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Information technology — Office equipment — Method for measuring digital copying productivity of a single one-sided original

Technologies de l'information — Équipement de bureau — Méthode de mesure de la productivité du copiage numérique d'un simple original une face

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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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

ISO/IEC 29183 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 28, *Office equipment*.

Introduction

Many digital copying devices produce copied pages at a different rate than their nominal speed when running with different quality modes, different substrate weight, different job content and job lengths. The degree to which a change in productivity is experienced depends significantly on other parameters of the job stream. The most dominant of the parameters of the job stream are

— image quality modes selected,

— job content,

— black-and-white and colour reproduction job stream, and

— run length.

ISO/IEC 24735 addresses the productivity issues for digital copying devices when using both collation and an automatic document feeder, but cannot be used for a single one-sided original.

This International Standard provides a general method for measuring productivity when the above-mentioned job stream parameters for digital copying devices are taken into consideration. This International Standard also includes instructions for the creation of test charts. It allows manufacturers and buyers of digital copying devices to describe the productivity of various digital copying devices with respect to representative office usage.

Information technology — Office equipment — Method for measuring digital copying productivity of a single one-sided original

1 Scope

This International Standard specifies a method for measuring productivity of digital copying devices and multifunctional devices with various copying modes and a single one-sided original. It is applicable to digital copying devices and multifunctional devices. It is intended to be used for black-and-white and colour digital copying devices and multifunctional devices of any underlying marking technology. This International Standard includes instructions for the creation of test charts, test setup procedure, test procedure, and the reporting requirements for the digital copying productivity measurements.

This International Standard is not intended to replace manufacturer's rated speeds.

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 2470-1:2009, *Paper, board and pulps — Measurement of diffuse blue reflectance factor — Part 1: Indoor daylight conditions (ISO brightness)*

ISO 536:1995, *Paper and board — Determination of grammage*

3 Terms and definitions

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

3.1
full detailed report
presentation of information including machine setup and measured test results

3.2
full report
presentation of results including the **sFCOT** (3.8), **sESAT** (3.7) and **sEFTP** (3.6) values as well as the calculated average for each value

3.3
nominal copying speed
copy rate, excluding time to first page copied, as measured when producing pages in a continuous copy mode with a single static document using a nominal weight substrate

NOTE Nominal copying speed is expressed in copies per minute or images per minute (ipm).

3.4
performance test
test used to evaluate productivity by providing **sFCOT** (3.8), **sESAT** (3.7) and **sEFTP** (3.6)

3.5
saturated time per copy
average time per copy measured from the complete exit of the first copy to the complete exit of the last copy

3.6
sEFTP
effective throughput
average speed at which a device produces pages measured from the initiation of the job through the complete exit of the last copy

NOTE 1 “s” denotes that a single one-sided original is used for the measurement.

NOTE 2 sEFTP is expressed in images per minute (ipm); it can be affected by scan time, digital processing time, and maintenance, as well as the run time of the test.

NOTE 3 A different term (“EFTP; effective throughput” for digital copying machines) is defined in ISO/IEC 24735.

3.7
sESAT
estimated saturated throughput
rate at which a device produces pages measured from the complete exit of the first copy to the complete exit of the last copy

NOTE 1 “s” denotes that a single one-sided original is used for the measurement.

NOTE 2 sESAT is expressed in images per minute (ipm).

NOTE 3 A different term (“ESAT; estimated saturated throughput” for digital copying machines) is defined in ISO/IEC 24735.

NOTE 4 The parameter “continuous copying speed” for EP (electrophotographic) copying machines is defined in ISO/IEC 21117.

3.8
sFCOT
first copy out time
number of seconds between the initiation of the job and the complete exit of the first copy

NOTE 1 “s” denotes that a single one-sided original is used for the measurement.

NOTE 2 sFCOT is strongly affected by the scanning time.

NOTE 3 A different term (“FSOT; first set out time” for digital copying machines) is defined in ISO/IEC 24735.

NOTE 4 The parameter “first-copy-out time” for EP (electrophotographic) copying machines is defined in ISO/IEC 21117.

3.9
simplex copying
use of a copying device when only a single side of a sheet is copied on

NOTE Equivalent terms are “one-sided copying” and “simplex to simplex” (referred to as 1:1 mode).

3.10
sLCOT
last copy out time
number of seconds between the initiation of the job and the complete exit of the last copy

NOTE "s" denotes that a single original is used for the measurement.

3.11
summary report
presentation of results including the average **sFCOT** (3.8) and **sESAT** (3.7)

3.12
test file
digital file used for creating **test target**s (3.13)

3.13
test target
hardcopy page used for testing according to the test method, created from the **test file** (3.12)

NOTE An equivalent term is "test chart".

4 Test parameters and conditions

4.1 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 should be recorded in the full detailed report (Annex B).

4.2 Voltage

The copying device shall be connected to a voltage supply within the manufacturer specified operating voltage range for the copying device under test.

The measurement should be made under no-load condition prior to each test.

4.3 Copying device setup

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

The copying device shall be fully enclosed in its normal exterior cover. The machine and all of it's necessary supplies shall be acclimated in the test environment prior to conducting the test(s) for at least 8 hours. All supplies used in the test(s), including copy paper, shall be those specified by the manufacturer. All image and copying modes shall be at their factory pre-set configuration for the copying device. It is assumed that the settings listed in Table 1 are common to all copying devices. These listed settings shall be set to the manufacturer's default or pre-set condition for the device. If a device has settings not listed in Table 1, they too shall be set to default settings. For copying devices that have additional print 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. Examples include, but are not limited to the following: automatic cleaning or calibration cycles, and energy save settings. If the system has automatic media detect(automatic paper type selection), it can be disabled,

and paper used in the test shall be selected manually. This must be noted in the full detailed report (Annex B). The following pre-set values in the test will be noted on this report format. Additional optional tests with non-default settings or configurations may be run.

Table 1 — Pre-set settings

	Pre-set item	Pre-set value
Mode	Output resolution	default
	Output Quality	default
	Copying mode	default
	Auto density adjustment	default
	Collating function	default
Paper	Paper sending direction	default
	Paper type setting	default
Paper-path	Paper feeding	default Paper Feeder
	Paper exit	Standard exit tray
	Face up exit	default
Temporary stop	Fixing capability	default
	Image quality stability	default
	Capacity of paper	default
	Others	default

If the copying device is setup with internal or external options such as memory, sorter, or finisher as default, then these options should be noted on the full detailed report format in the configuration options as shown in Annex B, for example “Finisher as default” or “160GB HDD installed”.

4.4 Paper

The output paper used in this test shall be within the range of, and/or not violate, specific written attribute guidelines and recommendations provided by the copying device manufacturer, which may include but are not be limited to: size, weight, composition, paper manufacturer(s), paper type, part number and other physical characteristics. Care must be taken to use a paper that conforms to the copying device manufacturers' paper specifications for the default copying device settings. The paper used for the performance test [5.4] shall be cut-sheet, A4 and/or 8.5"x11" size. The paper used in the test shall be recorded in the Full Detailed Test Report.

You should use the same paper size for each machine when you want to compare the productivity results of one machine with other machines. If the copying device is used in “thick paper mode” for copying, then this optional mode should be noted on the full detailed report format in corresponding column in Annex B.

4.5 Maintenance

Copying device maintenance shall be performed throughout testing per the manufacturer's recommendations on an as needed basis. (For example, cleaning routines or consumables replacement).

4.6 Preparation of test targets (test charts)

The copying test file is outlined in Annex C (normative).

This test file is from ISO/IEC 24735. The test file consists of 4 single-sided pages. When using the test file for the copying productivity test, create the test targets by printing the most recent electronic test file. If the intended machine does not have a printer function, then record the name of the printer which is used to print out the actual test targets. The most recent official file can be located at http://standards.iso.org/ittf/PubliclyAvailableStandards/SC28_Test_Pages/.

The quality of test targets can affect the productivity measurement. You should create test targets according to the following instructions.

1) The test targets shall be printed by the equipment to be tested in its default-printing mode in simplex mode.

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

3) The paper used for creating the test targets shall be 64 g/m^2 or above and sufficiently opaque.

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

5) Confirm that there are no defects such as unexpected dots or contaminations.

6) Page scaling shall not be used. Typically, this is done by setting page scaling to “None”. Options such as “Fit to printable area” shall not be used.

The brightness shall be measured according to ISO 2470-1:2009. The paper weight shall be measured according to ISO 536:1995.

5 Test method

5.1 Test setup

Before test, the machine under test shall be preconditioned as follows.

1) Install the copying device following the manufacturer's recommendations.

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

3) The default required tests shall be run after the copying device has warmed-up and entered a “ready” state. Use of warm-up copying (that means at least one page is copied just before testing) to ready the copying device is acceptable.

4) Set the system parameters (such as paper weight selection, paper size and feed orientation, quality mode) for test. Record the copying device model, configuration (options), default condition and any other variations if selected. If the system has automatic media detect (automatic paper type selection), it can be disabled, and paper used in the test shall be selected manually. This must be noted in the full detailed report.

Refer to Annex B for an example of settings to record. Refer to 5.4 for information on required tests. Refer to Clause 6 for information on the calculation and treatment of data. Refer to Clause 7 for information on data reporting.

Measurement of printing productivity in MFDs should be measured according to ISO/IEC 24734. Only copying productivity function can be measured according to this International Standard.

Digital copying devices and multifunction devices with automatic document feeders and collation should also measure productivity using ISO/IEC 24735.

5.2 Test measurement procedure

Each of the 4 test targets are copied and measured to determine $sFCOT_{1copy}$. N copies of each test target are copied and measured for the 1 Copy + 30 Seconds Test run to calculate $sESAT_{30sec}$ and $sEFTP_{30sec}$, where N is the number of copies needed to meet $sLCOT_{30sec}$–$sFCOT_{30sec}$ ≥ 30 seconds. This simple approach allows faster products to be tested with more copies and slower products to be tested with less copies without