



ISO Yield Test Report

RIS Refilled Cartridges vs. HP OEM Published Yields

Prepared for:



September 2009

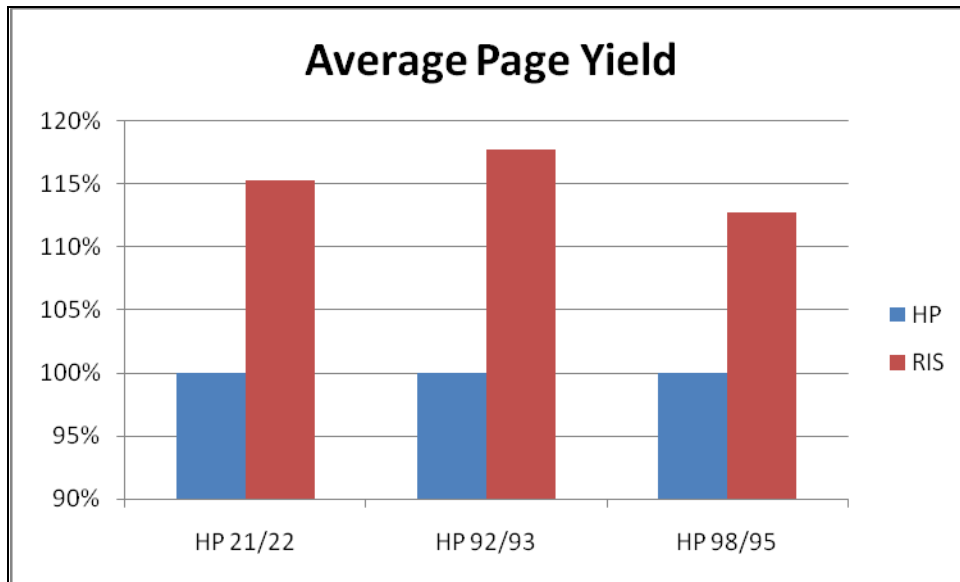
Executive Summary

In July of 2009, Retail Inkjet Solutions (RIS) commissioned QualityLogic to conduct a yield test in accordance with ISO/IEC 24711 on several of their refilled inkjet cartridges. RIS provided QualityLogic with a list of major national retailer locations that use the RIS InkCenter® for the refill process, and QualityLogic used three of these locations to have the cartridges refilled (using mystery shopper techniques). This is the first time QualityLogic has published test results for cartridges tested using the RIS InkCenter®.

Page Yield

The results of the test showed that, in all cases, cartridges refilled with RIS equipment had 10-20% higher yields than the OEM published yields for these cartridges.

| Cartridge | HP Yield* | RIS Yield | Delta | |
|-------------|-----------|-----------|-------|-----|
| HP 21 Black | 190 | 210 | 20 | 11% |
| HP 22 Color | 165 | 198 | 33 | 20% |
| HP 92 Black | 220 | 254 | 34 | 15% |
| HP 93 Color | 220 | 264 | 44 | 20% |
| HP 98 Black | 420 | 486 | 66 | 16% |
| HP 95 Color | 330 | 362 | 32 | 10% |



*HP Yield data taken from HP website for each cartridge tested:

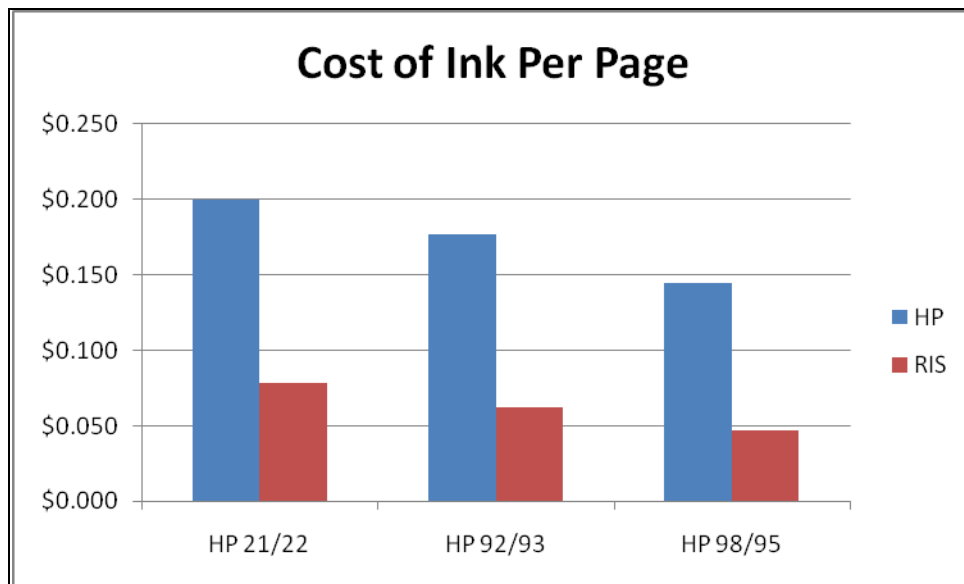
- 21 Black - <http://h10060.www1.hp.com/pageyield/us/en/cartridges/1-21.html>
- 22 Color - <http://h10060.www1.hp.com/pageyield/us/en/cartridges/2-22.html>
- 92 Black - <http://h10060.www1.hp.com/pageyield/us/en/cartridges/1-92.html>
- 93 Color - <http://h10060.www1.hp.com/pageyield/us/en/cartridges/2-93.html>
- 98 Black - <http://h10060.www1.hp.com/pageyield/us/en/cartridges/1-98.html>
- 95 Color - <http://h10060.www1.hp.com/pageyield/us/en/cartridges/2-95.html>

The following printers were used to test the RIS cartridges:

| Printer | Black Cartridge | Color Cartridge |
|--------------------|-----------------|-----------------|
| HP Officejet J3680 | HP 21 | HP 22 |
| HP Deskjet 6988 | HP 92 | HP 93 |
| HP Deskjet 6988 | HP 98 | HP 95 |

Cost of Ink Per Page

When these yield numbers are translated into cost of ink per page, the RIS cartridges had more than a 60% cost advantage compared to the published prices and yields of the HP cartridges.



| Cartridge | ISO 24711 Yield | Cartridge Price | Cartridge Set Price | Mixed Text & Graphics CPP | Delta |
|------------|-----------------|-----------------|---------------------|---------------------------|-------|
| HP | | | | | |
| 21 Black | 190 | \$14.99 | \$34.98 | \$0.200 | |
| 22 Color | 165 | \$19.99 | | | |
| 92 Black | 220 | \$14.99 | \$38.98 | \$0.177 | |
| 93 Color | 220 | \$23.99 | | | |
| 98 Black | 420 | \$23.99 | \$52.98 | \$0.145 | |
| 95 Color | 330 | \$28.99 | | | |
| RIS | | | | | |
| 21 Black | 210 | \$7.99 | \$15.98 | \$0.078 | -61% |
| 22 Color | 198 | \$7.99 | | | |
| 92 Black | 254 | \$7.99 | \$15.98 | \$0.062 | -65% |
| 93 Color | 264 | \$7.99 | | | |
| 98 Black | 486 | \$7.99 | \$18.98 | \$0.047 | -68% |
| 95 Color | 362 | \$10.99 | | | |

Cartridge Quality

The objective of this ISO Yield Test is to determine the yield of the cartridges being tested. ISO also requires that any cartridge or printer failure be reported. Sixty (60) of the 62 RIS cartridges tested achieved normal end of life according to ISO, with 2 cartridges (3.2%) unable to be tested because they were not recognized by the printer. There were no cartridges with ink leakage that caused the cartridge to be excluded from the test.

Detailed Test Results

The following data was extracted from the ISO Yield Reports for each product tested. Complete reports are available upon request.

| | | |
|---------------------------------|--|--------------|
| Printer Identifier | HP Officejet J3680 | |
| Cartridge Type | Integral ink supply and print head | |
| Cartridge Identifiers | Cartridge Identifier | Color |
| | 21 RIS Refill | K (Black) |
| | 22 RIS Refill | Tri-color |
| Test Methodology | ISO/IEC 24711 2006-12-15 | |
| Test Contact Information | QualityLogic, Inc. 5401 Tech Circle Moorpark, CA 93021 | |

Declaration of Yield:

Inkjet Cartridge Yield when tested in HP Officejet J3680:

Using the test suite defined in ISO/IEC 24712 provides the following results:

Average K (Black) Cartridge Yield – Up to 210 standard pages

Average Tri-color Cartridge Yield – Up to 198 standard pages

Values obtained by continuous printing. Declared yield values in accordance with ISO/IEC 24711

| Using 24712 Test Suite | | | | | | |
|------------------------|-----------|-----------------|----------------------------|------------------------------|----------------------------------|-----------------------|
| Cartridge Identifier | Color | Average (pages) | Standard Deviation (pages) | 90% Lower Confidence (pages) | Number used in calculations/test | Primary/ Supplemental |
| 21 RIS Refill | K (Black) | 221 | 17 | 210 | 9/10 | Primary |
| 22 RIS Refill | Color | 206 | 14 | 198 | 10/12 | Primary |

| | | |
|---------------------------------|--|--------------|
| Printer Identifier | HP Deskjet 6988 | |
| Cartridge Type | Integral ink supply and print head | |
| Cartridge Identifiers | Cartridge Identifier | Color |
| | 92 RIS Refill | K (Black) |
| | 93 RIS Refill | Tri-color |
| Test Methodology | ISO/IEC 24711 2006-12-15 | |
| Test Contact Information | QualityLogic, Inc. 5401 Tech Circle Moorpark, CA 93021 | |

Declaration of Yield:

Inkjet Cartridge Yield when tested in HP Deskjet 6988:

Using the test suite defined in ISO/IEC 24712 provides the following results:

Average K (Black) Cartridge Yield – Up to 254 standard pages

Average Tri-color Cartridge Yield – Up to 264 standard pages

Values obtained by continuous printing. Declared yield values in accordance with ISO/IEC 24711

| Using 24712 Test Suite | | | | | | |
|------------------------|-----------|-----------------|----------------------------|------------------------------|----------------------------------|-----------------------|
| Cartridge Identifier | Color | Average (pages) | Standard Deviation (pages) | 90% Lower Confidence (pages) | Number used in calculations/test | Primary/ Supplemental |
| 92 RIS Refill | K (Black) | 260 | 10 | 254 | 11/12 | Primary |
| 93 RIS Refill | Color | 274 | 17 | 264 | 9/11 | Primary |

| | | |
|---------------------------------|--|--------------|
| Printer Identifier | HP Deskjet 6988 | |
| Cartridge Type | Integral ink supply and print head | |
| Cartridge Identifiers | Cartridge Identifier | Color |
| | 98 RIS Refill | K (Black) |
| | 95 RIS Refill | Tri-color |
| Test Methodology | ISO/IEC 24711 2006-12-15 | |
| Test Contact Information | QualityLogic, Inc. 5401 Tech Circle Moorpark, CA 93021 | |

Declaration of Yield:

Inkjet Cartridge Yield when tested in HP Deskjet 6988:

Using the test suite defined in ISO/IEC 24712 provides the following results:

Average K (Black) Cartridge Yield – Up to 486 standard pages

Average Tri-color Cartridge Yield – Up to 362 standard pages

Values obtained by continuous printing. Declared yield values in accordance with ISO/IEC 24711

| Using 24712 Test Suite | | | | | | |
|------------------------|-----------|-----------------|----------------------------|------------------------------|----------------------------------|-----------------------|
| Cartridge Identifier | Color | Average (pages) | Standard Deviation (pages) | 90% Lower Confidence (pages) | Number used in calculations/test | Primary/ Supplemental |
| 98 RIS Refill | K (Black) | 522 | 58 | 486 | 9/13 | Primary |
| 95 RIS Refill | Color | 373 | 20 | 362 | 12/15 | Primary |

Test Methodology

The following are key provisions of ISO/IEC 24711:

- **Standard test document suite:** Use of a standard suite of five pages printed in a controlled environment with printer default settings.



- **Number of cartridges tested:** A minimum of nine of each cartridge is tested until they reach end of life, allowing reliable estimates of average predicted yield within statistically defined boundaries.
- **Source for cartridges:** Cartridges and printers used represent those available to customers on the open market.
- **Clear, objective, end-of-life criteria:** Determine cartridge yield using a well-defined end-of-life criterion.
- **Number of printers:** A minimum of three cartridge sets are tested on three different printers to avoid bias due to printer variability.
- **Controlled environment:** Printing environment is controlled and consistent because variations can affect yield.
- **Objectivity:** Because of worldwide and industry-wide participation, the testing criteria reflect objectivity in developing a reliable and rigorous standard.

Test Specifics

- QualityLogic procured the printers used in the test from commercial sources.
- OEM cartridges were drained according to the recommendations by the major national retailer.
- Empty cartridges were taken by QualityLogic to three different locations of a major national retailer in southern California. Three to four trips were made to each location.
- Refilled cartridges were then tested (using the same printers used for draining) in accordance with ISO 24711.

Definitions

| | |
|-----------------------------|--|
| Number of Printers Tested | Minimum of 3. |
| Number of Cartridges Tested | Minimum of 9 of each color. |
| Temperature | Testing room average 23.0°C ± 2°C with all running average temperatures between 20.0°C and 26.0°C. |
| Fade | Phenomenon in which a significant reduction in uniformity occurs due to ink depletion. |
| Ink Out | Signal generated by the printing system when the usable ink in the system is depleted and the printer stops printing. |
| End of Life (EOL) | A condition determined by one of two mechanisms: fade or ink out (only if ink out stops printing). |
| Declared Cartridge Yield | Cartridge Yield (in pages) that is at or below the lower 90% confidence bound of the average yield. |
| Test Suite | ISO/IEC 24712 |
| Driver Set-up | All image and print quality modifiers were set to their factory pre-set configuration for the printer and default installed condition for the driver. If auto media detection was available on the printer, it was disabled and media-type set to plain paper. |
| Paper | 8 ½" by 11" |
| Semi-Continuous Printing | Each copy of the test suite was printed as a separate five-page print job allowing for some intra-job servicing and calibration to take place. |
| Primary Cartridge | Cartridge containing full density black, cyan, magenta, or yellow, or a combination of full density cyan, magenta and yellow. |
| Individual Cartridge Yield | Value determined by counting the number of diagnostic pages (last page of the test page suite) printed between cartridge installation and end of life, and multiplying by five. |

About QualityLogic

QualityLogic Inc. has been a provider of leading-edge QA and QC test tools and services for the imaging and telecommunications industries for more than 20 years. Its tools and services are used for conformance, performance, interoperability, and competitive analysis testing – from low-level firmware testing to high-level multi-tier application testing. Its target markets are companies that develop and market printers, multifunction peripherals, telephony/IP products and services, and client-based/mobility software.

QualityLogic partners with leading technology firms and standards organizations to develop new and enhanced test solutions for emerging technologies. The following are some examples of QualityLogic affiliations and memberships:

- International Committee for Information Technology Standards (INCITS)
- PC Magazine
- Microsoft Certified Partner and Authorized Test Partner

QualityLogic is a member of ISO INCITS W1, the committee that developed the technically robust, consensus-driven international standard for measuring print cartridge yields. QualityLogic participated in the development of these standards and fully supports the standards that are approved for color ink and toner yield, monochrome ink yield, and monochrome toner yield.