
**Graphic technology — Requirements
for printed matter for commercial and
industrial production —**

**Part 1:
Measurement methods and reporting
schema**

*Technologie graphique — Exigences relatives aux imprimés destinés à
la production commerciale et industrielle —*

Partie 1: Méthodes de mesure et schémas de rapport



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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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).

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).

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

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 third edition of cancels and replaces the second edition (ISO/TS 15311-1:2019), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the following new subclauses have been added:
 - [4.3.2.8](#), Computing and analysing colour gamut
 - [4.3.5.3](#), Indoor light stability (display window)
 - [4.3.6.2](#), Contouring
 - [4.3.4.8](#), Perceived resolution
 - [4.3.3.8](#), Macroscopic uniformity
- [4.3.5.2](#), Indoor light stability (home and office display) has been modified.

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.

Introduction

When producing a colour reproduction, it is important that the persons responsible for data creation, colour separation, proofing and printing operations have previously agreed a minimum set of parameters that define the visual characteristics and other technical properties of the planned print product. This document identifies a number of metrics that can be applied to printed sheets and that can be used as the basis for such communication. The range of metrics is large, and it is not intended that all of these metrics are to be applied to any given printed product and for any given application. The range of metrics is to be carefully selected, for example based on subsequent parts of ISO/TS 15311.

The metrics described by this document can be applied to any type of print. They are likely most often to be applied to digitally printed prints.

When selecting the set of metrics, only those metrics that have a clear specification and that correlate well with human perception are included in this document. Since this is an area of significant research activity, new metrics are expected to emerge and existing metrics to be revised in the next few years. For this reason, we anticipate the need to revise this document within a very short time scale as new metrics are tested and found to be reliable.

Additional tests to those specified in this document, for example visual assessment of smoothness, images and other elements may be required when assessing print quality.

As with any parameter that is used as part of a product specification, it is important for readers to understand clearly what the metric means. For this reason, a reporting schema is to be followed when reporting measurements in conformance with this document.

Graphic technology — Requirements for printed matter for commercial and industrial production —

Part 1: Measurement methods and reporting schema

1 Scope

This document defines print quality metrics, measurement methods and reporting requirements for printed sheets that are suitable for all classes of printed products.

Guidance as to which of these metrics to apply to any given product category along with acceptable conformance criteria is provided in subsequent parts of ISO/TS 15311.

Although this document is expected to be used primarily to measure prints from digital printing systems, the metrics are general and can be applied to other kinds of print.

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 2813, *Paints and varnishes — Determination of gloss value at 20°, 60° and 85°*

ISO 8254-1, *Paper and board — Measurement of specular gloss — Part 1: 75 degree gloss with a converging beam, TAPPI method*

ISO 12642-2, *Graphic technology — Input data for characterization of 4-colour process printing — Part 2: Expanded data set*

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, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

ISO 15184, *Paints and varnishes — Determination of film hardness by pencil test*

ISO 18619, *Image technology colour management — Black point compensation*

ISO/TS 18621-11, *Image quality evaluation methods for printed matter — Part 11: Colour gamut analysis*

ISO/TS 18621-21, *Graphic technology — Image quality evaluation methods for printed matter — Part 21: Measurement of 1D distortions of macroscopic uniformity utilizing scanning spectrophotometers*

ISO/TS 18621-31, *Graphic technology — Image quality evaluation methods for printed matter — Part 31: Evaluation of the perceived resolution of printing systems with the contrast-resolution chart*

ISO 18924, *Imaging materials — Test method for Arrhenius-type predictions*

ISO 18930, *Imaging materials — Pictorial colour reflection prints — Methods for evaluating image stability under outdoor conditions*

ISO 18935, *Imaging materials — Colour images — Determination of water resistance of printed colour images*

ISO 18936, *Imaging materials — Processed colour photographs — Methods for measuring thermal stability*

ISO 18937, *Imaging materials — Photographic reflection prints — Methods for measuring indoor light stability*

ISO 18947, *Imaging materials — Photographic reflection prints — Determination of abrasion resistance of photographic images*

ISO/TS 21139-21, *Permanence and durability of commercial prints — Part 21: In-window display — Light and ozone stability*

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

ISO/IEC 29112, *Information technology — Office equipment — Test pages and methods for measuring monochrome printer resolution*

3 Terms and definitions

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

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 banding

appearance of one dimensional variation within an area that should be homogeneous

3.2 CIEDE2000 colour difference

method of/formula for calculating colour difference, ΔE_{00} /CIEDE00

Note 1 to entry: See ISO/CIE 11664-6 for details.

3.3 colour deviation

colour difference between the colour aim value and a colour measurement or the mean of a set of colour measurements

Note 1 to entry: In addition to the ΔE_{00} the ΔL^* with Δa^* and Δb^* and/or with ΔC^* and ΔH^* may be reported.

3.4 colour variation

colour difference between the mean of a set of colour measurements and each sample

Note 1 to entry: Colour variation is also known as colour fluctuation and may be reported as the mean or 95th percentile.

3.5 digital printing

process for text and image reproduction with a colour marker on a medium using a marking device, on which the marking information is generated from digital data directly to the medium

Note 1 to entry: Digital printing differs from traditional ink-based printing on which the marking information is generated from a form produced offline prior to imaging on the medium.