

Fade Resistance of HP Premium Plus Photo Paper with HP Photo Printing Systems

Hewlett-Packard Company,
September 2005



The following chart provides fade resistance resultsⁱ for HP Premium Plus Photo Paper when printed on HP printers and inkjet print cartridges introduced since 2002. In most cases, HP uses Wilhelm Imaging Research, Inc. (WIR), a leading independent test lab, to substantiate predicted fade resistance claims. HP participates in WIR's image permanence certification program. For more information on this program visit www.wilhelm-research.com

These printers and inkjet print cartridges are designed for sale in the United States, Canada and Latin America. Refer to page 3 for other regions.

Printer/Inkjet print cartridge ⁱⁱ	Photo type & cartridges used	Glass-covered Display:Years WIR ⁱⁱⁱ , HP ^{iv}
Officejet 7300 & 7400 series Photosmart 325, 375, 2600, 2700, 7850, 8150, 8450, 8750 series printers using these inkjet print cartridges containing HP Vivera Inks (Note: some cartridges are optional or not operational with certain printers. Please check your printer manual): Black : 92, 94, 96 or 98 Tri-color : 93, 95 or 97 Photo color : 99 or 101 or 102 Photo gray :100	Color printing with Tri-color only	82 (WIR)
	Color printing with Tri-color and Photo color	108 (WIR)
	Color printing with Tri-color, Photo color, or Photo blue and Photo gray	108 (WIR based on results for similar system)
	B&W/grayscale printing with Photo gray	115 (WIR based on results for similar system)

Printer/Inkjet print cartridge	Photo type & cartridges used	Glass-covered Display:Years WIR, HP
Photosmart 8200 series, Photosmart 3100, 3200, 3300 All-in-One series printers using the 02 series of ink cartridges including these colors: yellow, cyan, light cyan, magenta, cyan magenta, black	Color printing with all six cartridges in the 02 cartridge set	~100 (HP; testing in progress at WIR)
Photosmart 100, 130, 230 145, 245, 7600, 7700, 7900, 7150, 7200, 7350, 7450, 7500 series; and Deskjet 450C, 3600, 3800, 5100, 5550, 5600, 5800 and 9600 series; PSC 1350, 2100, 2200, 2300, 2400 2500series; and Officejet 6110, 4110, 5510 series (Note: some cartridges are optional or not operational with certain printers. Please check your printer manual): Black : 56 or 21 Tri-color : 57 or 22 Photo color : 58 Photo gray :59	Color printing with Tri-color only	18 (WIR)
	Color printing with Tri-color and Photo color	73 (WIR)
	Color printing with Tri-color, Photo color and Photo gray	73 (WIR)
	B&W/grayscale printing with Photo gray	115 (WIR)
Designjet 30, 130 Ink cartridges including these colors: Black: 84 yellow, cyan, light cyan, light magenta, magenta: 85	Color printing with all colors cartridges in the 02 cartridge set and 84	82 (WIR)

Other photo processing methods		
Kodak Easy Share printer dock (dye-sublimation)	Color or B&W photos processed from a digital file	26 (WIR)
Fujicolor Crystal Archive paper – (silver halide)		40 (WIR)
Kodak Ektacolor Edge Generations paper – (silver halide)		19 (WIR)
Canon CP-200 (dye-sublimation)		7 (WIR)
Sony DPP EX5 (dye-sublimation)		4 (WIR)

Other factors

HP carefully considers all factors related to permanence—not just lightfastness. Other permanence factors include:

- **Thermal Degradation** (also known as dark fade, since it does not require light to occur). HP inkjet colorants are very stable at room temperature—in fact, even after 200 years of simulated storage at 25°C, there is no noticeable change in the colored areas. So the limiting factor is the rate of yellowing of the paper

itself. In tests conducted by WIR with HP 57 + HP 58 inkjet print cartridges on HP Premium Plus, the dark fade resistance was found to be over 200 years. HP expects that this 200+ yr. value applies to HP photos made with all current HP inks on either HP Premium or HP Premium Plus photo papers. Confirmation tests are underway at WIR.

- **Air Fade** (or fade caused by airborne pollutant). HP has chosen to use a special, self-sealing inkjet coating on HP Premium and HP Premium Plus photo papers. This coating encapsulates the colors, thereby preventing significant air fade when prints are displayed in regular contact with air. Currently there is no official standard for calculating equivalent years of air fade resistance, but general industry practice used by several major manufacturers allows approximate estimates to be made based on elevated ozone exposure. Based on these tests, all current HP inks with HP Premium Plus or HP Premium should have several decades of air fade resistance when displayed in regular contact with air. However, for long-term display it is still preferable to use glass or other protection, since it helps protect the print from various types of unforeseen damage (scratches, smoke particles, etc.).
- **Humidity fastness.** Currently, there is no official standard for calculating equivalent years of display as a function of humidity exposure. However, general industry practice enables identification of products that have poor vs. good resistance to humidity-induced color changes. HP has tested the HP inks listed above on HP Premium Plus and Premium photo papers, and has found the resistance to humidity-induced color changes to be good. However, with all photos-not just inkjet-frequent exposure to high humidity (e.g. above 80 % RH) should be avoided to the extent possible.

General Tips for Better Permanence

Regardless of whether a photo print is inkjet, silver-halide, or based on any other technology, it is always advisable to ...

- Store it in a cool and dry place.
- Avoid constant exposure to conditions above 80% relative humidity.
- Place it behind glass, in a plastic sleeve or laminate it for display.

And especially for inkjet photo prints to ...

- Dry them for at least one day at conditions below 70% humidity.

ⁱ Results in “covered display” column refer to light fade test results of photos under glass. Degradation by light is not the only factor than can cause photos to fade or distort over time. Clearly specified test standards for the two other factors – humidity and ozone – are currently not defined. However HP IPL and WIR use existing general methods to test for resistance to humidity and ozone. In general, according to tests conducted by HP IPL, the HP products listed in the table show good humidity and ozone resistance. For best results with any photo product, display and store photos in a cool, dry location. For more information on factors that may cause fading refer to “Inkjet Photo Prints: Here to Stay” at www.hp.com/go/premiumplusphoto

ⁱⁱ Printer and inkjet print cartridges listed may not reflect all of the printers available with the inkjet print cartridge configuration listed. Some printer and inkjet print cartridge product numbers vary by region. Some photo cartridges may be optional with certain printers.

ⁱⁱⁱ WIR refers to Wilhelm Imaging Research. WIR Display Permanence Ratings (DPR) are based on accelerated light stability tests conducted at 35 Klux with glass-filtered cool white fluorescent illumination with the sample plane air temperature maintained at 24°C and 60% relative humidity. Data were extrapolated to display conditions of 450 lux for 12 hours per day using the Wilhelm Imaging Research, Inc. “Visually-Weighted Endpoint Criteria Set v3.0.” and represent the years of display for easily noticeable fading, changes in color

balance, and/or staining to occur. For more information regarding Wilhelm Imaging Research test methods and conditions please refer to www.wilhelm-research.com/

^{iv} HP IPL refers to HP's Image Permanence Laboratory. HP IPL test methods closely follows the WIR method. For more information regarding HP IPL test methods and conditions please see "Light fade testing methods: HP Image Permanence Labs and Wilhelm Imaging Research" at www.hp.com/go/premiumplusphoto