

New HP Vivera Pigment Inks for Professional Photo Printing

Print gallery-quality photos with superior fade resistance¹ and durability on a variety of HP papers, including new and improved HP Advanced Photo Paper



Technology Summary

The HP Photosmart Pro B9180 Photo Printer—HP's new pigment ink printer for professional and advanced amateur photographers—delivers precise, long-lasting color with new HP Vivera pigment inks. Optimized for a variety of photo and fine art papers, including new HP Advanced Photo paper and HP's Digital Fine Art portfolio, HP's new pigment-based inks provide superior fade resistance¹ and durability for reliable, professional results, print after print.

Introduction

The new HP Photosmart Pro B9180 Photo Printer delivers professional image quality and archivability, accurate, consistent color, and impressive performance on a wide range of photo and fine art media. An ideal solution for professional and advanced amateur photographers, creative and graphics professionals, the HP Photosmart Pro B9180 produces long-lasting, gallery-quality photos, portraits and fine art prints up to B+/A3+ size.

Many of the advancements offered with HP's new professional printer result from new pigment-based HP Vivera Inks, which are specifically designed for use with HP printing systems. Proprietary HP Vivera pigment inks offer superior display permanence on a variety of media—more than 200 years on HP Advanced Photo paper and other HP photo and fine art papers (see the table on page 4 for details). HP's new instant-dry Advanced Photo paper features an enhanced photo feel for realistic, studio-quality prints without the wait.

¹Based on light fade testing under glass and thermal degradation tests by Wilhelm Imaging Research using HP Advanced Photo paper, HP Photo Matte, HP Hahnemühle Smooth Fine Art paper, HP Hahnemühle Watercolor paper and HP 38 Pigment Ink Cartridges. Preliminary results to be updated as test progresses—see wilhelm-research.com or www.hp.com/go/printpermanence.

New HP Vivera Pigment Inks

HP's existing family of Vivera dye-based color inks provides a leading combination of image quality and display permanence. The new HP Vivera pigment inks take this performance a step further by vastly improving display permanence and providing water-resistant (and in some instances, waterproof) output on a wide range of print media. The new HP Vivera pigment inks do not replace dye-based Vivera Inks, but provide an additional, more flexible solution for creative professionals.

Precise, Long-lasting Color

The HP Photosmart Pro B9180 uses eight individual HP Vivera pigment inks, including new matte black and photo black inks, a new neutral gray ink, and new color inks in cyan, light cyan, magenta, light magenta and yellow.



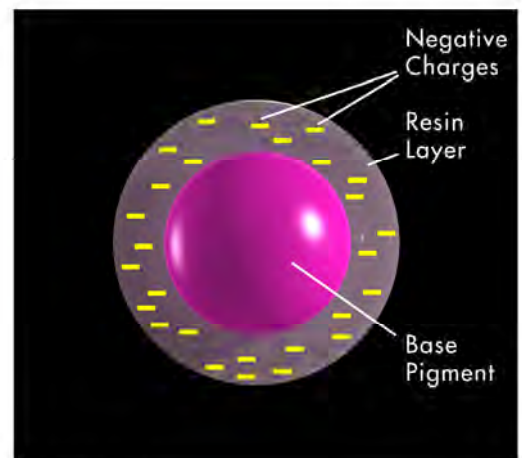
New pigment-based HP Vivera Inks are specially formulated to produce a broad color gamut, deep, rich blacks, and true, neutral grays on a variety of media for brilliant, life-like photos and fine art prints. HP carefully designs and combines exclusive pigment inks to provide excellent color rendition and fine gradations within the color space for accurate, consistent color. Exclusive HP pigment photo inks offer additional benefits for professional photographers and designers, from exceptional fade resistance and durability to support for a wide range of media types.

Exclusive encapsulation technology

HP Vivera pigment inks are formulated with an HP exclusive pigment dispersion technology—Electrosteric Encapsulation Technology (EET)—to deliver rich, vibrant color and exceptional fade resistance of more than 200 years (see the table on page 4). Since fade resistance and color vibrancy are affected by the size of the pigment particles, HP carefully optimizes both the pigment chemistry and particle size to deliver professional image quality and the best photo permanence on the market (see the table on page 4).

EET, in combination with HP's proprietary ink vehicle design, results in inks that form a smooth film without the bumps or irregularities that often result when printing with other pigmented inks. This allows the HP Photosmart Pro to deliver excellent gloss uniformity across a range of colors and exceptionally high gloss on glossy papers.

HP's unique stabilization technology and ink design produce a highly stable pigment dispersion that resists pigment settling, a common occurrence with lesser quality pigment inks. The key to delivering a reliable, consistent ink is to ensure that pigment particles do not stick together and form larger particles. EET maintains particle separation and helps provide dispersion stability for reliable, consistent printing performance. As Figure 1. shows, each pigment particle is encapsulated in a resin layer. The layer creates a protective barrier around the particle and keeps it from getting too close or adhering to neighboring particles. Negative electrostatic charges within the resin layer further enhance the repulsion force between particles.



Not drawn to scale
Figure 1.

HP's unique EET design results in a freer-flowing, less viscous ink, so printhead nozzles operate efficiently, even after relatively long periods of exposure to air. This allows the HP Photosmart Pro to deliver fast speeds and consistent, reliable printing—even when printing on large media sizes—without significant ink servicing. EET enhances the ink's shelf life and helps promote consistent, high-quality printing.

Dark photo black inks
 New photo black inks produce exceptionally dark, glossy blacks on fast drying paper for professional, studio-quality photos. The capability to produce deep, dark blacks on quick drying media, a feature which is difficult to achieve with pigment-based inks, is a result of HP's careful co-design of the ink and paper, including the formulation of the paper coating.

Various methods are used to compare the darkness of black inks in the context of print quality. While viewing of actual print samples is generally considered optimal, inclusion of full-size prints is not possible here. Another common method uses L* minimum to measure darkness levels of black output (the lower the number, the darker the black). The graph in Figure 2. shows such a comparison.

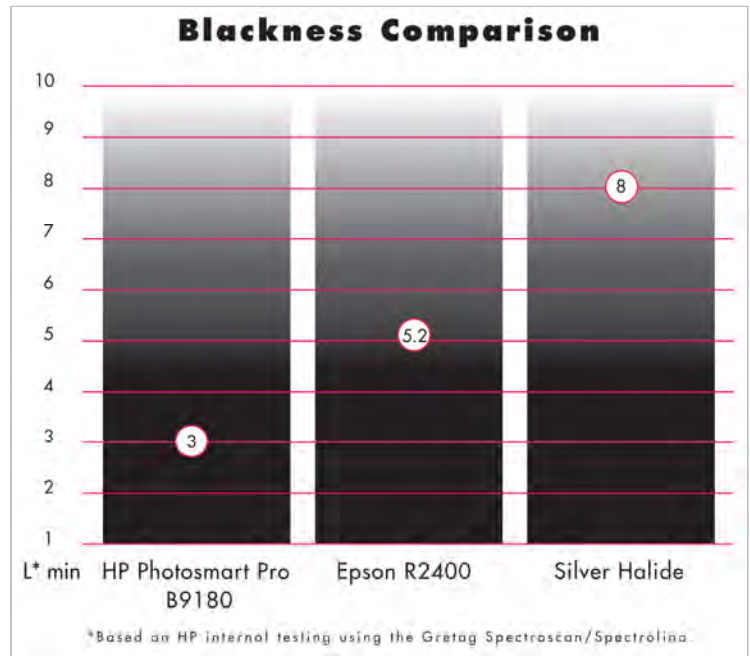


Figure 2.

Neutral gray ink

HP's third-generation gray ink printing technology delivers true, neutral grays across a broad range of media for artistic black-and-white photos and fine art prints (see examples below).

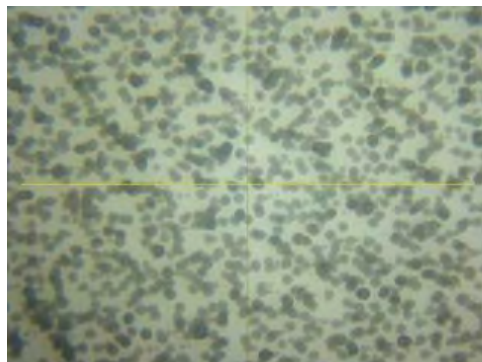


Figure 3. The HP Photosmart Pro B9180 uses HP Vivera gray ink to produce true, neutral grays.



Figure 4. Even competitive printers that use gray ink add composite inks, which produce less neutral grays.

As with all HP inks, the new pigment-based inks are carefully co-developed with HP printhead design to deliver highly accurate, precise drop placement even at high print speeds. Inks with even slightly different fluid properties would detract from this optimized genuine HP performance.

Versatile Media Support

New HP Vivera pigment inks are designed to deliver exceptional image quality, permanence, and durability on a variety of media types, including fast drying photo papers such as the new HP Advanced Photo paper, fine art papers, watercolor, canvas, and textured art papers.

The ability to deliver professional photo quality across a broad media set is a result of HP's careful approach to ink design, including the design and selection of pigment colorants, the amount of colorant used, and the ink vehicle. Designing a pigment ink that performs well on glossy media is particularly challenging, since pigment particles by nature form a film on the paper surface. Any variations within the film can lead to gloss non-uniformities.

Recommended HP Photo and Fine Art Papers for the HP Photosmart Pro B9180 ²			
Product Name	Paper Construction and Coating	Display Permanence, Years (test lab)	Water Resistance ³
HP Advanced Photo Paper (10.5 mil, 250 g/m ²)	Resin coated nano-porous technology coating with acid-free base	200+ (WIR) ⁴	Waterproof
HP Hahnemühle Smooth Fine Art Paper (15 mil, 265 g/m ²)	100% rag content, bright white coated, matte finish, acid free	200+ (WIR) ⁴	Water Resistant
HP Hahnemühle Watercolor Paper (13.4 mil, 210 g/m ²)	Coated matte paper with slightly structured texture with natural white shade. Mould-made with 50% rag content. Acid free	200+ (WIR) ⁴	Water Resistant
HP Photo Matte (9.2 mil, 196 g/m ²)	Bond paper with inkjet coating	200+ (WIR) ⁴	Not Water Resistant
HP Artist Matte Canvas (18.5 mil, 385 g/m ²)	Coated artist stretch canvas with matte finish. Polyester/cotton blend pH neutral and acid-free base	200+ (HP)	Water Resistant
HP Aquarella Art Paper (14.4 mil, 240 g/m ²)	Coated slightly structured mould-made paper with matte finish. Natural white, acid free	200+ (HP)	Water Resistant

Permanence and Durability

HP Vivera pigment inks deliver exceptional display and image permanence across a broad media set. Image permanence essentially describes how long a photo will last and is determined by how well the photo resists relevant degradation factors. For example, a displayed photo may experience noticeable changes such as fading due to exposure to light (light fade), air pollutants (air fade), or high

² Please refer to the HP Photosmart Pro B9180 User's Guide for more information on compatible papers.

³ Waterproof with HP Advanced Photo paper; water resistant with other HP-recommended papers. Based on HP image permanence lab's comprehensive water resistance testing. For details, see www.hp.com/go/printpermanence.

⁴ Preliminary Wilhelm Imaging Research estimate; tests in progress. Based on light (fade) degradation testing under glass; Storage permanence (thermal degradation resistance) is estimated in excess of 200 years based on Wilhelm Imaging Research estimate. For updates, visit wilhelm-research.com or www.hp.com/go/printpermanence.

temperatures. Other degradation factors include thermal or dark fade, which refers to image degradation due to the absence of light, and humid-fastness, defined as the migration of colorant when an image is exposed to elevated levels of humidity.

Light fade

The basic method for estimating light-fade resistance accelerates light exposure and calculates years of image resistance to fade based on the accelerated light exposure.⁵ There currently are no standard methods for estimating and accelerating pollutant-induced fade. To determine potential susceptibility to pollutant fade, HP tests products under concentrated ozone conditions.

Air fade

Although longer term display of any type of photo should be behind glass or other protection, HP recognizes the importance of photo printing technology that is highly resistant to the effects of airborne pollutants. In unprotected display in direct contact with indoor air, HP Vivera pigment inks offer several decades of ozone fade resistance on recommended papers. Please refer to the HP Photosmart Pro 9180 User's Guide for a list of recommended papers.

Water resistance

In addition to delivering exceptional image quality and fade resistance, the new pigment inks are carefully formulated for durability and water resistance. When printing on the new instant-dry HP Advanced Photo paper, prints can be handled immediately from the out-tray (see the section below, New HP Advanced Photo Paper).

During the development of HP Vivera pigment inks, HP paid close attention to the various types of water resistance performance characteristics most important to customers. HP developed a set of six tests: Water Immersion, Standing Water Drop Evaporation, Standing Water, Water Spray, Water Drip, and Wet Smudge. To meet HP's stringent definition of waterproof, photo prints must pass all six tests. HP considers prints which pass all but the first two tests as water resistant, although not waterproof. Prints produced using HP Vivera pigment inks and HP Advanced Photo paper pass HP's definition of waterproof and on many other papers produce water resistant prints. For more information see: www.hp.com/go/printpermanence.

Consistent, Reliable Results

HP Vivera pigment inks are carefully designed to provide reliable, stable performance and to help prevent ink and printhead nozzles from clogging inside the printer. HP Vivera pigment inks work with other elements of the printing system to deliver the image quality and performance customers expect from HP, including HP's electrostatic drop detection print head management system, which monitors all 8,448 print nozzles for optimal, high-quality printing and consistent, reliable results over the life of the product. See the technology backgrounder on the HP Photosmart Pro B9180 for details.

Ease of Use

HP Vivera pigment ink cartridges are easy to use and replace. High-capacity ink cartridges reduce intervention rates and save time by requiring fewer replacements. With eight, individual ink cartridges, you replace only the color that runs out. Built-in matte black and photo black inks in the new HP Photosmart Pro eliminate the need to change ink cartridges when printing on different media, as well

⁵ Display life predictions are derived from accelerated glass-filtered and bare-bulb fluorescent light fading tests conducted at 75 degrees Fahrenheit and 60 percent relative humidity, based on a standard indoor display condition of 450 lux for 12 hours per day. The spectral power distribution of the fluorescent lamps used in these tests meets the requirements set forth in ANSI Standard IT9.9 and ISO Standard 18909. Due to variability in illumination conditions in homes and offices, images will last longer when displayed under lower light levels. Likewise, display life will be shortened when displayed under illumination that is more intense than 450 lux.

as the potential for possible cross-contamination or mixing of inks when changing print modes between glossy and matte media.

HP SureSupply online ordering technology provides customers with the ability to conveniently and easily reorder ink cartridges for their HP inkjet printers via the Internet. HP SureSupply tracks ink levels and provides alerts via a pop-up window when ink is low. This innovative technology offers customers a simple click-through process for accessing supplies information and selecting purchase options from HP or their choice of on-line retailer.

New HP Advanced Photo Paper

HP's newest formulation of Advanced Photo paper offers a number of advancements over the previous HP Advanced Photo paper:

- Increased display permanence—more than 200 years when used in combination with new HP Vivera pigment inks (see the table on page 4).
- Improved gloss uniformity—a higher gloss level produces exceptionally smooth, glossy photos.
- An enhanced photo feel—at 10.5 mil, 250 g/m², the new HP Advanced Photo paper is significantly thicker and stiffer than the previous Advanced Photo paper for a true photo feel.

HP Advanced Photo paper, initially introduced in 2005, is a glossy, instant-dry media that offers excellent image quality, durability and water resistance with the look and feel of a traditional photograph. It offers excellent smudge resistance, thanks to HP proprietary instant dry coating technology. The first HP media to feature HP's proprietary Auto Sense technology, HP Advanced Photo paper allows HP Auto Sense-enabled printers to produce photo lab quality prints three to four times faster than previous HP inkjet printers.

New, Improved Design

When used with new HP Vivera pigment inks, the new Advanced Photo paper provides superb image quality and fade resistance. New HP Advanced Photo Paper is available in glossy and new soft-gloss finishes and comes in a variety of sizes, up to B+/A3+ (see the section below, Excellent Performance on any Inkjet Printer). Like its predecessor, the new HP Advanced Photo Paper offers excellent handling ability for fast, efficient photo printing. HP Auto Sense technology⁶ supports even faster photo printing when used with HP Auto Sense-enabled printers.

Enhanced performance features make the new Advanced Photo paper ideal for producing professional, studio-quality photos. Improvements in HP's newest instant-dry media result from a number of advancements in paper coating technology.

Coating Technology

Generally, there are two types of photo paper coating technologies, swellable and nano-porous. Swellable papers, such as HP Premium Plus Photo paper, provide superb image quality and fade resistance when used with HP dye-based inks.⁷ Swellable papers take longer to dry but typically have offered more fade resistance than the majority of "instant dry" nano-porous media.

HP Advanced Photo paper has a proprietary, nano-porous coating that absorbs ink through capillary pressure for rapid ink absorption and instant dry time. The new photo paper, which is optimized for use with new high-chroma HP pigment inks, has a higher ink absorption rate and higher ink capacity

⁶ Not available with A3 and 13x19-in. HP Advanced Photo paper, or with the HP Photosmart Pro B9180 Photo Printer.

⁷ HP Premium Plus Photo paper is not recommended for use with pigment inks.

than the previous paper. Since the porous coating is comprised of water insoluble ceramic pigments, it is highly water and scratch resistant.

Each layer of the paper coating serves a unique function and contributes to the new photo paper's enhanced features:

Protection layer: The protection layer is the outermost layer and is comprised of ultra-smooth ceramic pigments. These pigments provide a durable barrier of protection to the layers below, imparting excellent scratch and fingerprint resistance. The new Advanced Photo paper has a thicker protection layer—2.5 times the thickness of the previous paper. The increased thickness creates a smoother surface and allows the new photo paper to deliver superior gloss characteristics.

Imaging layers: Two imaging layers, directly beneath the protection layer, work together to give the new Advanced Photo paper its enhanced ink absorption capacity. The pigments used in the imaging layers are based on HP proprietary nano-particle technology. The surface of each nano-particle is customized to provide optimal compatibility with HP's newest inks. Advanced modification technology in HP's new Advanced Photo paper allows the coating to last in excess of 200 years (see the table on page 4).

Polyethylene layers: Two polyethylene layers, one directly above the core paper layer and a second layer directly beneath it, encapsulate and protect the photo base paper from water penetration. The thick, top polyethylene layer over the textured photo base gives HP Advanced Photo Paper an extremely smooth, glossy finish. The bottom polyethylene layer prevents edges from curling and keeps the paper flat for reliable printing performance across a range of humidity levels.

Core paper layer: The resin-coated photo base, comparable to the base paper used in traditional silver-halide photographs, gives the new HP Advanced Photo Paper the true look of traditional photo papers and, more importantly, an enhanced feel.

Increased Gloss

The thicker upper and lower polyethylene layers in the new HP Advanced Photo Paper work together to give it a higher gloss level and better uniformity than the previous Advanced Photo paper, as well as most competitive photo papers. The high level of gloss, an attribute that is difficult to attain with nano-porous media, results from a special combination of surfactants and other ingredients used in coating formulation. Careful formulation of key ingredients enables the optimal amount of leveling of ink pigment particles to deliver a smooth, consistent appearance and uniform gloss. The thicker, stiffer paper is also more crease-resistant, so corners are less likely to become damaged or bent.

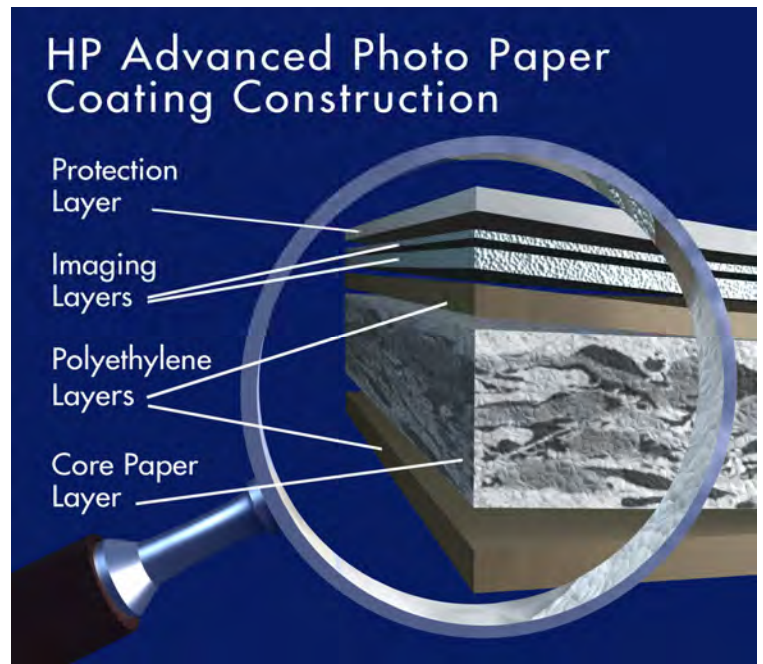


Figure 5.

Unlike some competitive media manufacturers that use UV brighteners to make photo papers appear brighter to the human eye, HP attains a high level of brightness in Advanced Photo paper through careful paper coating formulation. UV brighteners can cause the paper to fade, resulting in color or hue shifts and premature fading of photo prints. Prints produced on papers that contain UV brighteners may also be subject to metamerism. HP Advanced Photo paper, which is optimized for use with Vivera Inks and the new HP Photosmart Pro, enhances permanence without compromising the printer's built-in color calibration. See the technology backgrounder on the HP Photosmart Pro B9180 for details.

World-class Water Resistance

Water can affect photos in a variety of ways. The key variable is the ink used in combination with the paper. When used with new HP Vivera pigment inks, HP Advanced Photo paper produces durable, waterproof prints (see the section above, New HP Vivera Pigment Inks). When printing with HP six-, eight- and nine-ink HP dye-based photo printers, the new Advanced Photo paper produces water-resistant prints. Prints made with other printing systems, such as HP's three-ink compact photo printers, may have a lesser degree of water resistance.

HP Auto Sense Technology

The new HP Advanced Photo paper incorporates HP's proprietary Auto Sense technology, introduced in 2005 with the previous Advanced Photo paper and HP Auto Sense-enabled printing systems. HP inkjet printers with Auto Sense technology 'read' special Auto Sense marks on the back of HP Advanced Photo paper and automatically optimize print settings. Auto Sense technology simplifies printing and helps ensure consistent photo quality while helping to prevent wasted paper and ink. For more information on HP Auto Sense Technology, see the technology backgrounder, Enhanced Media Sensing with HP Auto Sense.

Excellent Performance on any Inkjet Printer

The new HP Advanced Photo Paper is compatible with any inkjet printer and delivers vivid color photos when used with various ink technologies, including pigment and HP's newest dye ink systems. HP Advanced Photo paper offers excellent performance and photo printing attributes at an affordable price, and brings exceptional value to both professional and home photo printing.

The new photo paper is available in the following sizes:

- New 8.5x11-inch, Soft Gloss and Glossy
- New A4, Soft Gloss (known as Satin-matt in Europe, Africa and Middle East) and Glossy
- New A3, Glossy
- New B+/A3+ (13x19-inch), Satin-matt and Glossy
- New 5x7-inch, Glossy
- 4x6-inch/10x15 cm, Glossy
- 4x6-inch/10x15 cm with perforated tab, Glossy
- L-size/3.5x5-inch, Glossy (available only in Japan)

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