Food Packaging Product Stewardship Considerations:

I. Background/Introduction

This document was created to provide a guideline to suppliers of food packaging. This is a voluntary set of considerations that a supplier or food producer is welcome to use (in whole or part) as a roadmap for awareness on quality issues and minimizing or eliminating chemicals of concern from food packaging. This document may go beyond regulatory requirements. This document is an output of a food brand owners' working group to harmonize many different lists of chemicals of concern and quality considerations. The working group members are a part of the Food Safety Alliance for Packaging (FSAP), a technical committee of the Institute of Packaging Professionals (IoPP).

This non-binding list can be used as a best practice for the formulation of food packaging for consumer products. The listed items are grouped by packaging part and substances. The considerations are as follows:

1. Should not use intentionally (where suitable alternative exist): Listed items should be replaced where a safe and technically suitable alternative exists.
2. Minimize Use: should use as much as necessary to achieve a technical effect, but no more.

II. Criteria for Listing

The substances comprising the attached list are selected based on one or more of the following criteria:

1. Local, state, federal, regional, or international regulatory requirements
2. Food and consumer safety considerations
3. Environmental protection
4. Negative impact on product quality
5. Consumer and retailer interest

Inclusion of an item on the list does not indicate that the members of the working group consider said item to pose a risk to food safety or public health.

III. Process for addition and removal of items from the list

The working group will review and update the list periodically. If any items are determined to need revision, their entry will be updated. Additionally, the list will be compared against any regulatory changes and/or industry understanding of unlisted items to then make additions or deletions as deemed necessary.

IV. Important Notes

- Applicable regulations must be followed in order to support the intended conditions of use for any food contact material.
- More extensive risk assessments should be considered for special package types, including but not limited to: baby food packaging, thermally processed packaging, and microwaveable/ovenable packaging.
- Additional requirements may be necessary to fulfill the standards of a given food manufacturer or customer.

Food Packaging Product Stewardship Considerations:

- Legal requirements must first be followed for food contact materials, then the below best practices can be considered.

- The below considerations in many cases go beyond regulations, if there is a conflict, regulations must be followed. Packaging applications, which have a higher risk due to use (e.g. ovenable/microwavable, etc) or sensitive target consumer (e.g. infant/toddler food, etc), should have additional safety assessments and possibly more stringent requirements to be considered when developing.

Packaging part/component	Substance(s) / Topic(s)	Description	Should not use intentionally (where suitable alternatives exist)	Minimize Use	Additional Information/ references
Any packaging component	- *ortho*-Phthalates (aka Phthalates) (non-exhaustive list given below)	- Phthalates should not be used as plasticisers and additives in packaging materials including inks, adhesives, plastics, etc., where suitable alternatives exist.	X		Prop65, SVHC, Consumer interest
	Di-(2-ethylhexyl)phthalate (117-81-7)	Di-*n*-propyl phthalate (131-16-8)			
	Diisodecylphtalate (26761-40-0)	Dicyclohexyl phthalate (84-61-7)			
	Dibutylphthalate (84-74-2)	Diethyl phthalate (84-66-2)			
	Diisononylphtalate (28553-12-0)	Diisobutyl phthalate (84-69-5)			
	Diisooctylphtalate (27554-26-3)	Diisodecyl phthalate (68515-49-1)			
	Diisobutyl phthalate (84-69-5)	Diisoheptyl phthalate (41451-28-9)			
	Diethyl phthalate (84-66-2)	Diisohexyl phthalate (146-50-9)			
	Benzyl butyl phthalate (85-68-7)	Dimethyl phthalate (131-11-3)			
	Di(*n*-octyl) phthalate (117-84-0)	*n*-Octyl *n*-decyl phthalate (119-07-3)			
	Di-*n*-hexyl phthalate (84-75-3)	Di-*n*-pentyl phthalate (131-18-0)			
Any Packaging components	- Heavy Metals: Cadmium, Chromium VI, Lead, Mercury	- Must not be intentionally used in packaging materials, including inks and pigments/colorants.			Follow CONEG/ TPCH regulations
Any Packaging Component	- SVHC (Substances of Very High Concern) (lists available from ECHA website)	- Applicable to products for sale in Europe, must comply with regulation - see below *REACH comment and links			Follow regulation where applicable
Any Packaging Component	- California Proposition 65	- Applicable to products for sale in California, must comply with regulation - e.g. well below communication limits (MADL, NSRL) or absence.			Follow regulation where applicable
Can coatings and Plastic resins (e.g. polycarbonate) containing Bisphenol A	Bisphenol A (BPA, 80-05-7)	- Bisphenol A based materials should not be used where suitable alternatives exist.	X		Prop65, SVHC, Consumer interest
Grease-proof coated paper and board	Perfluoro and polyfluoro compounds:				
	- C8 and higher (PFOA and related)	- Must not be used.	X		Not allowed by US-FDA
	- C6 polyfluoro, C2 perfluoro ethers and other polyfluoro and perfluoro compounds	- Can be used but consider alternatives if available.		X	Consumer interest

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Packaging part/component	Substance(s) / Topic(s)	Description	Should not use intentionally (where suitable alternatives exist)	Minimize Use	Additional Information/ references
Latex in cold seal	- Natural rubber latex	- Should only be used when applied to sealing areas; i.e. contact with food should be avoided.		X	Allergen risk. Only as allowed by regulations.
Polyethylene terephthalate (PET) films and rigid structures	- Antimony based catalysts in PET resin especially when used in High Temperature Applications	- As low as possible with a target maximum: 300 mg/kg (expressed as Sb) or lower if regulations are more stringent.		X	Consumer interest
Polystyrene (PS) films and rigid structures	- Styrene (100-42-5) - Polystyrene	-Target maximum 400 mg/kg in PS resin or lower if local regulations are more stringent. - Must not be used in oven and microwave applications.	X	X	Should be below regulatory and sensory threshold; CA Prop65 has 27µg/day styrene limit
Outer Printing Surface	- Printing Inks	- Must follow local regulations where they exist. Consider following Swiss Inks Ordinance and Guidance Note on Packaging Inks published by Nestlé			Swiss Inks Ordinance -see links below
Paper & board	- Recycled paper /solid board and Recycled corrugated board	- Can be considered for use for sustainability reasons based on conditions of use and an evaluation of supplier provided testing results using the RPTA protocol (see link below) or similar.			Consumer interest and Quality consideration
	- Recycled Solid board: Mineral Oil Hydrocarbons (MOH) (C16 to C24)	- As low as possible with target average level of 600±150 mg/kg MOH in the unprinted solid board		X	Quality consideration
	- SB-Latex binders in clay-coating of paperboard	- Use caution with energy cured application to ensure structure does not have a risk of off-odor. SB latex can cause odor issues with energy cured printing inks/ coatings/ varnishes.			Quality consideration for off-odors
Recycled plastics	- Recycled plastic (post-consumer)	- Can be considered for use for sustainability reasons based on conditions of use and meeting specific regulatory requirements for direct food contact (see link below to FDA database)			Consumer interest and specific regulatory requirements (e.g. US-FDA LNO listing)
Wooden Pallets	Bromo- and chloro- phenol chemical treatments as wood preservatives	Should not be used for wooden shipping pallets of food packaging due to high risk of off-odour and tainting.	X		Quality considersation as source of off-odor

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Packaging part/component	Substance(s) / Topic(s)	Description	Should not use intentionally (where suitable alternatives exist)	Minimize Use	Additional Information/ references
Residual printing solvents** for substrates with migration potential	- Total amount	- Maximum 20 mg/m^2 material or lower if local regulations are more stringent.		x	Quality consideration for source of off-odors and/or solvent contamination
	- Total amount of combined ketones and acetates	- Maximum 7 mg/m^2 material or lower if local regulations are more stringent.		x	Quality consideration for source of off-odors and/or solvent contamination
	- Toluene (108-88-3)	- Should not be intentionally used as solvent in ink formulation.	X		Quality consideration for source of off-odors and/or solvent contamination
Shrink sleeves on Glass containers	Full length plastic shrink sleeves (that cover the body and neck of the container) (Not applicable for carbonated beverages)	- Should not be used for glass containers of products that are spoon-fed or drunk directly from the bottle or jar.	X		Quality risk for broken glass into the food

Other materials	Recommended testing	Additional Information
Packaging materials where routine odor testing required	Results are acceptable according to Sniff Test, ISO-13302 standard	Quality consideration for off-odor
Packaging materials used for ovenable, microwaveable, cook-in bag, reheatable food product	Should demonstrate fit for use via extraction testing (e.g. from testing results, if applicable)	Only as allowed by regulations.

Link to Swiss Inks Ordinance - Annex 6

Link to Swiss Inks Ordinance - Annex 10 (transition date 04.2021)

*REACH: It is the responsibility of each company to evaluate if products fall under communication and notification obligations: 1) If above 0.1% (w/w), provide sufficient information to allow safe use of the article; 2) notify ECHA, if applicable

Link to SVHC candidate list obligations

Link to Substances of High Concern (SVHC) listing

Link to California Proposition 65 list of chemicals

Functional barriers are defined as one or more layers of food contact materials which ensure that substances of concern do not migrate into the food above levels of concern during the shelf-life and intended use of the product.

Note: Set-off migration is not prevented by functional barriers and should be evaluated for all packaging materials which are in stack or reel format during or after its conversion. Employ GMP to minimize.

Link to RPTA Protocol: http://www.rpta.org/recycled/Final_Comprehensive_Program_and_Protocol.pdf

Link to FDA Recycled Plastics database: https://www.accessdata.fda.gov/scripts/fdcc/?set=RecycledPlastics

Residual solvents of cured printing can involve many solvents. The below list has solvents which can be monitored to check levels in food packaging. Residual solvents standards are available commercially from Sigma Aldrich group. Two standard stock solutions are available from the following link:

http://www.sigmaaldrich.com/catalog/product/supelco/48994u?lang=en&region=US

http://www.sigmaaldrich.com/catalog/product/supelco/48995u?lang=en&region=US

and two additional standards from Supelco Analytical (+1 814-359-3441):

RSOL Stock Std Solution – Quote No. 21845020 and Quote No. 21845021

The standards include the following solvents:

List of Solvents	**Type of chemical**	CAS Number
ethyl acetate	acetate	141-78-6
ethyl cellosolve acetate	acetate	111-15-9
isobutyl acetate	acetate	110-19-0
isopropyl acetate	acetate	108-21-4
methyl acetate	acetate	79-20-9
methyl cellosolve acetate	acetate	110-49-6
n-butyl acetate	acetate	123-86-4
n-propyl acetate	acetate	109-60-4
1-methoxy-2-propanol	alcohol	107-98-2
1-propanol	alcohol	71-23-8
2-butanol	alcohol	78-92-2
2-ethoxy ethanol	alcohol	110-80-5
2-methoxyethanol	alcohol	109-86-4
2-propanol	alcohol	67-63-0
butanol	alcohol	71-36-3
ethanol	alcohol	64-17-5
isobutanol	alcohol	78-83-1
methanol	alcohol	67-56-1
benzaldehyde	aldehyde	100-52-7
ethylene glycol butyl ether	ether	111-76-2
propylene glycol butyl ether	ether	5131-66-8
cyclohexane	hydrocarbon	110-82-7
benzene	hydrocarbon (aromatic)	71-43-2
ethylbenzene	hydrocarbon (aromatic)	100-41-4
m,p-xylene (mixture)	hydrocarbon (aromatic)	m: 108-38-3 ; p: 106-42-3
o-xylene	hydrocarbon (aromatic)	95-47-6
styrene	hydrocarbon (aromatic)	100-42-5
tetrahydrofuran	hydrocarbon (aromatic)	109-99-9
toluene	hydrocarbon (aromatic)	108-88-3

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List of Solvents (continued)	Type of chemical	CAS Number
trichloroethylene	hydrocarbon (chlorinated)	79-01-6
2-butanone	ketone	78-93-3
acetone	ketone	67-64-1
cyclohexanone	ketone	108-94-1
methyl isobutyl ketone	ketone	108-10-1