INTERNATIONAL STANDARD

ISO 29861

First edition
2009-11-15

Document management applications — Quality control for scanning office documents in colour

Applications de gestion de document — Contrôle de la qualité pour le balayage de documents de bureau en couleurs

Reference number
ISO 29861:2009(E)

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Published in Switzerland

Foreword

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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 29861 was prepared by Technical Committee ISO/TC 171, *Document management applications*, Subcommittee SC 1, *Quality*.

Introduction

This International Standard is to be used in conjunction with ISO 12653 and describes procedures for the evaluation of output quality of a colour scanning system for office documents. ISO 12653-2 describes procedures for evaluating the output quality of a black-and-white scanning system for office documents, using the test target specified in ISO 12653-1.

Factors which affect the quality achieved by a document scanning system are:

a) physical scanning irregularities;

b) uniformity of exposure;

c) chromatic sensitivity of the photosensing unit;

d) contrast;

e) threshold setting;

f) reproduction of half-tones;

g) resolution;

h) scale.

The methods given in this International Standard

- can be used to
  - set up the system initially to yield satisfactory images,
  - check for consistent quality,
  - check that equivalent performance is being obtained from another system; and
- are intended to
  - enable the operator to check that the scanner is correctly set up,
  - inform the operator of the capabilities and limits of the scanner,
  - enable the user to monitor image quality over a period of time,
  - enable the user to draw up quality assessment procedures.

If the whole system is checked, from input to output, the results obtained can vary depending on the different items of equipment used. For example, one visual display unit screen might be poorly set up, giving worse quality than a well set up screen. It is thus important to establish the parts of the system on which to perform the tests. If tests are required for other parts of the system, then it might be necessary to repeat the tests as appropriate.

The regular use of the methods in this International Standard can ensure a given level of quality to be maintained.

Many systems include test procedures in their software. These tests can be performed in conjunction with the test methods defined in this International Standard.

This International Standard uses the test chart, Test Chart No.2 (CMYK), defined in ISO/IEC 15775:1999/Amd.1:2005, N4-1, as the test document.

Document management applications — Quality control for scanning office documents in colour

1 Scope

This International Standard specifies test methods for evaluating the consistency of the colour output quality over time from the colour reflection scanning of office documents.

It is applicable to assessing the output quality of colour scanners used in the office. It is particularly applicable where office documents containing half-tone and/or continuous tone colour areas are being scanned.

The test methods do not require specialist equipment that is not normally available in the office for the evaluation of the results. The test methods are based on the visual examination of the output of an office document scanner in comparison to the original test target.

It is not applicable to black-and-white only scanners or scanners used for the scanning of transparent or translucent documents.

This International Standard is to be used in conjunction with ISO 12653, which specifies a test method for the evaluation of the quality of output from black-and-white office document scanners.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 12651, *Electronic imaging — Vocabulary*

ISO 12653-1, *Electronic imaging — Test target for the black-and-white scanning of office documents — Part 1: Characteristics*

ISO 12653-2, *Electronic imaging — Test target for the black-and-white scanning of office documents — Part 2: Method of use*

ISO/IEC 15775:1999/Amd.1:2005, *Information technology — Office machines — Method of specifying image reproduction of colour copying machines by analog test charts — Realisation and application — Amendment 1*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 12651 apply.

4 Preparation

4.1 Initial system set-up

Tests shall be run under typical office operational conditions. Any required warm-up period shall be allowed before these tests are carried out.

Where possible, the manufacturer's instructions with regards to initial cleanup of the equipment and calibration routines should be followed, using the manufacturer's target, before these tests are carried out.

A number of PC software manufacturers provide systems which enable the calibration of colour images created from colour scanning systems. Where such software is available, their results may be used to supplement the visual results detailed in Clause 6.

4.2 Black-and-white scanning

Tests specified in ISO 12653-1 and ISO 12653-2 which are applicable to the requirements for the quality control of black-and-white scanning shall be completed prior to the initiation of tests specified in this International Standard.

4.3 Use of image enhancement and compression

The quality of output of a scanning system can be modified by the use of image enhancement and compression techniques. If these techniques are to be used during any of the tests carried out in accordance with this International Standard, the system shall be operating under typical office conditions, with scanner settings as used for typical office documents.

NOTE It could be an advantage during the initial testing to establish the best settings for these controls. Software changes can introduce different enhancement or compression techniques. New initial tests might be needed for validation after such changes.

4.4 Test chart

4.4.1 General

Test Chart No.2 (CMYK), defined in ISO/IEC 15775:1999/Amd.1:2005, N4-1, shall be used as the test document for the methods given in this International Standard.

4.4.2 Scanning

When a test chart is scanned, it shall be positioned correctly in the scanner. If the scanner incorrectly moves the chart, the resultant image shall be rejected if any major quality problems are evident. For example, if the chart alignment is substantially incorrect due to a problem with the paper path, the chart shall be re-scanned.

4.5 Internal test systems

Many systems include test procedures in their software. These tests may be performed in conjunction with the test methods defined in this International Standard.

4.6 Scanning software

Often, settings within the scanning software will affect the colour reproduction obtained by the system, therefore the settings to be used when scanning the test chart shall, for comparative purposes, be agreed and documented.

The scanning software shall be configured in colour mode. Where there are more than one colour mode options, separate tests shall be carried out at each mode normally used in practice.

4.7 Frequency

The frequency of testing of a system should be set by the user, taking advice from the system supplier. A system should be tested prior to the scanning of a batch of documents and, where necessary, at the end of the batch.

The tests shall also be performed after any maintenance operation or when any system component is changed.

4.8 Colour reproduction

Prior to carrying out this test for the first time, the impact of any inaccuracies of colour reproduction in relation to the business applications running on the scanning system shall be assessed.

Where accurate colour reproduction is necessary for an effective business application, the tolerance allowable on colour reproduction should be minimal.

For non-critical applications, a wider tolerance may be applied.

5 Quantitative testing

The following procedures shall be included in the quantitative test methods, in conjunction with the methods recommended by the PC software manufacturer.

— Compare image files side by side on the same PC screen at a given point in time.

— Where image compression is used, take care that compression does not significantly affect the quality of test images. Where practical, test image files should be saved in non-compressed format or as highest quality JPEG images.

— The frequency of testing shall be chosen taking into account the volume of scanning work performed.

NOTE For high volume scanning operations, comparing a reference image from a particular scanner to a target tested on a daily or shift basis would be appropriate.

— Where image quality is assessed from image prints, new prints shall be made from the reference image at the same time as the test image.

6 Test procedures

6.1 General

One or more of the three tests given in this clause shall be chosen, as appropriate to the business application, each test corresponding to the applicable test element on the test chart, as shown in Table 1.

Table 1 — Description and list of test elements

Test No.	Characteristics measured	Picture	Purpose of the test
1	Colour reproduction	B3	Identify colour changes between original and image
2	Colour steps	B4	Assess ability to reproduce colour graduations
3	Colour resolution	B5	Assess ability to resolve small characters in different colours

Tests shall be executed using original test charts and not from copies thereof.

Test results shall be obtained by the use of a display screen and/or on an output colour hard-copy as appropriate.

Where a double-sided scanner is being tested, the test chart shall be scanned both face-up and face-down, such that the test elements are scanned by both scanner sides.

Where it is important to carry out the tests over as wide an area of the scanner capture aperture as possible, the test procedure shall be carried out with the test chart oriented in as many different ways as is practical.

To perform a test, complete the following.

— Set the scanner software to the agreed settings.

— Orient the test chart as necessary.

— Scan the test chart.

— Either view or print the image.

— Carry out the inspections detailed in 6.2 to 6.4.

— Save the image on the system for future reference.

Viewing conditions have an effect on the perceived colour of a viewed or printed image. Wherever possible, test elements should be inspected under typical office viewing conditions.

6.2 Test 1: Colour reproduction

Perform the test as described in 6.1.

Compare the reproduction of the 14 CIE test colours on the test chart, Picture B3, with the same areas on the original chart. Document any variations in colour on a test results log. Describe variations in colour using one or more of the terms described in Table 2 as appropriate, or using similar terms:

Table 2 — Colour change descriptions

Term	Description
Lighter	Same colour, lighter in saturation
Darker	Same colour, darker in saturation
Slight colour shift	Small (e.g. just noticeable) change in colour (indicate colour shift)
Medium colour shift	Medium (e.g. noticeable) change in colour (indicate colour shift)
Major colour shift	Major change in colour (indicate new colour)

6.3 Test 2: Colour steps

Perform the test as described in 6.1.

Assess the ability, for the C, M and Y intensity wedges, to reproduce each of the 16 colour steps of the C, M and Y colours on the test chart, Picture B4, with the same areas on the original chart. Document any loss of step separation on a test results log.

6.4 Test 3: Colour resolution

Perform the test as described in 6.1.

Assess the ability, for the C, M and Y character sets, to reproduce each symbol consisting of an octagon with two lines inside (termed an “ISO word” in ISO/IEC 15775:1999/Amd.1:2005, N4-1) on each of the four character-size sets (e.g. 10, 8, 6 and 4) on Test Chart No.2 (Picture B5).

NOTE Resolution is indicated by the smallest character size where the two inner lines of each octagon-shaped symbol (“ISO word” in Picture B5) in a particular character size can be individually distinguished.

Document the assessed resolution for each colour on a test results log.

7 Expression of results

Results shall be obtained by checking the image of the test chart displayed on a screen or on hard-copy using a colour printer, with the original test chart.

The screen and/or print for the test image display shall be chosen according to the typical use of the system.

The results obtained on a screen may not agree with those obtained on hard-copy print out. In general, the legibility on a screen is inferior to that of output on paper. However, both output methods may be used, as this can show deficiencies particular to one of the output devices being used.

For quality control purposes, a reference data file of quality control images should be maintained.

Any variations noted in the test log shall be compared with the results of previous tests. Where a noticeable change to colour reproduction accuracy over time is evident, this performance variation shall be assessed in conjunction with system maintenance staff.

ICS 37.080

Price based on 5 pages