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

Part 5:  
**Screen printing**

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

*Partie 5: Sérigraphie*

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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 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

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

This second edition cancels and replaces the first edition (ISO 12647-5:2001), which has been technically revised.

ISO 12647 consists of the following parts, under the general title *Graphic technology — Process control for the manufacture 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

Historically, this International Standard established the process control parameters and their aim values and tolerances for the most important professional printing processes of the graphic arts industry. The initial concept was that the groundwork for the series was laid down in ISO 12647-1. This part of the ISO 12647- series differs from that concept because screen printing has changed significantly since this International Standard was initially conceived.

This edition of this part of ISO 12647 differs from the earlier edition by not defining specific printing condition aims but instead requiring that a specific reference printing condition (characterization data set) be specified. This part of ISO 12647 requires that the colour of the printed product match a characterization data set or a printing condition agreed upon by the provider and the receiver and specifies minimum requirements and tolerances to be communicated and produced. Where specific physical parameters can impact the final result (screen angles, resolution, screen mesh, etc.), specifications and tolerances are provided for these parameters.

Because material produced by screen printing varies widely in both size and nominal viewing distance, a viewing distance metric is introduced as part of all screening and resolution requirements.

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

## Part 5: Screen printing

### 1 Scope

This part of ISO 12647 specifies the requirements for the screen printing of four-colour process-colour material used for display, signage, and graphics using flat bed or cylinder printing equipment. Both the size and resolution of the finished product are unrestricted. The process stages included are

- data preparation and delivery,
- proof production,
- printing forme preparation, and
- production printing.

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### 2 Normative references (standards.iteh.ai)

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

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 12647-7, *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*

ISO 12647-8, *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*

ISO 13655:2009, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

ISO 15930-1, *Graphic technology — Prepress digital data exchange — Use of PDF — Part 1: Complete exchange using CMYK data (PDF/X-1 and PDF/X-1a)*

### 3 Terms and definitions

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

## 4 Requirements

### 4.1 Data requirements for screen printing systems

#### 4.1.1 Data delivery

Screen print systems shall accept digital data delivered as PDF/X data files as defined in ISO 15930-1 or TIFF/IT files as defined in ISO 12639.

The intended printing condition shall be either

- 1) a published Characterized Reference Printing Condition (CRPC) as listed in the ICC registry at [www.color.org](http://www.color.org), or
- 2) a custom data set where none of the available reference colour characterization data sets are considered appropriate for the intended printing because of the inks, paper, or other factors.

Where the characterization data to be used have a substrate colour (CIELAB values) that does not match the substrate to be used, the data should be adjusted using the tristimulus correction method defined in [Annex B](#).

Prior agreement as to the characterization data and substrate adjustment to be used shall be obtained between all parties involved before copy preparation work is started.

Characterization data sets are the only method recognized by this part of ISO 12647 for the proper identification of the printing condition to be used. Film and/or directly exposed screens shall be generated from digital data and legacy film should be assumed to have been prepared to some agreed upon reference characterization.

#### 4.1.2 Data resolution

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Input data should be provided at a data spacing of twice the screen ruling to be used as determined by the scaling criteria, e.g.: 140 cm<sup>-1</sup> pixels for a 70 cm<sup>-1</sup> screen ruling.

### 4.2 Printing forme requirements

#### 4.2.1 Resolution

Printed material produced by screen printing varies widely in both size and nominal viewing distance. For screen printing the reference acceptable image quality criteria shall be based on a 70 cm<sup>-1</sup> screen ruling viewed at a distance of 42 cm (175 lpi at 16,5 inches). This relationship of distance and screen ruling defines when rosettes are no longer visible to a viewer with 20/20 vision (dot fusion).

This relationship should be scaled for other viewing distances or other screen rulings. For the same viewing quality at different distances, maintain the relationship of resolution to distance.

NOTE For a convenient approximation, divide either the desired distance in meters or the desired resolution in dots per centimetre into 30 to compute the other for that specific pair. This is sometimes referred to as the rule of 30.

The target resolution shall be based on an agreement between the printer and their customer. It should be in accordance with the following three criteria:

- 1) a minimum screen ruling with dots large enough to reproduce a tonal range from 1 % to 98 % using the mesh as configured, the imaging technique, the emulsion and the ink;
- 2) a minimum printed dot size that is not less than 1,5x the width of the thread diameter of the mesh;
- 3) a maximum screen ruling as recommended by the “rule of 30” for the intended viewing condition.



## 4.2.2 Stencil production

The silver, thermal, or inkjet film used for imaging screens shall have sufficient UV density ( $>4,0$ ) in printing areas and sufficient UV transparency ( $<0,1$ ) in the non-printing areas to produce all dots required in 4.2.1. Direct to screen and computer to screen systems (CTS) shall have sufficient resolution to be able to produce all dots required in 4.2.1.

NOTE Computer to screen systems (CTS) directly image the stencil and direct to screen systems (DTS) apply an image which is used to create the stencil.

## 4.2.3 Printing forme orientation

### 4.2.3.1 Printing forme preparation

The angle of the screen mesh attached to the screen frame shall be at  $0^\circ$  and  $90^\circ \pm 1^\circ$  with respect to the frame. The angles of the image shall also be  $0^\circ$  and  $90^\circ \pm 1^\circ$  with respect to the frame.

### 4.2.3.2 Screen angles

For half-tone dots without a principal axis, the nominal difference between the screen angles for cyan, magenta, and black shall be  $30^\circ$ , with the screen angle of yellow separated at  $15^\circ$  from another colour.

For half-tone dots with a principal axis, the nominal difference between screen angles for cyan, magenta, and black shall be  $60^\circ$ , with the screen angle of yellow separated by  $15^\circ$  from another colour.

In all cases, no colour should align within  $7,5^\circ$  of the mesh (frame). If flesh tones are present, the yellow should not be referenced to magenta.

NOTE 1 This is to prevent moiré in flesh tones and to ensure that no row of dots lines up with the mesh, which would destabilize the small dot structure. It is poor practice to use and rotate offset films to produce the forme.

NOTE 2 It is common practice to use frequency modulated screening for the yellow separation with approximately the same size as the dots in the 10 % area of the conventional separations and a different tonal compensation curve.

## 4.2.4 Image size tolerance

For film based systems, the set of supplied films under common environmental equilibrium shall not differ by more than 0,02 % in the lengths of their diagonals.

## 4.3 Print production requirements

### 4.3.1 Visual characteristics of image components

#### 4.3.1.1 Visual appearance of the supplied proof

Supplied proofs shall be prepared in accordance with either ISO 12647-7 or ISO 12647-8 except where indicated below and shall use the same characterization data set chosen for production. The tristimulus correction factor shall be used to adjust for the substrate colour when the production stock is not available. Proofs shall have the proper colour but may have a different size than the intended product. Proof resolution may be finer than the intended product. In this case the rule of 30 shall be followed within the constraints of the proofing equipment assuming the proof to be viewed at 42 cm.

#### 4.3.1.2 Print substrate colour

For the best colour reproduction, the print substrate colour should be restricted as shown in Table 1. All colour measurement shall be made in accordance with ISO 13655:2009, white backing, M1.

NOTE Surface finish, if applied, can severely affect the substrate colour.