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

*Technologies de l'information — Méthode pour la détermination
du rendement des cartouches de toner pour les imprimantes
électrophotographiques monochromatiques et pour les dispositifs
multifonctionnels qui contiennent des composants d'imprimantes*



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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 World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO/IEC 19752:2004), which has been technically revised.

It also incorporates the Technical Corrigendum ISO/IEC 19752:2004/Cor 1:2012.

Introduction

The purpose of this document is to provide a process for determining the page yield for toner cartridges for monochromatic print systems using a standard office consumer type test page. In the case where a cartridge can be used in multiple printer models, only one yield test is performed as long as the difference between printer models does not impact yield.

NOTE 1 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 required as long as there are no differences in the cartridges other than market identifiers.

This document prescribes the following:

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

The end of life is judged with either of the two phenomena, “image fade” caused by toner depletion of the cartridge in the printing system or “automatic printing stop” by the toner out detection function.

NOTE 2 A comparison of yield for two printing systems is shown in [Annex E](#).

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

1 Scope

This document is limited to the evaluation of toner cartridge page yield for toner containing cartridges (i.e. all-in-one toner cartridges and toner cartridges without a photoconductor) for monochrome electrophotographic print systems. This document could also be applied to the printer component of any multifunctional device that has a digital input-printing path (i.e. multi-function devices that contain printer components).

This document is only intended for the measurement of toner cartridge yield. No other claims can be made from this testing regarding quality, reliability, etc.

NOTE 1 Application of this document for yield measurement of toner replenishment systems (i.e. toner cartridge- and bottle-type systems where the toner reservoir is internal to the printing system and not user-replaceable) requires some procedural modifications specifically noted herein. This document is intended for equipment used in the office space and does not apply to production volume or large format printing machines where the major cost of ownership is not caused by the consumable yield measured in this document.

NOTE 2 An all-in-one cartridge is a cartridge that includes at least a toner containment part, a photoreceptor part and a developer part (see ISO/IEC 29142-1).

2 Normative references

There are no normative references in this document.

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:

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

3.1 fade

phenomenon whereby a noticeable reduction in density uniformity across the page occurs

Note 1 to entry: In this test, fade is defined as a noticeably lighter, 3 mm or greater, gap located in the text or boxes around the periphery of the test page. The determination of the change in lightness is to be made referenced to the 100th page printed for each cartridge in testing. For examples of fade, see [Annex A](#).

3.2 shake procedure

specified method to carry out shaking of a cartridge according to the user manual

Note 1 to entry: If a shake procedure is used in testing, it will be noted in the report.

3.3

toner low

signal generated by the printer when it has been detected that the amount of toner is such that a toner change will be required soon

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

3.4

toner out

signal generated by the printer when the toner in the system is depleted and the printer is incapable of reliable printing without user intervention

Note 1 to entry: For the purpose of this test, the toner out signal will only be used if it causes the printer to stop printing and requires toner replacement to continue printing.

3.5

end of life

when the printer declares “*toner out*” (3.4) or when *fade* (3.1) is observed

Note 1 to entry: For more information about the exact requirements for judging end of life, see 4.8.

3.6

individual page yield

number of “standard page file” pages printed between cartridge installation and *end of life* (3.5)

Note 1 to entry: For replenishment systems, the individual page yield is determined by counting the number of “standard page file” pages printed between prescribed quasi-end of life conditions (defined in 4.5).

3.7

declared page yield

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

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. The driver version will 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.

If the cartridge used in testing is a toner replenishment or toner bottle type, then one complete toner cartridge will be used in each printer before the start of the test. The pages printed to deplete this priming cartridge do not have to be recorded and printing can be conducted at any environment. This priming cartridge is used to bring the printing system to a set toner level condition.

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 the printer and driver differ, then the driver defaults shall be used. Any user selectable toner conservation modes 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.

If the printer under test uses an internal PDF interpreter, it is okay 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.

To assure that the test page is rendered correctly, any page size modifiers such as “Fit to Page”, “Page Centring” and font substitution shall be turned off. To further ensure that font substitution does not

occur, fonts shall be downloaded as TrueType fonts if the driver provides that option. If the option exists, rendering of graphics shall be performed by the printer, not the application software or operating system. The file shall be printed using the fonts embedded in the file and shall be rendered on the page in a size corresponding to the dimensions in the test page description. Page placement modifiers, such as page centring, may be used to place the image properly on the page. If there is a question about rendering settings affecting the yield, the setting shall be noted in the report.

NOTE The application software (i.e. Adobe Reader™¹⁾), printer driver and printer may have page size modifier functions, such as “Fit to Page”. Make sure that all of these functions are disabled.

4.2 Sample size

A combination of at least three cartridges shall be run on a combination of at least three printers (for a minimum of nine cartridges and three printers). This is the minimum number of engines and cartridges that shall be used for testing. When feasible, it is recommended that additional engines and cartridges be used in testing. When testing additional engines and cartridges above the minimum, an effort should be made to test equal number of cartridges on each engine. For example, if an additional engine is to be tested then the minimum number of cartridges to be tested would be 12 (3 cartridges × 4 engines). When testing cartridges for a released product, it is recommended that cartridges and printers are procured from various sources, or selected 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 an additional cartridge be procured to allow for the possibility of cartridge failure during testing.

4.3 Print mode

For reporting cartridge yield, the test shall be run in semi-continuous print mode simplex printing. The actual print speed will be semi-continuous because of printing being interrupted for paper replenishment, etc. Every attempt should be made to have printing be continuous from the start of a cartridge to the end of cartridge life. If the printer is powered down at the end of day during testing, this shall be noted on the test report.

4.4 Print environment

The temperature and humidity 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 $26,0\text{ °C}$.

Relative humidity (RH): Testing room average $50\% \pm 10\% \text{ RH}$

Readings to be made with a running average of 1 h with readings recorded at least every 15 min, all running average RHs are to be between 35% and 65% .

EXAMPLE An example of the calculation of the temperature is shown below for temperature readings taken on 15-min intervals for the testing of one cartridge.

1) Adobe Reader™ 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 of this product.