BS ISO 12642-1:2011

BSI Standards Publication

Graphic technology — Input data for characterization of four-colour process printing

Part 1: Initial data set

bsi.

...making excellence a habit.™

Document Sharing Hub

Full document details: BS ISO 12642-1:2011

National foreword

This British Standard is the UK implementation of ISO 12642-1:2011. It supersedes BS ISO 12642:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PAI/43, Graphic technology.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© BSI 2011

ISBN 978 0 580 73109 9

ICS 35.240.30; 37.100.99

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 July 2011.

Amendments issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: BS ISO 12642-1:2011

INTERNATIONAL STANDARD

ISO 12642-1

Second edition
2011-07-15

Graphic technology — Input data for characterization of four-colour process printing —

Part 1: Initial data set

Technologie graphique — Données d'entrée pour caractérisation d'impression en quadrichromie —

Partie 1: Ensemble de données initiales

Reference number
ISO 12642-1:2011(E)

Documents
Document Sharing Hub

© ISO 2011

Full document details: BS ISO 12642-1:2011

COPYRIGHT PROTECTED DOCUMENT

© ISO 2011

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

© ISO 2011 – All rights reserved

Documents
Document Sharing Hub

Full document details: BS ISO 12642-1:2011

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Requirements **2**
Annex A (informative) **Application notes** **9**
Bibliography **13**

© ISO 2011 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO 12642-1:2011

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 12642-1 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

This second edition cancels and replaces the first edition (ISO 12642-1:1996) and its Technical Corrigendum (ISO 12642-1:1996/Cor.1:2005) and introduces no change in the technical requirements. Subclause 4.4 and Annex B have been replaced by references to ISO 28178 which has been created to include the data exchange file format for this and other International Standards.

ISO 12642 consists of the following parts, under the general title *Graphic technology — Input data for characterization of four-colour process printing*:

— *Part 1: Initial data set*

— *Part 2: Expanded data set*

© ISO 2011 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO 12642-1:2011

Introduction

0.1 General background

The technical content of this part of ISO 12642 is identical to ANSI IT8.7/3-1993. The ANSI document resulted from the joint efforts of an international industry group that included participants representing a broad range of prepress vendors, film manufacturers, and users. This group, initially identified as the DDES (Digital Data Exchange Standards) Committee, later became the founders of the ANSI IT8 (Image Technology) accredited standards committee which is responsible for electronic data exchange standards in graphic arts prepress.

In an environment in which colour information is passed between electronic publishing systems, it is essential for colour to be defined in an unambiguous manner. Substantial experimental evidence enables us to conclude that, for foveal vision, this can be achieved by specifying the mixture of three linearly independent stimuli required to match that colour. In 1931 a complete system of colour definition was developed by the CIE (Commission Internationale de l'Eclairage) based on experimental evidence published during the previous decade. This evidence confirmed the similarity between observers in making such a match. That system and its derivatives are now universally accepted for colour specification.

Many half-tone colour printing processes, however, require more than three colourants. There are two reasons for this. Generally the gamut of colours achievable with three printing inks is rather limited, and printing additional inks can extend the gamut significantly. Furthermore, the provision of extra inks can reduce the magnitude of the visual change caused by the variability in colour and register which arises in print production. By far the most common additional ink used is black, and four-colour process printing is accepted as the norm for most forms of printing.

The addition of an extra ink means that the production of a colour cannot, in general, be defined uniquely. As a result, different parts of a printed sheet can use varying ink combinations to achieve the same colour. For many practical purposes it is desirable to specify this combination directly, rather than encode it by rules, and this leads to the requirement to transfer data in a four-colour, device-specific mode. If the same data are to be used for other applications, or even if it needs to be modified for a different set of printing characteristics, some additional information is necessary to enable the receiver of the data to interpret it. This part of ISO 12642 has been developed to achieve this objective. It provides a data set which can be transmitted with an image to enable the receiver, if required, either to transform the data into a device-independent state or correct it for a different printing characteristic. An alternative application of the tools provided by this part of ISO 12642 is to enable the characterization of output systems; in this context, work has been undertaken by the committee to generate data for the major types of half-tone printing processes which have been specified internationally. This procedure is described in the application notes (Annex A) and the data will be published in future annexes.

The body of this part of ISO 12642 defines the ink values to be used for characterizing any four-colour (cyan, magenta, yellow, and black) half-tone printing process (including gravure). These ink values are defined as either digital data in a computer or half-tone tone values on film. This requires that particular care be taken in the preparation of film to ensure that the output device is properly “linearized” and the half-tone film values match the numerical data in the computer file. For some applications the film values used for linearization can be one or more generations removed from the film produced by the film writer. The measurement procedures and the data format to be used in determining and reporting tristimulus values (X,Y,Z) are also included.

While the technique employed in this part of ISO 12642 applies to all output processes, the data have been optimized for four-colour half-tone printing. For non-half-tone processes, or those which use colourants that are significantly different from typical printing inks, it is advisable that the reference data file be determined in such a way that it provides reasonably uniform colour differences when the data file is rendered. For a system which does not meet the criterion, the user-optional data set can be utilized. Suggestions for this are made in the application notes; however, they are not part of this part of ISO 12642.

Documents
Document Sharing Hub

© ISO 2011 – All rights reserved

Full document details: BS ISO 12642-1:2011

Note that this part of ISO 12642 does not define the physical layout of the patches or their size. This is because any such decision depends on the printing device to be used, and the area required for colour measurement. It is anticipated that a specific layout will be produced to suit the needs of the user. However, in order to realize the colours necessary for the measurements of specific printing processes to be included as future annexes, it was necessary to produce a specific layout. This layout, composed of four groups of patches, has been adopted by both ANSI/CGATS and ISO/TC 130. Within TC 130 the digital data in the appropriate format are contained in images S7 to S10 of the Standard Colour Image Data (SCID), ISO 12640-1:1997. For the guidance of others, this layout is shown in Figure A.1.

0.2 Technical background

0.2.1 Printing characteristics

Various efforts have been made over the past 20 years to reduce the variation which occurs between printing presses. Initially, standards such as ISO 2846 were developed to specify the colour of printing inks. Subsequently, as a result of the lead of FOGRA/BVD in Germany, significant effort has been made in developing specifications which define constraints for the ink transfer onto paper. This is achieved by specifying either the reflection density or the tristimulus values of a uniform (solid) printed ink film, and by specifying tolerances on the optical density (i.e. dot value) of various half-tone dot values. Within the international printing community such specifications are widely recognized and have become, in many cases, de facto printing standards. For magazine and periodical printing, SWOP (in the USA) and FIPP (in Europe) are widely recognized standards. For commercial printing, the specifications of FOGRA and PIRA are widely known in Europe. Specifications are also evolving for newspaper and heat-set web production. Future annexes to this part of ISO 12642 might contain the colorimetric tristimulus values corresponding to these percent dot values when printed in accordance with a number of such printing specifications. Such data can be used as the basis for the conversion between ink values and tristimulus values.

Note that any characterization of the process takes account of all steps involved in print production. Thus it includes production of the separations, any contacting operations that might be required and platemaking. All of the printing specifications as referred to above include recommendations for maintaining consistency of such operations to ensure that validity of a characterization is maintained.

For characterizing printing conditions which differ from the published specifications, two options exist. Either the large palette of colours can be printed and measured, or the process can be modelled analytically. The analytical modelling approach has the advantage of requiring far fewer colour measurements; the disadvantages lie in the accuracy of prediction. For many applications, a satisfactory compromise is achieved by using modelling for the modification of published data. This is discussed in more detail in the application notes.

0.2.2 Choice of colour palette

It is generally agreed that measurement of a reasonably large number of colours is preferred for accurate characterization of any printing process. It is not possible to be precise about how many colours are required; the number will depend on many factors including the accuracy of colour rendition required, the uniformity of spacing of the samples in terms of colour, the type of modelling process used, and any nonlinear characteristics of a specific printing process. However, practical experience suggests that measuring all combinations of six levels each for cyan, magenta, yellow, and black, preferably weighted towards lower half-tone dot values, will frequently prove adequate. Generally, for higher levels of black, the number of samples can be considerably reduced, since the colour difference between samples is very small. With the addition of single colour scales which contain extra values to assist in defining local nonlinearity, the accuracy obtained for most printing processes is adequate.

A reduced-size data set can be used if:

— a less accurate characterization is adequate;

— the process can be modelled accurately by one of the well-known models listed in the application notes;

— the aim of the measurement is to seek small corrections to an already accurate characterization.

© ISO 2011 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO 12642-1:2011