

# TECHNICAL SPECIFICATION

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## **Information technology — Office equipment — Test charts and methods for measuring monochrome printer resolution**

*Technologies de l'information — Équipement de bureau — Diagrammes  
et méthodes pour mesurer la résolution des imprimantes monochrome*

Withhold

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## Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

In other circumstances, particularly when there is an urgent market requirement for such documents, the joint technical committee may decide to publish an ISO/IEC Technical Specification (ISO/IEC TS), which represents an agreement between the members of the joint technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/IEC TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/IEC TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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/IEC TS 29112 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 28, *Office equipment*.

## Introduction

The purpose of this Technical Specification is to provide a process for the objective measurement of print quality characteristics that contribute to perceived printer resolution in pages printed on paper or similar opaque materials using monochrome electro-photographic printing processes.

This Technical Specification prescribes the following:

- Definitions of the print quality characteristics that contribute to perceived resolution.
- Definitions of conformance methods to qualify a reflection scanner for use as a measuring device.
- A testing procedure based upon: a well-documented printer and printing environment setup; well-controlled printing of specified test charts; and subsequent measurement of relevant print quality characteristics using test pattern elements on the printed test charts.
- Definitions of methods for measuring the contributing print quality characteristics using test patterns elements of the printed test charts, analyzing the resulting data, and deriving an assessment of printer resolution.
- Requirements for the report of a printer resolution assessment that define the context of the assessment and describe the results of the assessment.

Printer resolution, a quantification of the ability of a digital printing system to depict fine spatial detail, is a perceptually complex entity with no single, simple, objective measure. Five print quality characteristics that meaningfully contribute to resolution are described in this Technical Specification. These print quality characteristics are: native addressability, effective addressability, edge blurriness, edge raggedness, and the printing system modulation transfer function (MTF).

Native or physical addressability refers to the imaging framework in a digital printing process, usually a rectangular grid of printable spots, which enables depiction of fine spatial detail. Native addressability specifies only one facet of the perceived resolution of a printing system.

Effective addressability is a measure of the minimum pitch by which the centre of a printed object (e.g. line segment) can be displaced and evaluates the effects of imaged spot position modulation, size modulation, or exposure modulation.

Edge blurriness provides an optical measure of the geometric transition width of an edge between an unprinted substrate region and a printed solid area region.

Edge raggedness provides an optical measure of the geometric deviations of a printed edge from a requested straight line.

The modulation transfer function (MTF) describes the ability of a linear imaging system to depict fine spatial detail. The ability to depict fine spatial detail is affected by edge blurriness as well as the spot size of the printer's marking technology and any adjacency effects that may occur in the reproduction of fine detail. Two measurement methods are described that provide estimates of the printing system's modulation transfer function including contributions from edge blurriness, spot-size and adjacency effects.

Verification of the measurement methods specified in this Technical Specification is underway.

# Information technology — Office equipment — Test charts and methods for measuring monochrome printer resolution

## 1 Scope

This Technical Specification defines methods for the objective measurement of the print quality characteristics that contribute to the perceived resolution of reflection mode monochrome printed pages produced by digital electro-photographic printers. The measurement methods of this Technical Specification are derived from several existing techniques for the assessment of an imaging system's resolution characteristics. Each of these measurement methods is intended for the engineering evaluation of a printing system's perceived resolution and should not be used for purposes of advertising claims.

The methods of this Technical Specification are applicable only to monochrome prints produced in reflection mode by electro-photographic printing technology. The current version of this Technical Specification is intended for monochrome printers utilizing Postscript interpreters capable of accepting Postscript and encapsulated Postscript (EPS) jobs.

## 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 14524, *Photography — Electronic still-picture cameras — Methods for measuring opto-electronic conversion functions (OECFs)*

ISO 16067-1, *Photography — Spatial resolution measurements of electronic scanners for photographic images — Part 1: Scanners for reflective media*

ISO 21550, *Photography — Electronic scanners for photographic images — Dynamic range measurements*