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Information technology — Office equipment — Method for Measuring Scanning Productivity of Digital Multifunctional Devices

Technologie de l'information — Équipement d'Office — Méthode pour Productivité du Scanner d'Appareils Multifonctionnels Numériques

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation 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.

The committee responsible for this document is ISO/IEC JTC 1, *Information technology*, Subcommittee SC 28, *Office Equipment*.

Introduction

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

This International Standard provides a general method for measuring "scanning productivity" of the multifunctional devices. The International Standard also includes a test chart for scanning productivity measurement. It allows the manufacturers and the buyers of digital multifunctional devices to describe the productivity of various digital scanning devices with respect to representative office usage.

Information technology — Office equipment — Method for Measuring Scanning Productivity of Digital Multifunctional Devices

1 Scope

This International Standard specifies a method for determining scanning productivity by measuring "scanning speed" and "scan to network folder speed". It includes test files, test setup procedure, test procedure, and the reporting requirements for the scanning productivity measurements. This International Standard is applicable to black and white (B&W) as well as colour digital multifunctional devices of any underlying marking technology.

This International Standard is applicable to devices which are able to scan a media size of A4/8,5" × 11", and which have an automatic document feeder (ADF), an ability to scan to network folder, and do not need other application programs on a computer or another devices to do a scanning job.

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

ISO/IEC 24735, *Information technology — Office equipment — Method for measuring digital copying productivity*

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

ISO 536:2012, *Paper and board — Determination of grammage*

3 Terms and definitions

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

3.1
ADF speed
rate at which a device scans documents using an auto document feeder (ADF) to demonstrate the productivity of the ADF

Note 1 to entry: Suffix "$_A$" means "ADF Productivity Measurement". For example, suffix such as "$_{1setA}$" means a test of "1 set" test of the object to measure "ADF Productivity".

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

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

3.3
scanning Effective Throughput
scEFTP
rate at which a device scans pages measured from the initiation of the job through the full ejection of the last page of the scanning sets or through the complete creation of the file on the shared network folder after the transfer of the last page of the last test set

Note 1 to entry: There are suffixes such as "$_{1setA}$" or "$_{30secF}$". Each suffix is used to classify tests such as "1 set Test" or "1 set + 30 second test" of the objects of tests for "ADF Productivity Measurement" (using suffix "$_A$") or "Scan to Network Folder Productivity Measurement"(using suffix "$_F$") test respectively. For example, scEFTP$_{1setA}$ means scanning effective throughput of "1 set Test" for "ADF Productivity Measurement".

Note 2 to entry: scEFTP is expressed in images per minute (ipm); it can be affected by scan time, digital processing time, maintenance and the run time of the test.

Note 3 to entry: A different term ("EFTP; effective throughput" for digital copying machines) is defined in ISO/IEC 24735.

Note 4 to entry: As for scEFTP$_{30secF}$, measurement parameters involving the measurement of file transmission to a network folder are dependent on other factors like the computer and network configuration and represent relative values and not absolute values.

3.4
scanning Estimated Saturated Throughput
scESAT
rate at which a device scans pages measured from full ejection of the last page of the first test set from ADF through the full ejection of the of the last page of the scanning sets (using suffix "$_A$")

Note 1 to entry: scESAT is expressed in images per minute (ipm).

Note 2 to entry: There are suffixes such as "$_{1setA}$" or "$_{30secF}$". Each suffix is used to classify tests such as "1 set Test" or "1 set + 30 second test" for "ADF Productivity Measurement"(using suffix "$_A$") or "Scan to Network Folder Productivity Measurement"(using suffix "$_F$") test respectively. There is no measurement for "Scan to Network Folder Productivity Measurement" of scESAT, scESAT$_{30secF}$ defined, therefore scESAT$_{1setA}$ and scESAT$_{1setF}$ are not used as classifications.

3.5
scanning First Set Out Time
scFSOT
number of seconds between the initiation of the job to full ejection of the last page of the first test set from ADF

Note 1 to entry: There are suffixes such as "$_{1setA}$" or "$_{30secF}$". Each suffix is used to classify tests such as "1 set Test" or "1 set + 30 second test" for "ADF Productivity Measurement"(using suffix "$_A$") or "Scan to Network Folder Productivity Measurement"(using suffix "$_F$") test respectively.

3.6
full detailed report
presentation of information including machine setup and measured test results

3.7
full report
presentation of results including the scFSOT, scESAT, and scEFTP values in performance test as well as the calculated averages for each value

3.8
network folder speed
rate at which a device scans and stores the scanned image file in the network folder to demonstrate the overall productivity of the device when scanning documents

Note 1 to entry: Suffix "$_F$" means "Scan to Network Folder Productivity Measurement". For example, suffix such as "$_{30secF}$" means a test of "1 set + 30 second" test for "Scan to Network Folder Productivity".

3.9
performance test
test used to evaluate productivity by providing scFSOT, scESAT, and scEFTP without using any special feature or mode, and includes both the simplex scanning mode and the duplex scanning modes if available

3.10
scanning Last Set Out Time
scLSOT
number of seconds between the initiation of the job to full ejection of the last page of the last test set from ADF

Note 1 to entry: There are suffixes such as "$_{1setA}$" or "$_{30secF}$". Each suffix is used to classify tests such as "1 set Test" or "1 set + 30 second test" for "ADF Productivity Measurement"(using suffix "$_A$") or "Scan to Network Folder Productivity Measurement"(using suffix "$_F$") test respectively.

3.11
simplex scanning
use of a scanning device when only a single side of a sheet is scanned

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

3.12
summary report
presentation of results including the average overall scEFTP in the performance test for the scanning device default base line performance

3.13
test file
digital file used for creating test targets

3.14
test set
all of the pages of test target

3.15
test target
hard copy document used for testing per the test method, and created from test file

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

3.16
time measurement
number of seconds measured by timing device (stopwatch or other device) or by reading time display on the PC dock

Note 1 to entry: Suffixes such as "$_{SW}$" and "$_{PC}$" are used to show which time measurement is done; by timing device (stopwatch or other device) or by reading time display on the PC dock. For example, "t_{SW1A}" is the time measured via stopwatch or other device for completion of the first set out and "t_{PC1F}" is the time measured via PC clock for completion of the first set file written to the network folder.

3.17
scanning resolution
resolution at which the document is scanned

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 %

NOTE   The temperature and humidity of the test environment should be recorded in the full detailed report (Annex B).

4.2   Voltage

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

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

4.3   Scanning Device Setup

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

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

Table 1 — Preset settings

	Preset item	Preset value	Example
Mode	Scanning resolution	default	200 dpi
	Colour or grey scale/B&W	default	Colour
	Duplex/simplex	default	Simplex
	Original page size	default	A4
	Paper feed orientation (long/short edge)	default	Long edge
	Scan destination	default	Shared network
	Storing File Type	default	PDF (multi)
	Auto scan quality adjustment	default	(Factory preset default setting)

If the scanning device is setup with internal or external options such as memory as default, then these options shall be noted on the full detailed report format in the configuration options as shown in Annex B, for example "160 GB HDD installed".

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

Optional paper sizes may be used for the scanning device tests such as A3 and/or 11" × 17" size as appropriate for the test mode. When sheets of paper size other than A4/8.5"x11" are used, the sizes shall be indicated in the places of A4/8.5" × 11" 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.

NOTE   There are digital multifunctional devices that may use PC based scanning software. For reference, the measurement of scanning productivity applied for out of scope scanning systems is shown in Annex D (informative).

4.4   Maintenance

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

4.5   Preparation of Test Targets (Test Charts)

The scanning test file is outlined in Annex C.

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 scanning productivity test, the test targets shall be created by printing the most recent electronic test file on the device to be tested if it has print capability. If the test device to be tested does not have a printer function or if the device is a colour capable scanner but does not have a printing function of colour test targets (for the colour scanning test), then record the name of printer which is used to print out the actual test targets. The most recent official electronic file (ISO_IEC_24735_2009_Test_Pages.pdf) can be located at http://standards.iso.org/ittf/PubliclyAvailableStandards/SC28_Test_Pages/ .

As for preparation method for double-sided targets, refer to Annex C.

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

a)   The test targets shall be printed by the equipment to be tested itself in its default-printing mode. (If the test device to be tested does not have a printer function or if the device is a colour capable scanner but does not have a printing function of colour test targets (for the colour scanning test), then record the name of printer which is used to print out the actual test targets.)

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

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

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

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

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

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

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

5   Test Method

5.1   Test Setup

The objectives of this test are summarized as follows:

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

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

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

a) Install the scanning 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 scanning device has warmed-up and entered a "ready" state. Use of warm-up scanning (that means at least one page is scanned just before testing) to ready the scanning device is acceptable.

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

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.

5.2   Test Measurement Procedure

5.2.1   Overview

The productivity of a digital scanning device like "scan to network folder speed" depends on factors other than the scanning device itself. These include, but are not limited to, computer performance and network configuration or the general environment in which the test is being held. Because of this, in order to make useful and accurate direct comparisons of scanning productivity with this International Standard, the same computer system hardware and software and the network configuration shall be used for measuring the scanning devices if for the purpose of being directly compared one to another. For every scanning productivity measurement, the basic specifications of the computer and the network shall be included with the results of the scanning productivity measurement.

This measurement procedure defines how to measure "ADF Productivity Measurement" and how to measure "Scan to Network Folder Productivity Measurement". A single set of each test target is scanned and measured to determine $scEFTP_{1set}$. Multiple, N sets of test target are scanned and measured for the 1 Set + 30 Seconds Test run to calculate $scESAT_{30sec}$ and $scEFTP_{30sec}$, where N is the number of sets needed to meet $scLSOT_{Nsets} - scFSOT_{1set}$ more than 30 seconds. (To estimate N, number of sets for test target, refer to 5.3.2.)

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.

Both the "ADF Productivity Measurement" and the "Scan to Network Folder Productivity Measurement" have a destination to network folder. Therefore both tests can be measured in the same test run.

Preparation for test run

a) Estimate the number of sets (= N sets) which met $scLSOT_{Nsets} - scFSOT_{1set} \geq 30$ seconds. (1 set consists of 4 originals.) (To estimate N, number of sets for test target, refer to 5.3.2.)

b) Prepare N sets of test targets that will be used in the test, identified as described in 4.5.

c) Before test, the machine under test shall be preconditioned as described in 5.1.

d) Refer to 5.4 to decide what tests are to be run.

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

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

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

The objects of these tests are described as abbreviated "ADF speed" for "ADF Productivity Measurement" and "network folder speed" for "Scan to Network Folder Productivity Measurement" in the following paragraph.

The created file in the network folder shall be a single file of multiple pages.

5.2.2 Measurement for scanning productivity

5.2.2.1 1 set test

a) Put 1 set of test target on ADF. (For the second and third tests, use 1 set.)

b) [Start Test run] Initiate the scan and simultaneously start the timing device (stopwatch or otherwise) and record the time "t_{PC0}" to the minutes and seconds displayed on the PC clock of the system where the target network folder exists.

c) Record the time "t_{SW1A}" for completion of the first set out. This is the time from pressing scan button until the 4th page of the 1st test set is fully ejected from the ADF.

d) After the time the file is completely written to the network folder, check the time stamp of the file and record the time "t_{PC1F}" to the minutes and seconds.

e) Calculate $scEFTP_{1setA}$ by using time interval "t_{SW1A}" − 0.

f) Calculate $scEFTP_{1setF}$ by using time interval $scFSOT_{1setF}$ = "t_{PC1F}" − "t_{PC0}".

g) Record $scEFTP_{1setA}$ and $scEFTP_{1setF}$.

h) [End Test run]

i) Run this test [steps (1) − (8)] twice.

j) Determine if the results are consistent within ±5 % and refer to 5.3.3.

k) If needed, conduct a third Test run. (If the first two test runs are not consistent within ±5 %, then a third test run is 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.)

NOTE 1   It may also be possible to synchronize an external clock or stopwatch with the PC clock to record t_{SW1A}.

NOTE 2   "t_{PC0}" is a starting time displayed on the PC clock and not necessarily 0 (zero). On the other hand timing device starts from 0 (zero).

5.2.2.2 1 set + 30 second test

a) Put N sets of test target on ADF. N is required to for $scLSOT_{Nsets}$ − $scFSOT_{1set}$ ≥ 30 Seconds. (For the second and third tests, use the same number of sets as used in the first test.)

b) [Start Test run] Initiate the scan and simultaneously start the timing device (stopwatch or otherwise) and record the time "t_{PC0}" to the minutes and seconds displayed on the PC of the system where the target network folder exists.

c) Record the time "t_{SW1A}" for completion of the First set out. This is the time from pressing scan button until the 4th page of the 1st test set is fully ejected from the ADF.

d) Record the time "t_{SWNA}" for completion of the $LSOT_{Nsets}$. This is the time from pressing scan button until the last page of the N test set is fully ejected from the ADF.

   NOTE   If the original output tray capacity is less than the number of pages to be scanned, remove the output originals during the test.

e) Once determined that the file is completely written to the network folder, check the time stamp of the file and record the time "t_{PCNF}" to the minutes and seconds.

f) Calculate $scESAT_{30secA}$ by using time interval "t_{SWNA}" − "t_{SW1A}".

g) Calculate $scEFTP_{30secA}$ by using time interval "t_{SWNA}" − 0.

h) Calculate $scEFTP_{30secF}$ by using time interval "t_{PCNF}" − "t_{PC0}".

i) Record $scESAT_{30secA}$ and $scEFTP_{30secA}$ and $scEFTP_{30secF}$.

j) [End Test run]

k) Run this test [steps (1) − (10)] twice.

l) Determine if the results are consistent within ±5 % and refer to 5.3.3.

m) If needed, conduct a third Test run. (If the first two test runs are not consistent within ±5 %, then a third test run is 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.)

NOTE 1   It may also be possible to synchronize an external clock or stopwatch with the PC clock to record t_{SW1A}.

NOTE 2   "t_{PC0}" is a starting time displayed on the PC clock and not necessarily 0 (zero). On the other hand timing device starts from 0 (zero).

5.3 Test Method Process
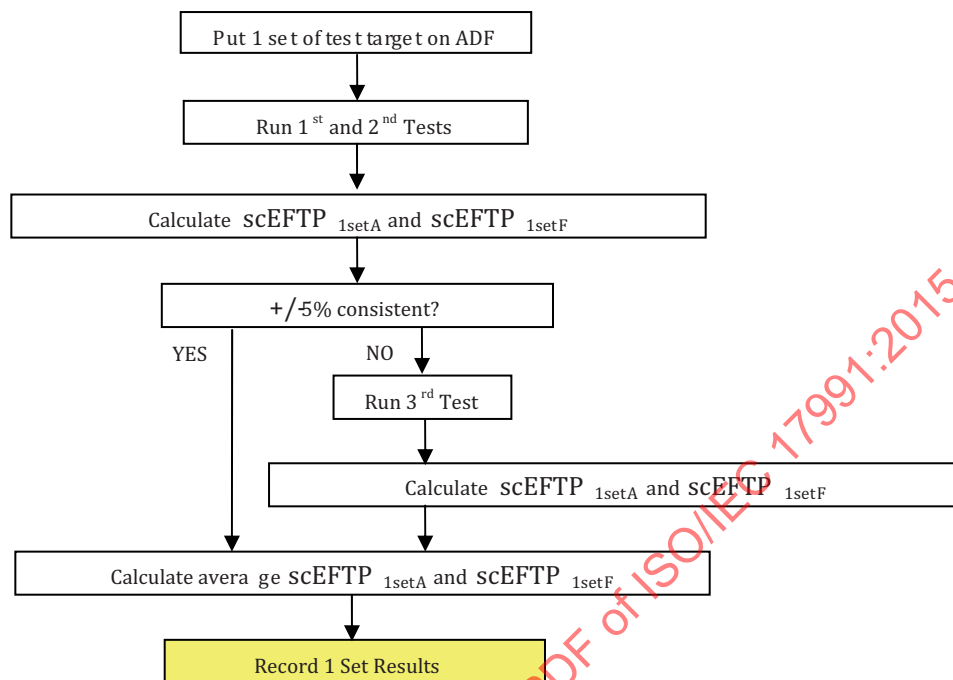
5.3.1 Suggested Test Method Process Flow Chart

```
            ┌────────────────────────────────┐
            │  Put 1 set of test target on ADF│
            └────────────────────────────────┘
                           │
            ┌────────────────────────────────┐
            │      Run 1ˢᵗ and 2ⁿᵈ Tests      │
            └────────────────────────────────┘
                           │
   ┌──────────────────────────────────────────────────┐
   │   Calculate scEFTP 1setA and scEFTP 1setF         │
   └──────────────────────────────────────────────────┘
                           │
            ┌────────────────────────────────┐
            │        +/−5% consistent?        │
            └────────────────────────────────┘
        YES │                  │ NO
            │         ┌──────────────────┐
            │         │   Run 3ʳᵈ Test   │
            │         └──────────────────┘
            │                  │
            │   ┌──────────────────────────────────────┐
            │   │ Calculate scEFTP 1setA and scEFTP 1setF│
            │   └──────────────────────────────────────┘
            │                  │
   ┌──────────────────────────────────────────────────┐
   │ Calculate average scEFTP 1setA and scEFTP 1setF   │
   └──────────────────────────────────────────────────┘
                           │
            ┌────────────────────────────────┐
            │        Record 1 Set Results     │
            └────────────────────────────────┘
```

Figure 1 — 1 set test flow chart

```
            ┌────────────────────────────────┐
            │  Put N sets of test target on ADF│
            └────────────────────────────────┘
                           │
            ┌────────────────────────────────┐
            │      Run 1ˢᵗ and 2ⁿᵈ Tests      │
            └────────────────────────────────┘
                           │
   ┌──────────────────────────────────────────────────┐
   │ Calculate scESAT 30secA , scEFTP 30secA and scEFTP 30secF│
   └──────────────────────────────────────────────────┘
                           │
            ┌────────────────────────────────┐
            │        +/−5% consistent?        │
            └────────────────────────────────┘
        YES │                  │ NO
            │         ┌──────────────────┐
            │         │   Run 3ʳᵈ Test   │
            │         └──────────────────┘
            │                  │
            │   ┌──────────────────────────────────────┐
            │   │Calculate scESAT 30secA , scEFTP 30secA and scEFTP 30secF│
            │   └──────────────────────────────────────┘
            │                  │
   ┌──────────────────────────────────────────────────┐
   │Calculate average scESAT 30secA , scEFTP 30secA and scEFTP 30secF│
   └──────────────────────────────────────────────────┘
                           │
            ┌────────────────────────────────┐
            │ Record 1 Set + 30 second Results│
            └────────────────────────────────┘
```
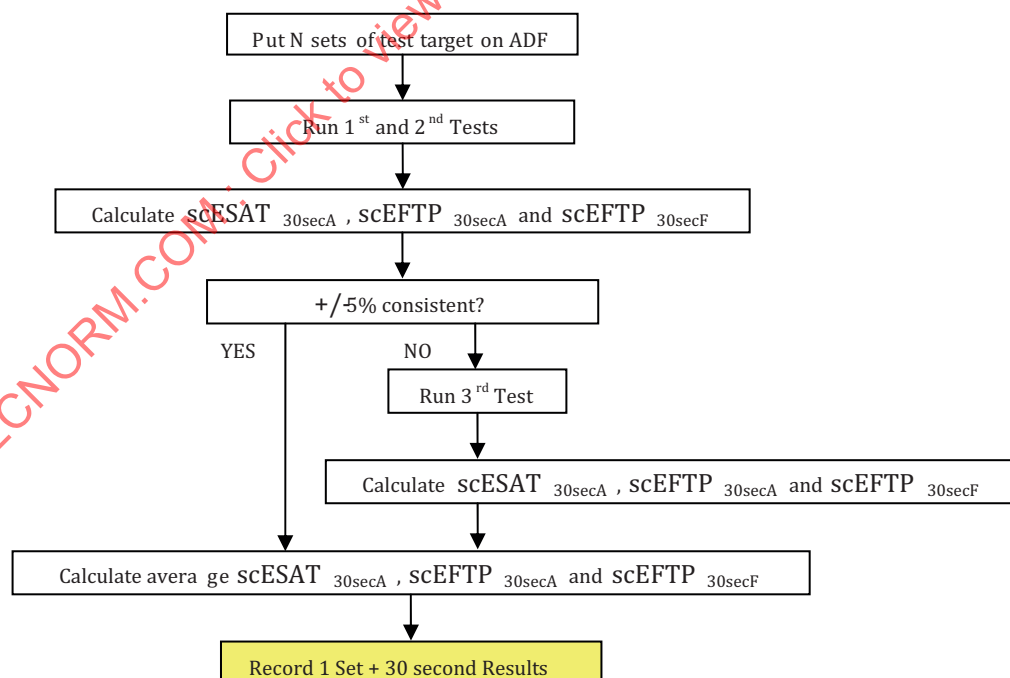
Figure 2 — 1 set + 30 second test flow chart

5.3.2　Estimating the Set Count

This estimation shall be done when multiple test targets sets are scanned.

1 Set + 30 Seconds Test:

The test may begin with an initial set count $N_{initial}$ = 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 $scLSOT_{Nsets} - scFSOT_{1set} \geq 30$ seconds requirement, then calculate necessary set count $estN_{30sec}$ as follows and test using the new $estN_{30sec}$ as the set count. The following equation can be used to estimate the number of sets needed:

$$estN_{30\,sec} = RoundUp\left[\frac{30 \times (N_{initial} - 1)}{scLSOT_{initial} - scFSOT_{initial}} + 1 \right]$$

where $scLSOT_{initial}$ and $scFSOT_{initial}$ are the data acquired in the Initial Test.

The number of sets tested should result in $scLSOT_{Nsets} - scFSOT_{1set} \geq 30$ seconds as close as possible. If the results of a test run gives $scLSOT_{Nsets} - scFSOT_{1set} < 30$ seconds the number of sets shall be increased and all runs re-tested.

If 1 Set + 30 Seconds Test estimated scan count is greater than the maximum scan count or ADF allowable capacity, this test shall not be run and reported as NA in the test report.

5.3.3　5 % Consistency Criteria

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

$$Consistency = \frac{2 \times scFSOT1}{scFSOT1 + scFSOT2} - 1$$

$$Consistency = \frac{2 \times scESAT1}{scESAT1 + scESAT2} - 1$$

$$Consistency = \frac{2 \times scEFTP1}{scEFTP1 + scEFTP2} - 1$$

If 1 Set + 30 Seconds Test estimated copy count is greater than the maximum scan count or ADF capacity, this test shall not be run and reported as NA in the test report.

5.4　Performance Test

5.4.1　ADF Productivity Measurement

The tests require using the 1 Set Test and 1 set + 30 Seconds Test procedures in 5.2.

There is one key parameter, scESAT, reported in the Summary Report and in the Full Report. The "Full Report" provides detailed information including scEFTP.

1) Measurement of scESAT

   Testing in colour mode using default scanning settings is required. If the machine is a colour scanning device, testing in monochrome scanning mode is optional. Testing in monochrome scanning is required if the machine is a B&W only scanning device.

   Prepare the test targets (described in 4.5) for this measurement. 1 set consists of 4 images, that is 4 simplex pages for simplex and 2 duplex pages for duplex.

The time measurement is started when the "scan start button" is pressed, and is concluded when the last = page is fully ejected from the ADF. The measured intervals of time should be recorded.

2) Table format and required data for Summary Report

The minimum required presentation of results shall include a Summary Report Form as displayed in Table 2. A Summary Report includes the averages of scESAT in a given test. The system setting for the scanning 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 scan both-side, the double-sided rows may be deleted. Similarly, a monochrome only scanning device does not need to report data for a colour scanning mode.

Table 2 — Table of Summary Report (for colour scanning device)

	Scanning mode			Measurement result
	File format version	Resolution	Scanning side	$scESAT_{30secA}$ (ipm)
Colour (default setting[a])	PDF version[b]	Default dpi[c]	single sided	R
Colour (default setting[a])	PDF version[b]	Default dpi[c]	double sided	O[d]
B&W (default setting[a])	PDF version[b]	Default dpi[c]	single sided	O
B&W (default setting[a])	PDF version[b]	Default dpi[c]	double sided	O[d]

R   Required to report when available on the scanning device

O   Optional and not necessary to report

[a]   Generally, 24-bit depth for colour and 8-bit depth for B&W is used for "default setting bit depth". These bit depth changes and depends on the scanned image. Use factory preset default setting as it is.

[b]   The information of PDF version can be found by clicking scanned file's properties in case of Microsoft® Windows® OS.

[c]   Default dpi is the resolution that the device is set by factory setting. Record the default dpi in the report.

[d]   Double-sided test is optional and tested for only devices that have an ADF equipped to duplex scan.

3) Table format and required data for Full Report

The presentation of results is recommended to include a Full Report Form as displayed in Table 3. A Full Report includes the averages of scEFTP and scESAT in a given test. The system setting for the scanning 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 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 scan both-side, the double-sided rows may be deleted. Similarly, a monochrome only scanning device does not need to report data for a colour scanning mode.

Table 3 — Table of Full Report (Colour scanning device)

	Scanning mode			Measurement result		
	File format version	Resolution	Scanning side	$scEFTP_{1setA}$ (ipm)	$scEFTP_{30secA}$ (ipm)	$scESAT_{30secA}$ (ipm)
Colour (default setting[a])	PDF version[b]	Default dpi[c]	single sided	R	R	R
			double sided	O[d]	O[d]	O[d]
B&W (default setting[a])	PDF version[b]	Default dpi[c]	single sided	R	R	R
			double sided	O[d]	O[d]	O[d]

R   Required to report when available on the scanning device

O   Optional and not necessary to report

[a]   Generally, 24-bit depth for colour and 8-bit depth for B&W is used for "default setting bit depth". These bit depth changes and depends on the scanned image. Use factory preset default setting as it is.

[b]   The information of PDF version can be found by clicking scanned file's properties in case of Microsoft® Windows® OS.

[c]   Default dpi is the resolution that the device is set by factory setting. Record the default dpi in the report.

[d]   Double-sided test is optional and tested for only devices that have an ADF equipped to duplex scan.

5.4.2   Scan to Network Folder Productivity Measurement

The tests require using the 1 Set Test and 1 set + 30 Seconds Test procedures in 5.2.

There is one key parameter, scEFTP, reported in the Summary Report and in the Full Report. The "Full Report" provides detailed information including $scEFTP_{1setF}$.

1)   Measurement of scEFTP

Each test shall be done in colour mode using default settings (required) and in monochrome mode (optional) if the machine is a colour scanning device. Monochrome scanning mode is required only if the machine is a B&W only scanning device.

Prepare the test targets (described in 4.5) for this measurement. 1 set consists of 4 images, that is 4 simplex pages for simplex and 2 duplex pages for duplex.

The time measurement is started when the "scan start button" is pressed, and is concluded when the last = page is fully ejected from the ADF and scanned file is saved in network folder. The measured intervals of time should be recorded. Measurement shall be done for 4 images.

2)   Table format and required data for Summary Report

The minimum required presentation of results shall include a Summary Report Form as displayed in Table 4. A Summary Report includes the averages of scEFTP in a given test. The system setting for the scanning 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 scan both-side, the double-sided rows may be deleted. Similarly, a monochrome only scanning device does not need to report data for a colour scanning mode.

Table 4 — Table of Summary Report (for colour scanning device)

	Scanning mode			Measurement result		
	File format version	Resolution	Scanning side	$scEFTP_{30secF}$ (ipm)	File size$_{30secF}$[e] (Mbyte)	Number of Sets$_{(30secF)}$
Colour (default setting[a])	PDF version[b]	Default dpi[c]	single sided	R	R	R
			double sided	O[d]	O[d]	O[d]
B&W (default setting[a])	PDF version[b]	Default dpi[c]	single sided	O	O	O
			double sided	O[d]	O[d]	O[d]

R   Required to report when available on the scanning device

O   Optional and not necessary to report

[a]   Generally, 24-bit depth for colour and 8-bit depth for B&W is used for "default setting bit depth". These bit depth changes and depends on the scanned image. Use factory preset default setting as it is.

[b]   The information of PDF version can be found by clicking scanned file's properties in case of Microsoft® Windows® OS.

[c]   Default dpi is the resolution that the device is set by factory setting. Record the default dpi in the report.

[d]   Double-sided test is optional and tested for only devices that have an ADF equipped to duplex scan.

[e]   "File size$_{30secF}$" is the size of the file on the shared network folder after file creation completion for "1set+30sec Test".

3)   Table format and required data for Full Report

The presentation of results is recommended to include a Full Report Form as displayed in Table 5. A Full Report includes the average of scEFTP in a given test. The system setting for the scanning 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 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 scan both-side, the double-sided rows may be deleted. Similarly, a monochrome only scanning device does not need to report data for a colour scanning mode.

Table 5 — Table of Full Report (Colour scanning device)

	Scanning mode			Measurement result			
	File format version	Resolution	Scanning side	$scEFTP_{1setF}$ (ipm)	$scEFTP_{30secF}$ (ipm)	File size$_{30secF}$[e] (Mbyte)	Number of Sets$_{(30secF)}$
Colour (default setting[a])	PDF version[b]	Default dpi[c]	single sided	O[f]	R	R	R
			double sided	O[f]	O[d]	O[d]	O[d]
B&W (default setting[a])	PDF version[b]	Default dpi[c]	single sided	O[f]	R	R	R
			double sided	O[f]	O[d]	O[d]	O[d]

R   Required to report when available on the scanning device

O   Optional and not necessary to report

[a]   Generally, 24-bit depth for colour and 8-bit depth for B&W is used for "default setting bit depth". These bit depth changes and depends on the scanned image. Use factory preset default setting as it is.

[b]   The information of PDF version can be found by clicking scanned file's properties in case of Microsoft® Windows® OS.

[c]   Default dpi is the resolution that the device is set by factory setting. Record the default dpi in the report.

[d]   Double-sided test is optional and tested for only devices that have an ADF equipped to duplex scan.

[e]   "File size$_{30secF}$" is the size of the file on the shared network folder after file creation completion for "1set+30sec Test".

[f]   Considering the measurement method used in this standard (Time for the creation of file can be judged from the file's properties.), the measurement has an intrinsic one second error. Therefore this measurement should be optional even in Full report and not necessary to report in case of devices with scanning speed faster than 10 ipm. (If other measurement method that can measure the time for the creation of file after the decimal point is used, this measurement may be done.)

6 Calculations and Treatment of Data

6.1 Calculations

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.

Rounding data and calculations to a faster time (sec) or throughput (ipm) is not allowed. Recorded and reported numbers shall never be better than actual measurement (higher for scESAT and scEFTP or lower for scFSOT).

Averages are calculated by averaging the results (scFSOT, scESAT, scEFTP), not by averaging the times, and then calculating a result. For example, calculate scESAT of test run one and scESAT from test run two (and of test run three if required), and then average $scESAT_1$ and $scESAT_2$ (and $scESAT_3$) to yield $scESAT_{ave}$.

The number of scESAT and scEFTP 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).

For example, if 34,99 is the measured and calculated average of scESAT, then a report could record 34,9 or 34 ipm, but NOT 35 ipm.

6.2 1 Set Test

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

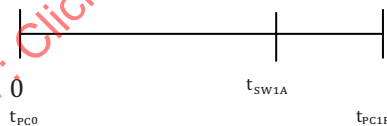For test runs using 4 pages file and 1 set count test run:

Figure 3 — 1 set test

$$scFSOT_{1setA} = t_{SW1A} - 0 \, (\text{seconds})$$

$$scFSOT_{1setF} = t_{PC1F} - t_{PC0} \, (\text{seconds})$$

$$scEFTP_{1setA} = \frac{240}{scFSOT_{1setA}} \, (\text{ipm})$$

$$scEFTP_{1setF} = \frac{240}{scFSOT_{1setF}} \, (\text{ipm})$$

6.3 1 Set + 30 Seconds Test

$scESAT_{30sec}$ and $scEFTP_{30sec}$ shall be calculated using the data of 1 Set + 30 seconds Test.

For test runs using 4 pages file and N set count test run:

Figure 4 — 1 set + 30 seconds test

For "ADF Productivity Measurement";

First Set Out Time = $scFSOT_{30secA}$ = t_{SW1A} – 0 (seconds)

Last Set Out Time = $scLSOT_{30secA}$ = t_{SWNA} – 0 (seconds)

N_{30sec} = Set count

240 = 4 pages × 60 seconds

$scESAT_{30secA}$ and $scEFTP_{30secA}$ shall be calculated from the 1 Set + 30 Seconds Test data from the following equation.

$$scESAT_{30\sec A} = \frac{240 \times (N_{30\sec} - 1)}{scLSOT_{30\sec A} - scFSOT_{30\sec A}} \text{ (ipm)}$$

$$scEFTP_{30\sec A} = \frac{240 \times N_{30\sec}}{scLSOT_{30\sec A}} \text{ (ipm)}$$

For "Scan to Network Folder Productivity Measurement";

Last Set Out Time = $scLSOT_{30secF}$ = t_{PCNF} – t_{PC0} (seconds)

N_{30sec} = Set count

240 = 4 pages × 60 seconds

$scEFTP_{30secF}$ shall be calculated from the 1 Set + 30 Seconds Test data from the following equation.

$$scEFTP_{30\sec F} = \frac{240 \times N_{30\sec}}{scLSOT_{30\sec F}} \text{ (ipm)}$$

7   Presentation of Results

Products that are of the same distinct scan system can share testing and reports. Two or more products or bundles may be part of a distinct scan system when they use the same scan 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 scan system, and are different scan systems, even if they use the same scan mechanism, and shall not share testing and reports.

"Full Report" and "Full Detailed Report" should be "Report" to be presented if requested.

"Summary Report" should be "Declaration" to be used in marketing materials or packaging. "Declaration" of the whole "Summary Report" is recommended.

However, the minimum requirement of "Declaration" shall include the following four items:

a)   Description that the productivity has been determined in accordance with ISO/IEC 17991.

b)   The average of scESAT30secA in an ADF Productivity Measurement Test for the default resolution, simplex scan.

c) The average of scEFTP30secF in a Scan to Network Folder Productivity Measurement Test for the default resolution, simplex scan.

d) Pointer to the Full detailed report or contact information.

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

Summary Report

The minimum required presentation of results is that displayed in Table 6, scESAT(ipm) for ADF Productivity Measurement, scEFTP(ipm) for Scan to Network Folder Productivity Measurement. Each test should be also done optionally in monochrome mode in addition to required in colour mode of default setting scanning mode, only if the machine is a colour scanning device.

The measured intervals of time should be recorded by an integer. The figure of average results is rounded down to the final results of scEFTP.

Table 6 — Results of Summary Report

ADF Productivity Measurement				
	Scanning mode			**Measurement result**
	File format version	Resolution	Scanning side	$scESAT_{30secA}$ (ipm)
Colour (default setting[a])	PDF version[b]	Default dpi[c]	single sided	R
			double sided	O[d]
B&W (default setting[a])	PDF version[b]	Default dpi[c]	single sided	O
			double sided	O[d]
R Required to report when available on the scanning device				
O Optional and not necessary to report				
[a] Generally, 24-bit depth for colour and 8-bit depth for B&W is used for "default setting bit depth". These bit depth changes and depends on the scanned image. Use factory preset default setting as it is.				
[b] The information of PDF version can be found by clicking scanned file's properties in case of Microsoft® Windows® OS.				
[c] Default dpi is the resolution that the device is set by factory setting. Record the default dpi in the report.				
[d] Double-sided test is optional and tested for only devices that have an ADF equipped to duplex scan.				

Scan to Network Folder Productivity Measurement

	Scanning mode			Measurement result		
	File format version	Resolution	Scanning side	$scEFTP30secF$ (ipm)	File size30secF[e] (Mbyte)	Number of Sets$_{(30secF)}$
Colour (default setting[a])	PDF version[b]	Default dpi[c]	single sided	R	R	R
			double sided	O[d]	O[d]	O[d]
B&W (default setting[a])	PDF version[b]	Default dpi[c]	single sided	O	O	O
			double sided	O[d]	O[d]	O[d]

R Required to report when available on the scanning device

O Optional and not necessary to report

[a] Generally, 24-bit depth for colour and 8-bit depth for B&W is used for "default setting bit depth". These bit depth changes and depends on the scanned image. Use factory preset default setting as it is.

[b] The information of PDF version can be found by clicking scanned file's properties in case of Microsoft® Windows® OS.

[c] Default dpi is the resolution that the device is set by factory setting. Record the default dpi in the report.

[d] Double-sided test is optional and tested for only devices that have an ADF equipped to duplex scan.

[e] "File size$_{30secF}$" is the size of the file on the shared network folder after file creation completion for "1set+30sec Test".

NOTE   If a device does not have the ability to scan both-side, the double-sided rows may be deleted or "NA" is put in a corresponding column. Similarly, for a colour scanning device, B&W measurement is optional, so B&W rows can be omitted.

Full Report

The required presentation of results is that displayed in Table 7. Each test should be also done optionally in monochrome mode in addition to required in colour mode of default setting scanning mode, only if the machine is a colour scanning device.

The Full Report reports averages for the test results. Averages are calculated by adding the totals (of scESAT and scEFTP) and dividing by the number of tests.

Table 7 — Results of Full Report

ADF Productivity Measurement

	Scanning mode			Measurement result		
	File format version	Resolution	Scanning side	$scEFTP_{1setA}$ (ipm)	$scEFTP_{30secA}$ (ipm)	$scESAT_{30secA}$ (ipm)
Colour (default setting[a])	PDF version[b]	Default dpi[c]	single sided	R	R	R
			double sided	O[d]	O[d]	O[d]
B&W (default setting[a])	PDF version[b]	Default dpi[c]	single sided	R	R	R
			double sided	O[d]	O[d]	O[d]

R Required to report when available on the scanning device

O Optional and not necessary to report

[a] Generally, 24-bit depth for colour and 8-bit depth for B&W is used for "default setting bit depth". These bit depth changes and depends on the scanned image. Use factory preset default setting as it is.

[b] The information of PDF version can be found by clicking scanned file's properties in case of Microsoft® Windows® OS.

[c] Default dpi is the resolution that the device is set by factory setting. Record the default dpi in the report.

[d] Double-sided test is optional and tested for only devices that have an ADF equipped to duplex scan.

Scan to Network Folder Productivity Measurement							
	Scanning mode			Measurement result			
	File format version	Resolution	Scanning side	$scEFTP_{1setF}$ (ipm)	$scEFTP_{30secF}$ (ipm)	File size$_{30secF}$[e] (Mbyte)	Number of Sets$_{(30secF)}$
Colour (default setting[a])	PDF version[b]	Default dpi[c]	single sided	O[f]	R	R	R
			double sided	O[f]	O[d]	O[d]	O[d]
B&W (default setting[a])	PDF version[b]	Default dpi[c]	single sided	O[f]	R	R	R
			double sided	O[f]	O[d]	O[d]	O[d]
R Required to report when available on the scanning device							
O Optional and not necessary to report							
[a] Generally, 24-bit depth for colour and 8-bit depth for B&W is used for "default setting bit depth". These bit depth changes and depends on the scanned image. Use factory preset default setting as it is.							
[b] The information of PDF version can be found by clicking scanned file's properties in case of Microsoft® Windows® OS.							
[c] Default dpi is the resolution that the device is set by factory setting. Record the default dpi in the report.							
[d] Double-sided test is optional and tested for only devices that have an ADF equipped to duplex scan.							
[e] "File size$_{30secF}$" is the size of the file on the shared network folder after file creation completion for "1set+30sec Test".							
[f] Considering the measurement method used in this standard (Time for the creation of file can be judged from the file's properties.), the measurement has an intrinsic one second error. Therefore this measurement should be optional even in Full report and not necessary to report in case of devices with scanning speed faster than 10 ipm. (If other measurement method that can measure the time for the creation of file after the decimal point is used, this measurement may be done.)							

NOTE   Single values from the required Performance test such as scESAT or scEFTP may be reported as long as these values include a pointer to the full detailed report.

Individual manufacturer may choose whether or not to display Summary Report or Full Report on his brochure or spec sheet. The Summary Report should be the "declaration" used in marketing materials or packaging. Declaration of the whole Summary Report is recommended. Abbreviated test reporting is allowed, including the reporting of the results from individual application testing as long as the report includes the corresponding Averages of scESAT or scEFTP, a pointer to the Full Detailed Report or contact information, and statement that the productivity has been determined in accordance with ISO/IEC 17991. 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.

Annex A
(informative)

Examples of report presentation

A.1   General

This ANNEX shows how to present the results of measurement in the following tables according to "7. Presentation of results".

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

A.2   Measurement Results for Summary Report

35 cpm colour scanning device equipped with ADF and duplex scanning unit

Table A.1 — ADF Productivity Measurement

	Scanning mode			Measurement result
	File format version	Resolution	Scanning side	$scESAT_{30secA}$ (ipm)
Colour (default setting)	PDF 1.7	200 dpi	single sided	72,8
			double sided	38,4
B&W (binary)	PDF 1.7	200 dpi	single sided	72,9
			double sided	38,4

Table A.2 — Scan to Network Folder Productivity Measurement

	Scanning mode			Measurement result		
	File format version	Resolution	Scanning side	$scEFTP_{30secF}$ (ipm)	File size$_{30secF}$ (Mbyte)	Number of Sets$_{(30secF)}$
Colour (default setting)	PDF 1.7	200 dpi	single sided	60,0	11,6	11
			double sided	32,7	6,4	6
B&W (binary)	PDF 1.7	200 dpi	single sided	62,8	1,7	11
			double sided	34,2	0,9	6

A.3   Measurement Results for Full Report

35 cpm colour scanning device equipped with ADF and duplex scanning unit

Table A.3 — ADF Productivity Measurement

	Scanning mode			Measurement result		
	File format version	Resolution	Scanning side	$scEFTP_{1setA}$ (ipm)	$scEFTP_{30secA}$ (ipm)	$scESAT_{30secA}$ (ipm)
Colour (default setting)	PDF 1.7	200 dpi	single sided	53,5	70,4	72,8
			double sided	32,1	37,2	38,4
B&W (binary)	PDF 1.7	200 dpi	single sided	54,0	70,6	72,9
			double sided	31,9	37,2	38,4

Table A.4 — Scan to Network Folder Productivity Measurement

	Scanning mode			Measurement result			
	File format version	Resolution	Scanning side	$scEFTP_{1setF}$ (ipm)	$scEFTP_{30secF}$ (ipm)	File size$_{30secF}$e (Mbyte)	Number of Sets$_{(30secF)}$
Colour (default setting)	PDF 1.7	200 dpi	single sided	—	60,0	11,6	11
			double sided	—	32,7	6,4	6
B&W (binary)	PDF 1.7	200 dpi	single sided	—	62,8	1,7	11
			double sided	—	34,2	0,9	6

NOTE   As for scEFTP30secF, measurement parameters involving the measurement of file transmission to a network folder are dependent on other factors like the computer and network configuration and represent relative values and not absolute values.

Annex B
(informative)

Example of full detailed report

B.1 General

This Annex B shows how to present an example presentation of full detailed report of measurement. When Summary Report or Full Report is provided for users, the following full detailed report is recommended to provide in response to user's request.

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

B.2 Machine Setup Information and Preset items

Table B.1 — Machine Setup Information

Test Start Date and Time:	4/September/2012 10:30 am
Tester	XXXXXX
Machine name/model:	SkyValley-7070
Colour or B&W:	Colour MFD
Configuration (options)	ADF, Duplex scanning Unit, Finisher(Staple) as default
Test temperature	25 °C
Test humidity	50 %
Voltage	100 volts
Test End Date and Time:	4/September/2012 03:00 pm

Table B.2 — Preset Items

	Preset item	Preset value
Mode and Settings	Scanning resolution	default (200 dpi)
	Colour or grey scale/B&W	default (colour)
	Duplex / simplex	default (simplex)
	Original page size	default (A4)
	Paper feed orientation (long/short edge)	default (long edge)[a]
	Scan destination	default (Shared network)
	Storing File Type	default (PDF-multi)
	Auto scan quality adjustment	default (factory preset default setting)
ADF Paper-path	Paper feed direction	default (long edge)[a]
	Output orientation	default
	scanning unit	default (duplex ADF)

[a]   These items are necessary because the paper feed orientation or ADF paper feed direction influences the scanning productivity.