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Information technology — Office equipment — Method for the determination of ink cartridge photo yield for colour printing with inkjet printers and multi-function devices that contain inkjet printer components

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This British Standard is the UK implementation of ISO/IEC 29102:2015. It supersedes BS ISO/IEC 29102:2011 which is withdrawn.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.

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INTERNATIONAL STANDARD

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Information technology — Office equipment — Method for the determination of ink cartridge photo yield for colour printing with inkjet printers and multi-function devices that contain inkjet printer components

Technologies de l'information — Équipement de bureau — Méthode d'essai de la détermination du rendement des cartouches d'encre pour l'impression de photographies en couleurs avec des imprimantes à jet d'encre et des dispositifs multi-fonctions contenant des composants d'imprimantes à jet d'encre

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Foreword

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

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

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 29102:2011), of which it constitutes a minor revision.

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Introduction

The scope of this International Standard is limited to evaluation of ink cartridge photo yield of ink-containing cartridges (i.e. integrated ink cartridges and ink cartridges without integrated printheads) for colour photo printing with colour inkjet printers. This International Standard can be applied to colour inkjet printers having an interface to a computer as well as colour inkjet printers that cannot be connected to a computer. This International Standard can also be applied to the inkjet printer component of any multifunctional device that has a digital input printing path, including multi-function devices that contain inkjet printer components. Both liquid and solid ink products can be tested using this International Standard.

The cartridge photo yields of primary cartridges are determined by an end of life judgment, or signalled with either of two phenomena: fade, caused by depletion of ink in the cartridge, or automatic printing stop, caused by an Ink Out detection function. The cartridge photo yields of supplemental cartridges are estimated. It is envisioned that one of the uses of this International Standard will be for the calculation of cost per page (CPP). While this International Standard measures a portion of this cost, it is not used as the sole component of CPP calculation. Additional factors need to be considered for accurate CPP calculations.

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INTERNATIONAL STANDARD ISO/IEC 29102:2015(E)

Information technology — Office equipment — Method for the determination of ink cartridge photo yield for colour printing with inkjet printers and multi-function devices that contain inkjet printer components

1 Scope

The purpose of this International Standard is to provide a method to determine the ink cartridge photo yield of ink-containing cartridges (i.e. integrated ink cartridges and ink cartridges without integrated printheads) for colour photo printing with colour inkjet printers and multifunction devices that contain inkjet printer components. In the case where a cartridge set can be used in multiple printer models, only one yield test needs to be performed as long as the difference between printer models does not impact yield.

NOTE A cartridge supplier may choose to use more than one market identifier for a single physical cartridge. In this case only one yield test is required as long as there are no differences in the cartridges other than market identifiers.

This International Standard prescribes the following:

— the test method that manufacturers, test laboratories, etc. use to determine ink cartridge photo yield;

— the method for determination of declared photo yield values from the test results; and

— the appropriate method of describing the photo yield of cartridges in documentation supplied to the consumer by the manufacturer.

This International Standard is only intended for the determination of ink cartridge photo yield. No other claims can be made from this testing regarding quality, reliability, etc.

This International Standard can be used to determine the yield of any cartridge that is used during the printing of the photo test file defined in ISO/IEC 29103.

This International Standard is not for use with printers whose minimum printable size is equal to or greater than A3. This International Standard is not intended to measure the yield of photo printing on paper size larger than 4×6, L or A6. In addition, this International Standard is not for use with industrial printers or point of sale printers. It only applies to desktop printing systems.

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 29103, *Information technology — Office equipment — Colour photo test pages for measurement of ink cartridge yield for colour photo printing*

ISO/IEC 24711, *Method for the determination of ink cartridge yield for colour inkjet printers and multi-function devices that contain printer components*

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3 Terms and definitions

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

3.1
fade
phenomenon in which a significant colour change occurs due to ink depletion

Note 1 to entry: If a printer exhibits fade, a five minute pause is allowed to provide for recovery of the ink delivery system and printing can continue. If fade appears on the next page, then the cartridge is judged at end of life and the additional page printed after the five minute pause is not counted in the yield calculation. If fade does not appear on the next page, then printing can continue until the next fade or ink out is encountered.

Note 2 to entry: For examples of fade, please consult Annex A.

Note 3 to entry: In some printer systems, fade can occur prematurely due to the way that ink is provided to the printing system.

Note 4 to entry: It can be helpful to use the first photo test suite print samples from the first cartridge set for colour comparison.

Note 5 to entry: A blue light source (such as a blue LED) can be used to help in the detection of yellow fade.

3.2
streak
thin lines of colour that appear in test images

Note 1 to entry: Streaks differ from fade in the width.

Note 2 to entry: If streaks occur in two or more out of four consecutive test pages, then a streak removal operation is required.

Note 3 to entry: Streaks can appear due to a number of reasons; thermal issues and clogged nozzles being two of the main causes. Comparisons are made using the phenomenon sample provided in Annex B.

3.3
streak removal operation
procedure used to restore the print performance by removing streaks

Note 1 to entry: It is often called a nozzle cleaning operation.

Note 2 to entry: If streaks are observed in two or more out of four consecutive test pages, first the printer can be left idle for five minutes. Then an additional four pages are printed. If the streaks are still observed, then a streak removal operation is conducted according to the latest printer manufacturer documentation. Due to the significant amount of ink that is used for cleaning, the maximum permissible number of times that the streak removal operation can be used on a given cartridge is prescribed in 5.2.1. All test pages printed during this process will be included in the page count for determining the yield.

3.4
printhead alignment operation
function that aligns newly installed printheads

Note 1 to entry: If it is mandatory according to the latest printer manufacturer documentation, this operation is performed during testing. The pages used in the alignment procedure are not counted in the measurement of yield.

3.5
ink low
warning generated by the printing system when it has determined that the amount of ink is such that a cartridge change may be required soon

Note 1 to entry: It does not indicate that the system is out of ink.

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3.6
ink out
signal generated by the printing system when the usable ink in the system is depleted and the printer stops printing

3.7
end of life
condition determined by one of two mechanisms: *fade* (3.1) or *ink out* (3.6)

Note 1 to entry: For cartridges containing multiple colour inks, end of life is defined when the first colour exhibits fade or ink out. In the event that the printer can continue printing after ink out is reported, the cartridge will still be considered at end of life.

3.8
end of testing
point of time when all of primary cartridges are consumed three times per printer under testing

3.9
photo test suite
series of pages defined in ISO/IEC 29103 that are printed as separate jobs

3.10
individual cartridge photo yield
number of pages printed between cartridge installation and end of life

3.11
declared cartridge photo yield
at or below the lower 90 % confidence bound of the mean

Note 1 to entry: 90 % confidence bound of the mean is prescribed in 6.1 and 6.2.

3.12
primary cartridge
major contributing cartridge for ink consumption

Note 1 to entry: The minimum number of primary cartridges to be tested for different printing systems is prescribed in 4.2. Cartridges that reach *end of life* (3.7) first are classified as primary cartridges. They should be consumed at least three times per printer at *end of testing* (3.8).

Note 2 to entry: Colour inkjet printers commonly utilize a set of different colour inks to improve quality of photo images. The number of different colour inks ranges from three to more than 10. Ink usages of different colours are not designed to be uniform. In order to maintain testing time and cost at a reasonable level, the definition of primary cartridges is introduced in this International Standard.

3.13
supplemental cartridge
cartridge that is not classified as primary cartridge

Note 1 to entry: The determination of yield for supplemental cartridges is made according to the procedure prescribed in 6.2.

3.14
proxy cartridge
primary cartridge to be utilized for estimating yield of *supplemental cartridges* (3.13)

Note 1 to entry: The definition of proxy cartridges is prescribed in 6.2.

3.15
photo paper
coated paper for photo printing

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3.16
content type selection
selection that specifies the content for printing

Note 1 to entry: Examples include photo and document. This can be selected by the user or in some cases by the printing system based on the automatic media detection.

3.17
paper media selection
selection that specifies the type of media

Note 1 to entry: This can be selected by the user and/or by the automatic media detection.

3.18
print quality level selection
user selection that specifies the various levels of printed image quality and enhancement

Note 1 to entry: Examples include normal, best or highest.

Note 2 to entry: Some printers might not have all of the selections specified in 3.16, 3.17 and 3.18 available.

4 Test parameters and conditions

4.1 Set up

Place the printer on a horizontal surface and set up the printer according to the installation guide provided in the printer user's manual. If a printer has the capability to use both PC connection and another method of data input for photo printing, the PC connection shall be used for testing. If a printer does not have PC connection capability, the method of delivering photo test page suite to printer and printing procedure shall be included in the test report. Use the most recent printer driver available from the manufacturer's website or the supplied driver with the printer. The driver version shall be specified on the test report. Cartridge installation shall be completed following the instructions in the cartridge installation guide. If there is a contradiction between the printer and cartridge manuals for the cartridge installation, the cartridge manual will take precedence except if changes are recommended for printer or driver settings.

At the start of the test, all printers shall be set up using a set of priming cartridges to ensure that the ink used in testing is primarily for printing, not for initial priming/cleaning. After the printer is set up according to the manufacturer's instructions, the priming cartridges shall be used to print until consistent images are generated. The priming cartridges shall be removed and replaced with new cartridges that will be used for testing yield. The pages printed during priming operation will be included in the test report. But, those pages are not counted towards yield. Even if required by the printer, printhead alignment does not have to be performed on the priming cartridges. The replacement of the priming cartridges with the first set of test cartridges may be done all at once or staggered individually. If done all at once, all test cartridges begin with photo test suite number 1 and continue until end of life. If the staggered start method is used, the test suite number shall be tracked separately for each cartridge. The test start method shall be included in the test report.

Print quality level selection shall be at factory pre-set configuration for the printer and default installed condition for the driver and shall be included in the test report. Any user selectable ink conservation modes, (for example, draft mode) shall be disabled during testing. If content type selection to photo is available on the printer, it shall be set to photo and included in the test report.

Paper media selection shall be set to photo paper. In case of multiple choices are available for photo paper setting, selection made for testing shall be included in the test report. If user selectable automatic media detection is available on the printer, it shall be disabled to make sure the same ink amount to be consumed for different media. If automatic media detection is used, it shall be noted on the test report. If these settings cannot be verified, then testing shall occur with automatic media detection on. If the printer and driver settings differ, then the driver defaults shall be used.

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