

DRAFT INTERNATIONAL STANDARD

ISO/IEC DIS 29183

ISO/IEC JTC 1/SC 28

Secretariat: JISC

Voting begins on:
2020-05-21

Voting terminates on:
2020-08-13

Information technology — Office equipment — Method for measuring digital copying productivity for 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

ICS: 37.100.10

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Reference number
ISO/IEC DIS 29183:2020(E)

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Published in Switzerland

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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.

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).

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

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](http://www.iso.org/foreword)

ISO/IEC 29183 was prepared by Technical Committee ISO/TC JTC1, *Information Technology*, Subcommittee SC 28, *Office Equipment*.

This second edition cancels and replaces the first edition (ISO/IEC 29183:2010), of which it constitutes a minor revision.

This edition includes the following changes with respect the previous edition:

- a) Updated document formatting based on ISO/IEC Directives, Part 2, 2016.
- b) "Terms and definitions" clause has been modified to add new definitions and removed definitions of terms not used in the text.
- c) Change the Annex structure to be consistent with other productivity standards.
- d) Added "Ready delay time" requirement to "Test measurement" Procedures.
- e) Added [\[Annex D\]](#) for the procedure to determine the "Ready delay time".
- f) Added sFCOT from sleep, sFCOT from sleep after 15 minutes, and sFCOT from off tests and reporting.
- g) Added minimim declaraction examples to [\[Annex A\]](#).

Introduction

Many digital copying devices produce copied pages at a different rate than their nominal speed when running with different quality modes, different substrate grammage, 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, B&W and colour reproduction job stream, run length). The existing International Standard (ISO/IEC 24735) only addresses the productivity issues for digital copying devices when using both collation and an ADF (Automatic Document Feeder), and cannot be used for a single one sided original.

This document provides a general method for measuring “productivity” when the above-mentioned job stream parameters for digital copying devices are taken into consideration. This document 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.

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

1 Scope

This document specifies a method for measuring “productivity” of digital copying devices and multifunctional devices with various copying modes and a single one-sided original. The document is applicable to digital copying devices and multifunctional devices. The document is intended to be used for black and white (B&W) as well as colour digital copying devices and multifunctional devices of any underlying marking technology. This document includes instructions for the creation of test charts, test setup procedure, test procedure, and the reporting requirements for the digital copying productivity measurements.

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

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*

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

ISO 5734-2:2004/ISO/IEC DIS 29183

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 <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

cpm

copies per minute

copying rate, excluding time to first page copied, measured when producing pages in a continuous copying mode for one minute with a single static document using a nominal grammage substrate

Note 1 to entry: Nominal copying speed is expressed in copies per minute or *images per minute (ipm)* (3.7).

3.2

sEFTP

effective throughput

rate at which a device produces pages measured from the initiation of the job through the complete exit of the last *test set* (3.18)

Note 1 to entry: “s” denotes that a single one sided original is used for the measurement.

Note 2 to entry: sEFTP is expressed in *images per minute (ipm)* (3.7). sEFTP can be affected by scan time, digital processing time, and maintenance as well as the run time of the test.

Note 3 to entry: There is a different definition called “EFTP; Effective Throughput”. This “EFTP” for digital copying machine is defined in ISO/IEC 24735 International Standard.

Note 4 to entry: The term “test set” and “test copy” have the same meaning for a single one sided original.

3.3

sESAT

estimated saturated throughput

rate at which a device produces pages measured from the complete exit of the first *test set* (3.18) to the complete exit of the last test set

Note 1 to entry: “s” denotes that a single one sided original is used for the measurement.

Note 2 to entry: sESAT is expressed in *images per minute (ipm)* (3.7).

Note 3 to entry: There is a different definition called “Continuous Copy Speed” for EP (electrophotographic) copying machine is defined in ISO/IEC 21117 International Standard. Also, there is a different definition called “ESAT; Estimated Saturated Throughput”. This “ESAT” for digital copying machine is defined in ISO/IEC 24735 International Standard.

Note 4 to entry: The term “test set” and “test copy” have the same meaning for a single one sided original.

3.4

sFCOT

first copy out time

number of seconds between the initiation of the job to the complete exit of the first copy

Note 1 to entry: “s” denotes that a single one sided original is used for the measurement.

Note 2 to entry: For a single one sided original the first copy is the first set and sFCOT equals sFSOT.

Note 3 to entry: sFCOT can refer to sFCOT from Ready, sFCOT from Sleep, sFCOT from Off. Specific usage will be noted by sFCOT_{Ready}, sFCOT_{Sleep}, sFCOT_{Off}.

Note 4 to entry: sFCOT is strongly affected by the scanning time.

Note 5 to entry: There is a different definition called “FCOT; First Copy Out Time”. This “FCOT” for EP (electrophotographic) copying machine is defined in ISO/IEC 21117 International Standard. Also, there is a different definition called “FSOT; First Set Out Time”. This “FSOT” for digital copying machine is defined in ISO/IEC 24735 International Standard.

3.5

full detailed report

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

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

3.6

full report

presentation of results including the *sFCOT* (3.4) from Ready, sFCOT from Sleep, sFCOT from Off, *sESAT* (3.3) and *sEFTP* (3.2) values as well as the calculated averages for each values

3.7

ipm

images per minute

copy rate, excluding time to first page copied, as measured when producing pages in a continuous copy mode for one minute with a single static document using a nominal grammage substrate

Note 1 to entry: Nominal copying speed is expressed in *copies per minute (cpm)* (3.1) or images per minute.

3.8**off state**

state from which a device is not capable of making a copy without user intervention to turn on the power.

Note 1 to entry: A device may enter Off state due to a user turning the device off, or the device may enter Off state automatically after a delay.

3.9**performance test**

test used to evaluate productivity by providing *sFCOT* (3.4), *sESAT* (3.3) and *sEFTP* (3.2)

3.10**power management delay time**

time that a device waits between the exit of the last page of the last job and being in a lower power state such as Sleep state or *Off state* (3.8)

Note 1 to entry: The power management delay time corresponding to the setting as shipped is referred to as "default power management delay time" or "default delay time".

3.11**ready delay time**

required delay time from the complete exit of the last page of the previous copy job to the start of the next job

3.12**ready state**

state which a device typically enters after the exit of the last page of the last job and the device is in a stable condition, but fully warmed up and prepared to operate

Note 1 to entry: While in the Ready state, systems not directly involved with marking the media are allowed to be in motion.

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EXAMPLE Fans may still be spinning and all other motors stopped.

3.13**recovery time**

time required by a device to recover from a sleep state given by the difference in the exit timing of the first page of the sleep state job and the exit timing of the first page of the *ready state* (3.12) job

Note 1 to entry: Other related terms are "resume time" and "return time". Other similar terms have been used in industry as well.

3.14**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

3.15**simplex****simplex copying**

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

Note 1 to entry: Other equivalent terms is "one-sided copying" or "simplex to simplex" (referred as 1:1 mode).

3.16**test file**

digital file used for creating *test targets* (3.20)

EXAMPLE A single Microsoft Excel file within the Office test is a "test file".

3.17
test run

operation of copying one *test target* (3.20), in a particular system configuration, with a particular *test set* (3.18) and page count

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

3.18
test set

all of the pages of a *test target* (3.20)

Note 1 to entry: The term “test set” and “test copy” have the same meaning for a single one sided original.

3.19
test suite

combination of *test files* (3.16) for each category test

EXAMPLE 1 The Office Category test suite consists of three test files.

EXAMPLE 2 The Advertising and Graphics Category test suite consists of four test files.

3.20
test target

hardcopy page used for testing per the test method, created from the *test file* (3.16)

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

3.21
warm-up time

time required by a device to recover from *Off state* (3.8) given by the difference in *sFCOT* (3.4) between *Off state* and *Ready state* (3.12)

Note 1 to entry: Other similar terms, such as “wait time”, have been used in industry as well.

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4 Test parameters and conditions

4.1 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 its 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.

EXAMPLE 1 Examples of routines that may not be disabled include, but are not limited to the following

- automatic cleaning
- calibration cycles
- 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 shall be noted in the full detailed report (see [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.

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

EXAMPLE 2 Examples of configurations options to be captured.

- Finisher as default
- 160GB HDD installed

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

4.2 Copying device condition

All supplies used in the test(s), including paper and printing device consumables, shall be only those specified as acceptable for use by the manufacturer (or otherwise noted). If available the number of pages printed on the engine and printed on the consumables prior to the start of the test shall be recorded and reported. The machine and all of its necessary supplies shall be acclimated in the test environment prior to conducting the test(s) at least 8 hours.

4.3 Sample size

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

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 limited to: size, grammage, composition, paper manufacturer(s), paper type, part number and other physical characteristics. Care shall 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.

EXAMPLE Examples of maintenance routines that shall be performed.

- cleaning routines
- 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 "Method of Measuring Digital Copying productivity". The test file consists of 4 single sided pages. When using the test file for the copying productivity test, the test targets shall be created 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 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 in its default-printing mode in simplex mode.
- 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/m² or above and sufficiently opaque.
- 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. 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. 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 %