BS ISO/IEC 24734:2014

Incorporating corrigendum August 2016

BSI Standards Publication

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

Documents
Document Sharing Hub

Full document details: BS ISO/IEC 24734:2014

National foreword

This British Standard is the UK implementation of ISO/IEC 24734:2014, incorporating corrigendum August 2015. It supersedes BS ISO/IEC 24734:2009 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee IST/3, IT Printers and Cartridges.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2016.
Published by BSI Standards Limited 2016

ISBN 978 0 580 95599 0

ICS 37.100.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2014.

Amendments/corrigenda issued since publication

Date	Text affected
31 August 2016	Implementation of ISO/IEC corrigendum August 2015: Equation in subclause 5.2.2 modified

Documents
Document Sharing Hub

Full document details: BS ISO/IEC 24734:2014

INTERNATIONAL STANDARD

ISO/IEC 24734

Second edition
2014-07-01

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

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

Reference number
ISO/IEC 24734:2014(E)

Documents
Document Sharing Hub
© ISO/IEC 2014

Full document details: BS ISO/IEC 24734:2014

COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2014

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

© ISO/IEC 2014 – All rights reserved

Documents
Document Sharing Hub

Full document details: BS ISO/IEC 24734:2014

Contents

Page

Foreword ... **iv**

Introduction ... **v**

1 Scope ... **1**

2 Terms and definitions ... **1**

3 Test Parameters and Conditions ... **5**
3.1 Test Platform ... 5
3.2 Test Platform Test Setup Procedures ... 5
3.3 Printing Device System Setup ... 6
3.4 Printing Device Connection ... 7
3.5 Printing Device Condition ... 7
3.6 Sample Size ... 7
3.7 Paper ... 7
3.8 Maintenance ... 7
3.9 Test Files, Test Suites and Software Applications ... 7
3.10 Environment ... 8
3.11 Voltage ... 8

4 Test method ... **8**
4.1 Test Measurement Procedure ... 9
4.2 Test Method Process ... 12
4.3 Category Tests ... 13
4.4 Feature Performance Test ... 17
4.5 Optional Special Tests ... 18

5 Calculations and Treatment of Data ... **18**
5.1 Overview ... 18
5.2 Category Tests ... 19
5.3 Feature Performance Test ... 20

6 Presentation of Results ... **21**
6.1 General ... 21
6.2 Category Tests ... 21
6.3 Feature Performance Tests ... 26

Annex A (normative) **Test platform system parameters that may affect digital printing productivity measurements** ... **28**

Annex B (normative) **Test Suites** ... **32**

Annex C (informative) **Report Presentation** ... **40**

Annex D (informative) **An example of printing device and test settings to record** ... **45**

Annex E (informative) **An example of a Full Detailed Report** ... **47**

Bibliography ... **50**

© ISO/IEC 2014 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

This second edition cancels and replaces the first edition (ISO/IEC 24734:2009), of which it constitutes a minor revision.

© ISO/IEC 2014 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

Introduction

Many digital printing devices produce printed pages at a different rate than their nominal speed when running with different modes (simplex, duplex, print quality modes), different substrate weight, system environments, applications and file content, and finishing options. The degree to which a reduction in productivity is experienced depends significantly on multiple parameters of the job workflow. The most dominant of the parameters of the job workflow are: system environment, application, and job characteristics, such as, the number of pages in a set to be printed, single-sided or double-sided output pages, quality mode, number of print sets to be produced, substrate weight/size used, finishing options, and job content complexities such as monochrome vs. colour, text/vector vs. raster, page scaling, and colour conversion. The existing International Standard (ISO/IEC 10561) only addresses printing throughput for class 1 and class 2 printers and, therefore, is not suitable for comparing colour printing devices or high-speed page-oriented printing devices with many finishing options and connectivity configurations.

This International Standard provides a general method for measuring the productivity when the above-mentioned job workflow parameters for digital printing devices are taken into consideration. This International Standard also includes a suite of test files, test-platform (hardware and software) setup guidelines, and a procedure to be used for measuring digital printing productivity. It allows manufacturers and buyers of digital printing devices to describe the productivity of various digital printing devices with respect to representative office usage patterns.

© ISO/IEC 2014 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

Documents
Document Sharing Hub

INTERNATIONAL STANDARD ISO/IEC 24734:2014(E)

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

1 Scope

This International Standard specifies a method for measuring the productivity of digital printing devices with various office applications and print job characteristics. This International Standard is applicable to digital printing devices, including single-function and multi-function devices, regardless of print technology (e.g. inkjet, laser). Devices can be equipped with a range of paper feed and finishing options either directly connected to the computer system or via a network. It is intended to be used for black and white (B&W) as well as colour digital printing devices. It allows for the comparison of the productivity of machines operating in various available modes (simplex, duplex, size of substrates, etc.) and office applications when the test system environment, operating modes, and job mix for each machine are held identical. This International Standard includes test files, test setup procedure, test runtime procedure, and the reporting requirements for the digital printing productivity measurements.

This International Standard is not intended to be used for devices which are not able to print on a media size of A4/8.5”x11” or for devices, which are not able to collate multiple copies of a print.

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

The productivity of a digital printing device depends on factors other than the printing device itself. These include, but are not limited to, computer manufacturer and model, central processor type and speed, RAM and hard disk memory capacity and speed, software driver, version of the application being used, operating system, and the type and speed of the communication path from computer to printing device, etc. Because of this, in order to make useful and accurate direct comparisons of printing productivity with this International Standard, the same computer system hardware and software have to be used for measuring the printing devices, if, for the purpose of being directly compared one to another. For every printing productivity measurement, the basic specifications of the computer hardware and software have to be included with the results of the printing productivity measurement.

NOTE There are other factors that influence the number of prints that a person can make on a printing device within a defined time period. These factors include typical job portfolio that is printed on a particular printing device, reliability of the system, downtime due to a service call, ease-of-use, (un)loaded paper during printing, routine maintenance, interaction with other users of the printing device and the network, etc. Such productivity items are not taken into account within the scope or methods of this International Standard.

2 Terms and definitions

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

2.1
category test
test pertaining to one of two separate categories: Office category and Advertising and Graphics category, whereby the Office Category test is used to test and report FSOT, ESAT, and EFTP using content from typical office applications and the Advertising and Graphics Category test is used to test and report FSOT, ESAT, and EFTP using applications and files representing more complexity, higher coverage, and a higher ratio of image and graphic content such as pictures, gradients, and embedded elements

2.2
collation
printing device’s capability to produce multiple hard copies of an electronic document in repeating original order, such as 1234, 1234, 1234, etc, which can be achieved through either software features that ensure proper output order or via a hardware finishing device

© ISO/IEC 2014 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

2.3
default driver
printing device driver that is automatically selected as the default per the manufacturers' installation procedure

2.4
duplex printing
printing where the printing device can make a number of prints with the printing being done to both sides of the sheet

Note 1 to entry: Other equivalent terms are "two-sided printing" or "two-sided perfecting".

2.5
EFTP
effective throughput
average speed at which a device produces pages measured from the initiation of the job through the complete exit of the last page of the last test set

Note 1 to entry: EFTP is expressed in images per minute (ipm). EFTP can be affected by the digital processing time of the test set as well as the run time of the test set.

2.6
ESAT
estimated saturated throughput
rate at which a device produces pages measured from the complete exit of the last page of the first test set through the complete exit of the last page of the last test set

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

2.7
feature performance percentage
ratio of the printing performance (such as FSOT and ESAT) with the subject feature ON versus the printing device default baseline performance (without the subject feature ON)

2.8
feature performance test
optional test used to evaluate productivity changes with various printing and finishing features enabled

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

2.9
FSOT
first set out time
number of seconds between the initiation of the job to the complete exit of the last page of the first test set

2.10
full detailed report
presentation of information including machine setup and measured test results

2.11
full report
presentation of results, including the FSOT, EFTP, and ESAT values for each file tested for a given category or feature test as well as the calculated averages for the overall FSOT, EFTP, and ESAT values

© ISO/IEC 2014 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

2.12
host-based controller
(printing devices with a host-based controller) page description interpreter and RIP residing in the host computer; these processes convert the PDL into a simplified format such as a raster bitmap, and the simplified data are then sent to the printing device

Note 1 to entry: Most of the data and images processing is done on the host computer side. The performance of the printing device depends upon the whole system (the host computer, the data transfer, and the printing device).

2.13
initial installation state
state of the test platform after the installation and configuration of the operating system and applications but before the installation of unique software, e.g. print driver for the printing device under test

2.14
input image equivalent
number of original electronic input images printed independent of the number of hardcopy output sheets the images are printed on

Note 1 to entry: Input image equivalent is expressed in terms of the equivalent number of images input from the source test file. For example, if two A4-sized input images from the test file are printed on one side of an A3 page in simplex printing, the output printed on this A3 page is a two A4-sized input image equivalent. For another example, if four A4-sized input images from the test file are printed in reduction on one side of an A4 page in a 4-up mode in simplex printing, the output printed on this A4 page is a four A4-sized input image equivalent.

2.15
interface
network
interface between the host and the printing device, such as a direct (via parallel, serial, USB, Firewire, or wireless) or an indirect (via network router/server) connection

2.16
LSOT
last set out time
number of seconds between the initiation of the job to the complete exit of the last page of the last test set

2.17
nominal printing speed
printing rate, excluding time to first page printed, and measured when producing pages in a continuous printing mode with a single static data page using a nominal weight substrate, expressed in pages or images per minute

2.18
PDL
page description language
specifies commands and data structures that a printing system interprets to produce an intended print page image

2.19
PDL-based controller
[printing devices that include a PDL-based controller (such as a PostScript RIP)] host computer processing the page information through a software application into a standardized or well-known format (with embedded PDL and compression) and the standardized/well-known page data is sent to the printing device via an interface/network

Note 1 to entry: The printing device's controller has its own decompressor, PDL interpreter, and RIP, with job storage and the required large amount of processing power. Most of the final page data processing, images processing, and job and file management are done on the printing device side. However, the performance of the printing device still depends upon the whole system (the host computer, the data transfer, and the printing device).

© ISO/IEC 2014 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

2.20
printing device
produces hard copy output, or prints on media such as paper, from digital electronic documents

Note 1 to entry: The function of the device is not limited to printing only, such as is the case with multi-function devices, which have the ability to print and perform other functions such as copy, scan, and/or digital send.

2.21
RIP
raster image processor
component used in a printing system, which produces a bitmap

2.22
set count
the total number of sets printed during a test run, with set count N, and then N (as in N test sets) × M (number of pages in one test file) pages will be printed.

Note 1 to entry: This is often referred to as copy count in the application or print driver setting.

2.23
simplex printing
use of a printing device when only a single side of a sheet is printed on

Note 1 to entry: Single-sided printing mode is similar to the copying modes often referred to as 1:1 mode, simplex to simplex, or single-sided originals to single-sided copies.

2.24
summary report
presentation of results including the average overall FSOT and ESAT values calculated for a given category or feature test

2.25
test file
refers to individual files used for testing as per the test method

EXAMPLE A single Microsoft Excel[1)] file within the Office test is a “test file”.

2.26
test platform
set of hardware and software system components configured to perform the collection of digital printing productivity tests, including, but not limited to a computer installed with an operating system and applicable application software, installed printing device software, hardware and software interfaces, and timing devices (stopwatch or automated)

2.27
test run
refers to the operation of printing one test file, in a particular system configuration, with a particular set and page count

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

2.28
test set
all of the pages of a single test file

1) Microsoft Excel is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO and IEC of this product.

© ISO/IEC 2014 – All rights reserved
AVA Documents Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

2.29
test suite
refers to the combination of test files for each category test

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

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

3 Test Parameters and Conditions

3.1 Test Platform

Due to the rapid change of computer technology, a common test platform (hardware and software) that can be used for productivity testing over time is considered to be not practical. Instead, when a test platform is used, the test platform system parameters that may affect digital printing productivity measurements (see Annex A) shall be recorded.

3.2 Test Platform Test Setup Procedures

3.2.1 Initial Platform Setup

The test platform hardware should be installed as per the manufacturer's instructions. The test platform hardware information shall be recorded as listed in Annex A. The test platform operating system and applications should be installed as per the manufacturer's instructions. The test platform operating system and application information shall be recorded as per Annex A. All settings or selections made during installation that differ from the application's default settings or operating system's default settings shall be recorded.

— The test platform should be configured for the appropriate connection environment, such as direct USB connection or network Ethernet connection, and the information shall be recorded as per Annex A along with all settings and selections that differ from the installation default configuration.

— It should be verified that the test platform is configured for optimal performance by evaluating system parameters such as hard disk fragmentation and compression, swap memory size, etc. Any settings, changes or optimizations made that differ from the installation default condition shall be recorded.

— The test platform is now in the Initial Installation State. All recorded settings shall be included in the Full Detailed Report.

3.2.2 Creation of Disk Image of Test Platform (optional)

Disk imaging software may be used to enable the system to be restored to the Initial Installation State. Create the disk image after the test platform has been configured and before the print driver for the printing device is installed. Record the disk imaging software used and all settings that differ from the imaging software's installation default condition.

3.2.3 Initial Test State

The test platform shall be restored to the Initial Installation State before beginning the sequence of tests for each new printing device. Products that are of the same distinct print system can share testing and reports. Two or more products or bundles may be part of a distinct print system when they use the same 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 print system, and are different print systems, even if they use the same print mechanism, and shall not share testing and reports. Record the method used to establish the Initial Installation State.

© ISO/IEC 2014 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

3.3 Printing Device System Setup

Place the printing device on a horizontal surface and setup the printing device according to the manufacturer's recommendation. Install the software (driver, port, etc.) recommended by the manufacturer. Use the most recent print driver available from the manufacturer. The driver and driver version shall be recorded on the test report.

The standard test shall be conducted using the manufacturer's default driver for the given printing device. If a default driver is not installed/selected automatically by the manufacturer's installation procedure, consult the manufacturer's documentation and use the recommended driver. All image, print quality, mode and speed modifiers shall be at their factory pre-set configuration for the printing device and default installed condition for the driver. If the printing device and driver differ, then the driver defaults shall be used. Disabling manufacturer default installed features, routines or applications, is not allowed. Examples include, but are not limited to the following: automatic cleaning or calibration cycles, bi-directional communications and energy save settings.

Testing shall be carried out in the specified modes, regardless of whether they are default settings or not. For example, if the default driver setting is duplex, the setting shall be changed to simplex for the simplex tests. Other modes that may need to be modified for specific tests include B&W mode on colour devices, paper size, paper scaling, and collation. It is allowable to disable automatic media detect and select plain paper. All changes to the default settings shall be recorded in the Full Detailed Report.

The file shall be rendered on the page in a size corresponding to the dimensions in the test page description. For example, when testing an A4 sized document, the media settings shall be set to A4, and when testing a 8.5"x11" size document, set to 8.5"x11", and so forth. Verify the printing device and print driver default page margin settings are not larger than 12,7 mm (0,5 inches). Adjust the settings as necessary to insure the test page printable area is rendered correctly. Adjust the settings as necessary to insure the test pages printable area is rendered to cover the paper page area as shown in the softcopy display of the test file. Any modifications to the printing device or print driver settings shall be recorded. Page placement modifiers such as page centering and auto-rotation can be used to place the image properly on the page. Any change from the printing device defaults shall be recorded in the Full Detailed Report.

Adjust the settings such as turning off "page scaling" setting to ensure the test page printable area is rendered correctly.

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.

For colour and B&W printing devices, printing the three files in the Office suite, using default settings is required. The output of the three files on a colour device shall be in colour, whereas the output of the three files on a B&W device shall be in B&W. For colour printing devices, an optional B&W result may be reported by using the same three colour files, changing the printing device or driver to produce B&W output, but maintaining the default quality or resolution setting.

Procedurally, the optional B&W output on a colour device test shall be done as follows: Select the printing device or driver options which are intended to produce B&W only output. Follow the manufacturer's instructions on how to change the printing device or driver for the result of producing B&W output utilizing only the black toner or ink. If other settings change automatically as a result of changing to B&W mode, such as quality mode, this shall be noted on the test report. If B&W printing is performed by composite black, it should be reported.

NOTE Common means of setting a printing device in B&W include, but are not limited to, selecting a B&W option in the driver. In the driver, this might appear as: "print in B&W", "print in grayscale" or "print in black only". The selection of B&W printing can occur in several places in the driver and printing device. When the best method to set the printing device to print in B&W only is in question, it is best to contact the manufacturer regarding the best method to change this setting.

Additional tests may be conducted using other, non-default, drivers or printing device description languages provided by the manufacturer for the printing device. Additional tests may also be conducted.

© ISO/IEC 2014 – All rights reserved
AVA Documents Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

using other settings available with the device. Such settings may be, but are not limited to, print quality and speed modifier choices available in the driver. The results of such additional tests will be documented as having system parameters that differ from the factory defaults and shown in comparison to the default system parameter results.

3.4 Printing Device Connection

Connection to the test platform should be determined by the manufacturer's targeted usage. A printing device intended to be shared by several users should be connected via the network connection with which the printing device is equipped from the manufacturer. A printing device intended to be personal or desktop should be connected direct to the test computer (such as USB). The connection type, version, and all settings that differ from the system or printing device defaults shall be recorded and reported.

3.5 Printing Device Condition

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

3.6 Sample Size

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

3.7 Paper

The paper used in this test shall be within the range of, and/or not violate, specific written attribute guidelines and recommendations provided by the printing device manufacturer, which may include but are not limited to: size, weight, composition, paper manufacturer(s), paper type, part number and other physical characteristics. Care must be taken to use a paper that conforms to the printing device manufacturer's paper specifications for the default printing settings. The paper manufacturer, weight, size and paper type/name used in each test shall be noted on the report.

In all cases the paper size used shall be indicated in the measurement results tables, and the paper feed orientation shall be noted in the test report. When a comparison is made between the productivity of one machine with that of other machines the measurement shall be done with the same paper sizes and paper feed orientation.

3.8 Maintenance

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

3.9 Test Files, Test Suites and Software Applications

The productivity test suites and test files are specified in Annex B. The tests shall be conducted using the standard official electronic test files as the input. The most recent official files can be located at http://standards.iso.org/ittf/PubliclyAvailableStandards/SC28_Test_Pages/. Failure to use the exact files as specified shall invalidate test results. The versions of the test files and application software used shall be included in the test report.

A single set of each test file is printed and measured to determine FSOT. Multiple, N sets, of each test file are printed and measured for the 1 Set + 30 Seconds Test run to calculate ESAT and EFTP, where N is the number of sets needed to meet LSOT - FSOT ≥ 30 Seconds. This method is used to provide varying tests for products across varying segments. This 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

© ISO/IEC 2014 – All rights reserved

AVA Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

and weighting some test pages more heavily than others. The 1 Set + 4 Minutes Test is a similar concept used to calculate EFTP and is intended to provide a test to illustrate that differences in productivity can occur for longer printing times compared to shorter printing times. It is understood and recognized that 4 minutes may be a long test for some devices, but a short test for other, higher end devices. The 4 minutes time is a compromise to meet the needs of the many products across many segments covered in the scope of this International Standard.

The Office Category test is the required test. The Advertising and Graphics Category test is an optional test. If the printing device under test serves more than one market category, or if testing more applications and content is of interest, both Category Tests can be tested and measured.

The Feature Performance test is an optional test. The Feature Performance test is used to compare baseline FSOT and ESAT (obtained using a default print system configuration) to FSOT and ESAT obtained using a selected print system feature (e.g. stapling). When such a comparison is desired, the optional Feature Performance test (defined in 4.4) can be added to the category test. The selected Feature Performance test file is run with default print system settings to establish a base line, and then with the subject feature ON, for comparison. The choice of whether "Office" or/and "Advertising and Graphics", or/and "Feature Performance" test file is used depends on what areas of the market that the printing device under test is intended to be used. The baseline test choice ("Office" or "Advertising and Graphics") shall be noted in the Summary and Full Report (especially important for the feature performance ratio calculation versus the base).

3.10 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.

3.11 Voltage

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

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

4 Test method

This section defines the test methods.

A single set (1 Set Test) of the relevant test file is printed in order to measure First Set Out Time from the 1 Set Test ($FSOT_{1set}$). Multiple, N sets, of each relevant test file are printed and measured for the 1 Set + 30 Seconds Test run to calculate Estimated Saturated Throughput ($ESAT_{30sec}$) and Effective Throughput ($EFTP_{30sec}$), where N is the number of sets needed to meet $LSOT_{30sec}$ - $FSOT_{30sec}$ ≥ 30 seconds, and $LSOT_{30sec}$ is the Last Set Out Time for the 1 Set + 30 Seconds Test. The 1 Set + 4 Minutes Test is a similar concept used to calculate $EFTP_{4min}$.

The 1 Set + 30 Seconds Test is used to provide a test for products across varying segments. Without defining and categorizing products by segments, this simple method allows faster products to be tested with more sets and slower products to be tested with fewer sets, therefore more consistent with their usage.

The 1 Set + 4 Minutes Test is intended to provide a test to illustrate that differences in productivity can occur for longer printing times compared to shorter printing times. It is understood and recognized

© ISO/IEC 2014 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

that 4 minutes may be a long test for some devices, but a short test for other, higher end devices. The 4 minutes time is a compromise to meet the needs of the many products across many segments covered in the scope of this International Standard.

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

4.1 Test Measurement Procedure

Before testing:

a) Install the test platform into the Initial Installation State per 3.2.1 Initial Platform Setup.

b) Install the printing device and driver software following the user's manual and test setup requirements. The default required tests shall be run after the printing device has warmed-up and entered a "ready" state. Use of warm-up printing (that means at least one page is printed just before testing) to ready the printing device is acceptable.

c) Set the system parameters (such as paper weight selection, paper size and feed orientation, quality mode) for test. If the system has automatic media detect, it should be disabled and the paper to be used in the test should be selected. Record the printing device model, configuration (options), default condition and any variant if selected.

d) Assemble the files that will be used in the test, identified as described in 3.9. Ensure that the necessary applications are available on the computer that will be used in the test.

e) Printing Mode Control: Configure the Printing Mode for the current portion of the test. Default Printing Modes require no changes in the driver of the printing device under test, other than to turn off page scaling, to turn collation ON if it is not ON by default, to select plain paper, duplex, or for B&W on a colour printing device, set the mode of the print driver to produce B&W output. The test report shall include a record of the printing device modes selected and how it was selected.

   Some devices support multiple duplex options (for example, book versus tablet, long edge vs. short edge). The default duplex option should be used and the orientation recorded.

   NOTE 2 The manner in which collation, set count and B&W is selected can affect performance test results. Preliminary evaluation of the settings and their impact on performance throughput is recommended. Refer to the product's operator manual for additional information regarding recommended settings.

f) Refer to 4.3 and 4.4 to decide what tests are to be run. Refer to Annex D for an example of how to record test settings.

1 Set Test Procedure to measure $FSOT_{1set}$ and $EFTP_{1set}$:

a) Application and test file control: [Start Test run] Open an application and the corresponding test file for that application on the test machine.

b) Select Print from the application.

c) Select "OK" and simultaneously start the timing device (watch or otherwise). The time measurement is started when the "OK" button in the printing application window is selected.

d) Record the time in seconds for completion of one set (the last page of the test file has fully ejected from the machine) to at least two decimal places.

e) [End Test run] Close the test file and associated software application after the test file has been printed.

f) Run the 1 Set Test [steps 1 – 5] twice. Calculate $FSOT_{1set}$ and $EFTP_{1set}$ for each test run according to Clause 5.

© ISO/IEC 2014 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

g) Determine if the results are consistent within ±5% according to 4.2.3, and perform a third test run if required.

h) Calculate the average $FSOT_{1set}$ and $EFTP_{1set}$.

NOTE The average $FSOT_{1set}$ for this test set is reported in the Category Test Full Report and the Full Detailed Report as FSOT. The average $FSOT_{1set}$ for the test suite is reported in the Category Test Summary Report as FSOT. For detail, see Annex C and Annex E for an example of report presentation.

1 Set + 30 Seconds Test Procedure to measure $ESAT_{30sec}$ and $EFTP_{30sec}$:

a) Application and test file control: [Start Test run] Open an application and the corresponding test file for that application on the test machine.

b) Select Print from the application. Enter Print Set count = N required for Last Set Out Time $LSOT_{30sec} - FSOT_{30sec} \geq 30$ Seconds. Select any necessary collate options to insure that multiple set runs print the output in collated order (1234..., 1234, ...). All tests of the same file must use the same set count. For the second and third tests, use the same set count used in the first test. Record where collate and set count settings were made in the driver/application.

NOTE This $FSOT_{30sec}$ should not be confused with the $FSOT_{1set}$ from the 1 Set Test. The $FSOT_{30sec}$ measured here is used to verify $LSOT_{30sec} - FSOT_{30sec} \geq 30$ seconds and to calculate $ESAT_{30sec}$.

c) Select "OK" and simultaneously start the timing device (watch or otherwise). The time measurement is started when the "OK" button in the printing application window is selected.

d) Record the time in seconds for completion of the First Set Out Time ($FSOT_{30sec}$) to at least two decimal places. This is the time from "OK" until the last page (first test set, first complete print of file pages) of the test file has fully ejected from the machine.

NOTE 1 If the output paper tray size is less than the number of pages to be printed, remove the output paper during the test.

NOTE 2 Each test file of the Category test has four pages. Each test file of the Feature Performance Adobe Reader file has eight pages.

e) Record the time in seconds for completion of the Last Set Out Time ($LSOT_{30sec}$) to at least two decimal places. This is the time from pressing "OK" in the printing application window until the last page of the file set count [last page of the last test set] has fully ejected from the device.

f) [End Test run] Close the test file and associated software application after the test file has been printed.

g) Run the 1 Set + 30 Seconds Test [steps 1 – 6] twice. Calculate $ESAT_{30sec}$ and $EFTP_{30sec}$ for each Test run according to Clause 5.

h) Determine if the results are consistent within ±5% according to 4.2.3 and perform a third test run if required.

i) Calculate the average $ESAT_{30sec}$ and $EFTP_{30sec}$ according to Clause 5.

NOTE The average $ESAT_{30sec}$ for this test set is reported in the Category Test Full Report and the Full Detailed Report as ESAT. The average $ESAT_{30sec}$ for the test suite is reported in the Category Test Summary Report as ESAT. For detail, see Annex C and Annex E for an example of report presentation.

1 Set + 4 Minutes Test Procedure to measure $EFTP_{4min}$:

a) Application and test file control: [Start Test run] Open an application and the corresponding test file for that application on the test machine.

b) Select Print from the application. Enter Print Set count = N required to for Last Set Out Time $LSOT_{4min} - FSOT_{4min} \geq 4$ Minutes. Select any necessary collate options to insure that multiple set runs print the output in collated order (1234..., 1234, ...). All tests of the same file must use the same set count.

© ISO/IEC 2014 – All rights reserved
Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014

For the second and third tests, use the same set count used in the first test. Record where collate and set count settings were made in the driver/application.

NOTE This $FSOT_{4min}$ should not be confused with the $FSOT_{1set}$ from the 1 Set Test or the $FSOT_{30sec}$ from the 1 Set + 30 Seconds Test. The $FSOT_{4min}$ measured here is only used to verify $LSOT_{4min}$-$FSOT_{4min}$ ≥ 4 minutes.

c) Select "OK" and simultaneously start the timing device (watch or otherwise). The time measurement is started when the "OK" button in the printing application window is selected.

d) Record the time in seconds for completion of the First Set Out Time ($FSOT_{4min}$) to at least two decimal places. This is the time from "OK" until the last page (first test set, first complete print of file pages) of the test file has fully ejected from the machine.

NOTE 1 If the output paper tray size is less than the number of pages to be printed, remove the output paper during the test.

NOTE 2 Each test file of the Category test has four pages. Each test file of the Feature Performance Adobe Reader file has eight pages.

e) Record the time in seconds for completion of the Last Set Out Time ($LSOT_{4min}$) to at least two decimal places. This is the time from pressing "OK" in the printing application window until the last page of the file set count [last page of the last test set] has fully ejected from the machine.

f) [End Test run] Close the test file and associated software application after the test file has been printed.

g) Run the 1 Set + 4 Minutes Test [steps 1 – 6] twice. Calculate $EFTP_{4min}$ for each test run according to section 5.

h) Determine if the results are consistent within ±5% according to 4.2.3, and perform a third test run if required.

i) Calculate the average $EFTP_{4min}$ according to Clause 5.

Repeat the (1 Set Test, 1 Set + 30 Seconds Test, and 1 Set + 4 Minutes Test) for each required/optional test file, test suite, as applicable for the relevant printing modes on the printing device under test. (See Table 1, Table 2, and/or Table 3.)

© ISO/IEC 2014 – All rights reserved

Documents
Document Sharing Hub
Full document details: BS ISO/IEC 24734:2014