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Information technology — Office equipment — Method for measuring scanning productivity of digital scanning devices

Technologie de l'information — Équipement d'office — Méthode de mesure de la productivité du scanner des appareils de numérisation

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Contents

Page

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 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 Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 28, *Office equipment*.

This second edition cancels and replaces the first edition (ISO/IEC 17991:2015), which has been technically revised.

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

— changed the document structure to be consistent with other productivity standards;

— added single function scanners to the Scope;

— updated reporting to include examples of minimum declarations;

— added “first page eject” test result to the “1 set” test from ready.

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

The actual productivity measurement methods of copying and printing were published as ISO/IEC 24735 and ISO/IEC 24734. However, ISO/IEC 25735 contains no measurement method for the scanning productivity of multifunctional devices to be used for comparison and procurement of these machines.

This document provides a general method for measuring “scanning productivity” of the scanning devices. This document also includes a test chart for scanning productivity measurement. It allows the manufacturers and the buyers of scanning devices to describe the productivity with respect to representative usage.

Information technology — Office equipment — Method for measuring scanning productivity of digital scanning devices

1 Scope

This document specifies a method for determining scanning productivity by measuring "scanning speed", "scan to network folder speed" and "scan to PC speed". It includes test files, test setup procedure, test procedure and the reporting requirements for the scanning productivity measurements. This document is applicable to scanning devices including but not limited to multi-function devices, networked scanners and single-function scanners of any underlying scanning technology.

This document is applicable to devices which are able to scan a media size of A4/8,5" × 11" and which have an automatic document feeder (ADF). It is also applicable to devices which have the ability to scan to network folder, or folder on PC and do not require, but can use, other application programs on a computer or another device to perform a scanning job.

This document does not apply to testing and measurement of scan to USB, scan to local hard drive or other storage medium that is part of or plugged into the scanner.

This document is not intended to be used for image quality measurement, document or record management of any scanned images.

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 536, *Paper and board — Determination of grammage*

ISO 2470-1, *Paper, board and pulps — Measurement of diffuse blue reflectance factor — Part 1: Indoor daylight conditions (ISO brightness)*

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
ADF speed
rate at which a device scans documents using an automatic document feeder (ADF) to demonstrate the productivity of the ADF and is represented with suffix A

EXAMPLE $scEFTP_{1setA}$ is the scanner *effective throughput* (3.3) of the ADF on the 1set test.

3.2
duplex
duplex scanning
use of a scanning device with the scanning being done for both sides of a sheet

Note 1 to entry: An equivalent term is “double sided scanning”.

3.3
scEFTP
effective throughput
rate at which a device scans pages measured from the initiation of the job through the full ejection of the last page of the scanning sets or through the complete creation of the file on the shared network folder or PC after the transfer of the last page of the last *test set* (3.16)

EXAMPLE $scEFTP_{1setA}$ means scanning effective throughput of “1 set test” for “ADF productivity measurement”.

Note 1 to entry: “sc” denotes that the measurement is taken on the scanner.

Note 2 to entry: There are suffixes such as “$_{1setA}$”, “$_{30secF}$” or “$_{30secP}$”. Each suffix is used to classify tests such as “1 set test” or “1 set + 30 second test” of the objects of tests for “ADF productivity measurement” (using suffix A), “scan to network folder productivity measurement”(using suffix F) or “scan to pc file productivity measurement” (using suffix P) test respectively.

Note 3 to entry: *scEFTP* is expressed in images per minute (ipm); it can be affected by scan time, digital processing time, maintenance and the run time of the test.

Note 4 to entry: A different term (“EFTP; effective throughput” for digital copying machines) is defined in ISO/IEC 24735.

Note 5 to entry: As for $scEFTP_{30secF}$, measurement parameters involving the measurement of file transmission to a network folder are dependent on other factors like the computer and network configuration and represent relative values and not absolute values.

Note 6 to entry: As for $scEFTP_{30secP}$, measurement parameters involving the measurement of file transmission to a file are dependent on other factors like the computer, IO connection, IO speed and represent relative values and not absolute values.

3.4
scESAT
estimated saturated throughput
rate at which a device scans pages measured from full ejection of the last page of the first *test set* (3.16) from ADF through the full ejection of the last page of the last test set (using suffix A)

Note 1 to entry: “sc” denotes that the measurement is taken on the scanner.

Note 2 to entry: There are suffixes such as “$_{1setA}$”, “$_{30secF}$” or “$_{30secP}$”. Each suffix is used to classify tests such as “1 set test” or “1 set + 30 second test” of the objects of tests for “ADF productivity measurement” (using suffix A), “scan to network folder productivity measurement”(using suffix F) or “scan to pc file productivity measurement” (using suffix P) test respectively. There is no measurement for “scan to network folder productivity measurement” or “scan to pc file productivity measurement” of *scESAT*, $scESAT_{30secF}$ and $scESAT_{30secP}$ defined, therefore $scESAT_{1setA}$, $scESAT_{1setF}$, and $scESAT_{1setP}$ are not used as classifications.

Note 3 to entry: *scESAT* is expressed in images per minute (ipm).

3.5
scFPE
first page eject
number of seconds between the initiation of the job to full ejection of the first page of the first *test set* (3.16) from the ADF

3.6
scFSOT
first set out time
number of seconds between the initiation of the job to full ejection of the last page of the first *test set* (3.16) from the ADF

Note 1 to entry: There are suffixes such as "$_{1setA}$", "$_{30secF}$" or "$_{30secP}$". Each suffix is used to classify tests such as "1 set test" or "1 set + 30 second test" of the objects of tests for "ADF productivity measurement" (using suffix A), "scan to network folder productivity measurement"(using suffix F) or "scan to pc file productivity measurement" (using suffix P) test respectively .

3.7
full detailed report
presentation of information including machine setup, summary and full measured test results

Note 1 to entry: An example of the full detailed report is shown in Annex B.

3.8
full report
presentation of results including the *scFSOT* (3.6), *scESAT* (3.4), and *scEFTP* (3.3) values in the *performance test* (3.10) as well as the calculated averages for each value

3.9
network folder speed
rate at which a device scans and stores the scanned image file in the network folder to demonstrate the overall productivity of the device when scanning documents

EXAMPLE A suffix such as "$_{30secF}$" means a test of "1 set + 30 second" test for "scan to network folder productivity".

Note 1 to entry: Suffix "$_{F}$" means "scan to network folder productivity measurement".

3.10
performance test
test used to evaluate productivity by providing *scFSOT* (3.6), *scESAT* (3.4), and *scEFTP* (3.3) without using any special feature or mode, and includes both the *simplex scanning* (3.12) mode and the *duplex scanning* (3.2) mode if available

3.11
scLSOT
scLSOT$_{Nsets}$
scanning last set out time
number of seconds between the initiation of the job to full ejection of the last page of the last *test set* (3.16) from ADF

Note 1 to entry: There are suffixes such as "$_{1setA}$", "$_{30secF}$" or "$_{30secP}$". Each suffix is used to classify tests such as "1 set test" or "1 set + 30 second test" of the objects of tests for "ADF productivity measurement" (using suffix A), "scan to network folder productivity measurement"(using suffix F) or "scan to pc file productivity measurement" (using suffix P) test respectively.

3.12
simplex
simplex scanning
use of a scanning device when only a single side of a sheet is scanned

Note 1 to entry: An equivalent term is "single sided scanning".

3.13
summary report
presentation of results including the average overall *scEFTP* (3.3) in the *performance test* (3.10) for the scanning device default base line performance

3.14
test file
digital file used for creating *test targets* (3.17)

3.15
test run
operation of scanning all pages of targets from a *test file* (3.14), in a particular system configuration, with a particular set and page count

Note 1 to entry: Scan times are recorded for each test run.

3.16
test set
all of the pages of targets from a *test file* (3.14)

3.17
test target
hardcopy document used for testing per the test method, and created from *test file* (3.14)

Note 1 to entry: An equivalent term is “test chart”.

3.18
time measurement
number of seconds measured by a timing device (stopwatch or other device) or by reading time display on the PC clock

EXAMPLE "t_{sw1A}" is the time measured via stopwatch or other device for completion of the first set out and "t_{pc1F}" is the time measured via PC clock for completion of the first set file written to the network folder or PC file.

Note 1 to entry: Suffixes such as "$_{SW}$" and "$_{PC}$" are used to show which time measurement is done; by timing device (stopwatch or other device) or by reading time display on the PC clock.

4 Test parameters and conditions

4.1 Scanning device setup

Place the scanning device on a horizontal surface and set up the scanning device according to the manufacturer's recommendations.

The scanning device shall be fully enclosed in its normal exterior cover. The machine shall be acclimated in the test environment prior to conducting the test(s) at least 8 h. All images and scanning modes should be at their factory preset configuration for the scanning device. It is assumed that the settings listed in Table 1 are common to all scanning devices. These listed settings shall be set to the manufacturer's default or preset condition for the device. If a device has settings not listed in Table 1, they too shall be set to default settings. All settings shall be explicitly stated in either case of default or non-default settings. For scanning devices that have additional scan quality and digital image processing features, those features shall be set to match their normal default condition and included in the result reporting. Disabling manufacturer default installed features, routines or applications, is not allowed. As listed in Table 1 the preset values in the test shall be noted in the full detailed report (see Annex B).

If the scanning device is setup with internal or external options such as memory as default, then these options shall be noted on the full detailed report format in the configuration options as shown in Annex B.

EXAMPLE Examples of configurations options to be captured:

— 160GB HDD installed.

Additional tests may be conducted using other non-default settings for the scanning device. The results of such additional tests shall be documented as having parameters that differ from the factory defaults and shown in comparison to the default system parameter results.

Optional paper sizes may be used for the scanning device tests such as A3 and/or 11"×17" size as appropriate for the test mode. When sheets of paper size other than A4/8,5" ×11" are used, the sizes shall be indicated in the places of A4/8,5"×11" in the measurement results tables.

When a comparison must be made between the productivity of one machine with that of other machines the measurement shall be done with the same paper sizes.

Table 1 — Pre-set settings

	Pre-set item	Preset value
Mode	Scanning resolution	default (200 dpi)
	Colour or gray scale/B&W	default (colour)
	Duplex/simplex	default (simplex)
	Original page size	default (A4)
	Paper feed orientation (long/short edge)	default (long edge)
	Scan destination	default (shared network)
	Storing file type	default (pdf-multi)
	Auto scan quality adjustment	default (factory preset default setting)

4.2 Scanning device connection

There are three types of possible connections to the scanning device:

— network connection (such as Ethernet);

— wireless connection (such as Wi-Fi);

— direct connection (such as USB).

Connection to the test platform should be determined by the manufacturer's recommended connection. The connection type, version, and all settings that differ from the system or scanning device defaults shall be recorded and reported.

4.3 Scanning device condition

If available, the number of pages scanned on the device prior to the start of the test shall be recorded and reported. The machine shall be acclimated in the test environment prior to conducting the test(s) at least 8 h. Performance may be impacted by the amount of life used as represented by page count. Acclimation may affect the calibration of the device which in turn could impact performance.

4.4 Sample size

Each target shall be tested and measured at least twice for repeatability. All required tests shall be run using one device.

4.5 Maintenance

Scanning device maintenance shall be performed throughout testing per the manufacturer's recommendations.

4.6 Preparation of test targets (test charts)

Follow the outline of the scanning test file in Annex C.

This test file is from ISO/IEC 24735. The test file consists of four single sided pages. When using the test file for the scanning productivity test, the test targets shall be created by printing the most recent

electronic test file on the device to be tested if it has print capability. If the test device to be tested does not have a printer function or if the device is a colour capable scanner but does not have a printing function of colour test targets (for the colour scanning test), then record the name of printer which is used to print out the actual test targets.

For preparation method for double sided targets, follow the outline in Annex C.

The quality of test targets may affect the productivity measurement. Test targets should be created according to the following instructions.

a) The test targets shall be printed by the equipment to be tested itself in its default-printing mode. If the equipment to be tested does not have a print function or if the equipment to be tested does not have a colour print function and colour test targets are required, then record the name of the printer used to print out the actual test targets.

b) The paper used for creating the test targets shall have a brightness of at least 80 % to eliminate the influence of background.

c) The paper used for creating the test targets shall be 64 g/m^2 or above and sufficiently opaque to prevent scanning of images on the backside.

d) The paper used for creating the test targets shall be free of wrinkles or other surface defects.

e) Confirm that there are no defects such as unexpected dots or contamination.

f) Page scaling shall not be used in performance test. Typically, this is done by setting page scaling to "none". Options such as "Fit to printable area" shall not be used in performance testing, either.

g) Paper shall conform to the scanning device manufacturer's paper specifications.

The brightness shall be measured according to ISO 2470-1. The paper grammage shall be measured according to ISO 536.

4.7 Environment

The test environment, including temperature and humidity, shall be within the ranges recommended by the manufacturer for operating the device. If no recommendation is available, the following ranges shall apply:

— temperature: 18 °C to 25 °C,

— relative humidity: 30 % to 70 %.

The temperature and humidity ranges of the test environment shall be recorded in the full detailed report.

4.8 Voltage

The scanning device shall be connected to a voltage supply within the manufacturer specified operating voltage range for the scanning device under test. The voltage should be measured under no-load condition prior to each test suite and recorded in the full detailed report.

NOTE It is possible that devices that utilize a heater have a longer *scFSOT* time when the line voltage is at the lower value of the recommended operating range.

5 Test method

5.1 Overview

The productivity of a digital scanning device like “scan to network folder speed” depends on factors other than the scanning device itself. These include, but are not limited to, computer performance and

network configuration or the general environment in which the test is being held. Because of this, in order to make useful and accurate direct comparisons of scanning productivity with this document, the same computer system hardware and software, and network configuration shall be used for measuring the scanning devices for the purpose of being directly compared one to another. For every scanning productivity measurement, the basic specifications of the computer and the network shall be included with the results of the scanning productivity measurement.

This clause defines the procedure on how to measure "ADF productivity measurement", "scan to network folder productivity measurement" and how to measure "scan to PC file productivity measurement".

The intent of "ADF productivity measurement" test is to demonstrate the productivity of the ADF that may be achieved with the specific settings. ADF speed is a component of scanning productivity.

The intent of "scan to network folder productivity measurement" test is to demonstrate the overall productivity of the device in scanning documents. This test is a representative of a variety of scanning tasks (e.g. scan to file server, scan to fax server, scan to email, scan to workflow, etc.).

A single set of each test target is scanned and measured to determine $scEFTP_{1set}$. Multiple N sets of test target are scanned and measured for the 1 set + 30 seconds test run to calculate $scESAT_{30sec}$ and $scEFTP_{30sec}$, where N is the number of sets needed to meet $scLSOT_{Nsets} - scFSOT_{1set}$ more than 30 s. (To estimate N, number of sets for test target, refer to 5.3.3.)

This method is used to provide varying tests for products across varying segments. This simple approach allows faster products to be tested with more sets and slower products to be tested with fewer sets without defining and categorizing products by segment.

"Scan to PC file productivity measurement" utilizes PC scanning software and is measured separately from the "scan to network folder productivity measurement". Both can be paired with "ADF productivity measurement" to complete measurement in the same test run.

5.2 Test measurement procedure

5.2.1 Test setup

Before testing, the following setup activities shall be completed.

a) Install the scanning device following the manufacturer's recommendations.

b) Clean the surface of the image scanning device if needed.

c) Set the system parameters (such as paper size and feed orientation, image quality mode) for the test. Record the scanning device model, configuration (options), default condition and any other variations if selected.

d) Estimate the number of sets (= N sets) which is required to meet $scLSOT_{Nsets} - scFSOT_{1set} \geq 30$ s. (1 set consists of 4 originals.) (To estimate N, number of sets for test targets, refer to 5.3.3.)

e) Prepare N sets of test targets that will be used in the test, identified as described in 4.6.

f) Refer to 5.4 and 5.5 to decide what tests are to be run.

g) Connect the device and PC via an appropriate network connection or direct connection and create the destination folder. The network and PC setup shall be documented, including any settings of the configuration parameters that are different from the normal default.

h) Show a date/time tool on the PC.

i) The scan button used to start a scanning job may be a button on the device, a virtual button in an embedded webserver, a virtual button in PC scanning software or similar user interface if the virtual button initiates a scan in a similar way as the button on the device would.