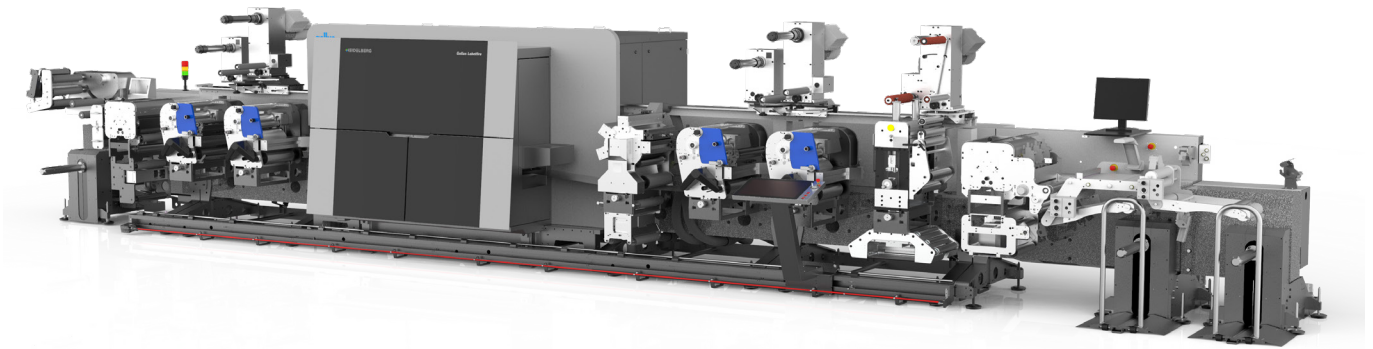


# Producing food-compliant low migration jobs with the Gallus Labelfire



**In the EU and Switzerland so-called low migration inks are required for the food-compliant production of labels and packaging. However, their use does not guarantee that labels and packaging will automatically comply with the limits for the necessary certification. In addition to these special low migration inks, the machine system must be equipped appropriate to ensure that inks are curing sufficiently to prevent the migration of certain substances. The Gallus Labelfire is one of the few digital UV inkjet presses with 1200 dpi resolution that meets these requirements and successfully demonstrates this in practice.**



*Gallus Labelfire Low Migration with Inert Drying and UV Booster (Photo: Gallus Ferd. Rüesch AG)*

## Requirements for low migration on UV inkjet inks

The requirement for food-compliant production of labels and packaging is driven by compliance with the respective legislation and, in addition, the specifications of the brand owners.

Saphira UVLM inks therefore meet the requirements of EU Regulations No. 10/2011, No. 1935/2004, No. 2023/2006 (GMP), the Swiss Ordinance, the Nestlé Guidance Note on Packaging Inks, and the EuPIA guidelines.

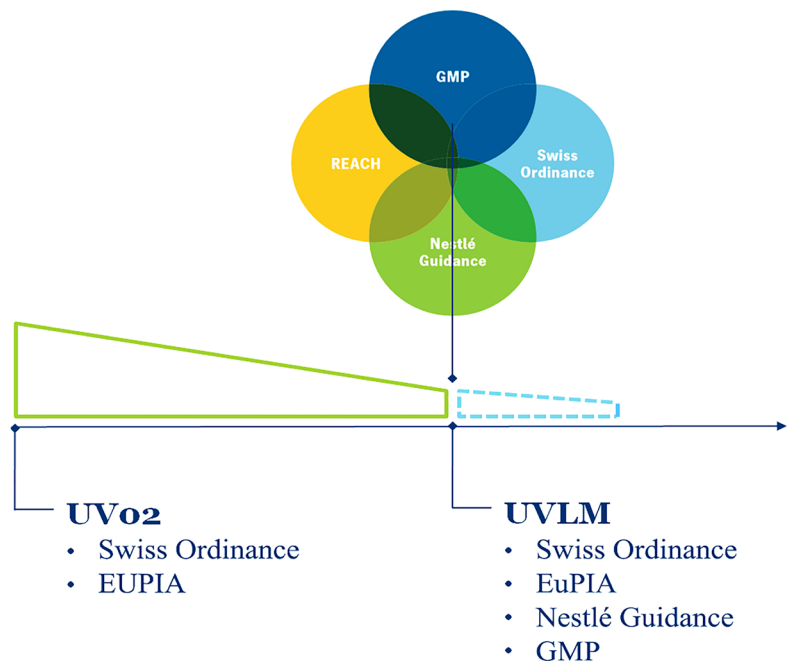
Compared to conventional inks, UV inkjet inks pose an additional challenge to the ink formulation. In addition to low migration behavior, good jetability is the key. At first glance, these two requirements contradict each other. An inkjet ink is said to have good jetability if it transfers the individual substances in the droplets to the substrate precisely and with high reproducibility at the highest printing speed. To achieve this, the ink components must be ground so finely or have to be so small that they fit safely through the nozzles of the print heads. For migration-optimized inks, long-chain molecules would be preferable. These are less mobile due to their longer structure. Due to small fonts, fine elements and

fine screen motifs in label and packaging printing, print heads with a native resolution of 1200 dpi and a droplet size of 2 pl are used. This is also the case with the Gallus Labelfire Low Migration. Such fine nozzles increase the requirements for raw material selection for UVLM inkjet inks due to the above-mentioned conditions.

## Saphira UVLM inks made by Heidelberg

Heidelberg was able to reduce migration behavior with the formulation of the latest generation of UVLM inks. This was

achieved by the selection of raw materials and the purity of these raw materials, which meet the requirements of Swiss Ordinance, the REACH regulation, the Nestlé Guidance Note, and the EU specifications. The ink series itself has a very low viscosity - matched to the size of the nozzles. Despite a limited selection of compliant photoinitiators for this viscosity range, Gallus/Heidelberg succeeded in translating this into a migration-optimized solution. The ink series consists of cyan, magenta, yellow, black

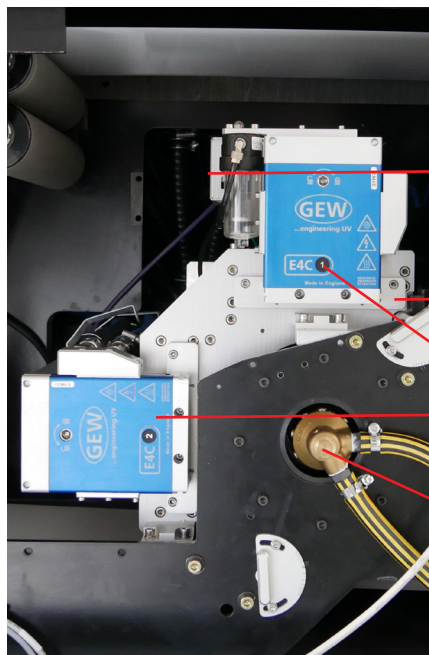


*The migration-optimized UV inkjet ink series UVLM meets the requirements of the Swiss Ordinance, EuPIA, Nestlé Guidance on Packaging Inks and Good Manufacturing Practice (Source: Gallus Ferd. Rüesch AG)*

as well as green, orange and violet to expand the color gamut. The opaque white completes the color series.

### Drying under inert conditions

A special drying system is required to ensure that this new generation of inks shows low migration behavior. The performance of the new Gallus Label-fire Low Migration drying system has been adapted to meet these high requirements. It consists of two water-cooled UV dryers, each with an output of 238 W/cm. The special feature of this drying unit is curing in the absence of oxygen. For this purpose, an inert chamber is flooded with nitrogen, which almost completely displaces the oxygen. This increases the reactivity of the photoinitiators and also the curing performance. Sensors permanently measure the output of the UV lamps during operation. Further sensors display the residual oxygen content in the



*The new drying unit has two inert chambers and is equipped with UV and oxygen sensors*

*(Source: Gallus Ferd. Rüesch AG)*

inert chamber.

This new machine concept makes it possible to print with UV inkjet in a food-compliant manner even on paper or cardboard. In order to prevent the ink from bleeding into the substrate and to achieve adequate curing, it is recommended to pre-print a primer. Thanks to the hybrid machine concept, this can be done inline. It must be ensured that the used primer meets the low migration requirements – this applies to all raw materials and consumables used in the production process.

### Booster for drying at higher speeds

In addition to this dryer unit, an optional booster is available for curing the UVLM inks. This booster enhances the drying performance and enables food-compliant production even at higher machine speeds. It is based on four UV lamps with 140 W/cm<sup>2</sup> each and each of these lamps is equipped with a sensor that measures the emitted power.



*Saphira Digital Labelfire UVLM printing ink developed for food packaging with indirect food contact*  
*(Source: Heidelberger Druckmaschinen AG)*

### Prinect Prepress and Press-room Manager

The quest for the lowest migration values is also supported by the software. Every printing process tries to reproduce a large color gamut with little ink. In low migration applications, this aim is even more important. The principle is: The less ink is on the substrate, the fewer substances can migrate.

The Prinect production workflow optimizes the ink buildup fully automatically in terms of the ink used volume. This color management system has been revised accordingly. By moving away from classic area-based color management (TAC = total area coverage) to volume-based color management (TIC = total ink coverage), it is possible to reduce ink volume and not restrict the color gamut.

### Migration tests

Migration tests are a safeguard for the producer to prove that the delivered material complies with the specification. To do this, print shops turn to specialized laboratories that carry out migration tests with specified simulants under defined test conditions. It is important for the institute to know



which substances to look for. For printing inks, these substances are specified in the respective safety data sheets. With the result of the gas chromatograph analysis, it is to be noted that a statement from it only refers to the examined sample, related to the defined test conditions.

### **GMP-compliant production method in practical tests**

Label production in accordance with Good Manufacturing Practice (GMP) is a complex issue that places high demands on label production. In addition to a quality assurance and quality control system, essential components include employee training and adequate documentation.

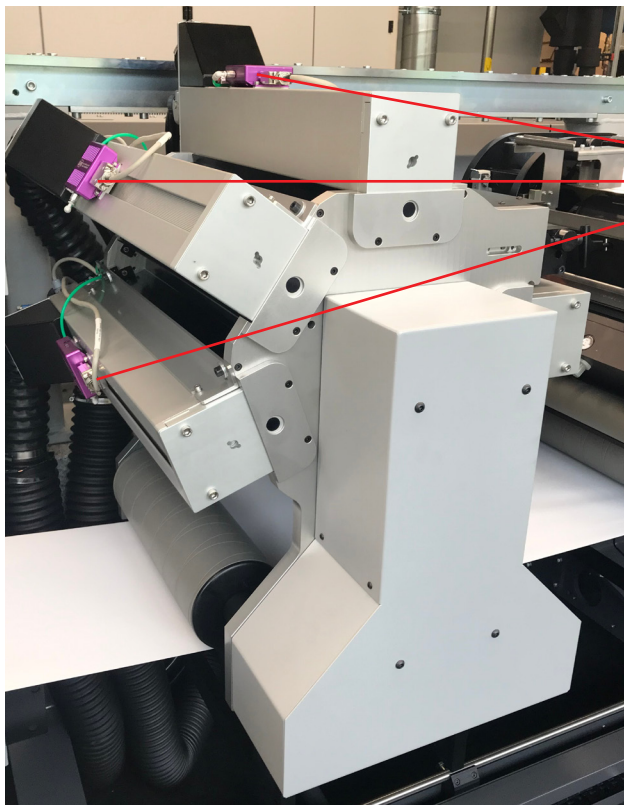
The Gallus Labelfire Low Migration is a solution developed for practical use that supports label printers in their GMP-compliant production in day-to-day business. This machine system makes it much easier for prin-

ting companies in the label and narrow-web packaging sector to implement good manufacturing practice in their daily operations.

### **Conclusion**

The three components – Saphira UVLM inks, inert dryer with optional booster, and volume-based ink management – enable the Gallus Labelfire Low Migration to produce food-compliant labels and packaging. As with conventional printing, the final responsibility for migration tests to ensure food conformity remains with the print shop.

Gallus and Heidelberg see it as their duty to make their contribution to the production of food compliant packaging.



UV-Sensors

*At printing speeds above 35 m/min the drying unit is additionally supported by a booster with four emitters  
(Source: Gallus Ferd. Ruesch AG)*