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

Technologies de l'information — Équipements de bureau — Méthode de mesure de la productivité d'un photocopieur numérique

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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.

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 or www.iec.ch/members _experts/refdocs).

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. 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) or the IEC list of patent declarations received (see patents.iec.ch).

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. In the IEC, see www.iec.ch/understanding-standards.

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

This third edition cancels and replaces the second edition (ISO/IEC 24735:2012), which has been technically revised.

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

— Clause 3 has been modified to add new definitions and removed definitions of terms not used in the text;

— added "ready delay time" requirement to "test measurement" procedures;

— annex structure has been changed to be consistent with other productivity standards;

— added minimum declaration example to Annex A;

— added Annex D for the procedure to determine the "ready delay time".

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 and www.iec.ch/national -committees.

Introduction

Many digital copying devices produce copied pages at a different rate than their nominal speed when running with different modes (simplex, duplex, copying quality modes), different substrate grammage and collating and/or finishing options. The degree to which a reduction in productivity is experienced depends significantly on other parameters of the job stream. The most dominant of the parameters of the job stream are: the number of original pages in a set to be printed, whether output pages are single-sided or double-sided, image quality modes selected, B&W and colour reproduction job stream, number of print sets to be produced, substrate size used, run length and finishing options.

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.

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

1 Scope

This document specifies a method for measuring the digital copying productivity of digital copying devices and multifunctional devices with various copying modes. It is applicable to digital copying devices and multifunctional devices equipped with automatic document feeder (ADF) and collating function. This 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. It allows comparison of the throughput copying rates for a machine operated in various available operating modes (simplex, duplex, size of substrates, 2-up, etc.) and various available digital image processing configurations. This document includes test files, test setup procedures, test procedures, and reporting requirements for digital copying productivity measurements.

This document is not intended to be used for devices which are not able to copy on a media size of A4/8,5" × 11", devices that do not have an ADF, or devices which are not able to collate multiple copies of original prints from a test set.

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*

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

ISO/IEC 24734, *Information technology -- Office equipment--Method for measuring digital printing productivity*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 24734 and the following 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
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)* (3.5).

3.2
duplex
duplex copying
two-sided copying
1:2 mode
2:2 mode
<copy> use of a copying device to make a number of copies with the copying being done on both sides of the sheet

Note 1 to entry: 1:2 mode refers to simplex originals that are copied to 2-sided output.

Note 2 to entry: 2:2 mode refers to two sided originals that are copied to 2-sided output.

3.3
feature performance test
<copy> optional test used to evaluate productivity changes with various copying and finishing features enabled

Note 1 to entry: The feature performance test suite is run with default copying system settings to establish a base line, and then with the selected feature (e.g. stapling) ON, for comparison.

3.4
full report
<copy> presentation of results including the *first set out time (FSOT)*, *estimated saturated throughput (ESAT)* and *effective throughput (EFTP)* values in *general performance tests* (3.6) or the FSOT and ESAT values in *feature performance tests* (3.3) as well as the calculated averages for each value

3.5
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.

3.6
general performance test
test used to evaluate productivity of default features

3.7
simplex copying
one-sided copying
simplex to simplex
1:1 mode
use of a copying device when only a single side of a sheet is copied on

3.8
summary report
presentation of results, including the average overall *first set out time (FSOT)* and *estimated saturated throughput (ESAT)* in *general performance tests* (3.6) or the ratio of the copying performance such as FSOT and ESAT with the subject feature ON versus the copying device default base line performance (without the subject feature ON) in *feature performance tests* (3.3)

3.9
test file
digital file used for creating *test targets* (3.12)

3.10
test run
operation of copying all pages of targets from a *test file* (3.9), in a particular system configuration, with a particular set and page count

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

3.11
test set
<copy> all of the pages of targets from a *test target* (3.12)

3.12
test target
test chart
hard copy document used for testing per the test method, and created from a *test file* (3.9)

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. All image and copying modes should be at their factory preset 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 preset 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.

Multiple copy output shall be collated. If collated output is not included in the default settings, follow the manufacturer's recommendation for obtaining collated output. In the case that collation settings do affect performance, the faster of the results should be reported. As with other settings, the test report shall disclose the manner in which collation was achieved.

Single and multiple copy output will be ordered according to "default settings". It is assumed that "default settings" will yield original order output for a dual output order device that supports both original order and reverse order output. If the default settings on a dual output order device yields reverse order output, then testing using original order output is required for the 1 set + 30 seconds test and the 1 set + 4 minutes test runs, optional for 1 set test.

If not the default and if supported, optional original order output on 1 set test may be done by following the manufacturer's instructions on how to change the copying device for the result of producing original order output. If other settings change automatically as a result of changing to original order output this shall be noted on the test report.

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 preset 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 configuration options to be noted in the full detailed report:

— finisher as default;

— 160GB HDD installed.

Table 1 — Preset settings

	Preset item	Preset value
Mode	Output resolution	Default
	Output quality	Default
	Copying mode	Default
	Auto density adjustment	Default
	Collating function	Activated (tests with copy set count >= 2)
		Default (tests with copy set count = 1)
Paper	Paper sending direction	Default
	Paper type setting	Default
Paper-path	Paper feeding	Standard cassette
	Paper exit	Standard exit tray
	Face up exit	Default
	Duplex copying unit	Default (used in 1:2 mode and 2:2 mode).
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 h.

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 general performance test (5.4) shall be cut sheet, A4 and/or 8,5" × 11" (215,9 mm x 279,4 mm) size. Optional paper sizes may be used in the feature performance tests such as 8,5" × 14", A3, and/or 11" × 17" (279,4 mm × 431,8 mm) size as appropriate for the test mode. The paper manufacturer, grammage, size and paper type/name used in each test shall be noted on the full detailed report.

When sheets of paper of the size other than A4/A3 are used, the sizes shall be indicated in the places of A4 and A3 in the measurement results tables. When a comparison needs to be made between the productivity of one machine with that of other machines, the measurement shall be done with the same paper sizes. If the copying device employs "thick paper mode" for copying, then this optional mode shall be noted in the machine setup information of the full detailed report specified 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   Device maintenance examples:

— cleaning routines;

— consumables replacement.

4.6 Preparation of test targets (test charts)

The copying test file is outlined in Annex C.

The test file consists of four 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 printer which is used to print out the actual test targets. The test targets shall be reordered to match the original electronic test file page order.

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.

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 to prevent copying 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 on the paper.

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 %.

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

4.8 Voltage

Input line voltage may affect productivity. The copying device shall be connected to a voltage supply within the manufacturer specified operating voltage range for the copying 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 utilise a heater have a longer *FSOT* time when the line voltage is at the lower value of the recommended operating range.

5   Test method

5.1   Overview

A single set of each test target is copied and measured to determine $FSOT_{1set}$.

Multiple, *N* sets, of each test target are measured for the 1 set + 30 seconds test run to calculate $ESAT_{30sec}$ and $EFTP_{30sec}$, where *N* is the number of sets needed to meet $LSOT_{30sec}-FSOT_{30sec} \geq 30$ s. 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.

The 1 set + 4 minutes test is a similar concept used to calculate $EFTP_{4min}$ and is intended to provide a test to illustrate that differences in productivity can occur for longer copying times compared to shorter copying times. It is understood and recognized that 4 min may be a long test for some devices, but a short test for other, higher-end devices. The 4 min time is a compromise to meet the needs of the many products across many segments covered in the scope of this document.

In order to ensure clarity between the results of each test and to avoid test result confusion that can be caused by back to back job spooling effect, each copy job test should be started only after the last copy of the previous test has been fully ejected from the machine and the device has returned to a ready state.

Repeat the (1 set test, 1 set + 30 seconds test, and 1 set + 4 minutes test) for each required/optional test target, test suite, as applicable for the relevant copying modes on the device under test. (See 7.2.)

5.2   Test measurement procedure

5.2.1   Test setup

Before testing, the following setup activities shall be completed.

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

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

c)   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 required in order to establish the job ready delay time.

d)   Set the system parameters (such as paper grammage selection, paper size and feed orientation, quality mode, collate) 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 shall be noted in the full detailed report.

e)   Refer to Annex B for an example of settings to record. Refer to 5.4 for information on required tests and 5.5 for information on running the optional feature performance tests. Refer to Clause 6 for information on the calculation and treatment of data. Refer to Clause 7 for information on data reporting.

f) Prepare and set the test targets that will be used in the test, identified as described in 4.6.

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

h) Determine the ready delay time between jobs. The (1 set test, 1 set + 30 seconds test, and 1 set + 4 minutes test) from ready for some devices is sensitive to the ready delay time from the exit of the last page of the previous print job to the initiation of the next job. The ready delay time used shall be no shorter than 20 s and no longer than 50 s; however, care shall be taken to select a ready delay time that places the device in a stable condition. If the tester is unsure of what ready delay time will place the device in a stable condition, the procedure in Annex D shall be used to establish a ready delay time to place the device in a stable condition. The ready delay time used may be different from what Annex D would indicate as long as the (1 set test, 1 set + 30 seconds test, and 1 set + 4 minutes test) result is equivalent to the (1 set test, 1 set + 30 seconds test, and 1 set + 4 minutes test) at the ready delay time that Annex D would have selected. It shall be noted in the full report the ready delay time and whether a ready delay time found with Annex D was used.

NOTE 1   In general electro-photographic devices are in a stable condition at 50 s, although many devices are in a stable condition in less than 50 s. With inkjet devices, an unstable condition happens during a print head capping or servicing routine.

NOTE 2   Measurement of printing productivity in a multi-function device (MFD) is measured according to ISO/IEC 24734. Only copying productivity function can be measured according to this document.

5.2.2   "1 set" test from ready

The procedure to measure $FSOT_{1set}$ and $EFTP_{1set}$ is defined by the following steps.

a) Enter copy set count = 1 and press the copy start button. Start the ready delay timer when the last page has fully exited from the device.

   NOTE 1   Step a) is skipped when the ready delay timer is started at the end of a different test.

b) Enter copy set count = 1 required for this specific test run on the copying device operation panel. If original document order is not the default, optionally select any necessary output order options to ensure that the 1 set run copies the output in original document order (ABCD).

c) [Start test run] At the end of the ready delay time, press the copy start button and simultaneously start the timing device (watch or otherwise).

d) Record the time for completion of one set to at least two decimal places and start the ready delay timer.

e) [End test run]

f) Run the "1 set" test, steps b) – e), twice. Calculate the average $FSOT_{1set}$ and $EFTP_{1set}$ for each test run according to Clause 6.

g) Determine if the results are consistent within ±5 % according to 5.3.2 and perform a third test run if required. (The data from the test is average of the individual runs. Three iterations are the maximum and the results from all iterations are averaged to get the required data.)

h) Calculate the average $FSOT_{1set}$ and $EFTP_{1set}$ according to Clause 6.

i) Repeat steps a) – h) for each required copying mode (1:1, 1:2, 2:2) which are available on the copying device under test.

   NOTE 2   The average $FSOT_{1set}$ for this test set is reported in the summary report, the full report and the full detailed report as $FSOT$. For details, see Annex A and Annex B for an example of report presentation.

5.2.3 "1 set + 30 seconds" test from ready

The procedure to measure $ESAT_{30sec}$ and $EFTP_{30sec}$ is defined by the following steps.

a) Enter copy set count = 1 and press copy start button. Start the ready delay timer when the last page has fully exited from the device.

  NOTE 1   Step a) is skipped when the ready delay timer is started at the end of a different test.

b) Enter copy set count = N required for $LSOT_{30sec}$–$FSOT_{30sec} \geq 30$ s. Select any necessary collate and output order options to ensure that multiple set runs copy the output in collated original order (1234..., 1234 ...). For the second and third tests, use the same set count as used in the first test.

  NOTE 2   This $FSOT_{30sec}$ is not the same as the $FSOT_{1set}$ from the 1 set test. The $FSOT_{30sec}$ measured is used to verify $LSOT_{30sec}$–$FSOT_{30sec} \geq 30$ s and to calculate $ESAT_{30sec}$.

c) [Start test run] At the end of the ready delay time, press the copy start button and simultaneously start the timing device (watch or otherwise).

d) Record the time for completion of $FSOT_{30sec}$ to at least two decimal places. This is the time from pressing the copy button until the fourth page of the first test set is fully ejected from the machine.

  NOTE 3   If the output paper bin capacity is less than the number of pages to be copied, the output paper is removed during the test.

e) Record the time for completion of $LSOT_{30sec}$ to at least two decimal places. This is the time from pressing copy button until the last page of the Nth test set is fully ejected from the machine and start the ready delay timer.

f) [End test run]

g) Run the 1 set + 30 seconds test, steps b) – f), twice. Calculate $ESAT_{30sec}$ and $EFTP_{30sec}$ for each test run according to Clause 6.

h) Determine if the results are consistent within ±5 % according to 5.3.2 and perform a third test run if required. (The data from the test is average of the individual runs. Three iterations are the max and the results from all iterations are averaged to get the required data.)

i) Calculate the average $ESAT_{30sec}$ and $EFTP_{30sec}$ according to Clause 6.

j) Repeat steps a) – i) for each required copying mode (1:1, 1:2, 2:2) which are available on the copying device under test.

  NOTE 4   The average $ESAT_{30sec}$ for this test set is reported in the summary report, the full report and the full detailed report as $ESAT$. For detail, see Annex A and Annex B for an example of report presentation.

5.2.4 "1 set + 4 minutes" test from ready

The procedure to measure $EFTP_{4min}$ is defined by the following steps.

a) Enter copy set count = 1 and press the copy start button. Start the ready delay timer when the last page has fully exited from the device.

  NOTE 1   Step a) is skipped when the ready delay timer is started at the end of a different test.

b) Enter print set count = N required for $LSOT_{4min}$–$FSOT_{4min} \geq 4$ min. Select any necessary collate and output order options to ensure that multiple set runs copy the output in collated original order (1234..., 1234 ...). For the second and third tests, use the same set count as used in the first test.

  NOTE 2   This $FSOT_{4min}$ is not the same as $FSOT_{1set}$ from the 1 set test. The $FSOT_{4min}$ measured here is only used to verify $LSOT_{4min}$–$FSOT_{4min} \geq 4$ min.

c) [Start test run] Press the copy button and simultaneously start the timing device (watch or otherwise).

d) Record the time for completion of the $FSOT_{4min}$ to at least two decimal places. This is the time from pressing the copy button until the fourth page of the first test set is fully ejected from the machine.

NOTE 3 If the output paper bin capacity is less than the number of pages to be copied, the output paper is removed from the output paper bin during the test.

e) Record the time for completion of $LSOT_{4min}$ to at least two decimal places. This is the time from pressing copy button until the last page of the Nth test set is fully ejected from the machine.

f) [End test run]

g) Run the 1 set + 4 min test, steps b) – f), twice. Calculate $EFTP_{4min}$ for each test run according to Clause 6.

h) Determine if the results are consistent within ±5 % according to 5.3.2 and perform a third test run if required. (The data from the test is average of the individual runs. Three iterations are the max and the results from all iterations are averaged to get the required data.)

i) Calculate the average $EFTP_{4min}$ according to Clause 6.

j) Repeat steps a) – i) for each required copying mode (1:1, 1:2, 2:2) which are available on the copying device under test.

5.3   Test method process

5.3.1   Suggested flow chart

The suggested test execution flow is shown in Figure 1.
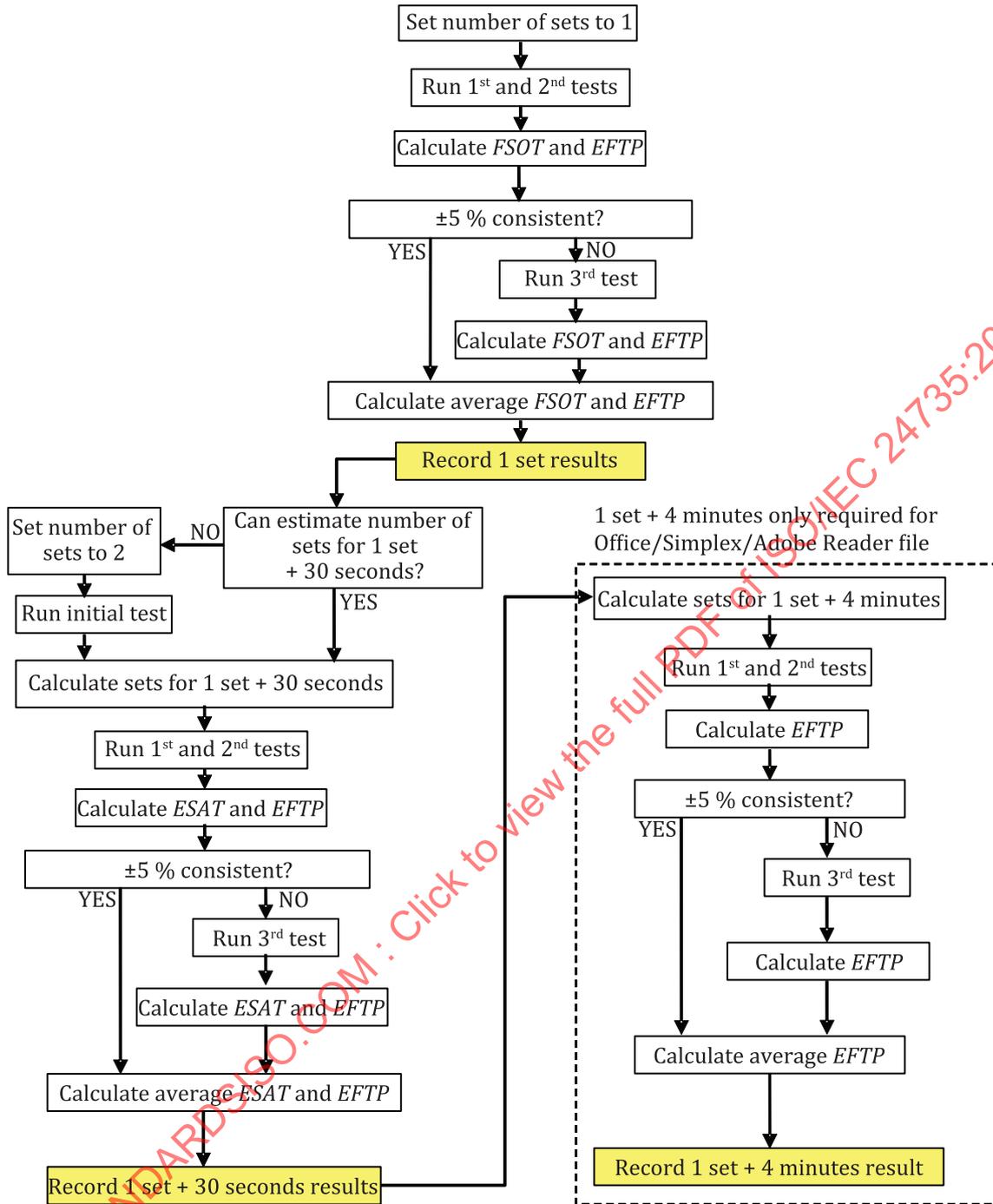
Figure 1 — Test flow chart

5.3.2 ±5 % consistency criteria

If the first two test runs are not consistent within ±5 %, then a third test run is required. Formulae for *ESAT* and *EFTP* can be found in Clause 6.

$$c_{\text{FSOT}} = \frac{2 \times S_{\text{FSOT},1}}{S_{\text{FSOT},1} + S_{\text{FSOT},2}} - 1$$

$$c_{\text{ESAT}} = \frac{2 \times S_{\text{ESAT},1}}{S_{\text{ESAT},1} + S_{\text{ESAT},2}} - 1$$

$$c_{\text{EFTP}} = \frac{2 \times S_{\text{EFTP},1}}{S_{\text{EFTP},1} + S_{\text{EFTP},2}} - 1$$

where

$S_{\text{FSOT},1}$	is the first measured first set out time ($FSOT_1$);
$S_{\text{FSOT},2}$	is the second measured first set out time ($FSOT_2$);
c_{FSOT}	is the consistency of $FSOT$;
$S_{\text{ESAT},1}$	is the first measured estimated saturated throughput ($ESAT_1$);
$S_{\text{ESAT},2}$	is the second measured estimated saturated throughput ($ESAT_2$);
c_{ESAT}	is the consistency of $ESAT$;
$S_{\text{EFTP},1}$	is the first measured first set out time ($EFTP_1$);
$S_{\text{EFTP},2}$	is the second measured first set out time ($EFTP_2$);
c_{EFTP}	is the consistency of $EFTP$.

If the 1 set + 4 minutes test estimated copy count is greater than the maximum copy count or input tray capacity, this test shall not be run and reported as N/A in the test report.

5.3.3 Estimating the set count

5.3.3.1 Overview

This estimation shall be done when multiple test sets are copied.

5.3.3.2 '1 set + 30 seconds test'

The test may begin with an initial set count $N_{\text{initial}} = 2$ or by estimating the number of sets needed, provided that the tester has sufficient information for estimation beforehand. If the $N = 2$ test result did not meet the $LSOT$-$ESOT \geq 30$ s requirement, then calculate necessary set count $estN_{30\text{sec}}$ as follows and test using the new $estN_{30\text{sec}}$ as the set count. The following formula can be used to estimate the number of sets needed:

$$N_{\text{est},30\text{sec}} = \text{Round up}\left[\frac{30 \times (N_{\text{initial}} - 1)}{S_{\text{LSOT},\text{initial}} - S_{\text{FSOT},\text{initial}}} + 1 \right]$$

where

N_{initial}	is the estimated number of sets needed for $N_{\text{est},30\text{sec}} \geq 30$ s;
$S_{\text{LSOT},\text{initial}}$	is the last set out time with N_{initial} sets ($LSOT_{\text{initial}}$);
$S_{\text{FSOT},\text{initial}}$	is the first set out time with N_{initial} sets ($FSOT_{\text{initial}}$);
$N_{\text{est},30,\text{sec}}$	is the estimated set count for 1 set + 30 seconds ($estN_{30\text{sec}}$).

The number of sets tested should result in $LSOT_{30sec}$–$FSOT_{30sec} \geq 30$ s as close as possible. If the results of a test run gives $LSOT_{30sec}$–$FSOT_{30sec} < 30$ s the number of sets shall be increased and all runs re-tested.

NOTE   The 1 set + 30 seconds test is devised to make $LSOT_{30sec}$–$FSOT_{30sec}$ long enough to minimise measurement error of ESAT and short enough to avoid delay caused by calibration or other interruption routine.

5.3.3.3 '1 set + 4 minutes test'

Calculate necessary set count $estN_{4min}$ as follows by using the results of the 1 set + 30 seconds test and test using the $estN_{4min}$ as the set count.

$$N_{est,4min} = \text{Round up} \left[\frac{240 \times (N_{30sec} - 1)}{S_{LSOT,30sec} - S_{FSOT,30sec}} + 1 \right]$$

where

N_{30sec} is the number of sets used for 1 set + 30 seconds test;

$S_{LSOT,30sec}$ is the last set out time acquired in the 1 set + 30 seconds test ($LSOT_{30sec}$);

$S_{FSOT,30sec}$ is the first set out time acquired in the 1 set + 30 seconds test ($FSOT_{30sec}$);

$N_{est,4min}$ is the estimated set count for 1 set + 4 minutes ($estN_{4min}$).

The number of sets tested should result in $LSOT_{4min} - FSOT_{4min} \geq 4$ min. If the results of a test run give $LSOT_{4min} - FSOT_{4min} < 4$ min the number of sets shall be increased and all runs re-tested.

If the 1 set + 4 minutes test estimated copy count is greater than the maximum copy count or input tray capacity, this test shall not be run and reported as N/A in the test report.

5.4   General performance test

5.4.1   Overview

The general performance tests require using the 1 set test, 1 set + 30 seconds test and 1 set + 4 minutes test procedures in 5.2.

There are two key parameters, *FSOT* and *ESAT*, reported in summary report and three key parameters, *FSOT*, *ESAT* and *EFTP*, reported in full report of general performance test. The full report provides detailed information including, *EFTP*, *FSOT* and *ESAT* for the various test runs. (*FSOT* and *ESAT* values are the same in the both reports.)

5.4.2   Measurement of FSOT and ESAT

The productivity test(s) shall be done in the 1:1, 1:2 and 2:2 modes, insofar as they are available on the machine of interest.

Prepare the test targets (described in 4.6) for this measurement. One set consists of four images, which are four simplex pages for 1:1/1:2 mode and two duplex pages for 2:2 mode.

Each test shall be done in full colour mode (required) in addition to monochrome copying mode (optional), only if the machine is a colour copying device. Only monochrome copying mode shall be done if the machine is a B&W copying device.

5.4.3   Measurement of EFTP

The time required in each mode to produce the completed copying is measured in seconds and recorded. First set out time is included inherently in the measurements of overall multicopy time to reflect the effective throughput (*EFTP*) of the machine under test.

The time measurement is started when the "copy start button" is pressed and is concluded when the last print is fully ejected from the machine. The measured intervals of time should be recorded to two decimal places. Measurement shall be done for four images in 1:1/1:2/2:2 modes.

Each test shall be done in full colour mode (required) in addition to monochrome copying mode (optional), only if the machine is a colour copying device. Only monochrome copying mode shall be done if the machine is a B&W copying device.

5.5 Feature performance test

5.5.1 Overview

An optional feature performance test is provided as a convenient means to evaluate productivity differences with various copying and finishing features enabled.

EXAMPLE   Examples of features that can be tested with the feature performance test, but are not limited to the following:

— mixed originals copying;

— 2-up copying;

— stapling;

— hole punching.

Copying 2-up simplex with larger size media means that two A4 sized images are copied on one side of the larger sheet A3. In the case of 2-up simplex copying with A4 sized media, two of the A4 size images are resized (by the reduction mode) and copied on one side of the A4 sized media.

The results when copying with a feature enabled shall be reported as a comparison to the performance when copying from a copying device in the default mode and the feature disabled. The feature performance test is done in full colour mode, only if the machine is a colour copying device. Only monochrome copying mode will be done if the machine is a B&W copying device.

5.5.2 Features setting conditions

The feature setting conditions and test preset conditions shall be identified (default and all non-default and optional test mode settings) and reported as shown in full detailed report in Annex B.

Mixed originals mode:

Some of the original document characters, especially when the document consists of mixed size hardcopies, affect the productivity of copying devices. In order to defining the effectiveness of original document size mixed, some other factors are fixed as in the following Table 2.

For this test, test targets (charts) A, B, C and D pages of the test file are printed. The sizes of charts are defined in the following table. When you use A3 chart, each assigned chart size shall be magnified and printed in A3 size.

Table 2 — Factors for mixed originals mode

Factors		Selected condition
Original size and combination	1) A4	4 pages in A4 size (all A4 size in ABCD order)
	2) A3+A4	2 pages in A3 + 2 pages in A4 (A3 size A and B, then A4 size C and D)
	3) A3	4 pages in A3 size (all A3 size in ABCD order)
Direction of original setting	Default	
Original image side	One-sided	
Paper path setting	Set A4 at the shortest path, A3 at the second shortest path if available. (When using by-pass/manual feed unit, it shall be noted in full detailed report.)	
Coping mode	Collating mode only (without any other mode)	

2-up mode:

Some of images combination to one copy affects the productivity of copying devices. In order to define the effectiveness of such a *N*-up process, some other factors are fixed as in the following Table 3. 2-up mode can be representative for this *N*-up mode and be measured as for the measurement of this mode.

For this test, test targets A, B, C and D pages of the test file are printed.

Table 3 — Factors for 2-up mode

Factors		Selected condition
Original size and combination	1) A4	4 pages in A4 size (all A4 size in ABCD order)
	2) A4 at 2-up mode	4 pages in A4 size into 2 pages (all A4 size in ABCD order)
Direction of original setting	Default	
Original image side	One-sided	
Coping mode	2-up mode, collating mode only (without any other mode)	

Other special modes:

Some other modes such as "Stapling", "heavy paper copying usage", "various colour originals usage", "Paper size unifying mode in mixed size originals" can be added as a special mode as in the following Table 4. In addition, testing of digital image processing configurations can be added as a special mode.

The set count may be modified from that required for the 1 set + 30 seconds run as needed to provide an appropriate test for the feature being evaluated. The modified set count is used for the feature mode test run.

When any other conditions such as "various character of paper", "various path of feeding paper", "auto density adjust", "% enlargement", "% reduction", which are different from the preset conditions, those values in the test will be noted on the full detailed report format as shown in Annex B.

For this test, test targets A, B, C and D pages of the test file are printed.

Table 4 — Factors for other special mode

Factors	Selected condition	
Original size and combination	1) A4	4 pages in A4 size
		(all A4 size in ABCD order)
	2) A4 at special mode	4 pages in A4 size
		(all A4 size in ABCD order)
Direction of original setting	Default	
Original image side	One-sided	
Coping mode	Selected special mode (without any other mode)	

5.5.3 Measurement of FSOT and ESAT

The feature performance tests require using the 1 set and 1 set + 30 seconds test procedures in 5.2.

First, complete a simplex test run using the manufacturer's default copying settings, (the base copying mode test). The base copying mode test is run consisting of four pages as 1 set without the feature and needs only be executed once for each base mode (consisting of two or three runs as needed to satisfy the ± 5 % consistency criteria). Next, complete the tests for each feature copying mode selected (the feature mode test). The minimum required presentation of results shall include data showing the ratio of *FSOT* and *ESAT* for base copying mode to *FSOT* and *ESAT* for feature copying mode test results.

When a feature performance test uses more than four pages in a set, *FSOT* for base copying mode shall be measured using the same number of pages in the set as the feature copying mode.

ESAT data from the general performance test can be used for the base copying mode.

The set count is determined using four pages simplex as 1 set for the base copying mode test run as in 5.2. The *ESAT* data for the base copying mode test are the same as in the general performance test in 5.4.

The set count may be modified from that required for the 1 set + 30 seconds run as needed to provide an appropriate test for the feature being evaluated. The modified set count is used only for the feature mode test run.

6 Calculations and treatment of data

6.1 Overview

The time intervals for each test run are recorded during the test operation. A spreadsheet format that records the time for the tests run is useful for this purpose but is not required.

Data and calculations may include as many decimal places as desired. Dropping fractions is allowed but rounding to a faster time (s) or throughput (ipm) is not allowed. Recorded and reported numbers shall never be better than actual measurement (higher for *ESAT* and *EFTP* or lower for *FSOT*).

Averages are calculated by averaging the results (*FSOT*, *ESAT*, *EFTP*), not by averaging the times, and then calculating a result. Calculate *ESAT* of test run one and *ESAT* from test run two (and of test run three if required), and then average $ESAT_1$ and $ESAT_2$ (and $ESAT_3$) to yield $ESAT_{ave}$.

The number of *ESAT* and *EFTP* is expressed in ipm in the following way:

a) less than 10 ipm: round down at two decimal places and express as two significant figures (X,X);

b) 10 ipm to 99 ipm: express with either of the methods below:

   1) round down at one decimal place and express as two significant figures (XX);

2) round down at two decimal places and express as three significant figures (XX,X);

c) 100 ipm or more: round down at one decimal place and express as three significant figures (XXX).

EXAMPLE   If 34,99 is the measured and calculated average of *ESAT*, then a report could record 34,9 or 34 ipm, but not 35 ipm.

6.2   General performance test

6.2.1   "1 set" test from ready

$FSOT_{1set}$ and $EFTP_{1set}$ shall be calculated using data from a single set test run.

For test runs using the four-page target and 1 set count test run, each time recorded is shown in Figure 2.

$$t_0 = 0 \qquad\qquad\qquad t_1$$
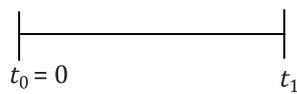
Figure 2 — 1 set test

$$S_{FSOT,1set} = t_1$$

$$S_{EFTP,1set} = \frac{240}{S_{FSOT,1set}}$$

where

$S_{FSOT,1set}$ is the first set out time ($FSOT_{1set}$);

$S_{EFTP,1set}$ is the effective throughput ($EFTP_{1set}$).

240 s in the above formula is four pages times sixty seconds.

6.2.2   "1 set + 30 seconds" test from ready

$ESAT_{30sec}$ and $EFTP_{30sec}$ shall be calculated using the data of 1 set + 30 s test.

For test runs using the four-page target and N set count test run, each time recorded is shown in Figure 3.

$$t_0 = 0 \qquad\qquad\qquad t_1 \qquad\qquad\qquad t_N$$
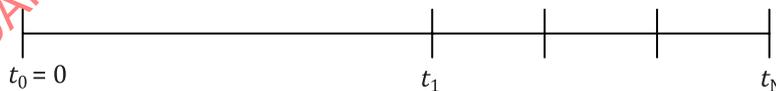
Figure 3 — 1 set + 30 seconds test

$ESAT_{30sec}$ and $EFTP_{30sec}$ shall be calculated using the 1 set + 30 seconds test data by the following formulae.

$$S_{FSOT,30sec} = t_1$$

$$S_{LSOT,30sec} = t_N$$

$$S_{\text{ESAT},30\text{sec}} = \frac{240 \times \left(S_{\text{N},30\text{sec}} - 1\right)}{S_{\text{LSOT},30\text{sec}} - S_{\text{FSOT},30\text{sec}}}$$

$$S_{\text{EFTP},30\text{sec}} = \frac{240 \times S_{\text{N},30\text{sec}}}{S_{\text{LSOT},30\text{sec}}}$$

where

$S_{\text{FSOT},30\text{sec}}$	is the first set out time ($FSOT_{30\text{sec}}$);
$S_{\text{LSOT},30\text{sec}}$	is the last set out time ($LSOT_{30\text{sec}}$);
$S_{\text{N},30\text{sec}}$	is the set count to reach 30 s ($N_{30\text{sec}}$);
$S_{\text{ESAT},30\text{sec}}$	is the estimated saturated throughput ($ESAT_{30\text{sec}}$);
$S_{\text{EFTP},30\text{sec}}$	is the effective throughput ($EFTP_{30\text{sec}}$).

240 s in the above formula is four pages times sixty seconds.

6.2.3 "1 set + 4 minutes" test from ready

$EFTP_{4\text{min}}$ shall be calculated using the data of 1 set + 4 minutes test.

For test runs using the four-page target and $N_{4\text{min}}$ set count test run, each time recorded is shown in Figure 4.

**Figure 4 — 1 set + 4 minutes test**

$$S_{\text{FSOT},4\text{min}} = t_1$$

$$S_{\text{LSOT},4\text{min}} = t_N$$

$$S_{\text{EFTP},4\text{min}} = \frac{240 \times S_{\text{N},4\text{min}}}{S_{\text{LSOT},4\text{min}}}$$

where

$S_{\text{FSOT},4\text{min}}$	is the first set out time ($FSOT_{4\text{min}}$);
$S_{\text{LSOT},4\text{min}}$	is the last set out time ($LSOT_{4\text{min}}$);
$S_{\text{N},4\text{min}}$	is the set count to reach 4 min ($N_{4\text{min}}$);
$S_{\text{EFTP},4\text{min}}$	is the effective throughput ($EFTP_{4\text{min}}$).

240 s in the above formula is four pages times sixty seconds.

In case the first set out time is constant regardless of set counts, i.e. $FSOT_{30\text{sec}} = FSOT_{4\text{min}} = FSOT$, it is possible to combine 1 set test, 1 set + 30 seconds test (and 1 set + 4 minutes test) to one combined test, whose set count should be at least $N_{30\text{sec}}$ (or $N_{4\text{min}}$ in case 1 set + 4 minutes test is combined). Measurement should be done at each timing of 1 set test, 1 set + 30 seconds test (and 1 set + 4 minutes test) as identified in Figure 5. If this option is adopted, it should be noted in the full detailed report.
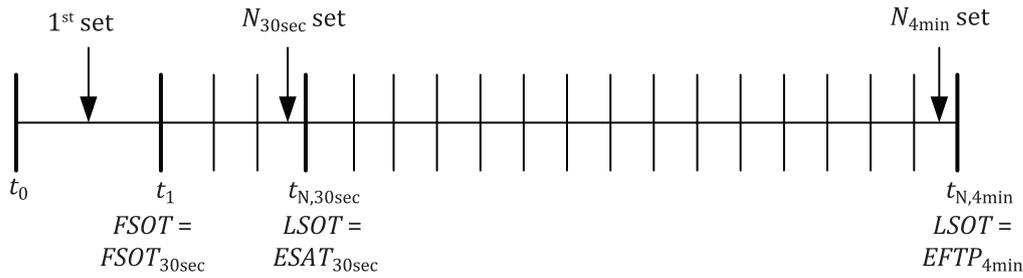
Figure 5 — combined test measurement points

6.3 Feature performance test

Feature performance test itself is optional. However, when conducted, 1 set test and 1 set + 30 seconds test are required for the base copying mode and for each feature performance test.

The set count is determined using four pages simplex as 1 set for the base copying mode test run as in 5.2. But the set count may be modified from that required for the 1 set+30 seconds run as needed to provide an appropriate test for the feature being evaluated. The modified set count is used for the feature mode test run.

6.3.1 "1 set" test from ready

$FSOT_{1set}$ shall be calculated using data from a single set test run.

For test runs using the four-page target and 1 set count test run, each time recorded is shown in Figure 6.

Figure 6 — 1 set

$$S_{FSOT,1set} = t_1$$

where

$S_{FSOT,1set}$ is the first set out time ($FSOT_{1set}$).

For each feature tested, the percentage of the feature copying mode to base copying Mode is calculated as follows:

$$S_{FSOT,feature,percent} = \frac{S_{FSOT,base}}{S_{FSOT,feature}} \times 100$$

where

$S_{ESAT,feature,percent}$ is the feature percentage $FSOT$ (format as a percentage);

$S_{FSOT,base}$ is the first set out time ($FSOT_{base}$);

$S_{FSOT,feature}$ is the first set out time ($FSOT_{feature}$).

NOTE   The $FSOT_{1set}$ for 1 set test in feature performance test is reported as $FSOT$. For $FSOT$ percentage, the base time is in the numerator so that a slower feature $FSOT$ results in a % < 100. This maintains consistency with the percentage of $ESAT$.

6.3.2 "1 set + 30 seconds" test from ready

ESAT$_{30sec}$ shall be calculated using the data of 1 set + 30 s test.

For test runs using four-page test targets and N_{30sec} set count test run, each time recorded is shown in Figure 7.
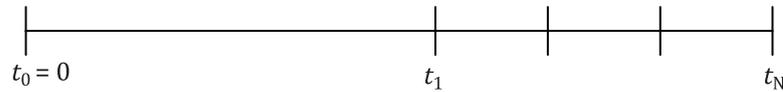
Figure 7 — 1 set + 30 seconds test

$ESAT_{30sec}$ shall be calculated from the 1 set + 30 seconds test data from the following formula.

$$S_{FSOT,30sec} = t_1$$

$$S_{LSOT,30sec} = t_N$$

$$S_{ESAT,30sec} = \frac{240 \times \left(S_{N,30sec} - 1\right)}{S_{LSOT,30sec} - S_{FSOT,30sec}}$$

where

$S_{FSOT,30sec}$ is the first set out time ($FSOT_{30sec}$);

$S_{LSOT,30sec}$ is the last set out time ($LSOT_{30sec}$);

$S_{N,30sec}$ is the set count to reach 30 s (N_{30sec});

$S_{ESAT,30sec}$ is the effective throughput ($ESAT_{30sec}$).

240 s in the above formula is four pages times sixty seconds.

If a feature test is performed on large sizes media (A3) then the *ESAT* calculation shall be corrected for the 2-up copies. That is A3 shall be counted as two pages of A4.

For each feature tested, the percentage of the feature copying mode to base copying mode is calculated as follows:

$$S_{ESAT,feature,percent} = \frac{S_{ESAT,feature}}{S_{ESAT,base}} \times 100$$

where

$S_{ESAT,feature,percent}$ is the feature percentage *ESAT* (format as a percentage);

$S_{ESAT,feature}$ is the estimated saturated throughput of the feature ($ESAT_{feature}$);

$S_{ESAT,base}$ is the estimated saturated throughput of the feature ($ESAT_{base}$);.

7 Presentation of results

7.1 Sharing testing and reports

Products that are of the same distinct copy system can share testing and reports. Two or more products or bundles may be part of a distinct copy system when they use the same scan and print mechanism and

operating points, and there are no differences that might be expected to affect performance. Devices with differences that could affect performance are not part of the same distinct Copy system, and are different copy systems, even if they use the same scan or print mechanism, and shall not share testing and reports.

7.2 General performance test

7.2.1 Overview

Three reporting formats are described:

a) the minimum declaration is the minimal requirement for presenting results;

b) the "full report" and "full detailed report" should be the "report" format to be presented if requested;

c) the "summary report" should be the "declaration" to be used in marketing materials or packaging.

A "declaration" of the whole "summary report" is recommended.

All reporting including minimal declaration, summary and full report tables shall include a pointer to the full detailed report or contact information to obtain the report. An example of a summary report is shown in 7.2.3 and a full report is shown in 7.2.4. Optionally reported data are shown as "O", required as "R", and "R*" for testing which is required to report if an optional test mode is selected. An example of the summary report and the full report is included in Annex A. An example of the full detailed report is included in Annex B.

The individual manufacturer can choose whether or not to display summary report or full report on his/her brochure or spec sheet. If the report is shown on them, above table formats are recommended to be used. A pointer to the full detailed report (an example shown in Annex B) shall be included in his brochure or spec sheet.

7.2.2 Minimum declaration

The minimum requirement of "declaration" shall include the following three items:

a) description that the productivity has been determined in accordance with ISO/IEC 24735;

b) the average of $ESAT_{30sec}$ in a general performance test for the default simplex mode;

c) pointer to the full detailed report or contact information.

7.2.3 Summary report

The minimum required presentation of results shall include a summary report form as displayed in Table 5. A summary report includes the averages of $FSOT$(s) and $ESAT$ (ipm) in a given test. The system setting for the copying modes and test preset conditions shall be identified (default and all non-default and optional test mode settings) and reported as shown in full detailed report (Annex B). An example of a summary report table is shown in Annex A.

When appropriate, rows may be deleted from the summary report. Specifically, if a device does not have the ability to duplex, the duplex rows may be deleted. Each test should be also done optionally in monochrome mode in addition to the required full colour copying mode, only if the machine is a colour copying device. Similarly, a monochrome only copying device does not need to report data for a colour copying mode.

The measured intervals of time should be recorded to two decimal places. The figure of average results is rounded down at two decimal places to the final result of $ESAT$ and the figure of average results is rounded up at two decimal places to the final result of $FSOT$.

Table 5 — Results of summary report

	Copying mode	$FSOT_{1set}$(s)	$ESAT_{30sec}$(ipm)
Defaults (colour for colour device, B&W for mono-chrome device)	1:1	R	R
	1:2	R	R
	2:2	R	R
B&W mode (optional for colour device)	1:1	R*	R*
	1:2	R*	R*
	2:2	R*	R*

Reporting on tests is defined by:

— R is required to report when available on the printing device;

— R* is required to report if optional B&W mode is run on colour device.

The following shall be recorded in the first table row after the data:

a) the device settings;

b) the copying device settings used for B&W output mode on colour device;

c) the 1 set output order: original order or reverse order;

d) the location to find full detailed report or contact information;

e) the paper size and paper feed orientation;

f) the statement "Productivity has been determined in accordance with ISO/IEC 24735".

7.2.4 Full report

The presentation of results is recommended to include a full report form as displayed in Table 6. A full report includes the averages of *FSOT*, *ESAT* and *EFTP* in a given test. The system setting for the copying modes and test preset conditions shall be identified (default and all non-default and optional test mode settings) and reported as shown in full detailed report (see Annex B). An example of a full report table is shown in Annex A.

When appropriate, rows may be deleted from the full report. Specifically, if a device does not have the ability to duplex, the duplex rows may be deleted. Each test should be also done optionally in monochrome mode in addition to the required full colour copying mode, only if the machine is a colour copying device. Similarly, a monochrome only copying device does not need to report data for a colour copying mode.

The full report reports averages for the test results. Averages are calculated by adding the totals (of *EFTP*) and dividing by the number of tests.

Table 6 — Results of full report

	Copying mode	$FSOT_{1set}$(s)	EFTP (ipm)			$ESAT_{30sec}$ (ipm)
			1 set	1 set + 30 seconds	1 set + 4minutes	
Defaults (colour for colour device, B&W for monochrome device)	1:1	R	R	R	R	R
				X sets	A sets	
	1:2	R	R	R	R	R
				Y sets	B sets	
	2:2	R	R	R	R	R
				Z sets	C sets	
B&W mode (optional for colour device)	1:1	R*	R*	R*	R*	R*
				X sets	A sets	
	1:2	R*	R*	R*	R*	R*
				Y sets	B sets	
	2:2	R*	R*	R*	R*	R*
				Z sets	C sets	

Reporting on tests is defined by:

— R is required to report when available on the copying device;

— R* is required to report if optional B&W mode is run on colour device.

The following shall be recorded in the first table row after the data:

a) the device settings:

b) the device settings used for B&W output mode on colour device;

c) the 1 set output order: original order or reverse order;

d) the location to find full detailed report or contact information;

e) the paper size and paper feed orientation;

f) the start date/time and end date/time;

g) the statement "Productivity has been determined in accordance with ISO/IEC 24735";

h) if Annex D was used to determine the ready delay time;

i) the ready delay time used;

j) any differences in ready delay time between B&W and colour.

NOTE   X, Y, Z, A, B, and C are set counts used for each test. FSOT and ESAT are the same value as in "summary test report".

7.3   Feature performance test

7.3.1   Overview

Two reporting formats are described:

a) the "full report" and "full detailed report" should be the "report" format to be presented if requested;

b) the "summary report" should be the "declaration" to be used in marketing materials or packaging.

A "declaration" of the whole "summary report" is recommended.

All reporting including summary and full report tables shall include a pointer to the full detailed report or contact information to obtain the report. An example of a summary report is shown in 7.3.2 and a full report is shown in 7.3.3. Optionally reported data are shown as "O", required as "R", and "R*" for testing which are required if an optional test mode is selected. An example of the summary report and the full report is included in Annex A. An example of the full detailed report is included in Annex B.

7.3.2 Summary report

The minimum required presentation of results shall include data showing the ratio of the results of feature copying mode to the results of the base copying mode test, as displayed in the summary report, Table 7.

The system setting for the copying modes shall be identified (default and all non-default and optional test mode settings identified) (Annex B).

Averages are calculated by adding the totals (of *FSOT* and *ESAT*) and dividing by the number of tests. Reported numbers may include as many decimal places as desired.

Table 7 — Feature performance test summary report
(form shows 2-up as example, feature modes may vary)

Copying modes	Feature performance ratio	
	2-up	
	$\dfrac{FSOT_{\text{base}}}{FSOT_{\text{feature}}}$ **(%)**	$\dfrac{ESAT_{\text{feature}}}{ESAT_{\text{base}}}$ **(%)**
2-up mode (4 pages → 2 pages)	R*	R*
Reporting on tests is defined by:		
— R* is required to report when optional feature performance is run.		

7.3.3 Full report

In a full report, the *FSOT* and *ESAT* numbers as well as the ratio for each of the individual test ratio shall be reported as displayed in Table 8. The system setting for the copying modes shall be identified. The test preset conditions shall be reported as shown in full detailed report (see Annex B).

Table 8 — Feature performance test full report
(form shows 2-up as example, feature modes may vary)

Copying modes	Base printing mode		Feature performance ratio			
			2-up			
	$FSOT_{\text{1set}}$ **(s)**	$ESAT_{\text{30sec}}$ **(ipm)**	$FSOT_{\text{1set}}$ **(s)**	$ESAT_{\text{30sec}}$ **(ipm)**	$\dfrac{FSOT_{\text{base}}}{FSOT_{\text{feature}}}$ **(%)**	$\dfrac{ESAT_{\text{feature}}}{ESAT_{\text{base}}}$ **(%)**
2-up mode (4 pages → 2 pages)	R*	R*	R*	R*	R*	R*
Reporting on tests is defined by:						
— R* is required to report when optional feature performance is run.						
The following shall be recorded in the first table row after the data:						
a) if Annex D was used to determine the ready delay time;						
b) the ready delay time used;						
c) any differences in ready delay time between B&W and colour.						

Annex A
(informative)

Report presentation

A.1 General

This annex shows how to present the results of measurement in the following tables according to Clause 7.

NOTE   The following data are not real data from copying device or MFD; they are just examples showing how to present the results.

A.2 General performance test

A.2.1 Minimum declaration

EXAMPLE

ADF: 34 ppm colour, 43 ppm mono [1]

Footnotes:

[1] Tested in accordance with ISO/IEC 24735, for full detailed report: URL: xxxx.xxxx

A.2.2 Summary report

EXAMPLE 1   35 cpm colour copying device equipped with ADF and duplex copying unit.

Summary report

	Copying mode	$FSOT_{1set}$(s)	$ESAT_{30sec}$(ipm)
Colour	1:1	15,7	34,7
	1:2	20,7	27,3
	2:2	23,9	27,9
B&W	1:1	11,4	43,9
	1:2	15,4	36,1
	2:2	17,6	36,0

NOTES

1)   All device settings were default mode.

2)   For the B&W results, the copy colour was set to "B&W".

3)   1 set output order: original order.

4)   The full detailed report can be found at URL: xxxx.xxxx.

5)   Productivity has been determined in accordance with ISO/IEC 24735.

EXAMPLE 2   75 cpm B&W copying device equipped with ADF and duplex copying unit.

Summary report

	Copying mode	$FSOT_{1set}$(s)	$ESAT_{30sec}$(ipm)
B&W	1:1	8,9	76,0
	1:2	12,4	75,7
	2:2	13,2	75,5
NOTES			
1) All device settings were default mode.			
2) A4 paper was used for this test, short edge feed.			
3) 1 set output order: original order.			
4) The full detailed report can be found at URL: xxxx.xxxx			
5) Productivity has been determined in accordance with ISO/IEC 24735.			

A.2.3   Full report

EXAMPLE 1   35 cpm colour copying device equipped with ADF and duplex copying unit.

Full report

	Copying mode	$FSOT_{1set}$ (s)	EFTP (ipm)			$ESAT_{30sec}$ (ipm)
			1set	1 set + 30 seconds	1 set + 4 minutes	
Colour	1:1	15,7	15,3	28,7	32,5	34,7
				6 sets	36 sets	
	1:2	20,7	11,6	21,5	24,7	27,3
				5 sets	27 sets	
	2:2	23,9	10,0	20,6	25,2	27,9
				5 sets	27 sets	
B&W	1:1	11,4	21,1	38,7	42,4	43,9
				8 sets	45 sets	
	1:2	15,4	15,6	29,6	33,4	36,1
				6 sets	36 sets	
	2:2	17,6	13,6	28,2	33,1	36,0
				6 sets	36 sets	
NOTES						
1) All device settings were default mode.						
2) For the B&W results, colour was set to "B&W".						
3) Full detailed report can be found at <here>.						
4) 1 set output order: reverse order.						
5) A4 paper was used for this test, short edge feed.						
6) Start date: <date> ; end date: <date>.						
7) Productivity has been determined in accordance with ISO/IEC 24735.						
8) Annex D was used to establish ready delay time (ready delay time: 50 s).						

EXAMPLE 2   75 cpm B&W copying device equipped with ADF and duplex copying unit.

Full report

	Copying mode	$FSOT_{1set}$ (s)	EFTP (ipm)			$ESAT_{30sec}$ (ipm)
			1set	1 set + 30 seconds	1 set + 4 minutes	
B&W	1:1	8,9	26,9	65,2	73,8	76,0
				11 sets	77 sets	
	1:2	12,4	19,4	59,9	72,8	75,7
				11 sets	77 sets	
	2:2	13,2	18,3	58,8	72,6	75,5
				11 sets	77 sets	

NOTES

1)   All device settings were default mode.

2)   Full detailed report can be found at <here>.

3)   A4 paper was used for this test, short edge feed.

4)   Start date: <date> ; end date: <date>.

5)   Productivity has been determined in accordance with ISO/IEC 24735.

6)   Annex D was used to establish ready delay time (ready delay time: 50 s).

A.3   Feature performance test results

A.3.1   Summary report

EXAMPLE 1   26 cpm copying device equipped with ADF, duplex copying unit with mixed originals setting.

Summary report

	Feature performance ratio	
	Mixed original mode	
Copying modes	$\dfrac{FSOT_{base}}{FSOT_{feature}}$ (%)	$\dfrac{ESAT_{feature}}{ESAT_{base}}$ (%)
A4:A3 = 2 pages: 2 pages	71,3	76,1
A3 = 4 pages	67,2	100,5

EXAMPLE 2   26 cpm copying device equipped with ADF, duplex copying unit with stapler setting.

Summary report

	Feature performance ratio	
	Special mode	
Copying modes	$\dfrac{FSOT_{base}}{FSOT_{feature}}$ (%)	$\dfrac{ESAT_{feature}}{ESAT_{base}}$ (%)
Stapler	67,1	79,6

EXAMPLE 3   35 cpm copying device equipped with ADF, duplex copying unit using 2-up mode.

Summary report

Copying modes	Feature performance ratio	
	2-up	
	$\dfrac{FSOT_{base}}{FSOT_{feature}}$ **(%)**	$\dfrac{ESAT_{feature}}{ESAT_{base}}$ **(%)**
2-up mode (4 pages → 2 pages)	78,4	209,9

A.3.2   Full report

EXAMPLE 1   26 cpm copying device equipped with ADF, duplex copying unit with mixed originals setting.

Full report

Copying modes	Base copying mode		Feature performance ratio			
			Mixed original mode			
	$FSOT_{1set}$ **(s)**	$ESAT_{30sec}$ **(ipm)**	$FSOT_{1set}$ **(s)**	$ESAT_{30sec}$ **(ipm)**	$\dfrac{FSOT_{base}}{FSOT_{feature}}$ **(%)**	$\dfrac{ESAT_{feature}}{ESAT_{base}}$ **(%)**
A4:A3 = 2 pages	19,5	26,6	27,2	20,2	71,3	76,1
A3 = 4 pages	19,5	26,6	28,9	26,7	67,2	100,5

EXAMPLE 2   26 cpm copying device equipped with ADF, duplex copying unit with stapler setting.

Full report

Copying modes	Base copying mode		Feature performance ratio			
			Special mode			
	$FSOT_{1set}$ **(s)**	$ESAT_{30sec}$ **(ipm)**	$FSOT_{1set}$ **(s)**	$ESAT_{30sec}$ **(ipm)**	$\dfrac{FSOT_{base}}{FSOT_{feature}}$ **(%)**	$\dfrac{ESAT_{feature}}{ESAT_{base}}$ **(%)**
Stapler	19,5	26,6	29,0	21,2	67,1	79,6

EXAMPLE 3   35 cpm copying device equipped with ADF, duplex copying unit using 2-up mode.

Full report

Copying modes	Base copying mode		Feature performance ratio			
			2-up			
	$FSOT_{1set}$ (s)	$ESAT_{30sec}$ (ipm)	$FSOT_{1set}$ (s)	$ESAT_{30sec}$ (ipm)	$\dfrac{FSOT_{base}}{FSOT_{feature}}$ (%)	$\dfrac{ESAT_{feature}}{ESAT_{base}}$ (%)
2-up mode (4 pages → 2 pages)	8,7	30,4	11,1	63,8	78,4	209,9

Annex B
(normative)

Full detailed report example

B.1   General

This annex shows how to present an example presentation of full detailed report of measurement. When a summary report or full report is provided for users, the following full detailed report is recommended to be provided in response to user's request.

NOTE   The following data are not real data from copying device or MFD; they are just examples showing how to present the full detailed report. And the machine under measurement is not the same one as the example described in Annex A.

B.2   Machine setup information

EXAMPLE

Machine setup information

Test start date and time	4/September/2007 10:30 am
Tester	XXXXXX
Machine name/model:	MFX-2635
Colour or B&W:	Colour MFD
Configuration (options)	ADF, duplex copying unit, finisher (staple) as default
Test temperature	23 °C
Test humidity	60 %
Test end date and time	4/September/2007 03:00 pm

Preset items

	Preset item	Preset value
Mode	Output resolution	Default
	Output quality	Default
	Copying mode	Default
	Auto density adjustment	Default
	Collating function	Activated (if not activated in default mode.)
Paper	Paper sending direction	Default
	Paper type setting	Default
Paper-path	Paper feeding	Standard cassette
	Paper exit	Standard exit tray
	Face up exit	Default
	Duplex copying unit	Default (used in 1:2 mode and 2:2 mode).

Preset items *(continued)*

	Preset item	Preset value
Temporary stop	Fixing capability	Default
	Image quality stability	Default
	Capacity of paper	Default
	Others	Default
	Manufacturer	Office Paper Co.
	Grammage	60 g/m2
	Size	A4 and A3
	Paper type/name	A44FG48A

B.3 Machine general performance test results

EXAMPLE

Summary report

	Copying mode	$FSOT_{1set}$ (s)	$ESAT_{30sec}$ (ipm)
Colour	1:1	19,5	26,7
	1:2	30,1	26,4
	2:2	33,4	26,1
B&W	1:1	14,0	35,7
	1:2	23,6	35,5
	2:2	27,0	35,1

NOTES

1) All device settings were default mode.

2) For the B&W results, the copy colour was set to "B&W".

3) A4 paper was used for this test, short edge feed.

4) 1 set output order: original order.

5) The full detailed report can be found at URL: xxxx.xxxx.

6) Productivity has been determined in accordance with ISO/IEC 24735.

Full report

	Colour mode	$FSOT_{1set}$(s)	EFTP (ipm)			$ESAT_{30sec}$ (ipm)
			1set	1 set + 30 seconds	1 set + 4 minutes	
Colour	1:1	19,5	12,3	21,6	25,5	26,7
				5 sets	26 sets	
	1:2	30,1	8,0	18,1	23,8	26,4
				5 sets	26 sets	
	2:2	33,4	7,2	17,1	23,4	26,1
				5 sets	26 sets	
B&W	1:1	14,0	17,1	30,2	34,6	35,7
				6 sets	37 sets	
	1:2	23,6	10,2	25,1	32,5	35,5
				6 sets	37 sets	
	2:2	27,0	8,9	23,6	32,0	35,1
				6 sets	36 sets	

NOTES

1) All device settings were default mode.

2) Full detailed report can be found at <here>.

3) A4 paper was used for this test, short edge feed.

4) 1 set output order: original order.

5) Start date: <date> ; end date: <date>.

6) Productivity has been determined in accordance with ISO/IEC 24735.

7) Annex D was used to establish ready delay time (ready delay time: 50 s).

B.4 Machine feature performance test results

EXAMPLE 1   Mixed originals mode.

Test conditions

Factors	Selected condition	
Original size and combination	1) A4	4 pages in A4 size (all A4 size in ABCD order)
	2) A3+A4	2 pages in A3 + 2 pages in A4 (A3 size A and B, then A4 size C and D)
	3) A3	4 pages in A3 size (all A3 size in ABCD order)
Direction of original setting	Default	
Original image side	One-sided	
Paper path setting	Set A4 at the shortest path, A3 at the second shortest path if available (when using by-pass/manual feed unit, it shall be noted in full detailed report.)	
Coping mode	Collating mode only (without any other mode)	

Summary report

Copying modes	Feature performance ratio	
	Mixed original mode	
	$\dfrac{FSOT_{base}}{FSOT_{feature}}$ (%)	$\dfrac{ESAT_{feature}}{ESAT_{base}}$ (%)
A4:A3 = 2 pages: 2 pages	71,7	75,9
A3 = 4 pages	67,5	100,4

Full report

Copying modes	Base copying mode		Feature performance ratio			
			Mixed original mode			
	$FSOT_{1set}$ (s)	$ESAT_{30sec}$ (ipm)	$FSOT_{1set}$ (s)	$ESAT_{30sec}$ (ipm)	$\dfrac{FSOT_{base}}{FSOT_{feature}}$ (%)	$\dfrac{ESAT_{feature}}{ESAT_{base}}$ (%)
A4:A3 = 2 pages: 2 pages	19,5	26,6	27,2	20,2	71,7	75,9
A3 = 4 pages	19,5	26,6	28,9	26,7	67,5	100,4
NOTES						
1) Annex D was used to establish ready delay time (ready delay time: 50 s).						

EXAMPLE 2   Stapler mode.

Test conditions

Factors	Selected condition	
Original size and combination	1) A4	4 pages in A4 size (all A4 size in ABCD order)
	2) A4 at staple	4 pages in A4 size (all A4 size in ABCD order)
Direction of original setting	Default	
Original image side	One-sided	
Copying mode (stapling)	Stapling unit name: SU 1234	
	Stapling one place at upper left edge	
	One stapling on the upper left corner	

Summary report

Copying modes	Feature performance ratio	
	Special mode	
	$\dfrac{FSOT_{base}}{FSOT_{feature}}$ (%)	$\dfrac{ESAT_{feature}}{ESAT_{base}}$ (%)
Stapler	67,2	79,7