SunPak® FSP

1. Description

SunPak FSP is a series of low migration* sheetfed offset process and base inks for sensitive (food and tobacco) packaging.

2. Product features

SunPak FSP inks:

- allow the production of food packaging with excellent organoleptic (low odour*, taint*, hexanal*) properties as well as safe migration levels far below the global migration limit of 60mg per 1 kg food (60ppm)
- are based on “triglycerides” which are evaluated as non-toxic for the human body. There are no restrictions for the daily intake. Consequently the European Food Safety Authority does not assign a Specific Migration Limit. In addition these oils are an allowed food additive and listed in FDA (21CFR175.300)
- allow the production of food packaging compliant with relevant requirements, like the Framework Regulation (EC) No 1935/2004, the Good Manufacturing Practice Regulation (EC) No 2023/2006 and their connected ordinances
- are vegetable based and mineral oil free
- are available as a 4 process colour ink set plus a set of 17 base inks for spot colour mixing
- complies with the ISO 2846-1 (colour standard) and allows printing in accordance to ISO 12647-2
- do not dry by oxidation
- are roller fresh

*See glossary at the end of this document

3. Product Suitability

3.1 Applications

The main application of SunPak FSP inks is low odour or low migration packaging (folding cartons, wrappers, etc.) for the food, cosmetic, pharmaceutical or tobacco industry.
Preferred press configurations are straight 4+ colour sheetfed offset presses of all makes and sizes with a unit for aqueous coatings.

Printers should assure themselves that the use of this product on food packaging has been fully assessed for risk and that the packaging produced meets regulatory requirements for the intended use.

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Whilst SunPak FSP inks are versatile in performance, they may not be suitable if used outside the above described applications. If in doubt, please check suitability with your local Sun Chemical representative.

SunPak FSP inks should not be used in the following areas:

- Food packaging where the foodstuff is in direct contact with the printing ink
- Where the application of aqueous coating is not an option.
- Printing on non absorbent substrates (films, foils, metal plates, metallised paper, PE layer of laminated boards, etc.)
- Poster printing

3.2 Substrate

SunPak FSP inks are suitable for the following substrates:

- Single- or double side coated carton board
- Single- or double side coated paper

Please make sure that these substrates comply with the end use requirements (organoleptics, migration).

3.3 Varnishability

Inline overprinting with aqueous coating is mandatory. Please make sure that these coatings comply with the end use requirements (organoleptics, migration).

3.4 Interaction with plastic films

In some cases printed material is wrapped with plastic films (e.g. tobacco or confectionary packaging). Some polymers (like Polyethylene or Polypropylene) tend to absorb liquid ink components resulting in a cloudy appearance of the film or a dimension change, often described as "swelling". SunPak FSP has a significantly reduced potential of solvent migration, however a test under practice condition is advised if film swelling could be an issue.

4. Colour Range

SunPak FSP inks are available as bespoke finished inks.

The process inks comply with ISO2846-1 and allow the printers to deliver jobs compatible with the international standard ISO12647-2.

The following table sums up the light fastnesses and the resistances corresponding to the 4 process colours and the base inks:

PROCESS COLOURS	PRODUCT CODE	LIGHT FASTNESS ISO 12040**	ALCOHOL ISO 2836**	SOLVENT MIXTURE ISO 2836**	ALKALI ISO 2836**
SUNPAK FSP Process Black	**FSP46**	8	+	+	+
SUNPAK FSP Process Cyan	**FSP25**	8	+	+	+
SUNPAK FSP Process Magenta	**FSP27**	5	+	+	-
SUNPAK FSP Process Yellow	**FSP26**	5	+	+	+

** For more information regarding these standards, please contact your local Sun Chemical representative.

BASE INKS	PRODUCT CODE		LIGHT FASTNESS ISO 12040	ALCOHOL ISO 2836	SOLVENT MIXTURE ISO 2836	ALKALI ISO 2836*
SUNPAK FSP Yellow	FSB18	Mid Shade Yellow	5	+	+	+
SUNPAK FSP Orange	FSB21	Orange	5	+	+	+
SUNPAK FSP Red	FSB33	Resistant Warm Red	5	+	-	+
SUNPAK FSP Rubine	FSB42	Red Shade Magenta	5	+	+	-
SUNPAK FSP Rubine	FSB35	Blue Shade Magenta	5	+	+	-
SUNPAK FSP Red	FSB36	Resistant Magenta	6	+	+	+
SUNPAK FSP Carmine	FSB37	Res. Blue Shade Magenta	6	+	+	+
SUNPAK FSP Resistant Pink	FSB54	Resistant Pink	7	+	+	+
SUNPAK FSP Violet	FSB53	Resistant Violet	7	+	+	+
SUNPAK FSP Blue	FSB17	Cyan	8	+	+	+
SUNPAK FSP Reflex Blue	FSB65	Reflex Blue Shade[#]	4	-	-	+
SUNPAK FSP Green	FSB71	Green	8	+	+	+
SUNPAK FSP Black	FSB50	Untoned Black	8	+	+	+
SUNPAK FSP Yellow	FSB11	Green Shade Yellow	7	-	-	+
SUNPAK FSP Blue	FSB63	Resistant Blue	7	+	+	+
SUNPAK FSP Transparent White	FSB48	Transparent White				
SUNPAK FSP Opaque White	FSB45	Opaque White				

[#]This ink is based on so-called Triarylcarbonium pigments. This class of pigments has limited resistances against solvents and alkali and tend to bleeding when over-varnished.
A test under industrial conditions is mandatory to avoid customer complaints.

5. General Handling

5.1 Storage

SunPak FSP inks should be stored at ambient temperature between 5°C and 35°C. Under these conditions SunPak FSP inks have a shelf life of at least 36 months in an unopened vacuum-packed tin. Inks in 200kg drums should be worked off within 6 months after the removal of the lid.

When storing opened containers it is advised not to apply any chemicals (e.g. antioxidants) onto the surface.

5.2 Waste disposal

SunPak FSP ink waste can be handled as any other sheetfed ink waste. This should be carried out in accordance with good industrial practice, observing all the appropriate local, national and regional regulations and guidance.

6. Printing Conditions and press room consumables

All press room consumables could have a negative influence on the organoleptic properties and could be potential migrants. Therefore a careful selection considering these impacts needs to be carried out.

6.1 Fount Solution

Fountain solution additives are available for all water qualities, press types and IPA (alcohol) levels. For achieving best value regarding odour and taint as well as migration the selection of the right fountain solution additive is vital. With regard to fountain solution related press performance other parameters such as water quality and press conditions have to be considered.

6.2 Press auxiliaries

The addition of up to 5% of SunPak LMQ Tack Reducer Gel LMC70 enables printing on difficult cardboards.

6.3 Printing Plates

SunPak FSP can be run with any type of aluminium based printing plates (CtP plates, conventional positive or negative plates).

6.4 Press cleaning

In order to avoid contamination from standard print shop consumables the press should be ideally dedicated to food packaging printing and only run with SunPak FSP inks and press aids appropriate for food packaging. If this is not possible we recommend to thoroughly clean the press in order to extract left over substances from the rollers.

For more specific handling advice refer to the Sun Chemical Best Practice Guide for food packaging printing and the Safety Data Sheet (SDS).

7. End-use safety

All Sun Chemical Europe printing inks and related materials are formulated in accordance with the CEPE/EuPIA Exclusion List. This excludes the use of carcinogenic, mutagenic and toxic for reproduction Category 1 and 2 (CMR1&2) materials according to the Dangerous Substances Directive (67/548/EEC) and the Dangerous Preparations Directive (1999/45/EC) (Category 1A and 1B according to the CLP Regulation (EC) No 1272/2008), as well as materials labelled as toxic (T) or very toxic (T+) (CLP Acute Toxicity Category 1, 2 or 3) and pigment colourants based on and compounds of antimony, arsenic, cadmium, chromium(vi), lead, mercury or selenium.

SunPak FSP also complies with the EuPIA “Guideline on Printing Inks applied to the non-food Contact Surface of Food Packaging Materials and Articles”, the EuPIA “Good Manufacturing Practices for the Production of Packaging Inks formulated for use on the non-food-contact surfaces of food packaging and articles intended to come into contact with food” which is in compliance with the European Regulation (EC) No 2023/2006. Copies of these documents are available on the EuPIA (website: http://www.eupia.org).

“Statements of Composition” are available on request for SunPak FSP for further details.

All components of SunPak FSP are listed in Annex 6 of the Swiss Ordinance on Materials and Articles in Contact with Food (SR 817.023.21).

SunPak FSP inks allow packaging to be produced which meets the requirements of the Packaging and Packaging Waste Directive (94/62/EC) and the CONEG heavy metal limits.

SunPak FSP inks do not contain chemical catalysts based on Cobalt (Co), Manganese (Mn) or other metal catalysts.

SunPak FSP can be used to print packaging which meets the requirements of EN71-3 (toy standard).

8. Regulations

The SunPak FSP ink range is only suitable for use on the non-food-contact side of food packaging provided that they are applied under the relevant Good Manufacturing Practices (GMP) and according to the recommendations of this Technical Data Sheet.
The printer, converter and the packer or filler entity have the legal responsibility to ensure that the finished article is fit for the intended purpose and that the ink and coating components do not migrate into the food at levels that exceed legal and industry requirements as outlined in the EU Framework Regulation (EC) No 1935/2004, the GMP Regulation (EC) No 2023/2006 and the Swiss Ordinance on Materials and Articles in Contact with Food (SR 817.023.21). We recommend that the finished packaging is tested under appropriate representative conditions of use if there are any doubts regarding compliance.

9. Technical Glossary

Aldehydes are a family of chemical compounds, as pentanal, hexanal, heptanal and octanal. They can easily be quantified by means of analytical chemistry such as gas chromatography (GC).

GC separates mixtures of chemical compounds and indicates their concentration. Subsequent in-line analysis, e.g. mass spectrometry (MS), identifies every compound. There is no international standard for the determination of aldehydes in prints. Laboratories who wish to compare their results with other partners have to agree on specific details of the test procedure.

Hexanal is an odorous compound which is created by oxidative decomposition of vegetable oils, common in sheetfed offset inks. SunPak FSP inks do not undergo such a chemical reaction with oxygen.

Migration is the (unwanted) transfer of substances from the packaging or its components (printing ink, substrate, varnish etc) into the packaged product (e.g. foodstuff). Solvents used in oxidative drying sheetfed offset inks (mineral or vegetable oils) may show a significant migration potential. Migration is assessed by appropriate test methods and can occur whilst the organoleptic properties maintain unaffected.

Odour/taint can be assessed in organoleptic tests, as EN 1230-1 (odour) and EN 1230-2 (taint).

Oxidation is a chemical reaction with oxygen, often initiated by a drying catalyst. By-products of this chemical reaction are aldehydes and other odorous compounds. Unlike oxidative drying sheetfed offset inks, SunPak FSP inks do not contain oxidative drying materials or a drying catalyst.

The use of printing inks and coatings for **oven or microwave applications** is critical for 3 reasons:

1. Printed carton board packaging exposed to heat is supposed to release volatile compounds which are constitutional parts of the substrate, the printing ink or the overprint varnish. SunPak FSP is not based on volatile chemicals and represents the technically optimum solution regarding migration even under elevated temperature conditions.

2. Chemical compounds may decompose under the influence of heat. This is obvious when the substrate or the printing ink begin to discolour, which is standard under oven temperature. Further to this, decomposition may happen without being visually noticed. Thus, the following SunPak FSP products shall never be used for these applications: metallics, FSB26, FSB11, FSB18, FSB21 and FSB33. For 4c process printing, Process Yellow FSP26 can roughly be matched by a blend of 99.4% LMB08 plus 0.6% LMB54.

3. The surface of inks and coatings will soften at oven temperatures. This may result in set-off when being touched by the consumer. Although this is not harmful, it might be negatively recognised.

4. There have been a small number of reported instances of a potential fire hazard when packaging printed with a printing ink based on carbon black pigment are heated in a microwave oven. Although these incidents appear to be rare, they have not been the subject of definitive technical evaluation. Consequently, Sun Chemical advises that products printed with carbon black containing inks, FSP46 and FSB50 or blends out of either product, intended for microwave applications be assessed under appropriate conditions to ensure they are fit for that purpose. If necessary, a trichromatic black blend can be used in place of a carbon black based ink.

10. Technical Assistance / Contacts

For further information, please contact your local Sun Chemical team or visit our website on www.sunchemical.com

SunPak® is a registered trademark of Sun Chemical Corporation

Appendix

SPOT COLOUR MANAGEMENT

For optimum colour consistency it is recommend to use precise proofing equipment and a colour computer. For SunPak FSP users Sun Chemical provide colour data bases for effective colour matching. They are available for various substrates as coated and uncoated papers and for cardboards.

Depending on their colour (whiteness) and on the oil-absorbency one and the same spot colour ink might look differently when being printed on various substrates. Further to this it must be noted that most colours change during the drying process of the ink. If the print is in-line varnished this effect is minimised. These effects must be respected if a precise colour specification is agreed.

Dark colours and those of high colour strength often show the so-called bronzing effect which is a colour impression varying with the observation angle. This is not a product failure and influenced by the surface of the substrate. In-line coating or foil lamination eliminates the bronzing effect.

If (proof) prints are not over coated, the level of gloss, which is substrate depending, will have an impact on the reading of spectrophotometers.

The human eye and spectrophotometers assess bronzing and gloss differently. The make of spectrophotometers, in particular the geometry and the software used, respect gloss and bronzing in the calculation of the colour data in a different way. Therefore, specifying colour data must always include the substrate, the conditions of proof printing, the use of an overprint coating (or not) and the time between printing and assessment.

FASTNESS AND RESISTANCE REQUIREMENTS

During its lifetime, a print might change its colour. Light fastness and resistance parameters describe the ability of the print to maintain the colour under the conditions of its application. The product table (see page 4 of this document) contains the parameters evaluated using test methods agreed in international standards.

The parameters of the pure base inks are unlike to those of a blended spot colour. As a general rule, it is the base ink with the lowest resistance that defines the overall fastness/resistance value. Higher pigmented inks are usually more persistent, the resistance is reduced the more the strength of the shade is reduced. Resistance levels can also vary in practice caused by a number of factors as pigment compositions, substrate, colour strength, film weight used, the printed picture (solids, screened half-tones), storage conditions, exposure time etc.

LIGHT FASTNESS

Light fastness is important where prints are exposed to sunlight. Inks for outdoor poster application should reach at least a light fastness of WS 6 (and should be alkali resistant because of the potential use of alkaline glue).

The light fastness for inks for packaging varies with the intended use. Packaging which are supposed to be stored closed to a window should have a light fastness of not lower than WS 5.

CHEMICAL RESISTANCIES

Resistance properties play a role when the prints are processed (coating, foil-laminating) or the prints are exposed to chemicals, as detergents. Water-based overprint varnishes may contain solvents or high percentage of ammonia, which can require the resistance against alkaline and alcohol. A test under practice conditions is advised.

UV coatings contain monomers which might have an impact on the print. Often alkaline, alcohol and solvent resistance are demanded. Again, a test under practice conditions is recommended.