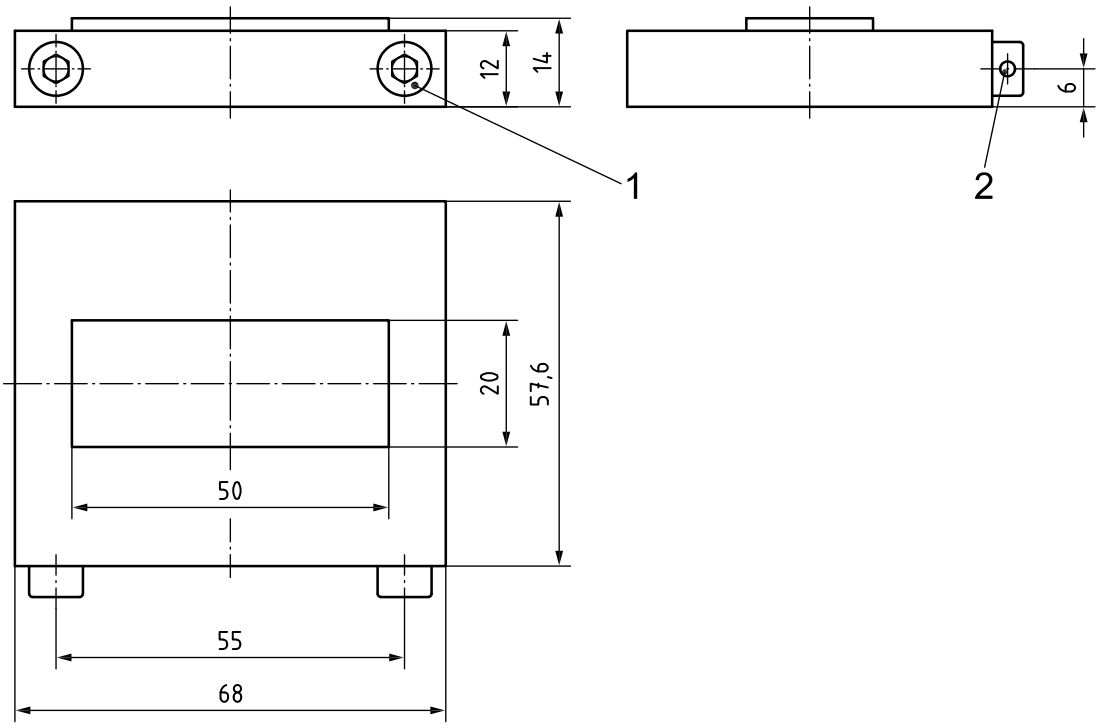
A.1 Apparatus

A.1.1 Slab

For the procedure, a stainless steel slab is used, having dimensions in accordance with Figure A.1, with a mass of approximately 400 g, a protruding wipe area of 10 cm^2 and, hence, a ratio of force 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 Figure A.1, key item 1.

NOTE This procedure is modelled after DIN 53131-2, method A.

Dimensions in millimetres



Key

1 screw M5

2 hole, Ø 2 to 3, for fastening of the pull string

Figure A.1 — Slab

A.1.2 Rubber mat

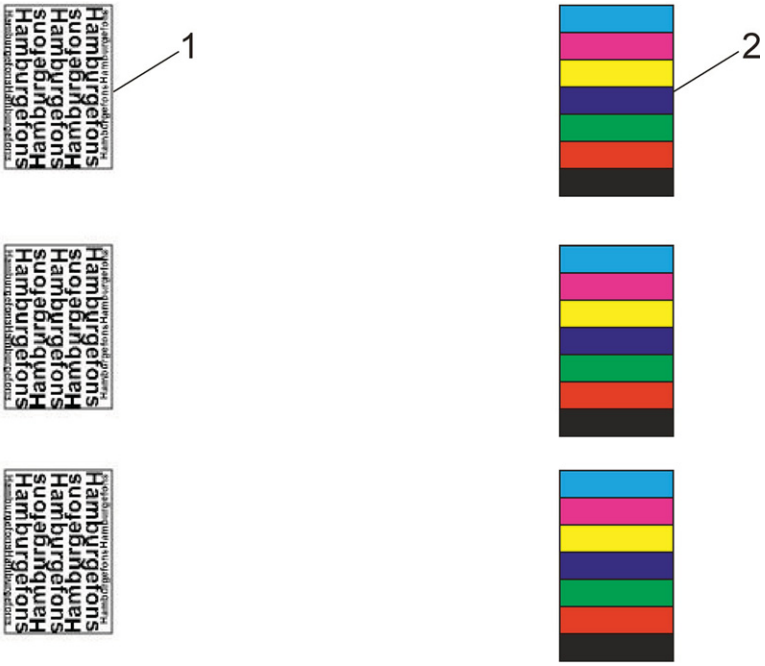
Rubber mat with the following properties: thickness, 2 mm; length, 340 mm; width, 250 mm; Shore-A hardness, 65 A; and a smooth matte surface.

A.2 Printing system

The results of this test pertain only to the particular combination of printing system, hardware, firmware, driver setting and software, and the particular validation print substrate and colorant material used.

A.3 Printed test area

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



Key

1 text sample area

2 colour sample area

Figure A.2 — Example layout for printed test objects

A.4 Mechanical stabilization period test

A.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.

A.4.2 Preparation of the slab

Fasten a piece of unprinted 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 paper facing away from the slab so that this surface comes in contact with the printed test area.

A.4.3 Test

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

Place the prepared slab on the validation print behind a rectangular printed object, with the protruding part facing the validation 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, keep the string parallel to the table surface. Inspect the substrate attached to the bottom of the slab. If it is marked by transferred colorant, replace it with a fresh piece of validation print substrate. Repeat the rubbing pulls for the remaining five test areas.

A.4.4 Evaluation

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

A.4.5 Mechanical stabilization period of colorant

Determine the colorant mechanical stabilization period as follows: Make a series of tests in accordance with A.4.3, starting immediately after the validation print fully emerges from the print system. Repeat at least three times, at evenly spaced intervals of approximately 10 min. The time elapsed after printing until the point when no visual traces of the rubbing action can be seen is the colorant mechanical stabilization period.

A.5 Test report

Report the following details:

a) a reference to this part of ISO 12647;

b) the validation print substrate (vendor, type, article number);

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

d) any coating that has been applied;

e) the validation printer (vendor, type, article number);

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

g) the application programme (vendor, type, version);

h) the raster image processor (type and version);

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

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

k) the test results;

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

Annex B
(normative)

Surface gamut patches

Table B.1 contains a selected subset of the surface gamut patches of the data set of ink value combinations defined in both ISO 12642-1 and ISO 12642-2. The column in Table B.1 labelled “A” contains the ISO 12642-2 ink value combination ID number, the column labelled “B” is the ID number of ISO 12642-1. The columns labelled “C”, “M”, “Y”, and “K” are the cyan, magenta, yellow and black ink values, respectively.

Table B.1 — 226 surface gamut patches

Index	A	B	C	M	Y	K
1	1	26	0	0	0	0
2	2	50	0	10	0	0
3	3	48	0	20	0	0
4	4	46	0	30	0	0
5	5	45	0	40	0	0
6	7	42	0	70	0	0
7	9	2	0	100	0	0
8	10	37	10	0	0	0
9	11	190	10	10	0	0
10	12	191	10	20	0	0
11	14	192	10	40	0	0
12	16	193	10	70	0	0
13	18	194	10	100	0	0
14	19	35	20	0	0	0
15	20	196	20	10	0	0
16	21	15	20	20	0	0
17	23	198	20	40	0	0
18	25	199	20	70	0	0
19	27	200	20	100	0	0
20	28	33	30	0	0	0
21	37	32	40	0	0	0
22	38	202	40	10	0	0
23	39	203	40	20	0	0
24	41	11	40	40	0	0
25	43	205	40	70	0	0
26	45	79	40	100	0	0
27	55	29	70	0	0	0
28	56	208	70	10	0	0
29	57	209	70	20	0	0
30	59	210	70	40	0	0
31	61	8	70	70	0	0
32	63	212	70	100	0	0
33	73	1	100	0	0	0
34	74	214	100	10	0	0
35	75	215	100	20	0	0
36	77	90	100	40	0	0
37	79	217	100	70	0	0
38	81	4	100	100	0	0
39	82	63	0	0	10	0
40	83	220	0	10	10	0
41	84	221	0	20	10	0
42	86	222	0	40	10	0
43	88	223	0	70	10	0
44	90	224	0	100	10	0
45	91	225	10	0	10	0
46	100	231	20	0	10	0
47	118	237	40	0	10	0
48	136	243	70	0	10	0
49	154	249	100	0	10	0
50	163	61	0	0	20	0
51	164	256	0	10	20	0
52	165	17	0	20	20	0
53	167	258	0	40	20	0
54	169	259	0	70	20	0
55	171	260	0	100	20	0
56	172	261	10	0	20	0
57	181	16	20	0	20	0
58	199	273	40	0	20	0
59	217	279	70	0	20	0
60	235	285	100	0	20	0
61	244	59	0	0	30	0
62	325	58	0	0	40	0
63	326	292	0	10	40	0
64	327	293	0	20	40	0
65	329	12	0	40	40	0
66	331	295	0	70	40	0
67	333	81	0	100	40	0
68	334	297	10	0	40	0
69	343	303	20	0	40	0
70	361	14	40	0	40	0
71	379	315	70	0	40	0
72	397	88	100	0	40	0
73	487	55	0	0	70	0
74	488	328	0	10	70	0
75	489	329	0	20	70	0
76	491	330	0	40	70	0
77	493	10	0	70	70	0
78	495	332	0	100	70	0
79	496	333	10	0	70	0
80	505	339	20	0	70	0
81	523	345	40	0	70	0
82	541	9	70	0	70	0
83	559	357	100	0	70	0
84	649	3	0	0	100	0
85	650	364	0	10	100	0
86	651	365	0	20	100	0
87	653	83	0	40	100	0
88	655	367	0	70	100	0
89	657	6	0	100	100	0
90	658	369	10	0	100	0
91	667	375	20	0	100	0
92	685	86	40	0	100	0
93	703	387	70	0	100	0
94	721	5	100	0	100	0
95	735	160	0	100	0	20
96	741	410	10	100	0	20
97	747	416	20	100	0	20
98	753	422	40	100	0	20
99	759	428	70	100	0	20

Index	A	B	C	M	Y	K
100	760	159	100	0	0	20
101	761	430	100	10	0	20
102	762	431	100	20	0	20
103	763	432	100	40	0	20
104	764	433	100	70	0	20
105	765	162	100	100	0	20
106	771	440	0	100	10	20
107	796	465	100	0	10	20
108	807	476	0	100	20	20
109	832	501	100	0	20	20
110	843	512	0	100	40	20
111	868	537	100	0	40	20
112	879	548	0	100	70	20
113	904	573	100	0	70	20
114	910	161	0	0	100	20
115	911	580	0	10	100	20
116	912	581	0	20	100	20
117	913	582	0	40	100	20
118	914	583	0	70	100	20
119	915	164	0	100	100	20
120	916	585	10	0	100	20
121	922	591	20	0	100	20
122	928	597	40	0	100	20
123	934	603	70	0	100	20
124	940	163	100	0	100	20
125	950	619	0	100	0	40
126	955	624	20	100	0	40
127	960	629	40	100	0	40
128	965	634	70	100	0	40
129	966	635	100	0	0	40
130	967	636	100	20	0	40
131	968	637	100	40	0	40
132	969	638	100	70	0	40
133	970	168	100	100	0	40
134	975	644	0	100	20	40
135	991	660	100	0	20	40
136	1 000	669	0	100	40	40
137	1 016	685	100	0	40	40
138	1 025	694	0	100	70	40
139	1 041	710	100	0	70	40
140	1 046	715	0	0	100	40
141	1 047	716	0	20	100	40
142	1 048	717	0	40	100	40

Index	A	B	C	M	Y	K
143	1 049	718	0	70	100	40
144	1 050	170	0	100	100	40
145	1 051	720	20	0	100	40
146	1 056	725	40	0	100	40
147	1 061	730	70	0	100	40
148	1 066	169	100	0	100	40
149	1 075	744	0	100	0	60
150	1 080	749	20	100	0	60
151	1 085	754	40	100	0	60
152	1 090	759	70	100	0	60
153	1 091	760	100	0	0	60
154	1 092	761	100	20	0	60
155	1 093	762	100	40	0	60
156	1 094	763	100	70	0	60
157	1 095	764	100	100	0	60
158	1 100	769	0	100	20	60
159	1 116	785	100	0	20	60
160	1 125	794	0	100	40	60
161	1 141	810	100	0	40	60
162	1 150	819	0	100	70	60
163	1 166	835	100	0	70	60
164	1 171	840	0	0	100	60
165	1 172	841	0	20	100	60
166	1 173	842	0	40	100	60
167	1 174	843	0	70	100	60
168	1 175	844	0	100	100	60
169	1 176	845	20	0	100	60
170	1 181	850	40	0	100	60
171	1 186	855	70	0	100	60
172	1 191	860	100	0	100	60
173	1 199	868	0	100	0	80
174	1 203	872	40	100	0	80
175	1 207	876	70	100	0	80
176	1 208	877	100	0	0	80
177	1 209	878	100	40	0	80
178	1 210	879	100	70	0	80
179	1 211	880	100	100	0	80
180	1 215	884	0	100	40	80
181	1 224	893	100	0	40	80
182	1 231	900	0	100	70	80
183	1 240	909	100	0	70	80
184	1 244	913	0	0	100	80
185	1 245	914	0	40	100	80

Index	A	B	C	M	Y	K
186	1 246	915	0	70	100	80
187	1 247	916	0	100	100	80
188	1 248	917	40	0	100	80
189	1 252	921	70	0	100	80
190	1 256	925	100	0	100	80
191	1 262	19	0	100	0	100
192	1 266	18	100	0	0	100
193	1 268	21	100	100	0	100
194	1 278	20	0	0	100	100
195	1 280	23	0	100	100	100
196	1 284	22	100	0	100	100
197	1 290	27	90	0	0	0
198	1 292	28	80	0	0	0
199	1 295	30	60	0	0	0
200	1 296	31	50	0	0	0
201	1 299	34	25	0	0	0
202	1 301	36	15	0	0	0
203	1 303	38	7	0	0	0
204	1 305	39	3	0	0	0
205	1 310	40	0	90	0	0
206	1 312	41	0	80	0	0
207	1 315	43	0	60	0	0
208	1 316	44	0	50	0	0
209	1 319	47	0	25	0	0
210	1 321	49	0	15	0	0
211	1 323	51	0	7	0	0
212	1 325	52	0	3	0	0
213	1 330	53	0	0	90	0
214	1 332	54	0	0	80	0
215	1 335	56	0	0	60	0
216	1 336	57	0	0	50	0
217	1 339	60	0	0	25	0
218	1 341	62	0	0	15	0
219	1 343	64	0	0	7	0
220	1 345	65	0	0	3	0
221	1 405	174	100	0	0	70
222	1 406	175	0	100	0	70
223	1 407	176	0	0	100	70
224	1 408	177	100	100	0	70
225	1 409	178	100	0	100	70
226	1 410	179	0	100	100	70

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