
Minimalne zahteve za združljivost kartuš s sistemom z brizgalnim tiskalnikom

Minimum requirements for remanufactured and compatible cartridges to safeguard proper interaction with inkjet printer systems

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English Version

Minimum requirements for remanufactured and compatible cartridges to safeguard proper interaction with inkjet printer systems

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/SS H99.

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Foreword

This document (prEN 15474:2006) has been prepared by Technical Committee CEN/BT/TF 165 "Remanufactured and compatible toner and inkjet cartridges", the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

Introduction

This standard describes a basis for the assessment of reprocessed and compatible ink cartridges.

1 Scope

This standard applies to remanufactured and compatible ink cartridges for operation in a typical office environment. The objective of the standard is to provide two areas for common testing:

- 1) Provide test methodologies to assess potential cartridge/ink interactions with the printer/printhead and to safeguard the continuous functioning of the printer and printhead.
- 2) Measurement of yield.

No other claims can be made from this testing regarding image quality, reliability, etc.

In general throughout the text, only printers and prints are mentioned for the purpose of simplification. Nevertheless this standard also applies to copiers, fax machines and multifunction machines as well as to the copies and facsimiles produced by them however the methods described in this standard are for use on the digital input printing part of any of these systems.

2 Normative references

The following referenced documents are indispensable for the application 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 780:1997, *Packaging – Pictorial marking for handling of goods*

ISO/IEC 24711¹⁾, *Method for the determination of ink cartridge yield for colour inkjet printers and multi-function devices that contain inkjet printer components*

ISO/IEC 24712²⁾, *Colour Test Pages for the Measurement of Office Equipment Consumable Yield*

1) in preparation (Status FCD 2005-10)

2) in preparation (Status CD 2005-10)

3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply:

3.1

Typical Office Environment

For the purpose of this standard the typical office environment is defined as:

Temperature: Testing room average $23.0^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Readings to be made with a running average of 1 hour with readings recorded at least every 15 minutes, all running average temperatures are to be between 20.0°C and 26.0°C .

Relative Humidity: Testing room average $50\% \pm 10\% \text{ RH}$

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

3.2

Ink

A coloured material (usually a liquid) for writing and printing in which dyestuffs, colour pigments and additional substances are dissolved or carefully distributed and which dries by means of air supply and/or absorption

3.3

Inkjet cartridge

Reservoir for ink (with or without printhead)

3.4

Original inkjet cartridge

Unused inkjet cartridge put on the market by the printer manufacturer

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3.5

Remanufactured inkjet cartridge

Empty original inkjet cartridge which has been cleaned and refilled and that can be used as an alternative to the printer manufacturer's original inkjet cartridge

3.6

Compatible inkjet cartridge

Newly manufactured inkjet cartridge which can be used as an alternative to the printer manufacturer's original inkjet cartridge

3.7

Yield

The number of prints as determined by ISO/IEC 24711 and ISO/IEC 24712

3.8

Ink compatibility

Capability of mixing of inks used in the printing system in any ratio without chemical reaction, separation in 2 phases, and/or deposition of solids dissolved in any of them

3.9

Material compatibility

No negative chemical reaction of ink with materials used in the printing system

3.10**Predicted shelf life of inkjet cartridges**

Anticipated storage life of an unused cartridge before performance degradation occurs as determined by accelerated ageing tests

3.11**Start-up behaviour**

Start-up printing behaviour of the test machine after installation of an unused inkjet cartridge

3.12**Cockle**

The tendency of paper to become wrinkled due to printing. Wrinkle is a small ridge or furrow formed on the paper surface by shrinking or contraction of the paper fibers when the ink moist them.

3.13**Curl**

To form the paper into a curled shape by the effect of moisture changes, either from ambient or by printing.

3.14**Starvation**

Print head failure with massive number of missing nozzles usually due to insufficient ink flow.

3.15**Streaking**

One or multiple thin lines lighter than the background, usually produced by one or several missing or malfunctioning nozzles.

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4 Process assurance

The process shall be designed, validated, documented and audited to ensure that the product reproducibility meets the test specifications and other requirements as set out in this document.

5 Labelling

The ink cartridge and package marking must inform the user clearly, that this is a remanufactured or compatible ink cartridge.

The durable marking of the ink cartridges and boxes according to this standard has to include at least:

- a) Name of the remanufacturer or compatible manufacturer or trade mark;
- b) Type/model of the ink cartridge (product code).

The outer packaging has to be clearly readable and durable marked corresponding to the specifications of 5a) and 5b) and must contain:

- Application range (printing systems);
- Storage and transportation conditions (symbols according to ISO 780:1997-11);
- "use before" date clearly readable or coded date of manufacture. The coded date shall consist of three digits, the first digit giving the year (0 to 9) and the last two digits representing the calendar week (01 to 52) (503, for example, stands for the year 2005 and the third calendar week).

6 Warranty Statement

A Warranty Statement shall be made available to consumer indicating the conditions of the warranty in relation to the cartridge as well as to the printer.

7 Test preparation and equipment

7.1 Test conditions

All tests have to be performed under 'typical office environment' conditions. Before start testing, the test paper, cartridges and the test machine need to be acclimatised in the office environment. Deviations from these conditions have to be noted in the test report.

For those inkjet cartridges that contain multiple ink reservoirs that cannot be individually replaced, the test requirements apply to the entire cartridge.

NOTE For testing printer systems with multiple individual cartridges: If not all cartridges are being tested then any cartridge positions not under test will be populated with original cartridges.

7.2 Sample Taking

Sample size is indicated in the various testing procedures. For several tests the same cartridge can be used as indicated.

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7.3 Test machines

The test machines should be selected to provide the most stressful test environment in terms of speed of printing. Criteria for speed:

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- For black and colour cartridges: ~~specified monochrome speed of the printer;~~
- For photo cartridges: specified photo speed of the printer.

The printers shall be in accordance with the series type for which the inkjet cartridge is produced ("original machine").

The inkjet cartridges shall be installed in the original machine in accordance with the instructions of the printer manufacturer and, if applicable, according to any additional instructions or precautions stated by the cartridge (re)manufacturer.

The test machine shall be operated using the default settings given by the printer manufacturer during initial installation of the printer driver; it shall be maintained in specified and documented intervals in a way that it can be guaranteed that the original print quality of the new test machine with the delivered original cartridges is still reached before the current test starts (If the test machine is a new one use the cartridges delivered with the printer according to the procedure in section 8.2.2 procedure A).

If a different type of paper is used, the printer setting shall be adjusted to the test paper. Recommendations of the printer manufacturer shall be followed.

7.4 Test paper

According to the information provided the following types of A4 paper (if applicable) shall be used as test paper during the tests if they are recommended by the manufacturer for the test machine described in 7.3:

Test paper 1: Commercial white paper, suitable for inkjet prints, 80 g/m², uncoated;

Test paper 2: One-side coated white paper ("Ink Jet Quality");

Test paper 3: The photo paper of the highest quality as recommended by the printer or ink manufacturer.

If no paper is recommended by the printer manufacturer, test paper 1, of any brand, is used for the tests. Alternatively if the printer manufacturer specifies the use of a specific type, brand or size of paper, then this paper shall be used as a default for all tests instead of test papers 1 to 3. The specific paper used shall be the consistently recorded and continuously used. The side indicated on the packaging is printed.

If the test requires all test papers use them in the following order: test paper 1, test paper 2, test paper 3. If the printer auto selects the print mode according to the paper type, then disable the auto select print mode and select the print mode manually.

7.5 Visual inspection conditions for printouts

For visual inspection of printouts the following conditions are to be met when testing:

- Lighting of the testing object under 45° with a minimum of 500 lux nominal illumination;
- Care should be taken in the case of use of chromatic illuminants that could alter the judgement of defects (If there are specific cases of chromatic illuminants that should be used then they should be specified in detail). In order to enhance yellow nozzle health judgements a blue filter is recommended;
- Observation of the testing object on an opaque white base (10 unprinted sheets of the test paper underneath the testing object) at a distance of about 50 cm;
- The testing persons must have normal colour vision and visual acuity.

7.6 Visual inspection conditions for printer and cartridge components

For visual inspection of printer and cartridge components the following conditions are to be met when testing:

- Inspection of removable test objects (e.g. disposable printhead) shall be conducted with a minimum of 500 lux nominal illumination;
- Inspection of non removable parts (e.g. capping station) shall be conducted under sufficient illumination;
- Printhead carriage needs to be out of the capping station;
- Potential defects at the capping station should be inspected using a spot light;
- The testing persons must have normal colour vision and visual acuity.

7.7 Test charts

The test charts, shown in Annex A and B are available from a server³⁾ in digital form.

7.7.1 Test chart 1

Apart from a text box for the test conditions test chart 1 contains seven images which are assigned to particular tests, see Annex A.

3) BAM server: <http://www.ps.bam.de/CEN>.

7.7.2 Test chart 2

Apart from a text box for the test conditions test chart 2 contains 8 x 8 = 64 photos including skin tones and memory colours. The photos make balanced use of the colour space, see Annex B.

8 Cartridge testing

All samples should be printed with the printer at the factory default printer and driver settings. All versions of the printer drivers, printer model and PDF reader should be mentioned in the test report and should be the same for all tests.

For the pass/fail test,

- If the remanufactured/compatible cartridge fails the test, then carry out the visual inspection of the printer;
- If mechanical or electrical damages are observed, which are not associated with the inkjet cartridge then test shall be repeated with a new printer;
- The cause of failure and the replacement of the printer shall be documented within the report.

8.1 General test methods

8.1.1 Visual inspection (pass/fail)

Goal: Detect visible failures.

NOTE This test is not performed in isolation. The method is used in conjunction with other test procedures.

Procedure:

- Remove cartridge from packaging;
- Inspect all visible parts of the cartridge.

This test should be performed after complete manufacture/remanufacture. If defects are observed the failures should be noted on the test report (e.g. damaged parts, leakage, missing components,...).

8.1.2 Start-up behaviour (pass/fail)

Goal: After installation the cartridges should print

NOTE This test is not performed in isolation. The method is used in conjunction with other test procedures.

Procedure:

- Remove all packaging and seals;
- Install the ink cartridge in the original machine in accordance with the instructions of the printer manufacturer (and if applicable, according to any additional instructions or precautions stated by the cartridge (re)manufacturer);
- Start a cleaning process before printing if this is mentioned in the handbook of the printer;
- After successful installation, activate the nozzle diagnostic test page of the printer. If the diagnostic page is not available use test chart 1;

- Carry out visual inspection of the printout for major defects (visible at a distance of 50 cm) such as missing colours, white stripes, dark stripes as explained in 7.5;
- If major defects occur a nozzle cleaning process is allowed as stated by the printer manufacturer;
- If on the second printout the same defects occur the cartridge fails;
- If a gloss optimizer fluid is tested apply the auto check test of the printer or use a manual test by activating the nozzle diagnostic test page of the printer and checking the printout for major defects;
- All other defects have to be documented.

8.1.3 Determining ink cartridge Yield according to ISO/IEC 24711 and ISO/IEC 24712

The results of the test according to ISO/IEC 24711 will be included in the report data sheet of this standard (see Annex E) marked as results according to ISO/IEC 24711.

It should be taken into account, that all regulations from ISO/IEC 24711 for the declaration of the cartridge yield should be pointed out (labelling etc.).

Strict conformance is required to the “Procedure for handling streaks” and “Streak removal operation” as specified in ISO/IEC 24711, particularly with regard to the “Permissible limited number of nozzle cleaning operation” restrictions.

A cartridge removed due to streaking according to the ISO/IEC 24711 procedure shall be recorded in the test report as a failed cartridge due to excessive streaking.

Page yield information shall be made available to the consumer according to the requirement of ISO/IEC 24711 and ISO/IEC 24712.

NOTE This test is not performed for its own. The method is used within “Printer/printhead safeguard test and compatibility of the ink with material” according to 8.4.

8.2 Physical ink testing:

8.2.1 Ink compatibility (pass/fail)

Goal: Prevent incompatibilities of different used inks which could cause defects in the printouts or printing system

Procedure:

- Take sufficient quantities of the ink under test and the original ink of the same color;
- Measure the viscosity and surface tension on both the test and the original ink. The viscosity difference between the original and the test ink shall not be more than +/- 20%. The surface tension difference between the original and the test ink shall not be more than +/- 20%. (If the difference is greater than +/- 30%, the test is considered a failure.);
- With the ink from the above test, mix the inks together in proportions of 50%:50%, 10%:90% and 90%:10%;
- Store the mixed inks for a time of 4 weeks at office environment in transparent, clean and closed glass bottles;
- After 4 weeks, inspect the undisturbed samples for non homogeneities;