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Graphic technology — Methods of adjustment of the colour reproduction of a printing system to match a set of characterization data

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National foreword

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Technologie graphique — Méthodes d'ajustage de la reproduction de couleurs d'un système d'impression pour correspondre à un ensemble de données de caractérisation

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Foreword

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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 document 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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

This second edition cancels and replaces the first edition (ISO/TS 10128:2009), which has been technically revised.

The main changes are as follows:

— addition of colour tone value (CTV) as a measure of printed tone;

— addition of colour-optimised correction curve set method for press calibration;

— updates to the Introduction and Bibliography.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Today, with digital data input, it is recognized that modification of that digital data can be used to compensate (adjust) for some of the differences in press, ink and paper between various printing sites and between the actual conditions at a specific site and the reference or standard printing condition.

As part of the introduction of digital technology, the printing industries (and its standards activities) have established reference characterization data corresponding to various printing specifications and conditions. Characterization data is generally defined as the relationship between the CMYK digital input values (in the data file exchanged) and the measured colorimetric values for the colour printed in response to these values.

Four general methods have been identified by which compensation for differences in printing conditions can be accomplished. Three of these make use of individual one-dimensional transforms (also known as plate curves) for each printing channel but differ in the method by which these transforms are determined. These are referred to as matching of tone value curves, use of near-neutral scales and colour optimised correction curve sets. The fourth method makes use of multi-dimensional transforms such as International Color Consortium (ICC) device-link profiles.

The features and general methodology for use of these adjustment techniques is the subject of this document. The goal is to provide a common understanding of these procedures across the industry, to allow consistency between implementations, and to facilitate communication of the adjustments used/desired in particular workflows.

It must be recognized that these are not competitive solutions, but each have different strengths and weaknesses in individual workflow applications. It is the choice of the individual print facility and/or the involved trade associations to decide how to best apply these capabilities, made possible through the use of digital data.

The basic assumption behind the use of characterization data and these correction techniques is that a printing process can be repeatedly restored to a prior printing condition and that condition can be maintained both within a run and between runs. A variety of process control methods can be used to achieve this repeatability. Solid ink density and tone value increase based on the specific materials involved, and tied back to the conditions established during characterization, are common process control tools that are used in addition to the data adjustment techniques described in this document. These adjustment techniques work together with process control to achieve the printing quality desired.

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Graphic technology — Methods of adjustment of the colour reproduction of a printing system to match a set of characterization data

1 Scope

This document describes four methods for the adjustment of the digital content data that is input to a printing system to achieve consistency in the printed results among a number of presses printing to the same general aim conditions. These four methods are generally identified as:

1) matching of tone value curves (TVI and CTV),

2) use of near-neutral scales,

3) colour-optimised correction curve set, and

4) use of CMYK to CMYK multi-dimensional transforms.

The procedures for establishing the aim condition for the necessary correction curves, the procedures for determining the individual correction curves, and a comparison of the applicability of these four methods are included.

These adjustment procedures are intended for use with printing systems that use CMYK colourants. Such systems are not restricted to those that use traditional ink on paper printing but can involve other marking technologies such as those used for proofing and/or digital printing.

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 15076, *Image technology colour management — Architecture, profile format and data structure*

ISO 20654, *Graphic technology — Measurement and calculation of spot colour tone value*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
characterization data
set of tone values and associated colorimetric values that fully describe a given printing process

[SOURCE: ISO 12647-2:2013, 3.3]

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