

# SunPak<sup>®</sup> LMQ

## 1. Description

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

## 2. Product features

SunPak LMQ 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 1kg food (60ppm)
- 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 mineral oil free
- are available as a 4 process colour ink set plus a set of base inks for spot colour mixing
- process colours comply with ISO 2846-1 (colour standard) and allow printing in accordance to ISO 12647-2
- do not dry by oxidation
- does not contain drying catalysts based on heavy metals such as cobalt and manganese
- are roller fresh

\*See glossary at the end of this document

## 3. Product Suitability

### 3.1 Applications

The main application of SunPak LMQ inks is low odour and 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.

Whilst SunPak LMQ 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 LMQ inks should not be used in the following areas:

- 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

SunPak LMQ inks are not designed for direct food contact (physical contact between ink and food). In case of questions an individual risk assessment is mandatory.

### 3.2 Substrate

SunPak LMQ 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).

LMB11, LMB33, LMP27, LMB35 and LMB42 are not resistant to either alcohol or alkali. Since the testing agents specified in ISO 2836 are more severe than solvent-free aqueous coatings, problems linked to the use of the aforesaid bases are not expected.

LMB65 is based on so-called Triarylcarbonium pigments. This class of pigments has very limited resistances against alcohol and solvents and tend to bleeding when being over-varnished. A test under industrial conditions is absolutely mandatory to avoid customer complaints. Wherever possible, LMB65 should be replaced by other LMB bases.

### 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". The potential of solvent migration of SunPak LMQ is reduced to a minimum, however a test under industrial condition is advised if film swelling could be an issue.



### 3.5 Hot Foil stamping

The adhesion between the different layers carton board, ink, varnish, lamination foil is essential for the final result. Therefore for hot foil stamping applications a waiting time of minimum 48 hours is requested. A suitable combination of water based coating and foil is mandatory for the application of hot foil stamping.

## 4. Colour Range

SunPak LMQ inks are available as bespoke finished inks.

The following table sums up the light fastness (ISO 12040) and the resistancies (ISO2836) corresponding to the 4 process colours and the base inks:

(see table next page)



PROCESS COLOURS	PRODUCT CODE		LIGHT ISO12040	ALCOHOL ISO2836	SOLVENT ISO2836	ALKALI ISO2836
SUNPAK LMQ Process Black	<b>LMP46</b>	Toned Black	8	+	+	+
SUNPAK LMQ Process Cyan	<b>LMP25</b>	Standard Cyan	8	+	+	+
SUNPAK LMQ Process Magenta	<b>LMP27</b>	Standard Magenta <sup>#</sup>	5	+	+	-
SUNPAK LMQ Process Yellow	<b>LMP26</b>	Standard Yellow	5	+	+	+
SUNPAK LMQ Process Yellow G/S	<b>LMP41</b>	Green shade Yellow	5	+	+	+
<b>BASE INKS</b>						
SUNPAK LMQ Yellow	<b>LMB11</b>	Green shade yellow <sup>#</sup>	7	-	-	+
SUNPAK LMQ Yellow	<b>LMB18</b>	Mid shade yellow	5	+	+	+
SUNPAK LMQ DAF Yellow	<b>LMB08</b>	Di-arylide free Yellow	6	+	+	+
SUNPAK LMQ Warm Yellow	<b>LMB19</b>	Warm shade Yellow	6	+	+	+
SUNPAK LMQ Orange	<b>LMB21</b>	Orange	5	+	+	+
SUNPAK LMQ Red	<b>LMB33</b>	Resistant warm red <sup>#</sup>	5	-	-	+
SUNPAK LMQ Rubine	<b>LMB35</b>	Blue shade Magenta <sup>#</sup>	5	+	+	-
SUNPAK LMQ Carmine	<b>LMB37</b>	Resistant blue shade Mag.	6	+	+	+
SUNPAK LMQ Rubine	<b>LMB42</b>	Red shade Magenta	5	+	+	-
SUNPAK LMQ Red	<b>LMB36</b>	Resistant Magenta <sup>#</sup>	6	+	+	+
SUNPAK LMQ Resistant Pink	<b>LMB54</b>	Resistant Pink	7	+	+	+
SUNPAK LMQ Violet	<b>LMB53</b>	Resistant Violet	7	+	+	+
SUNPAK LMQ Reflex Blue	<b>LMB65</b>	Reflex Blue Shade <sup>#</sup>	4	-	-	+
SUNPAK LMQ Blue	<b>LMB17</b>	Cyan	8	+	+	+
SUNPAK LMQ Green	<b>LMB71</b>	Green	8	+	+	+
SUNPAK LMQ Blue	<b>LMB63</b>	Resistant Blue	7	+	+	+
SUNPAK LMQ Black	<b>LMB50</b>	Untoned Black	8	+	+	+
SUNPAK LMQ Concentrated Black	<b>LMB74</b>	Untoned Black	8	+	+	+
SUNPAK LMQ Transparent White	<b>LMB48</b>	Transparent White				
SUNPAK LMQ Opaque White	<b>LMB45</b>	Opaque White				

<sup>#</sup>See chapter 3.3 Varnishability



METALLIC INKS	PRODUCT CODE
SUNPAK LMQ Pale Gold	MT521
SUNPAK LMQ Rich Pale Gold	MT522
SUNPAK LMQ Rich Gold	MT523
SUNPAK LMQ Premium Silver	MT511
SUNPAK LMQ Varnish untoned	MT591
SUNPAK LMQ Varnish toned	MT592

### Preparation / Additives

SunPak LMQ Metallics are supplied as a 2 pack system (vac pac tins). It is recommended to mix the two components directly before printing. The mixing ratios are:

Gold                      Bronze : Varnish = 1 : 1  
 Depend on the substrate the ratio can be raised up to 6 : 4

Silver                     Bronze : Varnish = 3 : 7

The addition of any other additives is not advised. Please note that mixed ink will deteriorate by time concerning organoleptic properties. Therefore, the storage of (mixed) finished inks should be limited to 2 weeks maximum. Press returns have to be disposed.



## 5. General Handling

### 5.1 Storage

SunPak LMQ inks should be stored at ambient temperature between 5°C and 35°C. Under these conditions SunPak LMQ 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.

SunPak LMQ bronze pastes have a shelf live of 12 month after production.

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

### 5.2 Waste disposal

SunPak LMQ 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. Usage conditions

When storing SunPak LMQ at low temperatures the surface might appear matt which has no impact on technical properties. This matt appearance will disappear at room temperature. However we strongly recommend storing 2.5kg vacpac tins for 24h at print shop conditions prior to use. 200kg drums should be conditioned for 96h dependent on the transportation temperature.

### 6.2 Fount Solution

Fountain solution additives are available for all water qualities, press types and IPA (alcohol) levels. For achieving best values 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.

### 6.3 Press auxiliaries

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



## 6.4 Printing Plates

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

## 6.5 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 LMQ inks and press aids appropriate for food packaging. If this is not possible we recommend to clean thoroughly the press in order to extract absorbed 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 Policy. This excludes from use all materials classified according to the CLP Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures as carcinogenic, mutagenic or toxic for reproduction in categories 1A or 1B with hazard statements H340, H350 or H360, in addition to toxic or highly toxic materials with hazard statements H300, H301, H310, H311, H330, H331, H370 or H372. None of the raw materials used in inks supplied intentionally contain the heavy metals Antimony, Arsenic, Cadmium, Chromium (VI), Lead, Mercury, Selenium. A copy of the document is available on the EuPIA website: <http://www.eupia.org>

SunPak LMQ 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 – Printing inks for food packaging material” 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>.

A “Statement of Composition” is available on request for SunPak LMQ for further details.

SunPak LMQ is produced in a dedicated printing ink plant avoiding cross-contamination to an utmost degree. In this plant, various HACCP principles are realised to provide maximum working hygiene possible.



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

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

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

## 8. Regulations

The SunPak LMQ ink range is designed 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/filler 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), identify 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 conventional sheetfed offset inks. SunPak LMQ 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 standard (oxidative drying) sheetfed offset inks 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 LMQ 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 several 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 LMQ is not based on volatile chemicals. For conventional sheetfed applications it 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 LMQ products shall never be used for these applications: Metallics (MTxxx), LMP26, LMP41, LMB11, LMB18, LMB21, LMB19 and LMB33, LMB65. For 4c process printing, Process Yellow LMP26 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 were 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, LMP46, LMB74 and LMB50 or blends out of either product, intended for microwave applications are 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.



All in all we recommend that the food is removed from the printed packaging before heating. As we are not able to test printed packaging under all kinds of conditions at elevated temperatures the performance and the suitability of the final packaging should be checked under the intended conditions of use.

#### 10. Technical Assistance / Contacts

For further information, please contact your local Sun Chemical team or visit our website on [www.sunchemical.com](http://www.sunchemical.com)

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## Appendix

### SPOT COLOUR MANAGEMENT

For optimum colour consistency it is recommended to use precise proofing equipment and a colour computer. For SunPak LMQ 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 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.

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.