

# ColorLok® Backgrounder



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There is high demand for cutsheet papers for home and office inkjet and laser printers that offer enhanced print quality with reliable and consistent printing. ColorLok® papers provide these benefits and are available worldwide from a growing number of paper manufacturers. ColorLok® papers are sold under various brands through retail, Internet, catalog, and contract stationers.

This backgrounder gives details about the ColorLok® Technology and brand, their benefits and performance, and how manufacturers can join the ColorLok® Program. The differences between the ColorLok® and ColorPRO® programs are mentioned briefly.

## What are ColorLok® Papers?

ColorLok® papers represent a standard for improved home and office printing using both inkjet and laser printers. Packaging of cutsheet papers displaying the recognizable ColorLok® brand concisely communicates the benefits of ColorLok® papers to shoppers, and it assures them that the paper has passed a concise set of print quality, physical and electrostatic standards for quality and reliability.

ColorLok® terminology applies to a brand, a technology, a set of performance standards, and a licensing program. The ColorLok® brand is a registered trademark of International Paper Company (“IPC”). Both IPC and HP have the right to license the use of the trademark to suppliers who participate in the ColorLok® Program.

ColorLok® and ColorPRO are different programs for improving paper performance, managed independently, each with its own performance objectives. The ColorLok® program is focused on home and office printing; the ColorPRO program is focused on commercial and industrial digital printing applications.<sup>1</sup> In some cases, the technologies used to achieve ColorLok® and ColorPRO performance specifications could be the same; however, the performance specifications for each program are unique to their respective applications. Paper production processes and chemistries may be optimized to meet different objectives.

## ColorLok® Brand



The ColorLok® brand on paper packaging is easily recognizable and effectively communicates key benefits of papers that meet ColorLok® performance specifications. A 2008 study<sup>2</sup> conducted by International Paper Company in collaboration with HP showed that more than 93% of respondents rated ColorLok® Technology benefits “appealing” with more than 60% responding with “very” or “extremely” appealing. 83% responded that inclusion of ColorLok® Technology in a paper would positively impact their intent to purchase.

## ColorLok® Technology

Papers with ColorLok® technologies have physical and chemical characteristics designed to benefit both inkjet and laser printing.

### Papers for Inkjet Printers with ColorLok® Technology

Pigment particles are the colorant used in many inkjet inks for home and office printers. Pigments are suspended in a colorless liquid, called the ink vehicle. Most of these pigments are stabilized by anionic or negative surface charges. When pigments come into contact with a certain cationic, or positively charged, salt<sup>3</sup> they rapidly come out of suspension or flocculate. When the salt is added during paper manufacture, it provides a means to rapidly immobilize pigments at the paper surface. This allows the ink vehicle to penetrate the paper without transporting the pigment particles into the paper. Rapid pigment immobilization also reduces “feathering” from capillary forces that cause ink vehicle to wick along surface fibers.

<sup>1</sup> For more information about ColorPRO, visit <http://www.hp.com/united-states/consumer/colorpro/>.

<sup>2</sup> This report is not publically available.

<sup>3</sup> Different divalent salts have been shown to flocculate pigments.

Figure 1 shows photomicrographs of cross and with ColorLok® Technology (right).<sup>4</sup> Note that without ColorLok® Technology, black pigment particles are carried deep into the porous sheet reducing optical density and increasing “striethrough”, where the image printed on the front of the sheet is visible on the back.<sup>5</sup> With ColorLok® Technology, pigments remain at and near the paper surface for high optical density and reduced striethrough.

Figure 1. Cross sections of HP Multipurpose Paper without ColorLok® Technology (left) and with ColorLok® Technology (right)

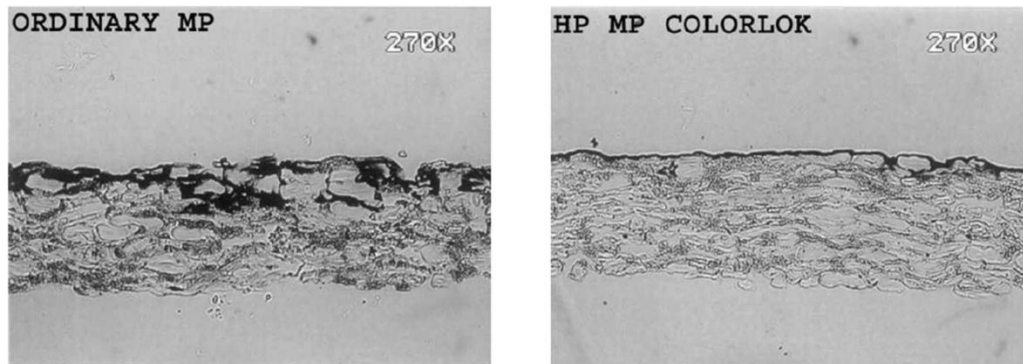


Image source: HP

Figure 2 shows how ColorLok® Technology reduces feathering to provide higher edge sharpness. HP Multipurpose Paper without ColorLok® Technology is shown on the left; HP Multipurpose Paper with ColorLok® Technology is shown on the right. Flocculating the pigments significantly reduces colorant transport along paper fibers on the surface from printed into unprinted areas. In addition, an increase in black optical density is apparent in the sample with ColorLok® Technology.

Figure 2. Improved Edge Sharpness with ColorLok® Technology (right)

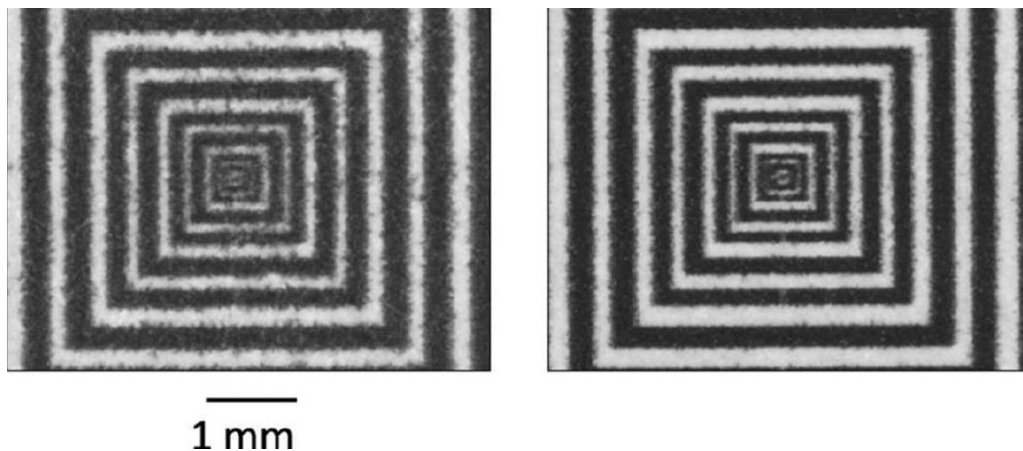


Image source: HP

<sup>4</sup>Printed with HP black pigment ink using an HP PhotoSmart Pro B9180 printer with default plain paper print mode settings.

<sup>5</sup>In extreme cases, colorant may be carried completely through the sheet to the back side.

The pigment flocculation process offers several important benefits for inkjet printing on porous, uncoated papers:

- Pigments remain near the paper surface instead of penetrating the sheet
  - improving optical density
  - improving color saturation
  - increasing color gamut
  - reducing strikethrough
- Pigment are rapidly immobilized
  - reducing feathering
  - improving edge sharpness in text and graphics
  - reducing color-to-color bleed
  - reducing ink transfer
  - reducing smear - fast dry time

Results of an independent study conducted by *SpencerLab* further support the benefits of ColorLok paper<sup>6</sup>. The study, which examined the print quality of ColorLok® paper versus papers without the ColorLok® logo in six inkjet printers from four manufacturers, found noticeable improvement in print quality with ColorLok® technology papers from all tested printers. The observed benefits of ColorLok® paper were richer and denser blacks, increased sharpness and greater color gamut with higher saturation, especially on pigment-based inkjet printers, smaller ink spread and minimized wicking. *SpencerLab* report is available for download at [www.hp.com/go/paperworld2010](http://www.hp.com/go/paperworld2010) and [www.spencerlab.com](http://www.spencerlab.com).

ColorLok® papers also deliver environmental benefits for inkjet printing including enhanced recyclability. ColorLok® Technology enables recycled paper grades to avoid compromised print quality for consistent, high quality inkjet printing.

#### Papers for Laser Printers with ColorLok® Technology

ColorLok® quality standards also include specifications for paper surface electrical resistivity, filler particle size limits, sheet moisture content, and surface smoothness. Control of these properties enhances performance and reliability of home and office laser printers. In August 2010, HP announced recommendation of ColorLok® papers for best printing results in LaserJet printers.

For more than two decades, laser printers in the home and office have established a reputation for value, reliability, quality, and long service life. While laser printers can produce good results on a wide variety of papers, office printing papers have evolved to have properties that improve laser imaging performance and help to reduce paper jams and misfeeds.

ColorLok® papers are validated for consistent filler particle size and surface properties, such as smoothness, low percentages of abrasive, large-particle fillers and electrical resistivity. These properties are important to laser printer reliability and print quality.

#### **ColorLok® Performance**

Papers meeting ColorLok® performance standards provide significant features and benefits to users of inkjet and laser printers compared to papers which don't meet the ColorLok quality standard.

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<sup>6</sup>Independent testing by SpencerLab Digital Color Laboratory, commissioned by HP. The full October 2009 report, "Print Quality Analyses – ColorLok Media Evaluation: AiO Printers: Brother MFC-5490CN, Canon PIXMA MX860 & MX7600, Epson WorkForce 600, HP Officejet 6500 and Officejet Pro 8500," is available for download at [www.spencerlab.com](http://www.spencerlab.com).

Features <sup>7</sup>	Benefits	Inkjet	Laser
Improved Optical Density <sup>6</sup>	Darker black, bolder text <sup>6</sup>	√	
Improved Line Raggedness <sup>6</sup>	Sharper text and graphics <sup>6</sup>	√	
Improved Color Gamut <sup>6</sup>	Vibrant images, brilliant colors <sup>6</sup>	√	
Reduced Strikethrough <sup>6</sup>	Improved duplex printing <sup>6</sup>	√	
Reduced Color-to-Color Bleed <sup>6</sup>	Sharper lines, graphics, and text <sup>6</sup>	√	
Faster Dry Time	Reduced smearing and ink transfer	√	
Consistent Filler Particle Size	High reliability		√
Consistent Surface Smoothness	Better print quality and reliability		√
Consistent Surface Electrical Resistivity	Fewer defects, better print quality		√
Consistent Coefficient of Friction	Reliable paper pick and transport for dependable printing results	√	√
Consistent Stiffness		√	√
Consistent Moisture Content		√	√
Consistent Edge Quality		√	√
Consistent Pre-print Curl		√	√
Rigorous Performance Standards and Third-Party Auditing	Consistent printing performance	√	√

## The ColorLok® Licensing Program

HP owns intellectual property around technology for immobilizing colorants in inkjet inks. HP partnered with International Paper to bring this technology to market and to develop the set of performance, physical, and electrostatic specification that defines the ColorLok® performance standard.

IPC owns the ColorLok® trademark, however HP and IPC both have the right to license the use of the ColorLok® trademark to other paper companies who participate in the ColorLok® Licensing Program.

### ColorLok® benefits

The ColorLok® Program offers benefits to both manufacturers and consumers of home and office printing products.

*For end-users,* ColorLok® papers provide high quality, reliable, and consistent printing performance on both inkjet and laser printers.

*For office managers and paper purchasers,* ColorLok® papers simplify paper purchasing with a readily available paper that offers high performance in both inkjet and laser printers.

*For paper manufacturers, retailers, and distributors,* the ColorLok® brand differentiates their portfolios from commodity papers through positive customer acceptance of the ColorLok® value proposition. ColorLok® compliance positions the paper supplier as a market leader committed to high levels of performance and customer satisfaction. This produces opportunities to grow market share, increase margins over commodity offerings, and gain access to new businesses and accounts.

<sup>7</sup>Features are related to quantitative specifications for ColorLok® papers and compare to papers which don't meet the ColorLok quality standard.

*For printer manufacturers, ColorLok® papers deliver an improved customer printing experience with papers offering higher output quality, improved handling, and better printer reliability.*

## Producing ColorLok® papers

All papers that carry the ColorLok® brand must meet a concise set of paper surface quality, physical and electrostatic performance metrics across a variety of factors related to image quality, dry time, and printer runnability. HP can provide detailed ColorLok® specifications under a confidential disclosure agreement (CDA) to paper companies and partners interested in joining the ColorLok® Program. Visit <http://www.hp.com/hpinfo/abouthp/iplicensing/colorlok-contactus.html> for more information.

ColorLok® papers employ performance-based paper standards that are not tied to a single chemistry or technology. Paper companies can elect to develop their own approach to meeting ColorLok® requirements, or they can contact HP or IPC regarding a license to use ColorLok® Technology.

Companies offering ColorLok® papers may use alternative means and technologies to reach the minimum performance requirements for ColorLok® certification, and they may exceed these minimum requirements with unique attributes that differentiate their products from other ColorLok® papers.

HP and IPC recognize that to better serve the customer and printing industry, it is necessary to work with other paper and printer manufacturers to endorse innovation in paper technology, to produce papers meeting the ColorLok® performance standard, and to make ColorLok® papers more available to customers worldwide.

There are several key factors a prospective ColorLok® partner must consider to obtain approval to use the ColorLok® brand:

- Papers must be submitted for testing and performance qualification to the Printing Applications Laboratory at the Rochester Institute of Technology (RIT-PAL). RIT-PAL is the worldwide authority to qualify and audit compliance with ColorLok® performance standards. Any paper company may submit papers for testing and qualification to RIT-PAL. For details, click on the ColorLok® Paper Qualification Program tab at <http://www.printlab.rit.edu/>
- The right to use the ColorLok® brand can be licensed either from HP or IPC. Please contact either company to understand the terms and conditions of these licenses. HP may be contacted at <http://www.hp.com/hpinfo/abouthp/iplicensing/colorlok-contactus.html>. For International Paper Company contact, [ColorLok@ipaper.com](mailto:ColorLok@ipaper.com).
- The ColorLok® Program is a performance-based standard and is not tied to a single technology. Paper companies can elect to develop their own approach to meeting the ColorLok® requirements, or they may license technology from either HP or International Paper Company. HP-owned ColorLok® Technology is paper enhancing technology that meets ColorLok® performance standards and can be licensed by HP under the terms of a Technology License Agreement. To contact HP regarding the use HP-owned ColorLok® Technology visit <http://www.hp.com/hpinfo/abouthp/iplicensing/colorlok-contactus.html>. International Paper Company-owned ColorLok® Technology is paper enhancing technology that meets ColorLok® performance standards and can be licensed by International Paper Company under terms of a Technology License as well. To contact International Paper Company regarding the use their ColorLok® Technology contact, [ColorLok@ipaper.com](mailto:ColorLok@ipaper.com)

## ColorLok® Program Sponsors

The ColorLok® Program has received broad industry support that is increasing the worldwide availability of ColorLok® papers as well as growing the use of ColorLok® papers through printer manufacturers' recommendations to their customers. These efforts will help to establish ColorLok® as a performance standard for home and office papers that may form the basis for future improvements in printing performance.

As of July 2012, papers from worldwide sources including paper mills, merchants, and products branded by office supply retailers have passed the ColorLok® performance specifications and display the ColorLok® brand. Current sponsors of the ColorLok® Program include:

- Antalis – Europe
- Copamex – Latin America
- Domtar – North America
- Georgia Pacific – North America
- HP – Worldwide
- International Paper – Worldwide
- JK Papers – India
- Kodak – Europe and Asia
- Metsa Board – Europe
- Mondi – Europe
- Office Depot – North America and Europe
- Papyrus – Europe
- Staples – North America and Europe
- Stora Enso – Europe
- Suzano – Latin America

## Summary

The rigorous performance specifications for ColorLok® papers provide users in the home and office with a high-quality, reliable, and consistent printing experience. For paper and printer manufacturers and paper suppliers, the ColorLok® Program offers members a means to differentiate their products with a value proposition that is both recognizable and appealing to consumers.

## For more information

To learn more about ColorLok® benefits, visit <http://www.colorlok.com> or <http://www.hp.com/go/colorlok>

To learn more about the HP ColorLok® licensing program, visit <http://www.hp.com/hpinfo/abouthp/iplicensing/colorlok-contactus.html>

To learn more about ColorLok® qualification and testing, visit <http://www.printlab.rit.edu/>

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