P3 Professional Photo Ink Jet Media

Studio

Code No. 4800, 4802, 4803

Sihl Digital Imaging (Information)

Description

These heavy weight inkjet photo papers exhibit excellent print quality on all professional inkjet printers particularly with pigmented or dye inks and its high value microporous inkjet coating is designed for long-term indoor display and archivability. The photo base paper is acid free.

Printing

- best at 30 - 65 % r.h., 20 - 30 °C (68 F-86 F)
- compatible inks: dye and pigmented inks in all photo printers in recommended printing modes (photo mode setting in printer driver) -> see separate printer setting recommendations
- storage conditions for prints: 30 – 65 % r.h., 10 – 30°C (50 F-86 F)

Finishing Application

- let the prints dry for at least 1 hour before further processing or applying
- let prints dry for 24 hours before framing under glass or placing into plastic folders or into a photo album
- outdoor application is not recommended
- for lamination use pressure sensitive (cold) or hot laminates

Storage

- storage conditions for media in original packaging: 30 - 65 % r.h., 10 - 30 °C
- warranty of 2 years on product quality under above mentioned conditions in original packaging

Archivability and Display Lifetime of Inkjet Prints

This statement is based on the expertise and experience of Sihl with inkjet media and printing since the beginning of the 1990ies. Thousands of accelerated stability tests as well as real life application tests have been evaluated to build-up know-how in this demanding area. Many improvements have been achieved in close co-operation with ink and colourant suppliers leading to state-of-the-art inkjet media.

As with Silver Halide Photographs the environmental conditions of display or storage are strongly influencing the image permanence. Therefore, a general statement of image durability is a complex task. Furthermore, inks of different printing systems vary extremely regarding the used colourants and their long-term fading properties. Latest printers from Epson, Canon and HP work with very stable pigmented inks.

Our proprietary microporous inkjet coating takes into account the chemical nature and requirements of these inkjet inks by specific ingredients which stabilise the colourants. During the printing process the inkjet dyes (ink colourants, aqueous solvents and auxiliary substances) are instantly absorbed into the microporous coating, leading to very effective drying and fixation of the colourants. This ensures optimal durability of colour saturation and image brilliance without further protection under indoor display conditions.

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Long term image stability is limited by unacceptable fading and colour shift which may be caused by different environmental influences:

- Intensive light exposure (“light fading”)
- High air humidity
- Ozone and other aggressive gases in the air (“gas fading”)
- High temperature

Light Fading

Light fading strongly depends on display conditions. The light intensity in the visible and the UV-range of indoor artificial illumination by bulbs on the one hand and of direct sunlight at a south side window on the other hand may vary by some orders of magnitude. Therefore, longevity of an inkjet printout has to be specified for different display conditions.

High air humidity

High humidity may re-dissolve inkjet colourants based on dyes in the inkjet coating. In extreme cases this will cause blurring of the image, decline of resolution and colour shift. Therefore, inkjet prints with dye ink should not be subjected to a relative humidity exceeding 70% over a longer period.

Ozone

Ozone in the air is created by different sources, e.g. by copying machines, laser printers, refrigerators as well as by industrial air pollution, mainly in the summer months. As Ozone is a very aggressive gas it may chemically attack sensitive colourants if they are not protected. Sihl has proven that P3 Professional Photo Media feature the utmost stabilisation effect on pigment colourants against aggressive environmental gases like ozone. Nevertheless, dye colourants are prone to degradation by ozone which can be avoided effectively only by protecting the image, e.g. covered by glass or lamination film as well as stored in an album.

High temperatures

Will accelerate any paper or image deterioration. Therefore, inkjet printouts should not be stored or displayed at elevated temperatures.

These basic dependencies lead to the following recommendations:

- Let your inkjet prints dry for 24 hours before covering the printed surface in a scrap book, a plastic folder or glass.
- If possible, do not subject inkjet prints to direct sunlight
- Avoid displaying prints in humid conditions, e.g. in kitchens, bathrooms, basements etc.
- Display at temperatures below 35 °C (95 F), do not display near heaters or in attics.
- Displaying behind glass increases image durability by shielding the printout against ozone, humidity and UV light.
- Storage in an album under moderate climatic conditions will result in longest print lifetime.

Following these recommendations Sihl´s unique inkjet photo paper technology will ensure high image permanence similar or even exceeding to conventional silver halide photographs. With the professional photo inkjet printers from HP, Epson and Canon long term stability of prints is achieved.

Depending on light intensity image permanence has to be rated accordingly for different display conditions.

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In a simplified approach under the restriction of constant environmental conditions (humidity, temperature, light source, no gas fading) the fading effect of the particular light source should be proportional to the light intensity multiplied by the exposure time. For different display conditions a rough estimation of the illumination intensity is given in the following table.

Typical Display Conditions

A Indoor low intensity indirect daylight (far from next window)	200 Lux, 10 hours/day
B Indoor medium intensity indirect daylight (typical office conditions)	500 Lux, 10 hours/day
C Indoor high intensity indirect daylight (in the near of a window)	2,000 Lux, 10 hours/day
D Direct sunlight at a south side window	10,000 Lux, 4 hours/day

For conditions A, B, C and D with prints framed under glass typical durability expectations can be given by extrapolation of data obtained in accelerated testing with high intensity illumination. One image failure criteria is the optical density decrease of colours, the decrease must not exceed a certain value. Furthermore, colour imbalance or colour balance shifts have to be rated as failure criteria, too.

Light fading is evaluated with an Atlas Weatherometer Type Alpha complying with the ASTM G26 standard. This standard ensures to hold consistent conditions of illumination and climate (relative humidity, temperature). The Xenon-Arc lamp used is a high sophisticated light source resembling very closely the spectrum of sunlight, particularly in the UV range between 320 nm and 400 nm. This ensures that the results can be directly correlated to real life permanence under daylight conditions.

The conditions and parameters used in the artificial aging tests are:

- Xenontest Alpha, Atlas Electric Devices Company
- Irradiation in the UV range: 60 W/m² at max. 55 °C (131 F) (Black Panel Temperature)
- UV Wavelength range: 320 nm – 400 nm (indoor under glass)
- Image failure criteria: 30% optical density loss on single colours CMYKRGB or 15 % optical density deviation between single colours C, M and Y based on original print density.
- Extrapolation of the measured lifetime in the accelerated testing to different indoor display conditions for Mean Middle European Sunlight Intensity (190 MW/m²/year).

Dark aging has to be analyzed differently. As there is no or nearly no light under archival conditions, e.g. in a binder, an album, image permanence depends mainly on temperature, humidity, and long term exposure to air and air pollutants. Therefore, accelerated tests have to be done in the dark at elevated temperatures at constant relative humidity. Durability ratings are extrapolated to the chosen failure criteria. The influence of gas fading is excluded in these investigations although it can be quite significant. Tests on archivability are ongoing.

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Estimated image permanance

The listed printers are used for accelerated permanence testing with genuine inks. Please note, that these ratings are made to the best of our knowledge of today and by extrapolation of accelerated tests. For storage under extreme conditions and for improper use of prints the prediction of durability is not possible. Please use these figures as a rough estimation. Further to fading of the printed areas (inks) a slight discolouring of the background due to the use of optical brighteners in the paper is observed which is not rated critical to user acceptance regarding photographic prints. This yellowing effect can be avoided as far as possible by using optical brightener free Sihl media of our Gallery range.

Display Condition	A Indoor low intensity indirect daylight under glass	B Indoor medium intensity indirect daylight under glass	C Indoor high intensity indirect daylight under glass	D Direct Sunlight at Window
Printers using genuine inks	Years	Years	Years	Months
Canon IPF 5000 / 8000 / 9000 Lucia pigmented ink				
4800	> 125	> 63	> 31	> 25,0
4802	> 125	> 63	> 31	> 25,0
4803	> 125	> 63	> 31	> 25,0
Epson 4800 / 7800/ 9800 / 2400 / 3800 Ultrachrome K 3 ink				
4800	63	31	16	12,5
4802	104	52	26	20,8
4803	104	52	26	20,8
HP Z 2100/3100 Photosmart Pro B 9180 Vivera ink pigmented				
4800	> 125	> 63	> 31	> 25,0
4802	> 125	> 63	> 31	> 25,0
4803	> 125	> 63	> 31	> 25,0

Note:

For Canon and HP inks the failure criteria have not been reached within the exposure time. In this test, fading is assumed to be caused mainly by UV-light from reflected sunlight in private indoor environments. Fluorescent light may give different results due to different spectra and intensity of UV light. This may be important for indoor office display conditions, museum displays etc. where artificial fluorescent light sources are used as well as comparing data to different test conditions (e.g. Wilhelm test method).

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