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**Information technology — Method  
for the determination of ink cartridge  
yield for monochrome inkjet printers  
and multi-function devices that  
contain inkjet printer components**

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## Foreword

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

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://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](http://www.iso.org/patents)) or the IEC list of patent declarations received (see <http://patents.iec.ch>).

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

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

The purpose of this document is to provide a process for determining the ink cartridge yield for a given monochrome inkjet print system (i.e. integrated ink cartridges and ink cartridges without integrated printheads) using a standard test page.

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

This document prescribes the following:

- the test method that manufacturers, test labs, etc., use to determine ink cartridge yield;
- the method for determination of allowable declared yield value from the test results;
- the appropriate method of describing the yield of cartridges in documentation supplied to the consumer by the manufacturer.

The cartridge yield is determined by an end of life judgement, 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.

It is envisioned that one of the uses of this document is for the calculation of cost per page (CPP). While this document measures a portion of this cost, it is not used as the sole component of CPP calculation. Additional factors are considered for CPP calculations.

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# Information technology — Method for the determination of ink cartridge yield for monochrome inkjet printers and multi-function devices that contain inkjet printer components

## 1 Scope

The scope of this document is limited to the evaluation of black ink cartridge page yield for ink-containing cartridges (i.e. integrated ink cartridges and ink cartridges without integrated printheads) for monochrome inkjet print systems. This document can also be applied to the 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 document.

This document is only intended for the measurement of ink cartridge page yield when printing on plain paper. No other claims can be made from this testing regarding quality, reliability, etc.

This document can be used to measure the yield of any cartridge that is used in a significant amount during the printing of the test page defined in ISO/IEC 19752.

This document is not for use with printers whose minimum printable size is equal to or greater than A3 or for printers designed or configured to print photos (for example, maximum printable size less than A4 or a printer configuration intended for photo only printing). In addition, this document only applies to drop on demand printing systems.

**NOTE** Integrated ink cartridge is a cartridge that includes at least: an ink containment part, an ink deposition mechanism and an ink transport part (see ISO/IEC 29142-1).

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 19752, *Information technology — Office equipment — Method for the determination of toner cartridge yield for monochromatic electrophotographic printers and multi-function devices that contain printer components*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

**3.1  
fade**

phenomenon in which a significant reduction in uniformity occurs due to ink depletion

Note 1 to entry: In this test, fade is defined as a noticeably lighter, 3 mm or greater, gap located in the text, in the bar chart, or in the boxes around the periphery of the *test page* (3.9). The determination of the change in lightness is to be made referenced to the 25<sup>th</sup> page printed for each cartridge in testing. For examples of fade, please consult [Annex A](#).

Note 2 to entry: In some printer systems, fade can occur prematurely due to the way that ink is provided to the printing system. 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* (3.7) and the additional page printed 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* (3.6) is encountered and the additional page shall be counted.

**3.2  
streaks**

very thin lines of colourant or missing colourant, other than intended in the test document

Note 1 to entry: Streaks differ from *fade* (3.1) in the width and severity of increase in lightness,  $L^*$ , or reduction in density. Streaks can appear due to a number of reasons, thermal issues and clogged nozzles being two of the main causes. If these streaks occur in three consecutive *test pages* (3.9), then a *streak removal operation* (3.2) is required. For examples of streaks, please consult [Annex B](#).

**3.3  
streak removal operation**

procedure used to restore the print performance by removing *streaks* (3.2)

Note 1 to entry: If streaks are observed on 15 consecutive *test pages* (3.9), first the printer can be left idle for five minutes. Then an additional 15 test 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 5.2.2.

Note 2 to entry: All test pages printed during this process are 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.

**3.6  
ink out**

signal generated by the printing system when the useable 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: In the event that the printer can continue printing after ink out is reported, the cartridge is still considered at end of life.

**3.8****monochrome inkjet printer**

printer only capable of printing black and not configurable to print another colourant

Note 1 to entry: More than one black cartridge can be installed simultaneously if they have the same cartridge identifier.

**3.9****test page**

test file that is printed as a single job

Note 1 to entry: The test page refers to ISO/IEC 19752.

**3.10****individual cartridge yield**

value determined by counting the number of *test pages* (3.9) printed between cartridge installation and *end of life* (3.7)

**3.11****declared cartridge yield**

value at or below the lower 90 % confidence bound of the mean as prescribed in 6.1

**3.12****non-colourant ink**

material designed for liquid state deposition on a substrate, such as gloss optimizers and fixatives, not containing a colourant

**3.13****black ink cartridge**

cartridge containing black colourant and no other colourant

Note 1 to entry: Black ink cartridge may contain *non-colourant ink* (3.12).

**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. 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 shall 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 priming cartridge 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 cartridge shall be used to print a minimum of 25 copies of the standard test page. The priming cartridge shall be removed and replaced with a new cartridge that is used for testing yield. The pages printed during this step are not counted towards yield. Even if required by the printer, printhead alignment does not have to be performed on the priming cartridges. The number of pages used in the priming operation shall be included in the test report.

All image and print quality modifiers shall be at their factory pre-set configuration for the printer and default-installed condition for the driver. If auto media detection is available on the printer, it shall be disabled and media-type set to plain paper. This is to avoid inaccurate sensing of the media. If the printer and driver settings differ, then the driver defaults shall be used. Any user selectable ink conservation modes, (e.g. draft) shall be disabled during testing.

For printers that default to duplex printing, the default shall be overridden and the printer shall be set to simplex for yield testing.

To assure that the test page is printed correctly, any page size modifiers such as Fit to Page and font substitution shall be turned off. The test page shall be printed using the fonts embedded in the test page and shall be printed on the page in a size corresponding to the dimensions in the test page defined by ISO/IEC 19752. Page placement modifiers such as page centering can be used to place the image properly on the page.

To facilitate automated testing, the test page may be pre-generated using the printer driver. This is often accomplished using a print to file command. This method is only valid if it does not affect the measured yield. If a pre-generated file is used, it shall be noted on the test report.

If the printer under test uses an internal PDF interpreter, it is ok to use it as long as the printer defaults are set to not substitute fonts. If the internal interpreter is used, this shall be noted on the report.

The application software (for example, Adobe Acrobat Reader<sup>1)</sup>), printer driver and printer can have page size modifier functions, such as Fit to Page. Ensure that all of these functions are disabled.

## 4.2 Sample size

The sample size shall be determined such that a minimum of three physical cartridges are tested in each of three printers. Therefore, the minimum number of tested cartridges is 9 (3 cartridges × 3 printers).

When testing additional engines and cartridges above the minimum, an effort shall be made to test an equal number of cartridges on each engine. For example, if an additional engine were to be tested then the minimum number of cartridges to be tested would be 12 (3 cartridges × 4 printers) for a one-cartridge system.

When testing cartridges for a commercially available product, it is recommended that cartridges and printers be procured from various sources or sampled from different production lots. The printers and cartridges shall be within their useful life as stated in their user's manual.

It is recommended that additional engines and/or cartridges be used in testing.

## 4.3 Print mode

For reporting cartridge yield, the test shall be run in semi-continuous simplex printing and set in the driver default print mode at or near rated print speed. Each copy of the test page shall be printed as a separate one-page print job. This allows for some intra-job servicing and calibration to take place. Additional pauses can take place due to paper refills and idle time due to end of workdays.

NOTE 1 This does not mean that the printer is required to stop between printed jobs.

Inkjet printers commonly need to service the printing system after a number of prints, or when the device has been powered down or not used for a given amount of time. This servicing uses ink that could have been used to print additional pages. It is realized that customers do not normally print in a continuous fashion, but these changes are made to decrease testing time and increase the repeatability of the testing process.

NOTE 2 Depending on use conditions, the yield experienced by a given user can vary significantly from the yield measured by this test method.

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1) Adobe Acrobat Reader<sup>®</sup> is the trade name of a product supplied by Adobe Systems Incorporated. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of the product named.

#### 4.4 Print environment

The temperature can have a profound effect on test results. For this reason, the test shall be carried out according to the following test conditions:

Temperature: Testing room average  $23,0\text{ °C} \pm 2\text{ °C}$

Readings to be made with a running average of 1 h with readings recorded at least every 15 min, all running average temperatures are to be between  $20,0\text{ °C}$  and  $26,0\text{ °C}$ .

EXAMPLE

An example of the calculation of the temperature is shown in [Table 1](#) for temperature readings taken on 15-minute intervals for the testing of one cartridge.

**Table 1 — Running temperature calculation example**

	$T_1$	$T_2$	$T_3$	$T_4$	$T_5$	$T_6$	$T_7$	$T_8$	$T_9$	$T_{10}$	$T_{11}$	$T_{12}$	Testing Room Average
Temperature $T_i$	24,0	23,4	20,5	24,2	23,6	22,0	25,5	24,7	22,1	20,8	22,0	23,5	23,0
Running average temperature	N/A	N/A	N/A	23,0	22,9	22,6	23,8	24,0	23,6	23,3	22,4	22,1	

$$\text{Running average temperature} = (T_{i-3} + T_{i-2} + T_{i-1} + T_i)/4$$

$$\text{Testing room average} = (T_1 + T_2 + \dots + T_{12})/12$$

From this, the testing room average would be  $23,0\text{ °C}$ , the maximum running average reading  $24,0\text{ °C}$  and the minimum running average reading  $22,1\text{ °C}$ . These values can be found highlighted in [Table 1](#). It shall be noted that the testing room average for temperature are averages of all measurements, not the running averages.

Environmental conditions shall be included in the test report. The maximum and minimum running averages for temperature shall be reported for each cartridge tested. Please see [Annex C](#) for a sample reporting form.

All materials shall be temperature acclimated to the test room environment. Prior to testing, the printer, paper and cartridges shall be acclimated to the above conditions. Before acclimation, packaging and shipping materials shall be opened with care to prevent damage to the cartridges during acclimation. Paper may be acclimated in the ream wrapper.

Any water condensation shall be avoided when printer, paper and cartridges are carried in the test environment.

#### 4.5 Paper

The paper used in this test shall represent a common medium weight paper and shall conform to the printer's list of approved papers. The paper manufacturer, weight and size, A4 or equivalent, used in the test are noted on the report. If auto media detection is available on the printer, it shall be disabled, and the media type set to plain paper. The auto-detect process can have a significant effect on the yield performance.

#### 4.6 Maintenance

Printer maintenance shall be performed per the printer and cartridge user's manual.

## 4.7 Test page

The test page, consisting of a single test page, is outlined and specified in ISO/IEC 19752. The test shall be conducted using the most recent official electronic test page as the input. The most recent official test page can also be located at <https://standards.iso.org/iso-iec/22505/ed-1/en/>. Failure to use the exact file specifications invalidates test results. In addition to the test page a publicly available PDF reader is used in conjunction with the printer driver to generate the printer input and send the file directly to the printer. The method used for connection between the host computer and the printer shall be recorded on the test report. For automated testing, a pre-generated print file can be used if the results are equivalent to direct printing methods. This shall be recorded on the test report. The version of the test page, the printer driver version and the PDF reader version shall be included in the test report. Before starting the test, a sample test page shall be printed to check the image and assure the proper size. The proper size for the test page is specified in ISO/IEC 19752.

There are several PDF-reader versions available; each version can have an impact on the yield results. It is recommended that the latest version of the chosen PDF reader be used for testing.

To reduce test variability due to other programs, it is recommended that test page generation be conducted on a printer with a “clean” install of the operating system (OS) with only the printer driver, PDF reader and any test control software installed. Testing has shown that old installed drivers from the same or different printers can affect the yield results.

To aid in counting and tracking pages, a header or footer can be added to the test page. Every attempt shall be made to reduce the size of this addition to minimize the effect on calculated yield. If this information is included in the test page, it shall be documented in the test report.

The host computer environment such as OS, RAM size, CPU type and application software may affect the yield test results, the computer environment recommended by the printer's user manual shall be used for the test. All of this information shall be recorded on the test report.

## 5 Test methodology

### 5.1 Testing procedure

#### 5.1.1 Flow chart

Flowchart of testing procedure is shown at [Annex D](#).

#### 5.1.2 Preparation

- a) Install at least three printers following the user's manual.
- b) Install a priming cartridge into each printer.
- c) Print at least 25 test pages.
- d) Remove each priming cartridge.

#### 5.1.3 Installation of test cartridges

- a) Remove all packaging material from a new cartridge to be tested and install the cartridge by following the cartridge installation guide. If there is a contradiction between the printer and cartridge manuals for the cartridge installation, the cartridge manual shall take precedence except if changes are recommended for printer or driver settings.
- b) If the printer has a mandatory printhead alignment operation, it shall be conducted according to the printer manual. These pages are not to be counted in the measured yield.

#### 5.1.4 Testing

- a) Begin test and start tracking the number of test pages printed on each test cartridge.
- b) When the 25th page is printed for the first cartridge for each printer, save page for use as the fade reference.
- c) When end of life is reached on any cartridge, as prescribed in [3.7](#), execute the end of cartridge life procedure according to [5.1.5](#).

#### 5.1.5 End of cartridge life procedure

- a) Record individual cartridge yield of the depleted cartridge as described in [3.10](#).
- b) Remove the depleted cartridge and replace it with a new one.
- c) Repeat steps [5.1.2](#) through step b) of [5.1.5](#) for all remaining test cartridges. If the printer has a mandatory printhead alignment operation, it shall be conducted according to the printer manual.
- d) Testing shall continue using additional test cartridges until all of the black cartridges for the predetermined sample size have reached end of life. (A minimum of nine cartridges, three cartridges on each of three printers).

### 5.2 Procedure for handling streaks

#### 5.2.1 Overview

If streaks are observed as described in [3.2](#), a streak removal operation ([3.3](#)) shall be performed according to the printer user's manual. The page count shall be recorded on the test report.

#### 5.2.2 Nozzle cleaning

- a) Nozzle cleaning strength

If the cleaning operation has the option of multiple cleaning strengths, the procedure indicated in the printer manual for resolving streaking shall be followed. Use of a light and a strong cleaning procedure shall count as one nozzle cleaning operation. Any cleaning pages printed during the nozzle cleaning operation shall not be counted in the yield calculation.

- b) Permissible limited number of nozzle cleaning operation

By conducting the nozzle cleaning operation, some amount of ink is consumed affecting yield test results. To reduce the influence of this operation, the maximum number of times a user-initiated cleaning operation for a single cartridge can be performed is limited as shown in [Table 2](#).

**Table 2 — Allowed Cleaning Cycles**

Estimated cartridge yield	Number of cartridge cleanings allowed
Up to 1 200 pages	3 times
Up to 1 600 pages	4 times
Up to 2 000 pages	5 times
Up to 2 400 pages	6 times
...	...
Up to 4 000 pages	10 times

NOTE The permissible limited number of nozzle cleaning operation is three times, when the assumed yield value for a printer tested is 1 200 pages or less. The limited number is incremented by one every additional 400 pages above 1 200 pages.

One more additional cleaning operation than the specified number of times can be tried. If on the additional cleaning operation, a fade occurs or an ink out is signalled, the yield data is still valid, and the data can be used in the final yield calculation. If a fade or ink out does not occur during the cleaning operation, the cartridge shall be replaced with new one regardless of streak condition. The cartridge shall be considered defective for having excessive streaks and the yield data is not valid. The cartridge removed for this reason shall be recorded on the test report as a failed cartridge due to excessive streaking.

### 5.3 Procedure for handling a defective cartridge, printhead or printer failure

#### 5.3.1 General

During testing, a failure of the cartridge, printhead or printer may occur. This shall be handled as described below. Cartridge failures are defined as occurrences of problems that would result in replacement of the ink cartridge before end of life. Examples of this could be excessive nozzle clogging (for integrated printheads), excessive ink leakage, structural failure, etc. Printhead failures are usually indicated by excessive, non-cleanable streaking or other non-resolvable print quality defects in systems where the printheads can be replaced. Printer failures are defined as non-user clearable errors that prevent normal printer operation from occurring. An example of this might be the failure of the paper feed mechanism or excessive streaking on a non-replaceable printhead. All defective cartridges, printheads and printers shall be recorded on the testing report along with reason for failure.

#### 5.3.2 Defective cartridge

In the case of a defective cartridge, the number of the last test page printed and reason for failure shall be recorded on the report. The cartridge shall then be replaced with a new cartridge and the testing continued. If the printer has a mandatory printhead alignment operation, it shall be conducted according to the printer manual. For the purposes of yield calculation, the defective cartridge shall not be used.

#### 5.3.3 Defective printhead

In the case of a defective printhead, the printhead shall be replaced as specified in the printer user's manual. For the purposes of yield calculation all cartridges that were in the printer at the time of the failure shall not be used in calculation of the final yield. After replacement of the printhead, the printer shall be set-up using a set of priming cartridges as specified in 4.1. A new set of cartridges shall be installed for subsequent testing. On the report, the number of the last test page printed for each cartridge using the defective printhead shall be recorded. A note shall be made that all cartridges were replaced due to printhead failure. If the printer has a mandatory printhead alignment operation, it shall be conducted according to the printer manual.

NOTE If the printhead is not user replaceable, refer to 5.3.4.

#### 5.3.4 Defective printer

In the case of a defective printer, the printer shall be repaired or replaced. After repair/replacement of the printer, the printer shall be set-up using a set of priming cartridges as specified in 4.1. Then new cartridges shall be installed for subsequent testing. If the printer has a mandatory printhead alignment operation, it shall be conducted according to the printer manual. On the report, the number of the last test page printed by the cartridges in the defective printer shall be recorded and it shall be noted that the cartridges were replaced due to printer failure. The failure of the printer shall be noted and the replacement printer serial number recorded. The yield data obtained before printer failure cannot be used for yield calculation unless it can be proved that the printer failure did not affect the previously tested cartridges. This justification shall be recorded in the test report.

## 6 Determination of the declared yield value and declaration

### 6.1 Yield of cartridges

An average and a standard deviation are obtained from the test runs (e.g.  $n = 9$ ).

Sample average for a given cartridge,  $\bar{X} = \sum_{i=1}^n \frac{x_i}{n}$

Sample standard deviation for a given cartridge,  $s = \sqrt{\sum_{i=1}^n \frac{(x_i - \bar{X})^2}{(n-1)}}$

where

$x_i$  is the individual cartridge yield defined in 3.10 (i.e. the number of standard test pages printed between cartridge installation and end of life);

$n$  is the sample size. For testing  $n$  shall be  $\geq 9$ .

It can be stated with 90 % confidence that the true average yield of the population of cartridges is within the following values:

Lower confidence bound =  $\bar{X} - (t_{\alpha, n-1}) \cdot \frac{s}{\sqrt{n}}$

Upper confidence bound =  $\bar{X} + (t_{\alpha, n-1}) \cdot \frac{s}{\sqrt{n}}$

where  $t_{\alpha, n-1}$  can be found on a students' t-distribution table with  $n-1$  degrees of freedom (df or 'v') and an  $\alpha$  of 0,1. (in this example,  $n-1 = 9-1 = 8$ ) This provides a 2-tailed confidence interval with 90 % confidence. This specific t-statistic for 8 degrees of freedom, and 90 % confidence is  $t_{\alpha, n-1} = 1,860$ . This can be used in the above calculation, only. A different sample size and/or different confidence interval yield a different  $t_{\alpha, n-1}$ .

### 6.2 Test data reporting

The data shall be reported as exemplified in Annex C. The report shall be made available if requested.

### 6.3 Declaration of the yield

For a monochrome print system, the declared cartridge yield is always based on its individual lower confidence bound.

EXAMPLE

From testing:

Black cartridge 90 % LCB = 1 100 pages

Yield can be reported as:

Average black cartridge yield      Up to 1 100 pages

Values obtained by continuous printing.

If a yield is reported according to this document, a full test report as shown in Annex C shall be available.

## ISO/IEC 22505:2019(E)

When an inkjet cartridge yield is declared in the user's manual, marketing materials or packaging, the following minimum information shall be included:

- description that the declared yield value has been determined in accordance with ISO/IEC 22505;
- declared yield value of the cartridge;
- declaration that the value obtained was using continuous printing;
- one of the following information shall be reported if a cartridge can be used in multiple distinct print systems:
  - the combination of tested printer and cartridges;
  - the minimum yield of all tested printers;
  - the range of yields from all tested printers (shall have reference to actual printer/cartridge performance available).

If two or any more cartridges are installed simultaneously, yield of a single cartridge shall be declared.

If any other cartridge except monochrome such as coating cartridge is installed, those yields shall be measured and declared.

### RECOMMENDED EXAMPLES

When tested in printer YYY:	
Ink cartridge yield:	
Average cartridge yield	1 100 standard pages
Values obtained by continuous printing using cartridges	
Declared yield value in accordance with ISO/IEC 22505	

When tested in printer YYY:	
Following declaration is available when using multiple monochrome cartridge at once.	
Ink cartridge yield:	
Average cartridge yield	1 100 standard pages
*Yield per one cartridge while using multiple cartridges	
Values obtained by continuous printing using cartridges	
Declared yield value in accordance with ISO/IEC 22505	

When tested in printer YYY:	
Following declaration is available when equipped with a coating cartridge as non-colourant ink at once.	
Ink cartridge yield:	
Average cartridge yield	1 100 standard pages
Average coating cartridge yield	2 000 standard pages
Values obtained by continuous printing using cartridges and coating cartridge	
Declared yield value in accordance with ISO/IEC 22505	

**Annex A**  
(informative)

**Examples of fade**

Examples of fade are shown in [Figure A.1.](#) and [A.2.](#)

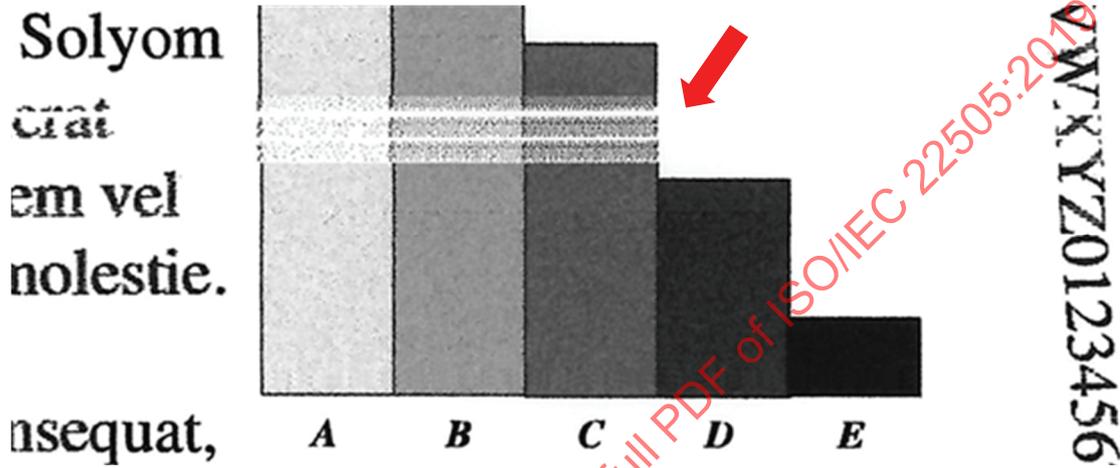


Figure A.1 — Example of fade



Figure A.2 — Example of fade

## Annex B (informative)

### Example of streaks

Examples of streaks are shown in [Figure B.1](#).

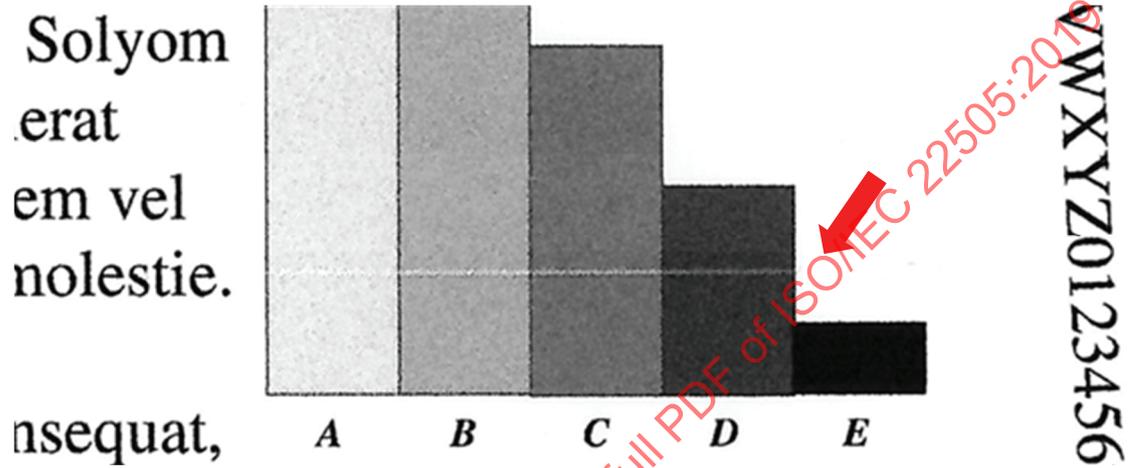


Figure B.1 — Example of streaks

**Annex C**  
(normative)

**Testing reporting form**

This annex specifies the data that shall be present on all test reports; the format may vary.

Declaration of yield:

When tested in printer PDL 5900:	
<b>Inkjet cartridge yield:</b>	
Average cartridge yield	1 100 standard pages
Values obtained by continuous printing	
<i>Declared yield value in accordance with ISO/IEC 22505</i>	

90 % Lower confidence

Black cartridge = 1 100 pages

Date tested: 2017/10/20– 2017/10/30

For questions concerning testing contact:

Cartridge Testing Associates  
123 Printer Lane  
Ink, IL 87484

Printer model used	PDL 5900
Black Cartridge Model	K45
Number of cartridges used in testing:	K=9
Number of cartridges used in calculations	K=9
Print mode:	Continuous
Number of printers used in testing:	3
Media used:	HiRight 20lb Copy paper
Paper size:	A4
Paper feed orientation:	Short edge feed
Computer model:	VectorPC 7155