

HP-engineered inks and photo papers print durable, water-resistant photos

HP-engineered ink and paper combinations produce high-quality, water-resistant photographs—HP Advanced Photo Paper and HP 38 Pigment Ink Cartridges with Vivera Inks work together to produce waterproof prints



Breakthrough durability

People want lasting photographs—memories they can handle, touch and display. They want pictures they can print the moment a memory is made, then immediately pass around to friends and family, without worrying about rain, humidity or wet fingers. Water resistance is a prime contributor to print durability, an area where HP is fast becoming an industry leader. HP has developed a proprietary set of inks and photo papers for water-resistant and waterproof printing. These ink and paper combinations withstand exposure to water, while delivering the rich color and sharp detail people have come to expect from HP. This backgrounder will examine the science behind HP's new water-resistance technology and explain the testing standards HP researchers use to determine water resistance.

Chemists play matchmaker

Water resistance is all about matching the right ink with the right paper. While a piece of photo paper looks fairly ordinary and a drop of ink looks like the tiniest speck of a melted color crayon, on a molecular level, ink and paper incorporate highly sophisticated technologies. HP chemists have spent thousands of hours researching, developing and matching proprietary HP inks to work with photo papers for beautiful prints that won't bleed or curl when exposed to water.

Some of the most rigorous research HP conducts involves photo paper coatings. Generally, there are two types of photo paper-coating technologies: swellable and nano-porous. Swellable papers, such as HP Premium Plus Photo Paper, deliver impressive image quality and fade resistance, but typically offer less impressive water resistance. Nano-porous photo paper, such as HP Advanced Photo Paper, is made up of water-insoluble ceramic pigments for instant dry time and excellent water resistance. Photos printed on nano-porous paper are better able to withstand spilled water and wet fingers.

In addition to the coating, water resistance is also influenced by the materials used to construct the paper. One reason HP Advanced Photo Paper is so water resistant—even when submerged under water for an hour, as part of HP's testing—is because the paper base is sandwiched between two layers of a plastic material called polyethylene. These layers add stiffness, contribute to a smooth and

glossy finish, and protect the base from water exposure. The layers also keep the pigment inks from rubbing off. Papers without this polyethylene protection are more susceptible to water damage.

The type of ink used during the printing process also changes how well a photograph holds up to water. There are two types of inks: dye-based inks and pigment inks. Pigment inks are inherently insoluble in water, providing excellent water resistance. Dye inks, on the other hand, must be water soluble in order to adhere to paper coatings. This solubility causes dyes to be more vulnerable to water damage.

People seeking waterproof inkjet prints should use pigment inks with a photo paper featuring a nano-porous coating and polyethylene-protected base. Photographers looking for unique paper textures and finishes should use pigment inks on fine art papers such as HP Hahnemühle Smooth Fine Art Paper—for water-resistant photographs and fine art. Dye-based inks with swellable paper and pigment inks with swellable paper are typically not water resistant but may have other characteristics such as great image quality and fade resistance. Please see “Water Resistance Performance of Common Ink and Paper Technologies” (below) for more details.

Water Resistance Performance of Common Ink and Paper Technologies	
Paper coating/ink type	Water resistance
Nano-porous/pigment	Waterproof or water resistant, depending on the paper
Nano-porous/dye	Water resistant or not water resistant, depending on the specific paper or ink
Swellable/dye	Typically not water resistant

Please refer to New HP Viverra Pigment Inks for Professional Photo Printing Imaging & Printing Backgrounder for more details on HP’s new pigment inks and HP Advanced Photo Paper.

Ready, set, wet

So what does HP mean when it says its photos are water resistant? Can a person drop an HP print in a lake and have the picture remain true? What happens if a friend spills a glass of water on the table, soaking prints? Because there has not been a standard water resistance definition widely used within the industry, HP has developed a set of six tests—Water Spray, Water Drip, Wet Smudge, Standing Water Blotted Off, Drop Evaporation and Immersion—to determine water resistance.

The tests simulate the types of accidents that might happen to a photo—and the steps a customer might take to “save” the photo—after exposure to water. To meet HP’s stringent definition of waterproof, prints must pass all six tests. HP considers prints that pass four key tests to be water resistant, although not waterproof. Photos that do not pass four key water resistant tests are easily damaged and can be rendered unusable by exposure to water. Extra care should be taken to protect these photos.

Photos are deemed waterproof only if there is no noticeable change to the image and paper after the six water exposure tests, which include a rigorous one-hour immersion. The photos must also maintain their integrity after the standing water drop test, where water is left on the photo for 24 hours. There can be virtually no change in image quality. Water-resistant photos must be able to withstand being sprayed, dripped on, blotted and wiped. A slight change in image quality is acceptable, but the photo should still be usable. Please refer to the table “HP Waterproof and Water Resistant Tests” (below) for more details.

- Water resistant: Slight change to the image after four key HP water exposure tests
- Waterproof: No perceptible change to the image and paper after six HP water exposure tests, including one-hour immersion

These definitions specifically apply to water, not to all liquids. Other liquids that could be exposed to output, such as coffee, soft drinks, wine, cleaning fluids, etc., may interact differently than water. HP expects prints would resist a variety of liquids; however, potential damage would vary.

HP Waterproof and Water Resistant Tests			
Type	Description	Waterproof	Water resistant
Immersion	Test print is immersed in water for one hour.	Must Pass	not required
Standing Water Drop Evaporation	Water is placed on test image and allowed to stand for 24 hours, or until water evaporates. If waterproof, there will be no damage.	Must Pass	not required
Standing Water Blotted Off	Water is placed on level test print. After one minute, water is wiped off using a weighted cotton cloth.	Must Pass	Must Pass
Spray	Using a standard household misting bottle, water is sprayed on vertically positioned test print. Water is allowed to evaporate for 24 hours.	Must Pass	Must Pass
Water Drip (inclined)	Water is dropped on a test print held at a 45 degree angle.	Must Pass	Must Pass
Wet Smudge	Water is dropped on a test print positioned horizontally and wiped off with a weighted cotton cloth after 30 seconds.	Must Pass	Must Pass
Test samples are printed 24 hours prior to testing			

HP delivers variety

Casual photo takers and professional photographers can handle photographs with confidence, using proprietary HP ink and paper formulations and HP printing systems. HP offers enhanced water resistance options—while still maintaining award-winning print quality. HP Advanced Photo Paper and HP 38 Pigment Ink Cartridges with Vivera Inks produce vivid, waterproof prints when used together. Pair HP Advanced Photo Paper with most HP 6-, 7-, 8- and 9-ink dye-based ink cartridges for water-resistant prints. HP Hahnemühle Smooth Fine Art, HP Hahnemühle Watercolor, HP Aquarella Art and HP Matte Canvas papers combined with HP 38 Pigment Ink Cartridges with Vivera Inks produce water-resistant artwork. Please see the table “HP Product Water Resistance” for product details:

HP Product Water Resistance		
Category	HP Photo and Fine Art Papers	HP Inks
Waterproof	HP Advanced Photo Paper	HP 38 Pigment Ink Cartridges
Water resistant	HP Advanced Photo Paper	<ul style="list-style-type: none"> • HP 110 Tricolor Inkjet Print Cartridge • Photo Inkjet Print Cartridges including: 02, 58, 59, 99, 100, 101, 102 • HP 56, 92, 94, 96, 98 Black Inkjet Print cartridges
	HP Digital Fine Art Media: <ul style="list-style-type: none"> • HP Hahnemühle Smooth Fine Art Paper • HP Hahnemühle Watercolor Paper • HP Aquarella Art Paper • HP Artist Matte Canvas 	HP 38 Pigment Ink Cartridges

Preventing water damage

HP Water resistance technology has created pictures that offer outstanding durability. But some of the best ways to protect photographs from water damage are still careful handling and storage. HP suggests following these tips to best protect your memories:

- Store photos in albums or behind glass in frames.
- Avoid handling photos in areas where water exposure is risky, such as at the beach or pool-side, and handle with dry hands.

If photos are exposed to water:

- Act immediately; don't let water stand on photo.
- Carefully blot up and down; do not wipe moisture from side to side, as this can remove the coating on some photo papers. Use a soft cotton cloth to blot off the water, being careful not to scratch the photo.
- Let dry thoroughly before storing.
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