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Office equipment — Print quality measurement methods for colour prints —

Part 1: Image quality measurement methods

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Foreword

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 28, *Office equipment*.

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Introduction

There are several standard measurement methods to evaluate image quality attributes of printed images formed by office equipment, i.e. colour reproductions, line reproductions, image structures of sharpness and graininess, gloss properties. Included are ISO/IEC 19799, ISO/IEC 24790 and ISO/IEC 29112. ISO/IEC 24790 specifies the measurement methods for large area density uniformity of graininess, mottle and banding, as well as line qualities. ISO/IEC 29112 specifies the methods for measuring sharpness attributes of edge blurriness and raggedness, special frequency response, etc. ISO/IEC 19799 specifies the methods for gloss uniformity. By utilizing these documents, users can obtain consistent test results when they comply with the protocols specified in the documents.

There are no standard methods to measure colour reproduction consistencies and geometrical accuracies in consecutive printing, and image stabilities in typical use case of print images formed by office equipment and used in office environments. In the current state, each printer distributer and its user can provide test results for those attributes measured by its own test methods and procedures, which are often convenient for its product, resulting in misleading customers in the selection of a printing system suitable for their use cases. The ISO/IEC 22592 series can provide standard methods and procedures for these print image attributes: ISO/IEC 22592-1 for colour consistency, ISO/IEC 22592-2 for geometrical accuracies and ISO/IEC 22592-3[1)] for image stabilities. By using these International Standards, consistent and comparable test results suitable for typical use cases of office prints can be obtained independent of data providers.

This document specifies measurement methods that quantitatively evaluate image quality attributes and test charts to measure the attributes as well as the variations in measured attributes in colour prints formed under the environment and stress assuming general office use case. The attributes for duplex colour print sets are within the scope as most of office documents are currently printed in duplex print sets comprising several sheets printed with colour images on both surfaces of substrates.

The measurement methods described in this document are used to access image qualities of a print set formed by a printing system on a substrate. When test results are compared among various printing systems, it is essential to use the same product of substrates and set equivalent printing conditions under default printer settings among the printing systems.

Electrophotography, thermal inkjet, or piezoelectric inkjet technologies are commonly used to form such prints. The purpose of this document is to provide objective measurement methods for image quality attributes of duplex colour print sets.

This document prescribes the following:

— test charts for the measurements which specify colour codes and locations in page to be measured;

— measurement method for colour reproduction range;

— measurement methods for colour variations, including variation by location within a page (within-page variation), variation between front and back side (side-to-side variation), variation among the sheets in the same print set (sheet-to-sheet variation) and variations depending on the colours printed on its back side (show-through variation);

— measurement methods for the attributes of line quality, graininess and mottle based on ISO/IEC 24790 and variations (side-to-side, sheet-to-sheet variations, etc.) in attributes.

The above methods relating to image quality variations are mainly designed to quantify the variations in duplex print sets. On the other hand, it is convenient for users to evaluate simplex print sets, comprising several sheets which are printed with colour images on one surface of a substrate and no image on the other surface, by using the same methods for duplex print sets. Therefore, some attributes for variations, such as colour variations “within a printed image”, “sheet-to-sheet variations”, can also be applicable for a simplex print set.

Measurement methods for gloss and its variations are out of the scope of this document, and have already been specified in ISO/IEC 19799.

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In this document colour codes for the test charts are defined in sRGB colour space as specified in IEC 61966-2-1 as is common in office documents colour measurements are based on CIELAB specified in ISO/CIE 11664-4.

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Office equipment — Print quality measurement methods for colour prints —

Part 1: Image quality measurement methods

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

1 Scope

This document specifies test methods as well as test charts to measure the image quality attributes and those variations in colour prints typically used in office environment. Included are digital colour prints formed by using a multifunction or single function printer. Printers supporting a maximum paper size of A4 or larger are suitable for the measurements using the test charts defined in this document.

The image quality attributes included are colour reproduction, line quality, graininess and mottle.

The sources of variation considered are locations in a page (within-page variation), printed side in a sheet (side-to-side variation), printed order of the sheet (sheet-to-sheet variation) and colours printed on the back side of evaluated patch (show-through variation).

A duplex print set, comprising several sheets which are printed by multifunction or single function printer with colour images on both surfaces of a substrate, is a main application of the test methods to measure image quality variations in the set. Variations, such as within-page variation and sheet-to-sheet variation, are also applicable for a simplex print set comprising several sheets which are printed colour images on one surface of a substrate and no image on the other surface.

Both duplex and simplex printers are applicable to form a print set. When image qualities of duplex prints are measured, duplex printers which are capable to print images on both sides of substrate automatically are applicable to form duplex prints. However, simplex printers which require a manual arrangement of substrates between the front side and back side printing to form duplex prints are out of scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 13655, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

ISO/IEC 24790, *Information technology — Office equipment — Measurement of image quality attributes for hardcopy output — Monochrome text and graphic images*

ISO/CIE 11664-4, *Colorimetry — Part 4: CIE 1976 L*a*b* colour space*

ISO/CIE 11664-6, *Colorimetry — Part 6: CIEDE2000 colour-difference formula*

IEC 61966-2-1, *Multimedia systems and equipment — Colour measurement and management — Part 2-1: Colour management — Default RGB colour space — sRGB*

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