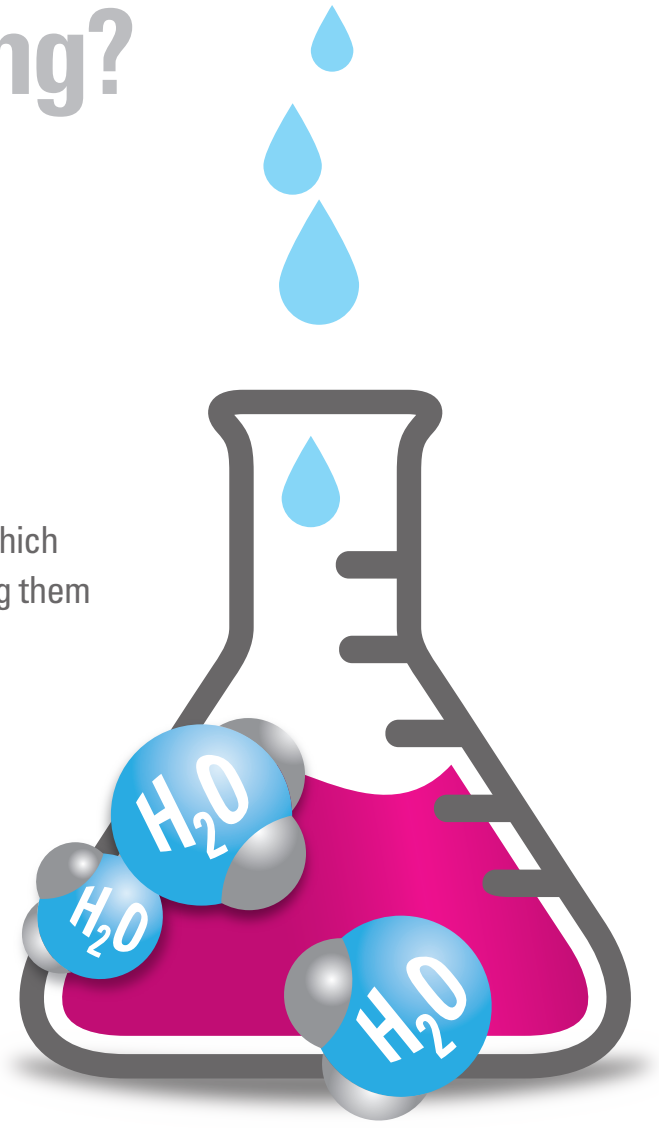
Why Memjet for food labeling?

Safe. Fast. Effective.

GOOD CHEMISTRY:

Memjet's solutions use ***water-based inks*** which are 100% free of reactive chemistries making them safer to use and better for the environment.



Smarter ink. Safer labels.

Developed by in-house chemists, water-based Memjet inks dry faster, enabling high-speed and high-quality color printing that is environmentally-friendly and doesn't require energy intensive drying or curing equipment.

Memjet inks vs competitive technologies.

The following safety and environmental factors table shows a comparison of Memjet VersaPass inks versus competitive technologies. Assessments are based on commercially available inks in each category. Rating does not represent every ink in that class, but is expected to be typical for the class.

	Memjet VersaPass DG & DN Inks	Typical UV Ink	Typical Solvent Ink	HP Indigo	Typical Eco-Solvent Ink
Odor					
HAPs					
VOCs	<30%	<10%	>80%	>60%	>80%
Special Ventilation Required?					
Ink Health Hazard					
Peripheral/Cleaning Fluids Hazard	N/A				
Transportation/ Flammability					
Waste/ Environmental Risk					

Memjet worldwide regulatory statements.

With a formulation comprised of ~70% water, Memjet VersaPass Inks are safe to use and are friendlier to the environment than UV, solvent, or liquid toner inks.

Memjet's VersaPass inks are free from:

- HAPs – Hazardous Air Pollutants
- SVHCs, heavy metals and aromatic amines
- Components on Japan Printing Ink Makers (JPIMA), Negative List, January 2017
- Phthalate esters and bishenol-A (BPA)
  - As well as hazardous UV ink components such as 4-methylbenzophenone or benzophenone
- Intentionally added mineral oil aromatic hydrocarbons (MOAH)
- Materials subject to California Prop 65 labeling (North America) above Safe Harbor Limits

Ink compliance around the world.

Regulatory statements are specific to VersaPass DN & DG Inks.

FULLY COMPLIANT WITH THESE US STANDARDS:

- US CONEG Model Toxics in Packaging Legislation
  - Memjet inks contain no: mercury, lead, cadmium or hexavalent chromium

  NOTE: None of these metals are intentionally added to the ink formulations, though small amounts may exist as trace contaminants. Memjet can confirm that any incidental presence is < 10 parts per million based on our testing of the final ink formulations.
- VersaPass DN & DG inks do not contain any Prop 65 substances above Safe Harbor Limits

FULLY COMPLIANT WITH ASIAN STANDARDS:

- China's revised Administrative Measures for the Restriction of the Use of Hazardous Substances in Electrical and Electronic Products effect on July 1, 2016, commonly referred to as China RoHS 2
  - No RoHS 2 materials are in Memjet inks
- Japan Printing Ink Makers (JPIMA), Negative List, 2017

FUTURE COMPLIANCE:

Although VersaPass inks are currently not fully compliant with the Swiss Ordinance, Memjet is in the process of completing Swiss Ordinance submissions for VersaPass DN & DG dyes and confirming compliance with the Nestle Guidance Note on Packaging Inks.

FULLY COMPLIANT WITH THESE EU STANDARDS:

- European Chemical Association (ECHA) SVHC Candidate List
  - No Memjet ink components are on the SVHC Candidate List
- EU Packaging Directive 92/62/EC
- The European Union's Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC, replaced by RoHS Directive 2011/65/EU commonly referred to as RoHS 2
  - No RoHS 2 materials are in Memjet inks
- Memjet inks are made according to Good Manufacturing Practice (GMP) principles (Global)
  - Compliance with Commission Regulation (EC) No 2023/2006 of 22 December 2006 on good manufacturing practice for materials and articles intended to come into contact with food must be confirmed by final packaging converter.

MEMJET VERSAPASS INKS ARE IN PARTIAL COMPLIANCE WITH THIS EU STANDARD:

- Swiss Ordinance of the FDHA on Materials and Articles
  - Several of the dyes used in these inks could be but are not yet listed.
  - Partial compliance with the Swiss Ordinance means that Memjet's VersaPass inks are not fully compliant with the current Nestle Guidance Note on Packaging Inks.

Use a functional barrier.

The best way to ensure no ink migrates from packaging to food is to use a barrier between the food and the printed label or package. A functional barrier is any material that prevents the migration of chemicals from the printed package/label into the food beyond any threshold limits.

Be advised that barrier effectiveness can be impacted by thickness of the barrier, food type, printed substrate, temperature and how the packaging is to be used (e.g. microwaved, frozen, boiled).

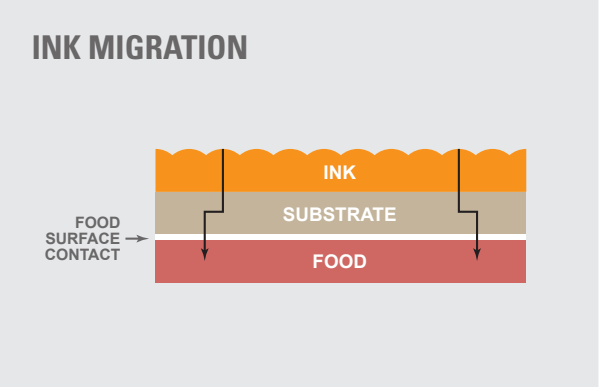
Some examples of functional barriers include:

- **Glass and certain metals:** (e.g. aluminum > 8 micron thickness). These are absolute barriers and ensure complete blockage of the migration of chemicals in the printed food package.
- **Plastics materials**: most plastic materials are partial barriers and prevent some to all migration, though particular use cases must be verified. Examples include:
  - PET (12 microns) used in take-out containers that are semi rigid such as grab & go lunch plastics boxes & sushi boxes.
  - Thick plastic (e.g. virgin PET ≥ 25 microns is considered a functional barrier by the FDA for room temperature applications); bag in a box (e.g. common cereal packaging) or rigid jars like peanut butter, nuts, chocolates, etc.
  - Polymer laminates containing an inner layer of EVOH or polyamide where the absence of swelling (for example by water) can be guaranteed for indefinite frozen and ambient temperature storage for all food types.
  - EVOH (3 microns) can also be used as for food packaging as a gas barrier to enhance shelf life. EVOH is used in rigid and semirigid containers, including bottles, trays, bowls, flexible films and paperboard beverage cartons.
  - Polyamide (15 microns) can also be used as a laminate because it is a good barrier for moisture and oxygen, and has better tensile strength and compatibility with fats. Applications include vacuum packaging of cheese, bacon, fresh and processed meats and frozen foods.

Note: Migration from label to food can happen both from the ink and label substrate as well as the adhesive used to affix the label to the packaging. Labels used on food packaging need to comply with FDA regulation 21 CFR 176.170, and label adhesive should comply with FDA regulation 21 CFR 175.105.

Migration: Insights and Recommendations

1. The base assumption is that any materials used in food contact applications will become part of the food unless documented testing proves otherwise.
2. Inks that do not have direct food contact are not regulated, as long as there is a "functional barrier" between the food contact side and the ink or coating, and the inks do not migrate to the food contact side during various steps in the process.



3. Thicker medias are generally better to help mitigate ink migration.
4. Using inkjet-appropriate medias with fast dry time as well as high-end synthetic medias can enhance water resistance properties and protect food as well as the quality of the label.
5. While outer lamination and varnishes do not protect against potential ink migration (through back side of label), they do help to limit set-off, therefore protecting what's printed on the label as well the food when there is contact with the label. Assure that the varnish and/or laminate are suitable for use with food packaging applications.
6. The following are recommended starting scenarios for the use of Memjet inks: labels that are placed on glass, tin cans, aluminum foil, or on the box of a 'bag in a box' package where the bag is made of an appropriate barrier material.
7. Always examine the thickness of packaging material. Thicker packaging materials will perform better as functional barriers to ink migration, but further testing will be required for verification.
8. Remember that environmental conditions play a role in possible ink migration or set-off. Foods stored in the refrigerator/freezer and used in the microwave will experience greater condensation, evaporation and therefore may require more substantial media or overcoat solutions.

Learn more about Memjet's **VersaPass DN inks** by visiting ***memjet.com/versapass***

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