

Frequently Asked Questions

:Anapurna Inkjet Inks

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What are :Anapurna inks?

:Anapurna inks are piezoelectric UV-curable inkjet inks that have been specially designed for use in the different models of Agfa's multi-pass wide format :Anapurna printers. The :Anapurna inkjet inks are stable, allow fast curing and are easy to handle. The excellent jetting performance and good adhesion on a wide variety of substrates enable a wide range of indoor and outdoor applications. The high image quality, vibrant colors and perfect edge sharpness combined with good outdoor light stability guarantee heavy duty industrial printing results.

Which :Anapurna ink sets are available and in what standard packaging size?

Ink set	Print head	Dedicated printer	Ink configuration
:ANAPURNA M inks	Konica KM512MN	:ANAPURNA M	CMYKcm + FS
:ANAPURNA L/XL inks	Spectra Nova 256/80	:ANAPURNA L/XL	CMYKcm + Wh + FS
:ANAPURNA XL ² inks	Spectra Galaxy 256/30	:ANAPURNA XL ²	CMYKcm + Wh + FS

All inks are packed in black, easy to handle 1 L HDPE bottles. Standard packaging size is 2 x 1 L bottle for :Anapurna M and :Anapurna L/XL inks, and 4 x 1 L bottle for :Anapurna XL² inks.

Are :Anapurna inks safe to use?

The ingredients used in our UV inks have been specifically selected to have low toxicity and can be safely handled as long as routine precautions are taken. These compounds are also selected to have very low irritancy properties although some ingredients are classified as irritants for both skin and eyes (N.B. all UV inks on the market contain such ingredients). However, the inks are safe as long as appropriate personal protection equipment such as gloves and safety glasses are used. If good working practices are not followed it is possible that prolonged skin contact may cause skin irritation. Certain individuals may develop sensitization or allergic reaction after repeated exposure and would need to be removed from the source of contact. However, experience has shown that if the inks are handled with appropriate protection, no problems will arise.

Agfa Inks
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What about the environment?

The :Anapurna inks do not contain ozone depleting agents. The prints can be handled and disposed of as similar prints derived from UV-curable screen printing, flexography or offset processes. All of these materials should be disposed of according to local regulations, often falling under the industrial waste treatment. For treatment of inks, please also refer to your local regulations. Liquid inks are mostly considered as chemical waste. For more information please check the material safety data sheets available at your local representative.

Do :Anapurna inks smell?

Like all inks (digital and non-digital) these inks have a certain smell. However, once cured all volatile ingredients will have polymerized. Therefore, UV-cured products smell much less than objects printed with solvent-based inks.

What about storage and transportation conditions for :Anapurna inks?

:Anapurna inks have to be stored between 4°C and 24°C. Temperature during transportation should always remain below 25°C. Exposure to light (especially direct sunlight), higher humidity and/or temperature can affect the product performance. It is therefore advised to keep the ink in the sealed and closed bottle inside the cardboard box until usage. When adding new ink to the machine, add the whole content of the bottle.

What about shelf life?

:Anapurna L/XL:

Cyan, Light Cyan Yellow, Black: 18 months from date of manufacturing

Magenta and Magenta light: 12 months from date of manufacturing

:Anapurna M, XL2 and XLS:

All colours 18 months from date of manufacturing

Anapurna White:

12 months from date of manufacturing

Anapurna Flushing and Varnish:

24 months from date of manufacturing

How do I know how old my :Anapurna ink is?

Before opening a bottle of ink it is important that the customer checks the age of the ink.

The production date or expiry date can be found on the bottle. The first 4 digits (xxxx) refer to the production year, the digits after the dot (yy) refer to the month. Thus FABR.DATE 2007.05 indicates that the ink was manufactured in May 2007.

The production date of the ink can also be deducted from the batch number, which is also mentioned on the label. An example of a batch number is 153 ... The first 2 digits after the 1 represent a production cycle of 8 years, numbered from "00" to "96", starting from January 2003 (2003 = "00"). In the above example the number "53" corresponds to the (production) month May 2007.



What about light stability and outdoor durability of printed images?

Agfa uses the highest quality pigments for its :Anapurna UV-curable inks, in order to ensure a high fade resistance. Detailed weathering studies on different substrates are currently in progress. First results indicate that the life expectancy of images printed with Agfa's :Anapurna inks is more than two years.

Which substrates can :Anapurna inks print on?

In principle UV curable inkjet inks can print on any substrate, both flexible and rigid. Examples are papers, plastic substrates such as vinyls, canvas, wood, glass, ceramics, etc. Typical failure modes are the lack of adhesion between the cured ink and the substrate, for example when using very smooth materials or polished surfaces with very little surface texture for the UV curable ink to adhere to and mechanically bond. In such cases one can use a primer.

Based on practical experiences we can say that the absorption of the :Anapurna inks is extremely good on following materials:

- Banner materials such as canvas and vinyls
- Forex PVC foam sheet
- Billboard blue back paper
- Dibond (coated aluminum composite panel)
- Corrugated cardboard

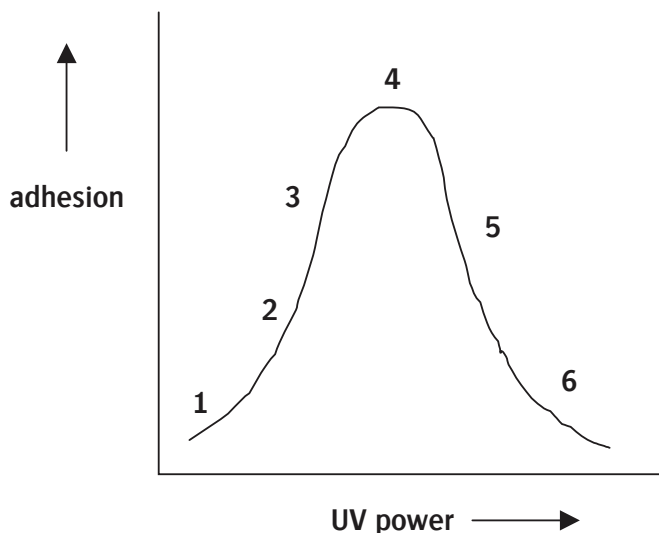
On polypropylene (PP) media adhesion is not always perfect, especially in the case of non-treated PP. In that case the use of a primer can help significantly.

Can :Anapurna inks be used for food packaging applications?

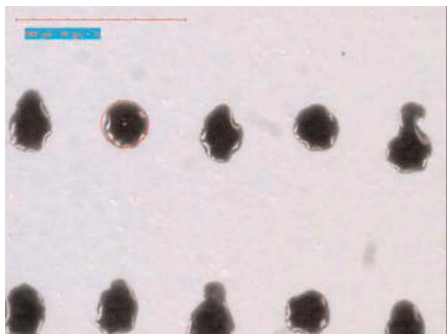
Agfa's :Anapurna inks are not suited for food packaging applications, neither direct or indirect.

Is there a relation between curing and adhesion?

Curing is a complex process that depends on numerous parameters (type of substrate, ink thickness, curing power, etc.). The thought "the higher the curing power, the better the curing, the better the adhesion" is not correct. The figure underneath shows the wide range of results that one can expect:



1. Little or no exposure, ink remains liquid
2. Partial curing (usually surface only) with possible "skinning" and generally poor adhesion to the substrate
3. Tacky surface, common to under curing
4. "Correctly cured" with no tack, low odor, flexible and with good adhesion
5. Increased surface hardness that can become brittle with poor over printability
6. Primary ink surface not receptive to secondary inks resulting in poor adhesion and low flexibility



Ink dots on non-absorbing DiBond-substrate

Can the adhesion be improved with a primer?

From practical experience (Dibond, Priplak) we know that adhesion can already be improved by cleaning the substrate with a solvent such as iso-propanol. Adhesion onto glass and certain plastics (e.g. plexi-glass (PMMA)) can be improved by the use of adhesion promoters (primers).

Is there a difference in adhesion between the different ink colors?

As mentioned before there are numerous parameters which influence adhesion (type of substrate, curing power, ink thickness, etc.). On certain substrates one can observe differences between the different ink colors. In general one can state that black inks are more difficult to cure. The reason for this is that the black pigment particles absorb a significant amount of the UV light. As a result there is less UV light available to initiate the photopolymerization of the monomers/oligomers. Therefore, these inks cure more slowly and, thus, adhesion is worse. A similar effect is observed for white inks. Here the pigment reflects a significant amount of the UV light, which results in slower curing and worse adhesion.



Ink dots on absorbing paper substrate

What is gloss banding and why does it occur?

Gloss banding is the difference in gloss that occurs with a certain periodicity. This phenomenon mostly occurs when one prints bi-directional. Due to the difference in dot shape (orientation of the cured droplets), light is reflected differently between the two printing directions. In fact one can compare this phenomenon with the effect that occurs when one mows grass with a lawnmower. The more bi-directional passes, the less visible the effect is.

The main reasons why gloss banding occurs are:

- too high ink load
- difference UV light output between the UV lamps
- dot shape vs. media

How can gloss banding be reduced?

- Change both UV lamps simultaneously in order to obtain identical curing power again
- Print uni-directional
- Increase the number of passes
- Apply Agfa color profiling technology

Why does the label/MSDS mention :Anapurna G1 ink?

G1 stands for generation 1. In order to provide our customers with the best available products, Agfa's R&D department is constantly striving to improve the quality of our inks. Focus points are improved shelflife, adhesion of the white ink, and adhesion of the other colors on difficult substrates such as PP. Therefore we might introduce a next generation in the future.

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What is inkjet printing?

Inkjet printing is defined as a non-impact printing technology in which droplets of ink are jetted from a small aperture directly to a specified position on a media to create an image. Inkjet printing can be divided into two types: continuous inkjet (e.g. used in industrial applications to mark and code packaging (bottles and cans), and drop-on-demand (DOD) inkjet. Unlike the continuous inkjet, DOD inkjet delivers ink to the substrate only when the internal printhead receives a specific digital signal. The two most popular types of DOD inkjet printers are thermal and piezoelectric.

What is an inkjet ink?

An inkjet ink is one of the consumables being used during the inkjet printing process. One can identify four types of inkjet inks:

- Water-based inks
- Solvent-based inks
- Oil-based inks
- UV-curable inks

What is a UV curable inkjet ink?

UV stands for ultra violet, which refers to the wavelength of the light being used for the curing process of UV curable inkjet inks. Ultra-violet light is electro-magnetic radiation situated between 200 and 380 nm (visible light goes from 380 to 720 nm and IR light from 720 nm to 1 m)

A UV curable ink is composed of different chemical components developed in such a way that the ink, after curing with UV light, meets the characteristics of the application. A typical UV ink formulation contains the following chemical components:

- Monomers
- Oligomers
- Pigment
- Photo-initiator(s)
- Additives

After being jetted onto a substrate, the UV curable ink is immediately cured upon radiation with UV light. During this curing process the monomers and oligomers immediately polymerize resulting in solidification of the ink on the substrate. Since UV light does not have enough energy to start the polymerization process, photo-initiators are added to the formulation. These compounds generate free radicals or cations which are needed to start the polymerization process (cross-linking). This process is simply called "UV-curing". Since the UV curing process is affected by oxygen, it can be significantly improved by curing under an inert atmosphere (i.e. nitrogen gas). Be aware that the final adhesive strength, rub and scratch resistance is obtained after 24hr.

There are 2 types of UV-curable inks commercial available today:

- Free Radical
- Cationic

:Anapurna inks are free radical UV curable inks.

Is the UV-cured ink 100% solid after exposure to UV light?

The curing process is very complex since numerous parameters, such as the thickness of the ink layer, the type of substrate, the UV light source used, the exposure time, the atmosphere, etc. can all affect the polymerization process. This means that there is always a possibility that a small part of the monomers and oligomers has not been cured and thus remains for a certain amount of time in the ink layer. This is an important issue when it comes to food packaging applications.

What about the price of UV curable inkjet inks?

Over the years water, solvent and oil-based inkjet inks have matured. UV curable inkjet inks, however, are still in a development phase. Furthermore, UV curable inks are formulated based on much more advanced ingredients (e.g. photo-initiators, monomers, oligomers). As a result the prices of UV-curable inks are generally higher.

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Agfa Graphics?

Agfa's Graphic Systems is a world leader in prepress solutions for the printing and publishing industries. Graphic Systems provides commercial, newspaper and packaging printers with the most extensive range of workflow automation, project management, computer-to-film, computer-to-plate and proofing solutions. As the world's largest plate supplier, Graphic Systems produces analog plates as well as thermal, visible light, and chemistry-free digital plates to offer advanced solutions for different printing applications. Agfa also serves the indoor and outdoor display market with wide-format inkjet printing systems, and the short-run industrial printing market with its :Dotrix and M Press industrial inkjet presses. Seeing the potential for inkjet printing, the company is investing heavily in the development of innovative technologies to fill market needs. Agfa Graphics is ISO certified.



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