

# Inks for food packaging

## The background

*Inks for food packaging is a hot topic. Press articles speculate on the risks of migration into food and how techniques used in the packaging process are being altered to reduce or remove this risk altogether.*

*Most articles are concerned with the inks used for the main printed surface of the packaging, whether printed by offset, flexo or gravure. This paper looks at the regulations and best practice that parties in the food supply chain should observe in relation to packaging inks as well as coding and marking - for Use By, Sell By and batch number - typically produced using CIJ (continuous ink jet) techniques.*

## The importance of coding and marking

The amount of ink used for coding and marking foodstuffs might be relatively low, (typically less than 1%) compared to the ink used for surface packaging, but ensuring this is safe too, is of equal importance.

When you consider the sheer volumes of foodstuffs that need to be coded and marked, you realise the enormous task at hand. It is estimated that more than 95% of all foodstuffs in Western Europe are packaged<sup>1</sup> with over 15 million tonnes of food<sup>2</sup> and over 5 billion litres of milk sold alone in the UK every year<sup>3</sup> In addition, vast quantities of water, fruit juices, alcoholic and soft drinks can be added to this list.



### References:

<sup>1</sup>Inkformation, "Printing Inks for Food Packaging", The Huber Group [www.hubergroup.com](http://www.hubergroup.com)

<sup>2</sup>Tesco, the Tesco and Society Report <http://www.tescopl.com/index.asp?pageid=17&newsid=881>

<sup>3</sup><http://www.thisisdairyfarming.com/discover/dairy-farming-facts/how-much-milk-is-produced-in-britain/>



The packaging has to be suitable and much of the packaging - whether it is made of paper, card, plastic, metal or glass containers - is printed. Print informs the customer about the product, confirms brand information, as well as confirming quantity, ingredients and serving suggestions. *Use By or Sell By* information plays just as big a role but can be overlooked in its importance in communicating vital consumer information.

## Migration and offset

Today, food producers are tasked to ensure that the combination of packaging and any ink or varnish used, does not enter into the foodstuff. Setting aside the packaging materials, it is still possible for components from printing ink to transfer into food and drink.

This can happen through migration, when ink seeps through the packaging into the adjacent foodstuff.

Or, as a result of the offset process, where flexible packaging is pre-printed and components from the ink to offset procedure, can seep into the other side of the packaging, when being re-reeled after printing. It would then come into contact with food when the packaging is formed and filled.

There's also a third possibility. Volatile components, from the air within the packaged product, can transfer into the food. As you'd expect, these components are likely to be invisible.

When it comes to inks used for coding and marking, food packaging suppliers need to be mindful to address the risks of chemicals from printing inks used to code primary packaging. This is especially the case as inks used in this way do sometimes come directly into contact with food, for example, the coding of eggs and cheeses.

## Effectiveness of substrates

Substrates have an important role to play for example in how easy or difficult it is for the components in the ink to seep through the packaging.

Packaging is graded in three ways in terms of its effectiveness:

1. Permanent (or absolute) barrier: Metals and glass act as an effective barrier where ink components cannot migrate. Aluminium foil has to be at least 7µm thick to be deemed effective.
2. Functional barriers. Here it is the combination of specific substrates and specific ink components which affect the effectiveness of the barrier: For example BOPP (biaxially oriented polypropylene) films are a good barrier against water but are ineffective as a barrier to many ink components like mineral oils.
3. Non-functional barriers. Packaging materials such as paper and card are not effective barriers, and can readily allow ink components to migrate into the food.

## Relevant legislation and codes of practice

Legislation in this area is diverse, complex and varies from country to country.

The suppliers of packaging and ink are responsible for ensuring that the food, in combination with the packaging and printing ink, are safe for human consumption. Safety to consumers is of paramount importance in all legislation and, in association with the food and drink manufacturers, (effectively the customers of the packaging and ink suppliers), all stakeholders have a part to play in the compliance process.

In addition to safety, organoleptic properties of the packaged foodstuffs, or that which relates to the human senses, such as, taste, odour, colour, appearance, shape retention and consistency, need to be retained, as these are critical factors affecting consumer enjoyment of foodstuffs.

## The legislation agenda

All legislation related to food packaging is concerned with ensuring health and safety of consumers. In order to meet the legislative requirements of food packaging EU Regulations must be implemented in all Member States and Directives must be implemented in each EU Member State as a local law.

Compliance with the law is the responsibility of the food packaging manufacturer, as well as the supplier, of the food. It's incumbent upon printing ink suppliers to provide adequate information to their customers to permit them to make informed decisions.

## Key regulations include:

- **Regulation 1935/2004/EC ('Framework Regulation')**

This covers European rules and regulations on materials which are intended to come into contact with foodstuffs. Such materials, (including any inks or varnishes printed onto them), when used for food packaging must not transfer substances into the food which a) endanger human health; b) cause an unacceptable change in the composition of the food; or c) affect the organoleptic properties of the food (such as taste or smell).

- **Regulation 2023/2006/EC**

This covers packaging materials included in the Framework Regulation (above) and ensures that effective quality assurance and control systems are in place to monitor good manufacturing practice when making these materials. Annexed to this regulation is the requirement that substances from the printed side of the packaging must not transfer to the food-contact side (as could happen if the printed material is re-reeled) in contravention of the requirements of Regulation 1935/2004 above.

However, there is no specific EU legislation regarding printing inks, coatings or varnishes. In addition, it is a requirement that inks or coatings present on packaging materials must comply with the regulations related to the packaging materials.

- **EU Regulation 10/2011/EC on plastic materials and articles intended to come into contact with food**

This regulation is concerned with the lists of chemicals approved for use in plastics that will come into direct contact with food. Clearly printing inks are not plastics but, in the absence of specific measures relating to printing inks intended to come into contact with food, this regulation has proven a useful guide as to which chemicals may be suitable.



## Resolutions of the Council of Europe

The omission of Regulations relating directly to printing inks is widely acknowledged throughout the industry, leading most to presuppose that this will be addressed in due course.

In the meantime, the Resolutions of the Council of Europe (CoE), which includes non-EU countries like Switzerland, are in place though these are guidelines rather than legally binding.

In Switzerland the Federal Department of Home Affairs (EDI) has issued the Swiss Ordinance on Materials and Articles in Contact with Food (SR 817.023.21) which includes rules that apply specifically to printing inks, and since April 2010 all inks used on food packaging which is brought into Switzerland must comply with this Ordinance.

### Key aspects of this Ordinance are:

1. Inks must be manufactured and printed following good manufacturing practice.
2. Printing inks must only use components on two 'positive lists' called Annex 1 and Annex 6. Annex 6 was initially compiled by EuPIA (European Printing Ink Association)
3. Annex 6 includes two lists, the first where SML (specific migration limits) have been determined and must be adhered to. The second is where such data does not yet exist, and here the migration of such materials must not be detectable, where the detection limit is set at 10 parts per billion (0.01 mg/kg).

Whilst a valuable reference point, the list of materials is incomplete and does not include all raw materials used in the manufacture of printing inks for food packaging applications.

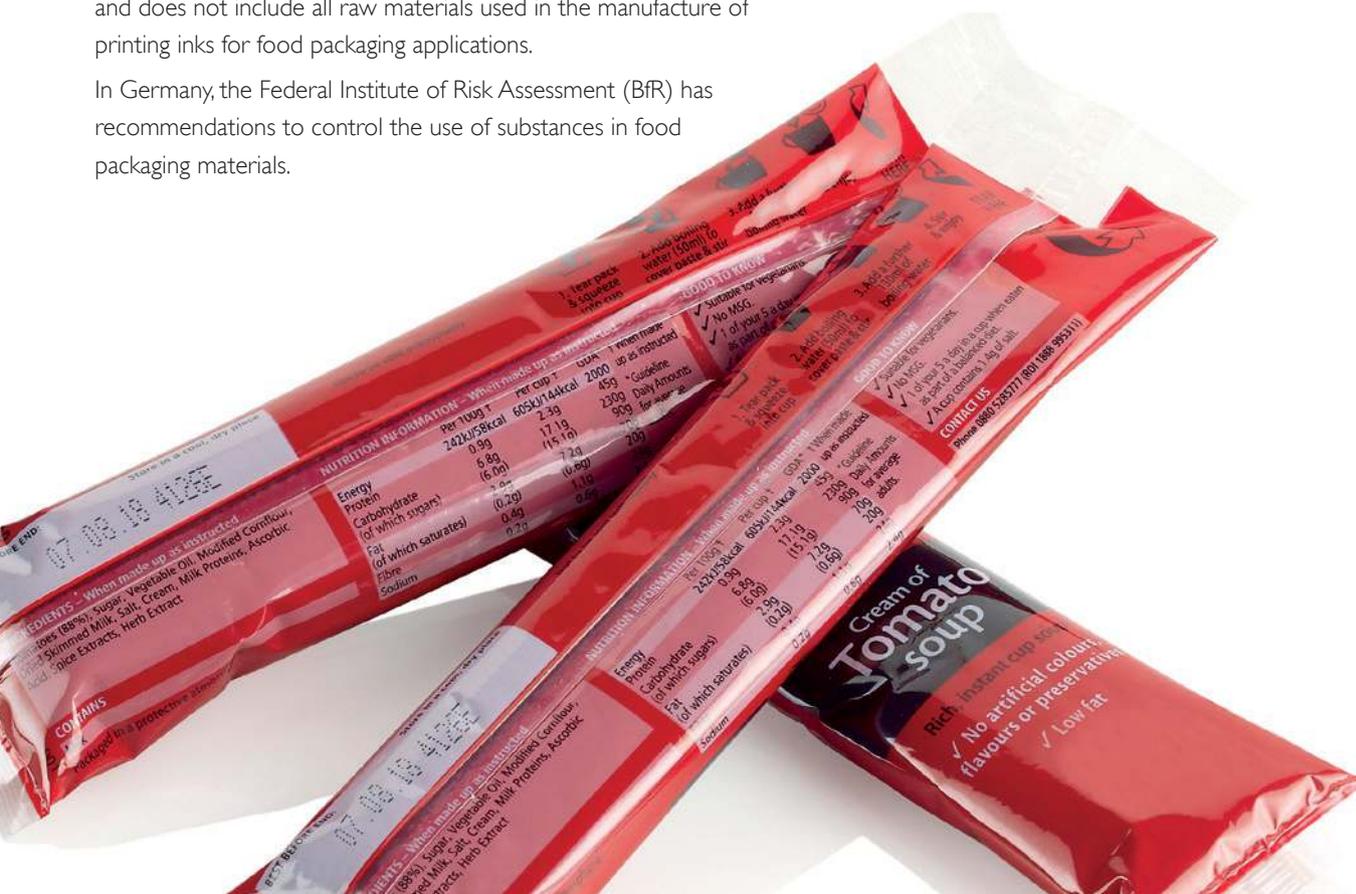
In Germany, the Federal Institute of Risk Assessment (BfR) has recommendations to control the use of substances in food packaging materials.

Outside of the EU other key regulations include the Code of Federal Regulations CFR21 from the United States Food and Drug Administration (FDA), Chinese legislation GB9685-2008, Japanese Food Sanitation Law, Canadian CFIA & "Health Canada" and Australian/NZ "Australian Standard AS 2070-1999.

In addition to national Regulations and guidelines, some Multinational Corporations have their own 'in-house' guidelines – though these typically closely follow Regulations.

In summary, these Regulations or recommendations require that no substances shall be permitted to transfer from the packaging into the foodstuffs unless permitted, based on proven safety data. The 'rules' in summary are:

1. No Category 1, 2 or 3 CMRs (carcinogens, mutagens or reprotoxins) are to be used.
2. The level of migration of any substance must be below the defined limits.
3. For toxicologically-evaluated substances, the SML, must be complied with.
4. For substances without toxicological data in place, migration must not be detectable where the detection limit is set at 10 parts per billion (0.01 mg/kg).
5. An overall limit on migration of all substances must not exceed 60mg/kg.



## Domino's Role in Supplying food producers and packers

Domino is a member of EuPIA and is committed to safeguarding the protection of food consumer safety within the areas under its control.

These commitments cover all products manufactured or marketed for application to the non-food contact surface of food packaging and materials. Domino is committed to:

- the principle of placing consumer safety first;
- compliance with relevant legislation currently in force and the resultant legal requirements in order to ensure a high level of consumer safety;
- the principles of transparency and information sharing to enable compliance within the packaging supply chain, whilst preserving appropriate commercial confidentiality and respecting competition law rules;
- the supply of products fit for the intended purpose as mutually defined between each company and its customers;
- the concept of risk and exposure assessment in accordance with internationally recognised scientific principles;
- the principles and implementation of Good Manufacturing Practices, including audit processes;
- the principle of continuous improvement in consumer safety in the light of any new scientific findings; and
- following EuPIA crisis management procedures, or equivalents, in the event of an incident related to a food packaging ink.



## Our commitment to producing inks

When developing new inks, Domino considers relevant regulations and guidelines when selecting the raw materials and components. In the absence of specific legislation covering printing inks, Domino has set its own criteria. This criteria includes a declaration regarding inks and associated fluids are suitable for food packaging applications.

Domino offers a specialist range of inks designed specifically for direct food contact, such as coding onto eggs or cheese. These inks are formulated using components compliant with relevant EU and FDA (Code of Federal Regulations Title 21) regulations on food additives, and in addition conforms to the requirements of Regulation 1935/2004/EC.

There are many excellent reference documents which provide much greater detail on the subject of Inks for Food Packaging. One example is "Designing Packaging with Certainty. A Best Practice Guide" from Sun Chemical, see [www.sunchemical.com](http://www.sunchemical.com).



## Conclusion

The challenges faced by food producers and packers are many and varied. Legislation is not all-encompassing, directives apply to separate territories, which is why all parties in the food supply chain need to be individually and collectively aware of how to observe and comply with the different standards.

Stakeholders in this chain include the brand owner, the packaging printer, the producer or packer and the supplier of coding equipment. Each needs to fully understand their role within the supply chain and to understand the relevant legislation and codes of practice, as well as ensuring they communicate effectively with other stakeholders, as follows:

- The brand owner is responsible for packaging materials and design, as well as the print and post-printing processes, which includes coding.
- The packaging printer ensures that the substrate and printing inks are as specified and fit for purpose and the producer or packer is concerned with filling, sealing, storage and checking accurate Use By and traceability codes.
- The supplier of coding equipment needs to ensure that suitable printing inks are available to the marketplace and that Technical Data Sheets provide the adequate information required for users to meet their obligations under 1935/2004/EC and 2023/2006/EC.

Inks used for coding and marking applications are equally as important as those used in surface packaging, especially as, in some cases, these come into direct contact with food. It's particularly important that stringent safety, to ensure consumer protection, is always upheld.

Regardless of mandatory requirements, there's growing pressure from consumers and retailers alike for Use By and Sell By codes to be used on foodstuffs clearly and consistently, so that consumers can make well-informed decisions about food and contribute to reducing the staggering amount that is thrown away in the UK each year, without good reason.

In summary, these are all reasons why the inks used for coding and marking foods, as well as the regulations governing their use, are of equal importance in the repertoire of food producers and packers, to the inks used for surface packaging.

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### References:

- "Printing Inks for Food Packaging", Stehlin Hostag Ink UK Huber Group
- "Designing Packaging with Certainty - A Best Practice Guide", Sun Chemical
- "Food Packaging: A Guide to Best Practice for Sheetfed Offset Print," Flint Group
- European Printing Ink Association [www.eupia.org/](http://www.eupia.org/)

## Glossary

BfR	Federal Institute of Risk Assessment, Germany
CIJ	Continuous ink jet
CoE	Council of Europe
CMRs	Carcinogens, mutagens or reprotoxins
EDI	Federal Department of Home Affairs, Switzerland
EU	European Union
EuPIA	European Printing Ink Association
FDA	United States Food and Drug Administration
PET	Polyethylene terephthalate, a semi-rigid plastic used for e.g. soft drinks packaging
SML	Specific Migration Limit

