

5.1 Categories of food packaging and their migration risk

5.1.1 Categories *with* migration risk

The following table gives a **non-exhaustive** overview on the major packaging categories with risk of migration, set-off and/or organoleptic deterioration, as well as recommendations with regard to the selection of ink types and validation measures by the printer.

In case of packaging with an identified migration risk, only inks and varnishes explicitly intended for NPH packaging applications should be used.

Special attention must be paid to applications subject to high temperature exposure, such as pasteurization, sterilization (dry or in an autoclave), microwave or baking oven. To prevent migration of cleavage products from certain yellow, orange or red pigments, selection of special ink shades, based on appropriate high-performance pigments, may be required. This applies especially if the packed food will be subject to more than 200°C in a microwave (e.g. presence of

a susceptor foil) or baking oven; equally a particular choice of alternatives is necessary if food is to be boiled, pasteurized, sterilized, or cooked in a microwave or baking oven, and is packed in structures which do not provide a functional barrier to migration.

A printer should additionally use the checklist: “Processes and Parameters which potentially trigger non-compliance [sic] (migration, organoleptic effect)” for verifications (see chapter 6.2.1).

Packaging intended for particularly sensitive consumer groups (such as infants and small children) requires formal qualification in any case.

FLEXIBLE PACKAGING

Application	Sandwich print in laminates or surface print on monofilm WITHOUT the inner layer(s) being a barrier to migration		Thermally treated packed food. Sandwich print in laminates or surface print on monofilm WITHOUT the inner layer(s) being a barrier to migration		Surface print monofilm and liddings WITH the inner layer(s) being a barrier to migration		Sandwich print in laminates WITH the inner layer(s) being a barrier to migration	
Examples	Cheese, meat products, tea bags, confectionery, bakery products, butter wrappers		Ready meals, bakery, pasteurized, sterilized dry or in an autoclave, boil-in-the-bag, microwaveable		Dairy products (aluminum lids)		Meat products, ready meals, soups, spices, coffee, tea, preserved food, packed in laminates with aluminum foil	
Potential migration risk of the packaging structure	Yes, migration both via diffusion across the layers and via set-off.		Yes, migration both via diffusion across the layers and via set-off. Migration can be enhanced by temperature, pressure and water/steam distillation.		Yes, migration via set-off to high absorbance layer (heat-seal varnish, PE ...).		Yes, migration via outer layer(s) and set-off.	
About inks for this application	Solvent-based and water-based Only products intended for NPH packaging.	UV curing Only products intended for NPH packaging ("migration optimized") No UV curing products for small packaging for food for infants and small children.	Solvent-based and water-based Only products intended for NPH packaging.	Solvent-based and water-based Only products intended for NPH packaging.	UV curing Only products intended for NPH packaging ("migration optimized") No UV curing products for small packaging for food for infants and small children.	Solvent-based and water-based Only products intended for NPH packaging.		
Measures recommended to the printer	Calculate migration of actual combination of products on specific packaging using Siegwark Statements of Composition. Consider qualification via migration testing order upon previous Siegwark disclosure to intended lab.		Formal qualification via migration testing order upon previous Siegwark disclosure to intended lab.		Calculate migration of actual combination of products on specific packaging using Siegwark Statements of Composition. Consider qualification via migration testing order upon previous Siegwark disclosure to intended lab. Observe chapter 6.2.1		Calculate migration of actual combination of products on specific packaging using Siegwark Statements of Composition.	

PAPER & BOARD PACKAGING

Application	Rigid packaging, tags, trays WITHOUT the inner layer(s) being a barrier to migration			Rigid packaging WITHOUT the inner layer(s) being a barrier to migration			Paper packaging WITHOUT the inner layer(s) being a barrier to migration		
Examples	Folding carton (with or without PE or varnish coating) for fast food, frozen food, confectionery, bakery, dry pasta, rice, sugar, cereals, vegetables, fruits, tea tags.	Some use for ready meals for microwave and baking oven.	Corrugated board boxes for pizza, fast food, bakery.	Folding carton with dry food (cereals) in PE, PP or paper bag inside the box, with air room between the two packages.			Paper bags for bakery, confectionery, sugar, flour, fruits, vegetables, wrappers (with or without PE or varnish coating) for fast food cheese, meat. <i>Some use for microwave.</i>		
Potential migration risk of the packaging structure	Yes, migration both via diffusion across the layers, via set-off and gas phase. Migration can be enhanced by <i>temperature and water/steam distillation</i> .			Yes, migration via diffusion & gas phase, or via set-off, diffusion & gas phase			Yes, migration via diffusion & gas phase, or via set-off, diffusion & gas phase. <i>Migration can be enhanced by temperature and exposure to water/steam.</i>		
About inks for this application	UV curing Only products intended for NPH packaging ("migration optimized") UV curing products for thermally treated food (microwave, baking oven) and for small packaging for food for infants and small children	Oleoresinous offset Only products intended for NPH packaging ("migration optimized")	Water-based Only products intended for NPH packaging	UV curing Only products intended for NPH packaging ("migration optimized") UV curing products for small packaging for food for infants and small children	Oleoresinous offset Only products intended for NPH packaging ("migration optimized")	Water-based Only products intended for NPH packaging	Water-based Only products intended for NPH packaging		
Measures recommended to the printer	Formal qualification via migration testing order upon previous Siegwerk disclosure to intended lab.	Calculate migration of actual combination of products on specific packaging using Siegwerk Statements of Composition. Consider qualification via migration testing order upon previous Siegwerk disclosure to intended lab. For microwave and baking oven, observe chapter 6.2.1.	Calculate migration of actual combination of products on specific packaging using Siegwerk Statements of Composition. Consider qualification via migration testing order upon previous Siegwerk disclosure to intended lab. For microwave and baking oven, observe chapter 6.2.1.	Calculate migration of actual combination of products on specific packaging using Siegwerk Statements of Composition. Consider qualification via migration testing order upon previous Siegwerk disclosure to intended lab. Observe chapter 6.2.1.	Calculate migration of actual combination of products on specific packaging using Siegwerk Statements of Composition. Consider qualification via migration testing order upon previous Siegwerk disclosure to intended lab.	Calculate migration of actual combination of products on specific packaging using Siegwerk Statements of Composition. Consider qualification via migration testing order upon previous Siegwerk disclosure to intended lab.	Calculate migration of actual combination of products on specific packaging using Siegwerk Statements of Composition. Consider qualification via migration testing order upon previous Siegwerk disclosure to intended lab. For microwave and baking oven, observe chapter 6.2.1.		

RIGID LIQUID FOOD PACKAGING

Application	PE-coated board packaging WITH or WITHOUT the inner layer(s) being a barrier to migration
Examples	Milk and fruit juice cartons, sauces, soups
Potential migration risk of the packaging structure	Yes, migration via diffusion and/or set-off to high absorbance PE layer
About inks for this application	Water-based, solvent-based, UV curing, electron beam curing Only products intended for NPH packaging (UV: "migration optimized"). By default, no UV curing products for small packaging for food for infants and small children.
Measures recommended to the printer	Calculate migration of actual combination of products on specific packaging using Siegwark Statements of Composition. Formal qualification via migration testing order upon previous Siegwark disclosure to intended lab.

SELF-ADHESIVE LABELS, CUPS, TAGS, SLEEVES, TUBES

Application	In-mold labels (IML) for cups, tubs, trays WITH or WITHOUT the inner layer(s) being a barrier to migration	Sleeves or glued or pressure-sensitive adhesive (PSA) labels, laminated or not laminated, for cups, tubs, trays
Examples	Dairy products, sauces	Dairy products, sauces
Potential migration risk of the packaging structure	Yes, migration via diffusion and set-off. Label will be melted on the container and become a primary food packaging which is stacked before filling	Yes, migration via diffusion and set-off. Sleeve or label will be applied onto the container and become a primary food packaging which is stacked before filling
About inks for this application	UV curing, oleoresinous offset, water-based overcoatings Only products intended for NPH packaging ("migration optimized").	UV curing Only products intended for NPH packaging ("migration optimized").
Measures recommended to the printer	Formal qualification via migration testing order upon previous Siegwark disclosure to intended lab.	Formal qualification via migration testing order upon previous Siegwark disclosure to intended lab.

SELF-ADHESIVE LABELS, CUPS, TAGS, SLEEVES, TUBES

Application	Glued or PSA labels for primary packaging and lidding	Shrink sleeves on PET bottles	Shrink sleeves on PE/PP/OP bottles	Tubes, cups	
Examples	Labels applied on filling line to preformed and filled packaging of all types of food.	Soda, mineral water.	Dairy food, fruit drinks.	Mayonnaise, mustard, dairy products.	
Potential migration risk of the packaging structure	Yes, depending on barrier properties to migration of the primary packaging: migration via diffusion (set-off not possible).	Minor, studies show that PET is quite a barrier to migration from printed layers.	Yes, migration via diffusion across PE/PP/OPS is possible.	Yes, depending on point in time of tube formation and on presence of barrier: migration via diffusion and/or set-off.	
About inks for this application	UV curing Products intended for NPH packaging ("migration optimized") highly recommended. In any case, odor optimized products recommended.	Water-based, solvent-based Products intended for NPH packaging recommended.	UV curing (cationic UV flexo, radical UV offset and flexo) Products intended for NPH packaging ("migration optimized") highly recommended. In any case, odor optimized products necessary.	UV curing Only products intended for NPH packaging ("migration optimized").	UV curing Only products intended for NPH packaging ("migration optimized").
Measures recommended to the printer	Individual case to be assessed. In any case, consider formal qualification via migration testing order upon previous Siegwerk disclosure to intended lab. Sensorial issues to be considered.	Individual case to be assessed. Consider calculating migration of actual combination of products on specific packaging using Siegwerk Statements of Composition.	Individual case to be assessed. In any case, consider formal qualification via migration testing order upon previous Siegwerk disclosure to intended lab. Sensorial issues to be considered.	Formal qualification via migration testing order upon previous Siegwerk disclosure to intended lab.	Formal qualification via migration testing order upon previous Siegwerk disclosure to intended lab.

5.1.2 Categories *without* migration risk

In cases where the converter can avoid set-off and can prove the existence of an efficient functional barrier, inks and varnishes not intended for NPH packaging may be used. This may also

apply to certain labels or sleeves applied to non-packed vegetables, fruits or equivalent foodstuffs which are peeled by the consumer before eating, thus potential migrants in the peel are eliminated. The following table provides some examples:

	PAPER & BOARD PACKAGING	SELF-ADHESIVE LABELS, SLEEVES	
Application	Rigid packaging <i>WITH the inner wrap being a barrier to migration</i>	PSA labels for primary packaging and lidding <i>WITH the inner wrap or the lidding being a barrier to migration</i>	Shrink sleeves on glass bottles
Examples	Cereal in a laminate OPP/aluminum foil/PE bag inside the box.	Labels applied on filling line to pre-formed and filled packaging/lidding with aluminum foil layer, i.e. labeled ready meal packs or aluminum tubs.	Soda, mineral water, alcoholic beverages.
Potential migration risk of the packaging structure	No. Food is completely tight-sealed against migrants coming through the air room between the two packages.	No. Aluminum foil prevents diffusion migration, and set-off is not possible ¹³ .	No. Glass is by default a recognized functional barrier.
About inks for this application	UV Curing, oleoresinous offset, water-based <i>In any case, odor optimized products necessary.</i>	UV Curing, oleoresinous offset, water-based <i>In any case, odor optimized products necessary.</i>	UV curing (cationic UV flexo, radical UV offset and flexo) <i>In any case, odor optimized products necessary.</i>
Measures recommended to the printer	If the layer eligible for being a functional barrier is not aluminum foil (i. e. vacuum deposited aluminum on PET is not necessarily a barrier): formal qualification via migration testing order upon previous Siegwirk disclosure to intended lab. Sensorial issues to be considered.	Sensorial issues to be considered.	Sensorial issues to be considered.

¹³Impossibility of migration may also apply to labels or sleeves applied to non-packed vegetables, fruits or equivalent foodstuffs which are peeled by the consumer before eating, thus potential migrants in the peel are eliminated.