



# HP ElectroInk

## Frequently Asked Questions





## What is HP ElectroInk?

HP ElectroInk is a unique liquid ink that combines the advantages of electronic printing with the qualities of liquid ink. HP ElectroInk contains charged pigmented particles in a liquid carrier. Like other digital printing technologies, i.e. Xerography, HP ElectroInk enables digital printing by electrically controlling the location of the print particles. However, unlike Xerography, HP ElectroInk enables very small particle size, down to 1-2 microns. HP ElectroInk is supplied as a concentrated paste that is loaded into the press in tubular cartridges in a "clean hands" operation. Inside the press it is fed into ink supply tanks and diluted with oil, to form a fluid mixture of carrier liquid and colourant particles ready for printing.



## How does HP ElectroInk support the performance required for high quality, digital colour printing?

The small particle size in the liquid carrier enables high resolution, uniform gloss, sharp image edges, and very thin image layers which closely follow the surface topography of the paper, resulting in a highly uniform finish complementing that of the paper.



## What is the colour stability of HP Indigo printing?

HP Indigo presses are the only colour digital production presses that have achieved GRACol\* certification for proofing. This was reached with both CGS and GMG colour management tools. This certification requires tight tolerances. Using the same colour management tools, HP Indigo also achieved Fogra print validation certification with very high scores.

As stated in the Seybold Report\*\* the colour consistency received on the HP Indigo press was the best of any machine in testing. The results of the HP Indigo press could just as easily have come from an offset press.

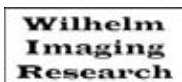
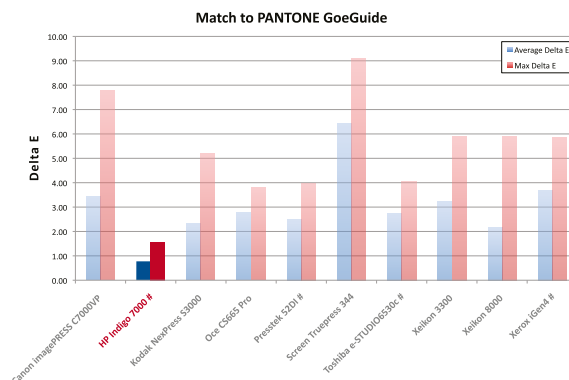
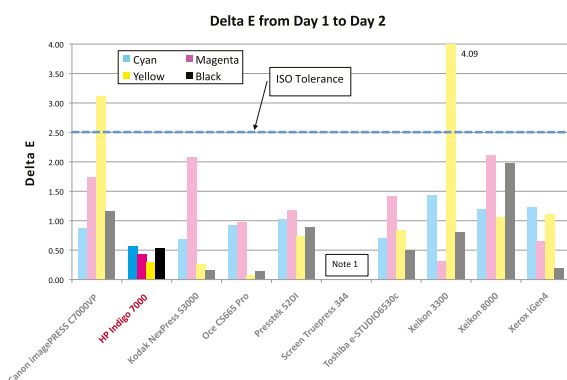
HP Indigo's colour performance leadership was also demonstrated in IPA testing of 10 digital presses from leading manufacturers. The tests found the HP Indigo 7000 Digital Press as having the lowest differentiations in colour variation within a run and from day to day, and the closest matching of spot colours.

\* General Requirements and Applications for Commercial Offset Lithography (GRACol) certification; 2009

\*\* The Seybold Report; Vol.5, No.7; 2005



**IPA testing of 10 leading vendor presses.** HP Indigo 7000 Digital Press achieved the lowest differentiation in Delta E and the closest matching to the PANTONE GoeGuide.



## Does HP ElectroInk support professional photographic printing?

True photographic quality can be achieved on HP Indigo presses, opening new opportunities in high-value photography applications. HP Indigo's superior photo quality was recognised by its wins in the 2010 DIMA Digital Printer Shoot-Out at the PMA International Convention and Trade Show.

## What is the permanence of HP Indigo prints?

HP Indigo is the only digital press vendor whose presses have received an ink permanence rating. A new print permanence study released by Wilhelm Imaging Research, Inc. (WIR) gives pages printed on HP Indigo presses a Display Permanence rating of 45 years\*. The WIR also gives HP Indigo photo book prints an Album/Dark Storage Lifetime rating of more than 100 years.

\* WIR study on HP Indigo Permanence (Feb 2010). The prints were made on Kromekote paper from HP partner SMART Papers. The permanence rating was longer than prints on Fuji Crystal Archive – the best of the silver halide photo papers – and more than twice as long as the WIR Display Permanence Rating for prints on Kodak silver halide photo paper.



Blue Wool test results

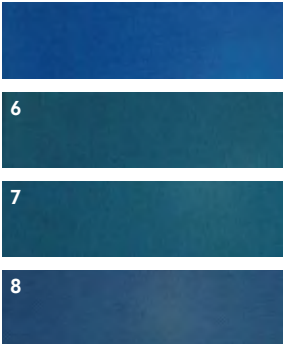
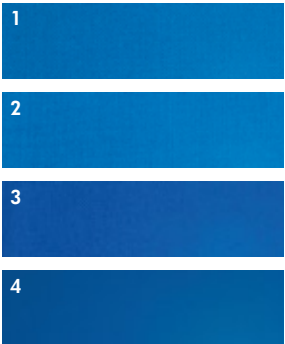
Type	Brand	HP ElectroInk				Testing standard used
		C	M	Y	K	
Acrylic Coated	Magnostar	7	2	1-2	4-5	ISO 4892-1
SBR Coated Gloss	Condat Gloss	6-7	3	3	4-5	ISO 4892-2
SBR Coated Gloss	Samarkand	6	6	4	4	ISO 105 B02
SBR Coated Matte	Condat Matte	6-7	2-3	3	4-5	ISO 4892-2
SBR Coated Matte	Perigord	6	6	4	4	ISO 105 B02
Uncoated	Hadar Top	6-7	5	3-4	3	ISO 105 B03

	Offset Ink				
	C	M	Y	K	
Acrylic coated	5	3	1	4	BS 1006B02
SBR Coated Gloss	6	2-3	1	4	BS 1006B02

Please note that different paper brands and types may present deviations from the presented test results.

Blue Wool Scale [BWS]

Scale	Simulates number of days indoors before fading	Rating
1	3.75	Very poor
2	6	Poor
3	19	Fair
4	65	Moderate
5	130	Good
6	260	Very good
7	520	Excellent
8	1100	Outstanding



The Blue Wool Scale is composed of 8 strips of wool fabric, of different dyeing standards. Their chromatic grades range from 1, indicating very low lightfastness, to 8, indicating very elevated lightfastness. Each standard's value equals twice the solidity value of the preceding one.

How effective is HP ElectroInk's ability to withstand exposure to light?

HP ElectroInk's ability to withstand exposure to light is measured by utilising various tests for lightfastness. Lightfastness is a term used to describe the resistance of a material to colour change when exposed to sunlight or to artificial light sources. Lightfastness tests evaluate the print's resistance to ultraviolet light by comparing the measure of change that has occurred between an exposed area and an unexposed area. A xenon arc lamp is used in these tests because xenon produces an intense light that accelerates the colour fading reaction. Since the xenon arc lamp reproduces full-spectrum light (as found in sunlight), it is useful for fade and colour change testing of inks and media.

Two separate tests of lightfastness are shown here. The first shows results based on a Blue Wool reference scale, while the second shows results based on changes in optical density (determined by the percentage of noticeable fading) and changes to colour coordinates (measured by the variation in deltaE).

Lightfastness test 1: Blue Wool

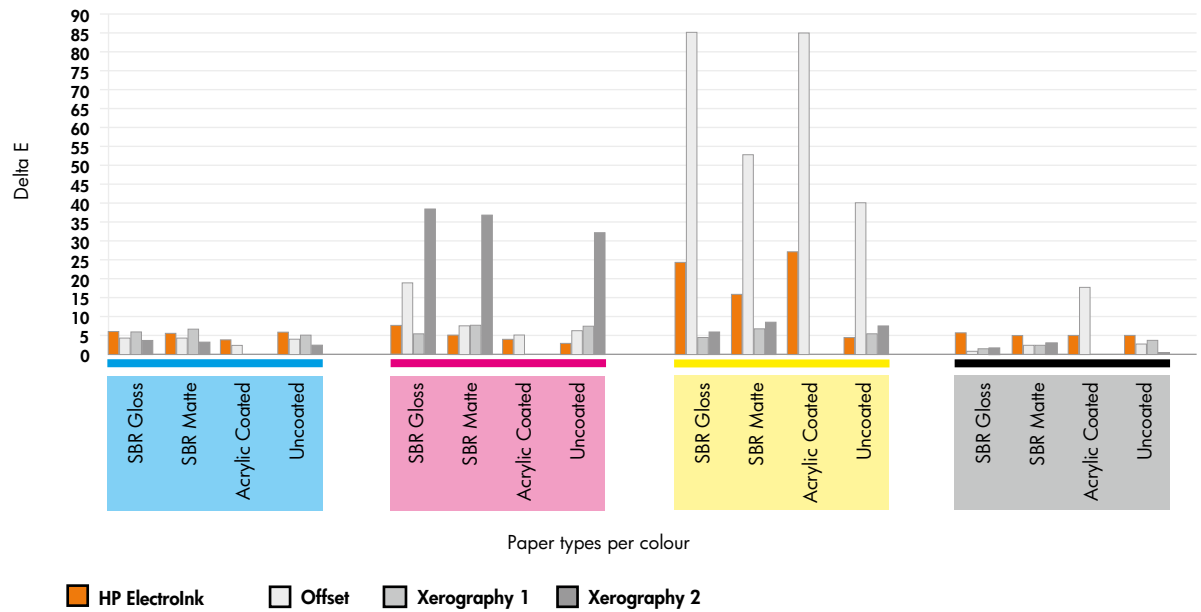
The lightfastness test was performed using a xenon arc UV lamp, under the following standards:

- British Standard BS-1006B02 for indoor conditions
- ISO 4892-1 Plastics – methods of exposure to laboratory light sources, method B, indoor behind window glass according to colourfastness to light (xenon arc)
- ISO 105 B02 – colourfastness to light (xenon arc)

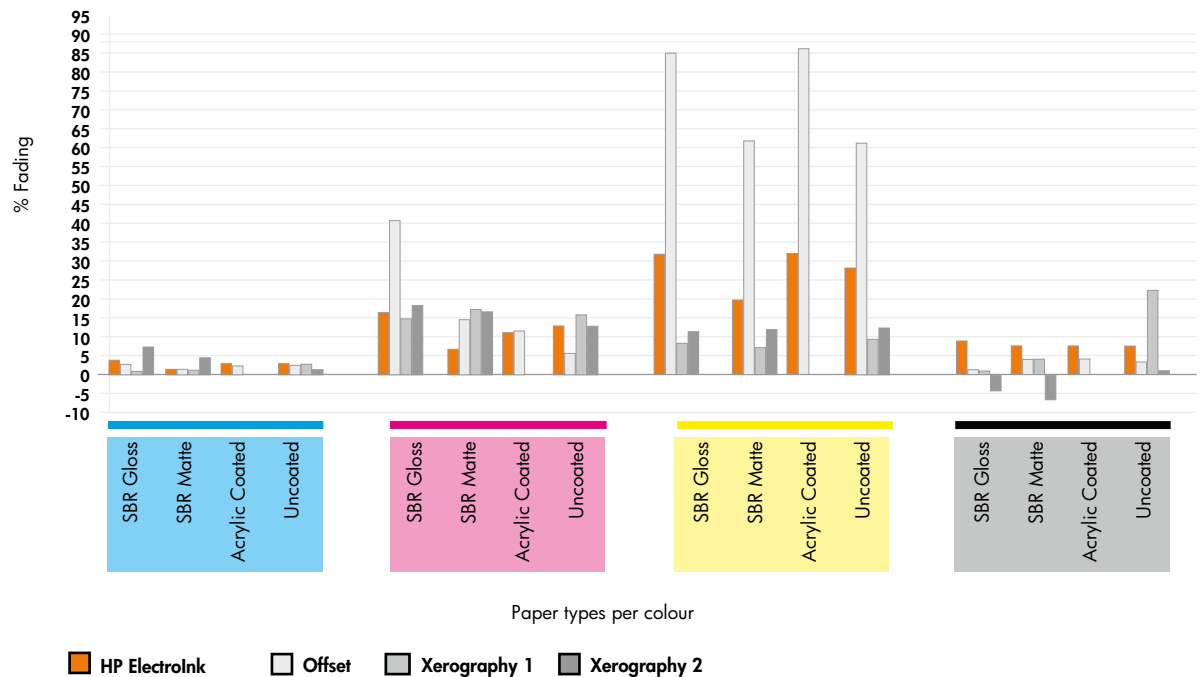
The results are presented on a 1-8 Blue Wool reference scale.

## Lightfastness test results

Change in colour coordinates at 6 days' exposure



Change in optical density at 6 days' exposure



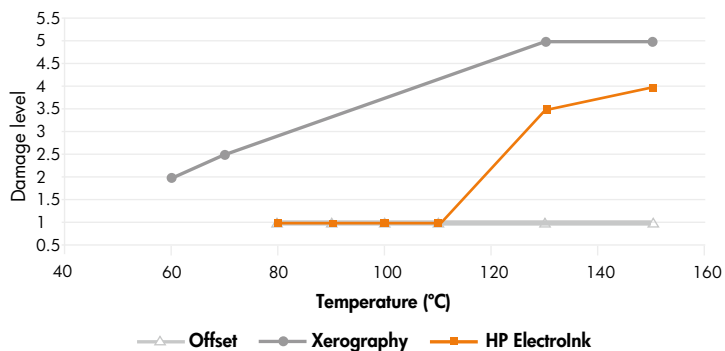
## Lightfastness test 2: Changes in optical density and in colour coordinates

This lightfastness test was performed according to a procedure specified by Wilhelm Imaging Research ([www.wilhelm-research.com](http://www.wilhelm-research.com)) by exposing test samples under an Atlas Suntest Tabletop Xenon Exposure System, for three-day cycles while monitoring changes in optical density (% fading) and colour coordinates

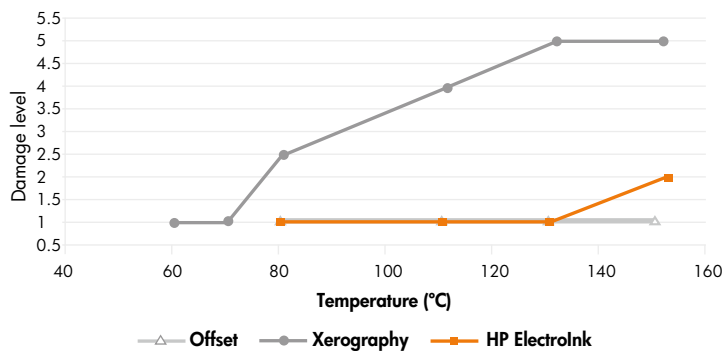
(deltaE). Each three-day cycle simulates six years' exposure under the above conditions. Three cycles of six days each, simulates 18 years. The tests were executed using HP ElectroInk technology, Xerography technology (Dry EP) and offset inks on various types of paper, intended to simulate a variety of typical substrates. (For a full list of papers used for all the tests described in this FAQ, please refer to page 10).



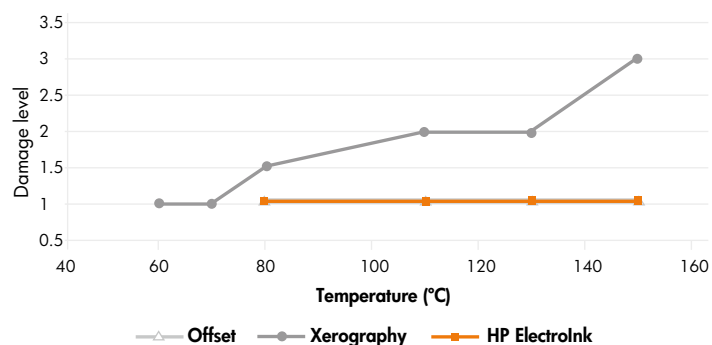
**Heat resistance**  
SBR Coated Gloss 1 hour



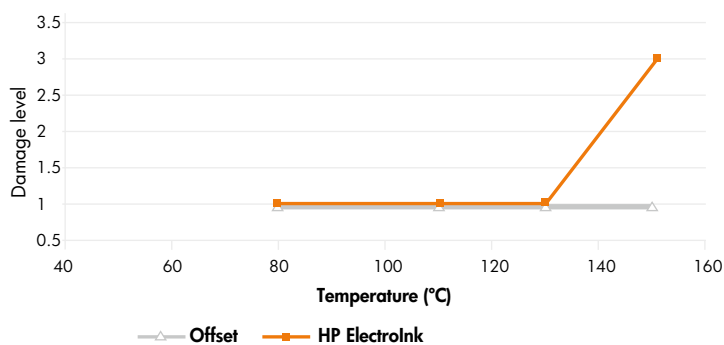
**Heat resistance**  
SBR Coated Matte 1 hour



Uncoated 1 hour



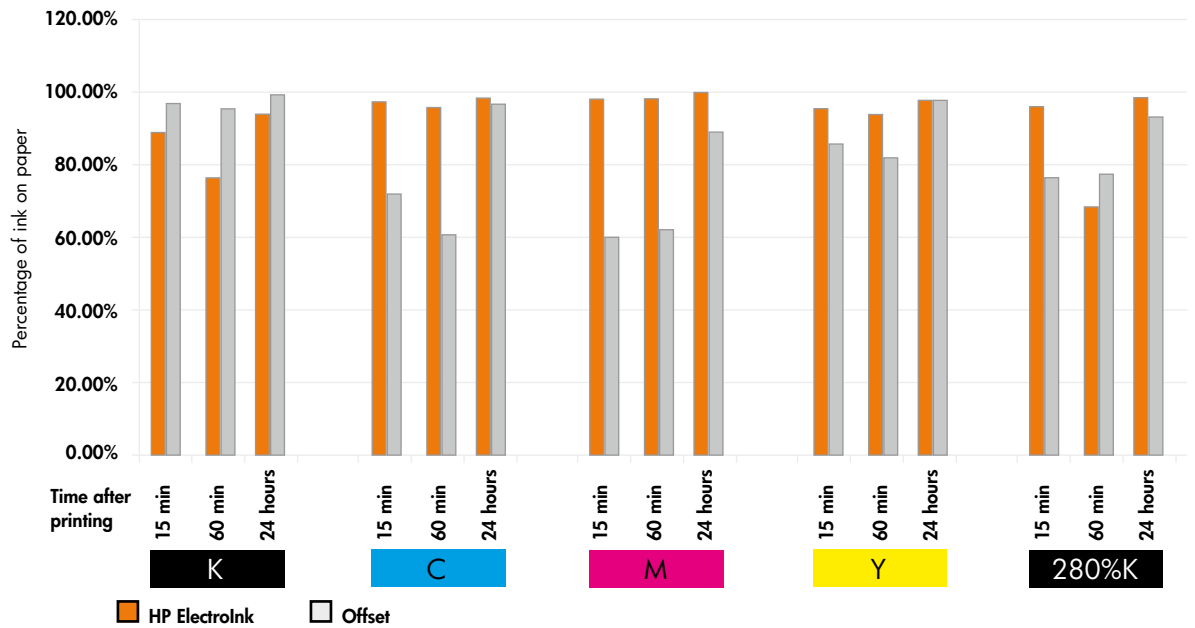
Acrylic Coated Gloss 1 hour



## How resistant to heat are HP ElectroInk prints?\*

The test for heat resistance measures the visible changes to print quality when two facing sheets, positioned so that the ink on one comes into contact with the ink on the other, are exposed to increasing temperatures (ranging from 60-150° Celsius) under a steady pressure of 645 Pascal. The prints were tested after one hour's exposure and after two hours. The test is a qualitative analysis based on the examiner's visual evaluation of the degree of the damage ranging on a scale from "no damage" to "strong damage". The tests were executed using ElectroInk technology, Xerography technology (Dry EP) and offset inks on various types of paper, intended to simulate a variety of typical substrates. (For a full list of papers used for all the tests described in this FAQ please refer to page 10).

\* Heat resistance: The ability of materials to withstand excessive heat which may result in the lowering of flexibility, strength, and resistance to natural decay through loss of moisture, as well as acceleration of decomposition reactions.



## How well does HP ElectroInk adhere to paper?

The adhesion of the ink to the paper is a critical parameter in order to ensure print stability in handling and storage.

HP ElectroInk's adhesion to paper is characterised by the employment of a test procedure that calculates the percentages of adhesion of solid colours to the paper surface, using an image analysis system. Adhesion was measured after 15 minutes, 60 minutes and 24 hours from the time of printing, using a tape-pull procedure that applies a 3M® drafting tape #230 with a 2lb roller weight.

The test for adhesion was performed by the Rochester Institute of Technology ([www.rit.edu](http://www.rit.edu)) under laboratory conditions as a simulation of on-site printing.

The tests were performed on two different types of substrates, simulating accepted types of coated gloss papers. Print samples were taken from the HP Indigo press using HP ElectroInk as well as the Heidelberg QMDI. The measurements were taken at the 500, 1000 and 2000 printed sheet mark and evaluated on a pass-fail criterion by colour. (The results shown here are on a single type of paper at the 1000 printed sheet mark).





## Can HP ElectroInk be used for printing food packaging applications?

Many of our customers around the world print flexible packaging, including food packaging on HP Indigo presses using HP ElectroInk. HP ElectroInk complies with the Federal Food Drug and Cosmetic Act 21 U.S.C 201 (FFDCA) requirements for printing on the non-contact side of the following food packaging materials where the resulting packages may be used to hold all types of food at temperatures up to 100° C (also known as FDA's Condition of Use B, "Boiling Water Sterilized", under 21 CFR 176.170): (1) low density polyethylene (LDPE) that is at least 40 microns thick; (2) polypropylene that is at least 20 microns thick; and (3) polyester which is at least 12 microns thick.

HP ElectroInk mark 4.0 complies with Article 3 of the EU Framework Regulation No. 1935/2004 for printing on the non-contact side of the following food packaging materials where the resulting packages may be used to hold all types of food at temperatures up to 100 ° C: (1) low density polyethylene (LDPE) that is at least 40 microns thick; (2) polypropylene that is at least 20 microns thick; and (3) polyethylene terephthalate (PET) which is at least 12 microns thick.

As with any packaging which contains food, our customers are required to adhere to Good Manufacturing Practices and applicable FDA requirements. It is recommended that customers perform the relevant materials analysis specific to their packaging material, together with the end user's labs. The objective of such analysis is to ensure the quality and integrity of the packaging polymers and to adhere to Good Manufacturing Practices and relevant regulations and standards applicable to the packaging material.

## Are any additional products recommended to enhance the adhesion of HP ElectroInk to the plastic substrates typically used in food packaging?

For food applications, we recommend the use of primer called DigiPrime produced by Michelman, which is utilised in coating a wide variety of substrates to enhance their compatibility with HP ElectroInk.

## Can substrates treated with DigiPrime 4431 be used for printing on food packaging applications?

Michelman confirms that the US Food and Drug Administration (FDA) has approved the use of Michelman's DigiPrime 4431 as a primer on flexible packaging without any temperature limitation, except for those consistent with good manufacturing practice.





### Do HP ElectroInk products contain any chemicals listed on California's Proposition 65 list?

HP ElectroInk products do not contain any substance listed under the California Safe Drinking Water and Toxic Enforcement Act of 1986, (Proposition 65).

### Do HP ElectroInk products contain any substances on the U.S. federal list of hazardous air pollutants?

None of HP Indigo's process ink colours (HP ElectroInk) or other supplies, contain substances that are listed on the United States federal list of hazardous air pollutants established under Section 112 of the Federal Clean Air Act. 42 U.S.C.A. §7412.

### Does HP ElectroInk meet the criteria for Nordic Swan Ecolabelling?

The Nordic Swan criteria includes requirements as to chemicals, emission to air and water, and waste treatment. HP ElectroInk meets the chemical requirements of the Nordic Swan 4.2 specification for printing companies.

### Does HP ElectroInk comply with REACH regulation EC No 1907/2006?

HP Indigo ElectroInk complies with EC Regulation 1907/2006 (REACH). The products do not contain any substances on the candidate list for inclusion in Annex XIV of REACH above the threshold level of 0.1% by weight of the article. Additional information about REACH can be found at [www.hp.com/go/reach](http://www.hp.com/go/reach)



### What is the concentration of heavy metals in HP ElectroInk?

Based on the formulation of our inks and information received from our raw material suppliers, HP ElectroInk does not contain lead, cadmium, mercury and hexavalent chromium in a combined concentration exceeding 100 parts per million by weight of the ink in a dry state.

### What is HP ElectroInk's flammability rating?

The oil in HP ElectroInk has a flashpoint >64°C and is not restricted for any mode of international transport.

According to the Hazardous Materials Identification System (HMIS) and the National Fire Protection Association (NFPA) system, the flammability of HP Indigo HP ElectroInk is rated at 2.

#### **The HMIS hazard ratings are as follows:**

- Minimal – 0
- Slight – 1
- Moderate – 2
- Serious – 3
- Severe – 4

For any specific workplace hazard warning and labeling requirements for these materials, please consult your local occupational health and safety regulations.

## Deinking trial results

In October 2009, Western Michigan University (WMU) Pilot Operations configured pilot unit operations and a trial design under the direction of NewPage Corporation and Technical & Investor LLC, to simulate the NewPage Duluth recycle pulp mill. The trial design adopted the flotation deinking process utilising at Duluth. "The results of the WMU pilot trial showed 5% Indigo content recycled pulp with other typical mixed office waste can meet high recycled pulp quality dirt and brightness requirements utilizing a process similar to that operated by NewPage Duluth. A commercial 5% Indigo trial at NewPage Duluth was recommended and will be run as final proof. NewPage will proceed with that (mill) trial." John F. Bergin, Technical & Investor Consulting LLC

## Can the HP Indigo prints be recycled?

As a leading printing equipment and supplies company, HP cares a great deal about the ease of recycling of paper and print media. Deinking is a key initial step in paper recycling whereby ink is separated from the fibres. Deinking efficiency is evaluated by measuring the residual ink specks in the deinked and processed pulp in terms of square millimetre per square metre. Brightness is also measured and compared to a target brightness and purity of the resultant un-printed recycled paper.

HP, in conjunction with leading paper research institutes such as Centre Technique du Papier (CTP), Grenoble, is researching deinking and processes and their applicability to HP Indigo printed media.

In 2009, single loop tests at CTP concluded that five out of six HP Indigo pages tested met general European Recovered Paper Council (ERPC) guidelines for deinkability. Furthermore, large volumes of HP Indigo prints have been successfully deinked in trials managed by NewPage Corporation (see box).

In 2009, HP Indigo research and development and manufacturing facilities sold more than 60 tons of HP ElectroInk prints each month for recycling.

## With which types of paper can HP ElectroInk be used?

HP ElectroInk can be printed on a wide variety of papers and non-papers including conveniently located off-the-shelf products. For specific types and brands in your area please refer to the Media Locator which can be found on the HP Indigo customer portal at <https://h21021.www2.hp.com/medialocator/>.

## Where can additional information about HP ElectroInk products be found?

Additional information on HP Indigo Imaging Products and Supplies, can be found on the HP Indigo web portal at <http://www.hp.com/go/graphic-arts>. Material safety data sheets can be found at <http://www.hp.com/hpinfo/globalcitizenship/environment/productdata/iimsdsuseng.html>

**Performance data presented in this document represent results obtained using specific press models, workflow versions, applications, media types and other variable testing components. Variations in performance may be expected when tests are carried out using different components. Users are therefore encouraged to perform their own tests under conditions typical of their own printing process.**

### Paper types utilised throughout this FAQ document

Paper Type	Brand
Acrylic Coated	BVS
Acrylic Coated	Magnostar
SBR Coated Gloss	Condat Gloss
SBR Coated Gloss	Mirage Gloss
SBR Coated Gloss	Samarkand
SBR Coated Gloss	SAPPI 100# Lustró
SBR Coated Gloss	Silver Digital
SBR Coated Matte	Condat Matte
SBR Coated Matte	Perigord
SBR Coated Semi-Matte	Mirage Satin
Uncoated	Carnival
Uncoated	Eastern Inspire
Uncoated	Hadar Top



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**Note**

This document is relevant to the following presses: HP Indigo 7500 Digital Press, HP Indigo W7200 Digital Press, HP Indigo 7000 Digital Press, HP Indigo WS6000p Digital Press, HP Indigo WS6000 Digital Press, HP Indigo press 5500, HP Indigo press 5000, HP Indigo press ws4500, HP Indigo press ws4050, HP Indigo press ws4000, HP Indigo 3550 Digital Press, HP Indigo press 3500, HP Indigo press w3250, HP Indigo press w3050, HP Indigo press 3000, and HP Indigo press w3200.

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