

# HP Vivera Pigment Inks for the Designjet Z2100 and Z3100 Photo Printers

Exclusive ink formulation technology enables museum-quality printing with an unmatched combination of exquisite image quality and exceptional fade resistance.



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## Technology Summary

HP Vivera pigment inks are designed to meet the needs of creative professionals. From professional photographers to graphic designers, from fine-art printing to pre-press proofing, HP Vivera pigment inks produce high-quality results that last. But the needs of creative professionals go beyond outstanding results. Acceptable results must be repeatable. HP Vivera pigment inks are engineered using exclusive HP ink formulation technology that ensures color accuracy and consistency. Customers can be confident of getting the same brilliant, vivid color print after print.

The new HP Designjet Z2100 and Z3100 Photo Printers use HP Vivera pigment inks to produce prints with outstanding image quality and exceptional fade resistance on a wide variety of media. Designed together as a system, prints produced with Original HP Vivera pigment inks, on a range of HP creative and specialty media, resist fading for over 200 years.<sup>1</sup>

## Introduction

The 8-ink HP Designjet Z2100 and 12-ink HP Designjet Z3100 Photo Printers produce museum-quality prints that withstand the demands of display, handling and storage.

With new color management technology and the HP Three-Black Ink set, the HP Designjet Z2100 takes advantage of exclusive HP Vivera pigment ink formulation technology to ensure exceptional color accuracy and consistency—a valuable tool for graphic designers and pre-press professionals who need repeatable results.

The HP Designjet Z3100 Photo Printer uses new red, green and blue HP Vivera pigment inks and the HP Quad-Black Ink set in the 12-ink printing system to create the fine detail and broad range of colors that enable professional photographers and digital fine artists to produce true museum-quality prints.

With an HP media portfolio that includes a wide range of creative and specialty media—including fine-art, canvas, watercolor and photo media in 24-, 36-, and 42-inch sizes—creative professionals now have a broad set of printing tools from HP that are designed, engineered, and tested together to produce optimal results from the first print to the last.

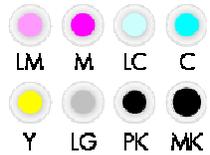
## HP Vivera Pigment Inks

HP Vivera pigment inks are a relatively new addition to the broad family of HP Vivera dye-based inks that have provided an industry-leading combination of image quality and display permanence. Designed as a tool to help creative professionals take full advantage of new HP digital printing technologies, HP Vivera pigment inks continue to add value to the industry, delivering outstanding image quality and long-lasting results. Prints produced with the new HP Designjet Z2100 8-ink printing system resist fading for over 200 years on a range of HP creative and specialty media.<sup>1</sup>

With new red, green and blue HP Vivera pigment inks, the HP Designjet Z3100 12-ink printing system takes image quality to a new level while continuing to provide exceptional fade resistance in water resistant prints. Three new color inks, a new gray ink, and HP Gloss Enhancer enable the system to produce a broad color gamut, rich black density and true gray neutrality, creating extraordinarily fine detail and producing prints with improved color accuracy, significantly reduced metamerism, and excellent gloss uniformity on glossy papers.

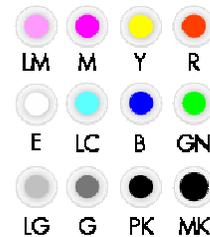
Creative professionals also benefit from the productivity-enhancing attributes of HP Vivera pigment ink. Color stabilizes quickly. And with unique pigment dispersion technology that prevents settling and

clumping of particles that can clog printhead nozzles, customers can be assured of consistent print quality and printing system reliability. Since HP Vivera pigment ink is carefully co-developed with HP printhead design to deliver highly accurate, precise drop placement, inks with even slightly different fluid properties could detract from this optimized Original HP performance.



**The 8-ink HP Designjet Z2100 Photo Printer:**

*Uses eight individual HP Vivera pigment inks including the HP Three-Black Ink set—matte black, photo black, and light gray—and color inks in cyan, light cyan, magenta, light magenta and yellow.*



**The 12-ink HP Designjet Z3100 Photo Printer:**

*Uses twelve individual ink cartridges including HP Vivera pigment inks in the HP Quad-Black Ink set—matte black, photo black, gray and light gray. HP Vivera color pigment inks include three new colors—red, green and blue—in addition to light cyan, magenta, light magenta and yellow. The system also uses new HP Gloss Enhancer.*

## Museum-quality prints

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 the brilliant, vivid color of museum-quality 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 inks offer additional benefits for creative professionals, from exceptional fade resistance to support for a wide range of media types.

## Exclusive encapsulation technology

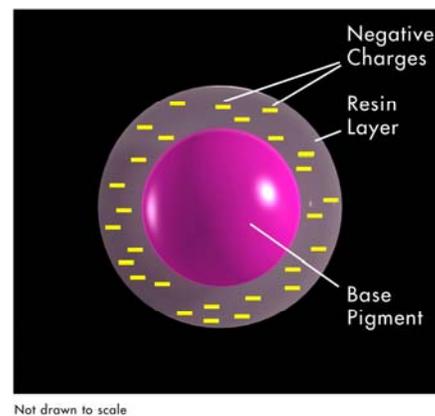
HP Vivera pigment inks are formulated with an HP exclusive pigment dispersion technology—Electrosteric Encapsulation Technology (EET)—to deliver rich, vibrant color and exceptional fade resistance of more than 200 years.<sup>1</sup> Since fade resistance and color vibrancy are affected by the size of the pigment particles, HP carefully optimizes both the pigment chemistry and particle size to deliver the unmatched combination of outstanding image quality and exceptional fade resistance.

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 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.

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. As a result, the printer can deliver 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.

Figure 1. Exclusive encapsulation technology



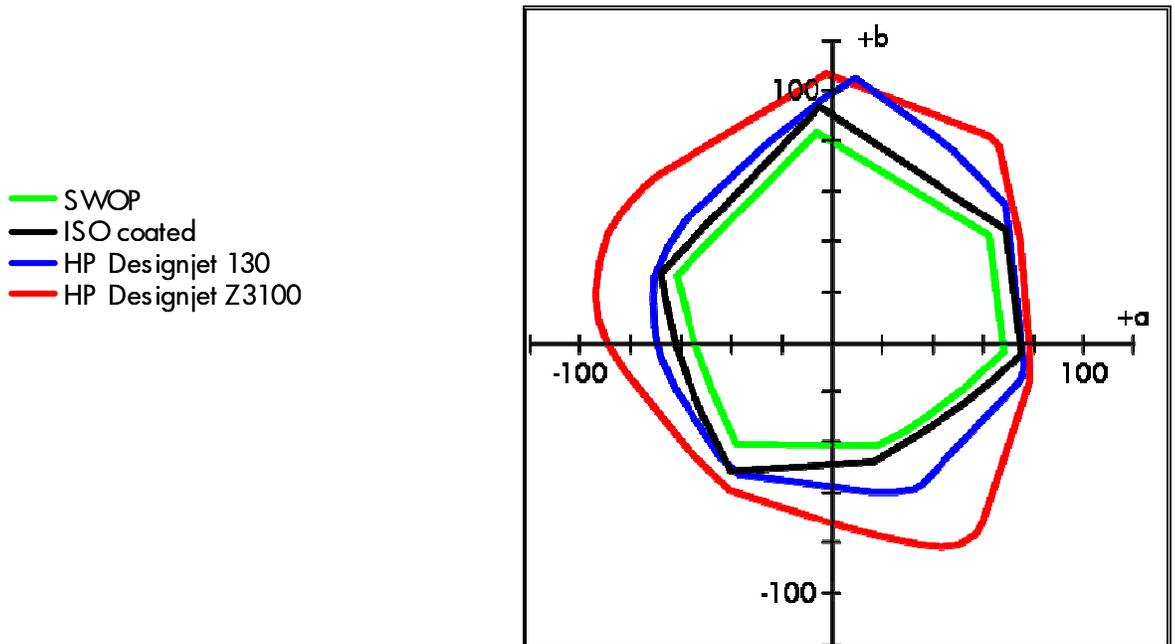
## Brilliant, vivid color

HP Vivera pigment inks are engineered around carefully selected ultra-pure pigments and were designed together with HP's new Designjet Z2100 and Z3100 Photo Printers to produce a broad color gamut tailored to the needs of creative professionals.

The HP Designjet Z3100 Photo Printer uses 3 new color inks that enable a broad color gamut. The addition of red, green, and blue inks allow these colors to be printed directly, which can reduce ink use, and extends the gamut for these important colors. In addition, color accuracy is improved and metamerism is significantly reduced.

In addition, HP Vivera pigment inks in both the HP Designjet Z2100 and Z3100 Photo Printers provide complete coverage of both SWOP and ISO coated gamuts when printing on HP Proofing Papers.<sup>2</sup> HP expects that this gamut performance will translate well into PANTONE® coverage for graphic arts applications. See Figure 2.

Figure 2. HP Designjet Z3100 Photo Print Gamut Comparison



Finally, HP Vivera pigment inks enable exceptional color accuracy and consistency. Color stabilizes in less than 5 minutes using HP Premium Instant-dry Satin Photo Paper or HP Professional Semi-gloss Contract Proofing Paper.<sup>3</sup>

## Rich, dark black inks

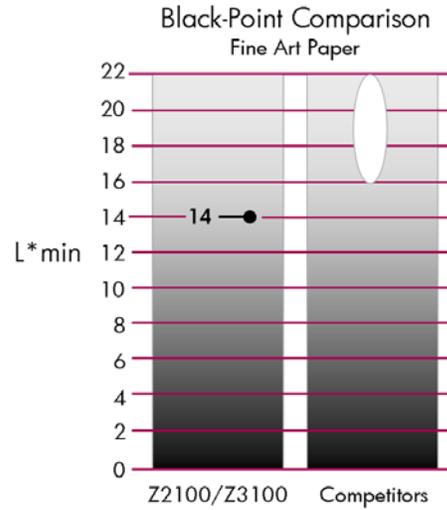
HP black inks produce exceptionally rich, dark blacks for professional, museum-quality prints across a variety of creative and specialty media. The capability to produce industry-leading performance on HP media is a result of our careful co-design of the ink and paper, including the formulation of the paper coating. Designed together to work together, HP Vivera pigment inks and HP media achieve dark blacks that far exceed the blackness of silver halide prints on glossy photo paper—a feature which is difficult to achieve with pigment-based inks on glossy papers—and consistent, dark blacks on a variety of matte fine art media.

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).

HP 70 Photo Black Ink achieves an excellent minimum  $L^*$  of 4 on glossy photo paper,<sup>4</sup> significantly exceeding the black point of silver halide prints.

Figure 3. shows the dark black performance achieved by HP 70 Matte Black and HP 70 Photo Black Inks on HP Hahnemühle Smooth Fine Art paper, 310gsm. Together these inks deliver an outstanding minimum  $L^*$  of 14 on matte fine art media.<sup>5</sup>

Figure 3. Minimum L\* on HP Hahnemuhle Smooth Fine Art paper, 310gsm



## Neutral gray inks

HP's gray ink printing technology produces true, neutral grays—without using color inks that can cause color casts and metamerism—across a wide range of media for museum-quality black-and-white photos and fine art prints. See Figure 4.

Figure 4.

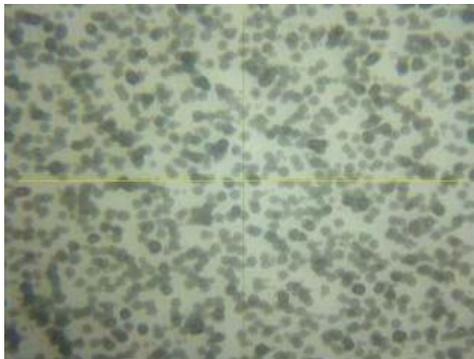


Figure 4a. An example of HP Viverra gray inks used to produce true, neutral grays in an 8-ink printing system.

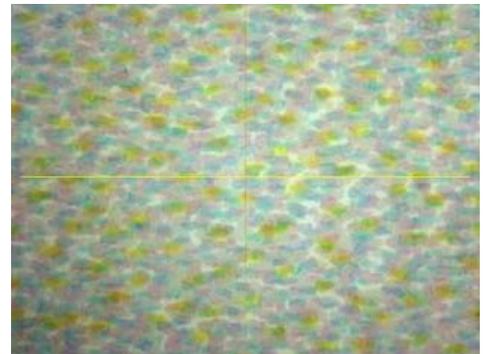


Figure 4b. Even competitive printers that use gray ink add composite inks, which produce less neutral grays.

HP Three-Black and HP Quad-Black Ink sets in the HP Designjet Z2100 and Z3100 Photo Printers, respectively, use HP black and gray pigment ink formulations to produce rich blacks, neutral grays and smooth transitions. In addition, the HP Quad-Black Ink set—which includes light gray and gray, photo black, and matte black inks—produces exceptional highlight and shadow detail and virtually invisible grain for exquisite B&W photos. And with four black inks on-board, images on matte fine art papers and glossy photo media can be printed without swapping ink cartridges and wasting time and ink to reconfigure the printer.

## HP Gloss Enhancer

The HP 12-ink printing system features an innovation tailored to the needs of professional photographers. HP Gloss Enhancer is used on photo media (with the exception of matte-finish papers) to produce images with uniform gloss from highlights to shadows, and eliminates bronzing as an image quality issue.<sup>6</sup>

Obtaining uniform gloss on photo media is a challenge, because ink gloss in the midtones and shadows must match the paper's gloss in the highlights. Otherwise, white areas in the image might appear as dull or shiny patches at some angles of view.

Bronzing appears as an unwanted metallic luster and changes in perceived density and tone in a printed image. It is caused by interference between rays of light that reflect off the surface of the ink layer and others that pass through it to reflect off the ink-paper interface. In the past, some photographers and graphic artists have eliminated both gloss uniformity and bronzing issues by laminating prints with a liquid or spray coating or displaying prints behind glass.

In HP's 8-ink Vivera pigment ink system for the HP Designjet Z2100, HP chose the resin, pigment loads, ink vehicle, and print modes to deliver excellent gloss uniformity and very low bronzing on glossy and semi-gloss photo media without lamination.

With HP Gloss Enhancer, HP's 12-ink system for the HP Designjet Z3100 takes gloss uniformity and suppression of bronzing even further to meet the needs of the most demanding professional photographers. Prints produced with HP 70 Gloss Enhancer achieve uniform gloss from highlights to shadows, eliminating bronzing as an image quality issue, without the need for film, liquid, or spray lamination.<sup>6</sup>

## Permanence

HP Vivera pigment ink delivers exceptional display and image permanence across a wide range of creative and specialty media. When used with HP's new Designjet Z2100 and Z3100 Photo Printers, these inks produce prints that resist fading for over 200 years on a range of HP creative and specialty media.<sup>1</sup>

Image permanence essentially describes how long a print will last and is determined by how well the print resists relevant degradation factors. For example, a displayed print may experience noticeable changes such as fading due to exposure to light (lightfade), air pollutants (air fade), or high 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.

### Lightfade

The basic method for estimating lightfade resistance accelerates light exposure and calculates years of image resistance to fade based on the accelerated light exposure.<sup>7</sup>

### Air fade

Although longer-term display of any type of photo should be behind glass or other protection, HP recognizes the importance of printing technology that is highly resistant to the effects of airborne pollutants. 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. In unprotected display in direct contact with indoor air, HP Vivera pigment inks offer several decades of ozone fade resistance on recommended papers. For more information, see [www.hp.com/go/supplies/printpermanence](http://www.hp.com/go/supplies/printpermanence).

### Water resistance

In addition to delivering outstanding image quality and exceptional fade resistance, HP Vivera pigment inks are carefully formulated for water resistance and produce results that can be counted on across a range of HP creative and specialty media.

During the development of HP Vivera pigment inks, HP tests water resistance performance characteristics most important to customers. HP uses ISO and internally developed tests and considers prints which pass the following tests to be water resistant: *ISO Standing Water*, *Water Spray*, *Water Drip*, and *Wet Smudge*.

## 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. This includes interactive HP Smart printing technology<sup>8</sup> in Original HP ink cartridges, printheads and the printer that monitors print nozzles, making automatic and continuous adjustments to optimize print quality and reliability. HP Vivera pigment ink is designed and tested with the printer to produce optimal results—that can be repeated—print after print. See the technology backgrounders on the HP Designjet Z2100 and Z3100 Photo Printers for details.

## Print with Fewer Interruptions

HP Vivera pigment ink formulations are designed for reliable, consistent printing. In addition, HP ink cartridges are designed to enable easy, hassle-free printing. Original HP ink cartridges contain HP Smart printing technology that makes HP ink cartridges easy to use and replace, providing automatic alerts when ink cartridges are low and enabling convenient reordering of supplies through HP Designjet Online.<sup>9</sup> HP 130 ml Ink Cartridge Twin Packs—2 ink cartridges of the same color—reduce intervention rates and save time by requiring fewer replacements in addition to offering savings and convenience.

With individual ink cartridges, replace only the color than runs out. And with built-in matte black and photo black inks that reside in the printer at all times, the HP Designjet Z2100 and Z3100 Photo Printers eliminate the need to change ink cartridges when printing on different media, as well as the potential for possible cross-contamination or mixing of inks when changing print modes between glossy and matte media.

## Versatile Media Support for Creative Printing

HP Vivera pigment inks are designed to deliver exceptional image quality and permanence on a variety of creative and specialty media types including canvas, fine art and photo papers. The HP printing system is designed and tested together—printers, ink and media—to perform throughout the entire printing and finishing workflow, for consistent results with a variety of finishing options. HP large-format specialty and creative media work in conjunction with HP Vivera pigment inks for accurate colors and sharp details that help bring artistic visions to life.

The ability to deliver consistently outstanding quality across a wide 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. To address the challenge of producing smooth gloss on glossy media with pigment ink, HP Vivera pigment inks and HP glossy paper coatings are designed together to minimize any variations within the film that can lead to gloss non-uniformities.

Many of HP's fine art papers feature an acid-free base and pH-neutral coating, ensuring long-term stability and outstanding archivability for your art. HP has partnered with Hahnemühle, makers of fine specialty papers since 1584, expanding HP's fine art paper portfolio. And HP canvas media are available in a variety of grades and finishes, to meet the creative needs of print shops, artists, photographers and graphic designers. With fast dry times and museum-quality results, HP canvas media enables high productivity.

HP's dedication to providing a wide range of creative and specialty media compatible with HP Vivera pigment inks means customers can produce museum-quality prints, time after time—from fine art reproductions to home décor prints, black-and-white photography and everything in between.

Figure 5.

<b>Various types of HP creative and specialty media for the                      HP Designjet Z2100 and Z3100 Photo Printers                      with fade-resistance<sup>1</sup> and water-resistance performance</b>			
Based on internal HP lightfade testing on a range of HP creative and specialty media; confirmation tests in progress at Wilhelm Imaging Research, Inc (WIR). For details, see <a href="http://www.hp.com/go/supplies/printpermanence">www.hp.com/go/supplies/printpermanence</a> . (Website available around September 26, 2006).			
Product Name	HP Designjet Z2100 Photo Printer Display Permanence	HP Designjet Z3100 Photo Printer Display Permanence	Water Resistance
HP Hahnemühle Smooth Fine Art Paper (265 g/m <sup>2</sup> )	200+ years (In test at WIR)	200+ years (In test at WIR)	Water resistant
HP Hahnemühle Watercolor Paper (210 g/m <sup>2</sup> )	200+ years (In test at WIR)	200+ years (In test at WIR)	Water resistant
HP Hahnemühle Smooth Fine Art Paper (310 g/m <sup>2</sup> )	Not yet available	In test at WIR	Water resistant
HP Hahnemühle Textured Paper (310 g/m <sup>2</sup> )	Not yet available	In test at WIR	Water resistant
HP Artist Matte Canvas	200+ years (HP internal testing)	200+ years (HP internal testing)	Water resistant
HP Professional Matte Canvas	Not yet available	In test at WIR	Water resistant
HP Collector Satin Canvas	Not yet available	In test at WIR	Not yet available
HP Premium Instant-dry Gloss Photo Paper	200+ years (In test at WIR)	In test at WIR	Water resistant
HP Professional Satin Photo Paper	Not yet available	In test at WIR	In test at HP
HP Super Heavyweight Plus	200+ years (HP internal testing)	200+ years (HP internal testing)	Not yet available

Matte Paper			
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<sup>1</sup> Based on internal HP lightfade testing on a range of HP creative and specialty media; confirmation tests in progress at Wilhelm Imaging Research, Inc. For details, see [www.hp.com/go/supplies/printpermanence](http://www.hp.com/go/supplies/printpermanence).

<sup>2</sup> Results are obtained on HP Professional High-gloss Contract Proofing Paper and HP Professional Semi-gloss Contract Proofing Paper.

<sup>3</sup> Printing and measuring environmental conditions: 23 degrees C (+/- 10%) – 50% RH (+/- 10%).

<sup>4</sup> Measured on HP Premium Instant-Dry Gloss Photo Paper using HP 70 Photo Black Ink, in native mode.

<sup>5</sup> Measured on HP Hahnemühle Smooth Fine Art Paper using HP 70 Photo Black and HP 70 Matte Black Inks.

<sup>6</sup> Bronzing is eliminated as an image quality issue when HP Gloss Enhancer is used. Gloss Enhancer is used on photo media, with the exception of matte-finish papers.

<sup>7</sup> 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.

<sup>8</sup> Using Original HP supplies ensures availability of all HP printing features.

<sup>9</sup> Program features and availability may vary by country. For more information, visit <http://www.hp.com/go/designjet/supplies>.

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