



ESALUX E4 Ink Series

Low-Migration Ink Series for EB Offset

Characteristics

With the ESALUX E4 Ink Series we present a electron-beam curing (EB) offset inks, especially for printing of food packaging and odour-sensitive packaging on film or cartonboard. The ink series is formulated free from initiator and therefore shows least possible odour and migration properties.

Technical Data

- **Drying/Curing:** EB Electron Beam
- **Substrate:** Film - Paper Plastic Coated - Paper Coated - Paper Uncoated
- **Printing Process:** Offset Web-Fed
- **Formulation:** Low Migration - VOC-free
- **Surface Properties:** Cured Ink Low Odour - Glossy
- **Further Processing:** Overvarnishing - Hotfoiling - Coldfoil
- **Application:** Folded Box - Flexible Packaging - Self Adhesive Labels
- **End Application:** Food - Cosmetics - Pharmaceuticals
- **Market:** Packaging
- **Available Systems:** 4 Colour Process - PANTONE® Base Colours - Z Base Colours
- **Mixing Lists Basis:** PANTONE® Base Colours - Z Base Colours

Packing Units

- 10 kg Plastic Bucket (black)
- 2,5 kg plastic can (black)

Technical Service Center

Kindly note that we are ready at any time for competent technical application support on your site. Please contact our technical service centre for printing inks:

Ink-Service@Zeller-Gmelin.de
Tel: +49 7161 802-279

Additives

UVALUX® U0012 UV Reducer

Addition max. 5%

ESALUX E4 Farbserie

06/2017-ESALUX E4 Farbserie-16

The statements made in this publication are according to our current knowledge. They do not absolve the user from his own responsibility to ascertain that our products are suitable for his process. They are intended to inform and advise and are subject to influence from the technical process.

This edition 06/2017-ESALUX E4 Farbserie-16 dated June 1, 2017 replaces the previous edition dated April 12, 2017.

With the present edition expires the validity of all older editions.

ZG Division: Printing inks
Zeller+Gmelin GmbH & Co. KG
Schlossstr. 20, 73054 Eisingen/Fils, Germany
Tel. +49 7161 802-0 - Fax +49 7161 802-200
www.zeller-gmelin.de - druckfarben@zeller-gmelin.de

Page 1 of 10





Reduces the viscosity and the tack.

UVALUX® U0088 UV Printing Paste

Addition max. 10%

Reduces the tack without reducing the viscosity significantly.

UVALUX® U0021 UV Slip Additive

Addition max. 2%

Improves scratch- and tape resistance. Please note that after adding the slip agent U0021 further processing such as lacquering, thermaltransfer printing or hotfoil stamping is not possible any more. Please make sure to stir in the slip agent very thoroughly.

ESALUX E4-X60001 Transparent White

Addition unlimited

Highly transparent, for reducing colour strength, tack and viscosity remain at a comparable level.

W963 UV Wash Up with Lemon Smell

Suitable for cleaning inking systems, sleeves, plates, blankets, etc.

Not approved for automatic washing units

Remark:

The addition of any additive might change the overall characteristics of the printing ink.

Storage

Optimal storage conditions:

The optimal storage temperature is 20°C. Higher storage temperatures reduce the shelf-life.

Remarks:

- protect from frost
- store in a cool and dark place
- stir well before use
- can should be closed immediately after usage

Warranty:

If the inks are stored correctly, we guarantee a shelf life of 6 months from date of delivery, as our raw material suppliers guarantee this period to us. However we know from practical experience our products can remain usable for 1-2 years or

ESALUX E4 Farbserie

06/2017-ESALUX E4 Farbserie-16

The statements made in this publication are according to our current knowledge. They do not absolve the user from his own responsibility to ascertain that our products are suitable for his process. They are intended to inform and advise and are subject to influence from the technical process.

This edition 06/2017-ESALUX E4 Farbserie-16 dated June 1, 2017 replaces the previous edition dated April 12, 2017.

With the present edition expires the validity of all older editions.

ZG Division: Printing inks
Zeller+Gmelin GmbH & Co. KG
Schlossstr. 20, 73054 Eisingen/Fils, Germany
Tel. +49 7161 802-0 - Fax +49 7161 802-200
www.zeller-gmelin.de - druckfarben@zeller-gmelin.de

Page 2 of 10





longer if they are properly handled and stored.

Service

Complete PANTONE® mixing recommendations. Ink formulation systems, mixing systems and dispensing systems are possible in different expansion levels.

Base ink basis for mixing recommendations:

- ESALUX E4-P... PANTONE® base inks
- ESALUX E4-Z... high intensity monopigmented base inks

Practice Remarks

Printing Materials

We recommend using ester and ketone resistant rollers (EPDM-material). The inking roller, rubber blanket and printing plate have to be resistant against UV-inks and UV-detergents (see manufacturers instructions).

Fountain Solution

Approved fountain solution parameters:

- ph-value: 4,8 - 5,2
- Water hardness: 9 - 12° dH

We recommend the use of temperature controlled ink ducts and fountain solution.

Information about Light Resistance

All light resistances are indicated according to the blue wool scale (BWS) and are based on the product specifications of our pigment suppliers. Light resistance can change when mixing inks and when printing halftone. Depending on the mixing ratio and on the fineness of the screen the light resistance can be lower than the pure solid colour.

Resistance requirements when using dispersion varnishes

Inks overprinted with dispersion varnishes should be resistant against alkali according to DIN 16524. Exception: Although the standard Magenta pigment of our ESALUX E4 Ink Series is not alkali resistant it can be overprinted with common dispersion lacquers without problems.

Preliminary Tests Recommended

Before beginning to print we recommend practice oriented pretests on your substrate, in order to test the desired characteristics of the finished product.

Marking

Marking according to EC legislation:

ESALUX E4 Farbserie

06/2017-ESALUX E4 Farbserie-16

The statements made in this publication are according to our current knowledge. They do not absolve the user from his own responsibility to ascertain that our products are suitable for his process. They are intended to inform and advise and are subject to influence from the technical process.

This edition 06/2017-ESALUX E4 Farbserie-16 dated June 1, 2017 replaces the previous edition dated April 12, 2017.

With the present edition expires the validity of all older editions.

ZG Division: Printing inks
Zeller+Gmelin GmbH & Co. KG
Schlossstr. 20, 73054 Eisingen/Fils, Germany
Tel. +49 7161 802-0 - Fax +49 7161 802-200
www.zeller-gmelin.de - druckfarben@zeller-gmelin.de

Page 3 of 10





Our inks are classified and marked according to EC legislation and the German "Gefahrstoffverordnung" (German dangerous substances regulation).

The material safety data sheet (MSDS) is available on request.

Product Designation

Process Inks CMYK:

E4-S... Standard Process Inks

Zeller+Gmelin Base Inks:

E4-Z... high intensity monopigmented base inks

PANTONE®:

E4-P... PANTONE® base inks

E4-P...S PANTONE® base inks, high light resistance

E4-C... PANTONE® mixed shades "coated"

E4-U... PANTONE® mixed shades "uncoated"

Special Colours: E4-X...

Covering White: E4-X55...

Transparent White: E4-X60001

Monopigmented Base Inks

For ink mixing we recommend our mono-pigmented base inks. It is a print-ready system, with maximum colour strength. These base inks contain only one pigment respectively.

Advantages:

- Ink formulations are better reproducible
- Higher production security
- The higher colour-intensity makes printing with reduced ink lay-down possible
- Reduced dot gain
- More flexibility when adjusting colour strength for solids or fine texts
- Mixing recommendations are available for all PANTONE® mixed shades
- Ink dispensing, mixing and measuring systems with different expansion levels available

Product designation of the monopigmented base inks:

ESALUX E4 Farbserie

06/2017-ESALUX E4 Farbserie-16

The statements made in this publication are according to our current knowledge. They do not absolve the user from his own responsibility to ascertain that our products are suitable for his process. They are intended to inform and advise and are subject to influence from the technical process.

This edition 06/2017-ESALUX E4 Farbserie-16 dated June 1, 2017 replaces the previous edition dated April 12, 2017.

With the present edition expires the validity of all older editions.

ZG Division: Printing inks

Zeller+Gmelin GmbH & Co. KG

Schlossstr. 20, 73054 Eisingen/Fils, Germany

Tel. +49 7161 802-0 - Fax +49 7161 802-200

www.zeller-gmelin.de - druckfarben@zeller-gmelin.de

Page 4 of 10





- ESALUX E4-Z... high intensity monopigmented base inks

Resistance Properties

Colour Name	Article Number	Light Resistance	Spirit Resistance	Solvent Resistance	Alkali Resistance
4 Colour Process					
Yellow	E4-S1101	4 BWS	+	+	+
Magenta	E4-S1201	5 BWS	+	+	-
Cyan	E4-S1301	8 BWS	+	+	+
Black	E4-S1401	8 BWS	+	+	+
PANTONE® Base Colours					
Yellow	E4-P100	4 BWS	+	+	+
Yellow 012	E4-P101	4 BWS	+	+	+
Orange 021	E4-P150	5 BWS	+	+	+
Red 032	E4-P201	6 - 7 BWS	+	+	+
Rubine Red	E4-P202	5 BWS	+	+	-
Process Blue	E4-P301	8 BWS	+	+	+
Green	E4-P350	8 BWS	+	+	+
Black	E4-P400	8 BWS	+	+	+
PANTONE® Base Colours (High Light Resistance)					
Warm Red	E4-P200S	5 BWS	+	+	+
Rhodamine Red	E4-P203S	6 - 7 BWS	+	+	+
Purple	E4-P250S	6 - 7 BWS	+	+	+
Violet	E4-P251S	6 - 7 BWS	+	+	+
Reflex Blue	E4-P300S	6 - 7 BWS	+	+	+
Blue 072	E4-P302S	6 - 7 BWS	+	+	+
Z Base Colours					
Yellow	E4-Z2100	6 - 7 BWS	+	+	+
Yellow	E4-Z2101	4 BWS	+	+	+

ESALUX E4 Farbserie

06/2017-ESALUX E4 Farbserie-16

The statements made in this publication are according to our current knowledge. They do not absolve the user from his own responsibility to ascertain that our products are suitable for his process. They are intended to inform and advise and are subject to influence from the technical process.

This edition 06/2017-ESALUX E4 Farbserie-16 dated June 1, 2017 replaces the previous edition dated April 12, 2017.

With the present edition expires the validity of all older editions.

ZG Division: Printing inks
Zeller+Gmelin GmbH & Co. KG
Schlossstr. 20, 73054 Eisingen/Fils, Germany
Tel. +49 7161 802-0 - Fax +49 7161 802-200
www.zeller-gmelin.de - druckfarben@zeller-gmelin.de

Page 5 of 10





Yellow	E4-Z2102	7 BWS	+	+	-
Orange	E4-Z2150	5 BWS	+	+	+
Red	E4-Z2201	6 BWS	+	+	+
Red	E4-Z2202	6 - 7 BWS	+	+	+
Red	E4-Z2203	5 BWS	+	+	-
Red	E4-Z2205	6 - 7 BWS	+	+	+
Violet	E4-Z2251	6 - 7 BWS	+	+	+
Blue	E4-Z2302	8 BWS	+	+	+
Green	E4-Z2350	8 BWS	+	+	+
Black	E4-Z2400	8 BWS	+	+	+
Opaque White	E4-Z2500	8 BWS	+	+	+
Transp.White	E4-Z2600				

Remarks on Migration and Conformity

The following remarks are valid for the production of food packaging which conforms to the regulations in the European Union. We can not make any statements concerning food packaging legislation of countries outside the EU.

Regulation (EC) No. 1935/2004 requires that the one responsible for the “placing on the market” of a packaging article must have an appropriate documentation available to demonstrate the compliance with the rules related to food processing and distribution.

Not only the used materials have an influence on the food-legislation related properties of a packaging. The production process of the packaging has a significant impact as well.

Therefore we recommend that you send your finished products to a recognized analytical institute for examination and certification. That way you can prove that your products comply with the legal requirements.

The transfer of substances from the packing into the filling is called migration. The following production parameters have a significant influence on the grade of migration:

- correct processing, especially the complete through-cure of the ink film
- type of substrate and substrate thickness (sufficient barrier effect of the substrate)
- prevention of a direct contact of the printing ink with the food

ESALUX E4 Farbserie

06/2017-ESALUX E4 Farbserie-16

The statements made in this publication are according to our current knowledge. They do not absolve the user from his own responsibility to ascertain that our products are suitable for his process. They are intended to inform and advise and are subject to influence from the technical process.

This edition 06/2017-ESALUX E4 Farbserie-16 dated June 1, 2017 replaces the previous edition dated April 12, 2017.

With the present edition expires the validity of all older editions.

ZG Division: Printing inks
Zeller+Gmelin GmbH & Co. KG
Schlossstr. 20, 73054 Eisingen/Fils, Germany
Tel. +49 7161 802-0 - Fax +49 7161 802-200
www.zeller-gmelin.de - druckfarben@zeller-gmelin.de

Page 6 of 10





- use of low-migration printing inks

The ESALUX E4 Ink Series

has a special low-migration formulation. Therefore we recommend these products for printing of materials for food-packaging. The EuPIA designation "FCM" stands for products which are generally suitable for the production of food-packaging. Please note that our FCM products are designed for use on the packaging outside (Non-DFC). A direct contact of the filling with the printed image has to be avoided.

Due to the low migration formulation it is reasonable to assume that with these products migration limit of the European Union should be well achievable (Regulation (EU) 10/2011 and Regulation (EU) 1183/2012). Therefore it should be possible with these products to fulfil the legal requirements of EC regulation 1935/2004.

We produce our low-migration products in accordance with the EU regulation 2023/2006 (Good Manufacturing Practice, GMP). The resulting demands on printing ink manufacturers are detailed in the EuPIA-GMP (see www.eupia.org).

Generally you should ensure with a migration analysis that no migration through the entire packaging system takes place. Due to the multitude of packaging materials and their completely different barrier properties we are unable to make any statements regarding through-migration.

However please note that migration can also occur by set-off when the printed surface is pressed against the food-contact surface of the packaging in the stack or reel.

We formulate our low-migration products in such a way that potential migration is as low as possible, both through the substrate and by set-off from the print-surface to the food contact surface in the stack or reel.

Although electron-beam curing (EB) inks and lacquers are formulated without polymerisation initiators the user has to check the suitability of EB products for his application when printing food packaging. Because of the high energy application during the curing process cleavage products may split from the substrate and the ink which could have a negative influence on the migration result.

The ESALUX E4 Ink Series is formulated in accordance with the Nestlé Guidance Note on Packaging Inks.

The ESALUX E4 Ink Series is formulated in accordance with the Swiss ordinance 817.023.21 on materials and articles intended to get into contact with food.

Declaration of Composition and Product Declaration

As there are no specific regulations concerning printing inks and varnishes Zeller+Gmelin -like other ink suppliers- is obliged to follow regulations in the EU not directly related to printing inks.

Regulation (EU) 1935/2004

ESALUX E4 Farbserie

06/2017-ESALUX E4 Farbserie-16

The statements made in this publication are according to our current knowledge. They do not absolve the user from his own responsibility to ascertain that our products are suitable for his process. They are intended to inform and advise and are subject to influence from the technical process.

This edition 06/2017-ESALUX E4 Farbserie-16 dated June 1, 2017 replaces the previous edition dated April 12, 2017.

With the present edition expires the validity of all older editions.

ZG Division: Printing inks
Zeller+Gmelin GmbH & Co. KG
Schlossstr. 20, 73054 Eisingen/Fils, Germany
Tel. +49 7161 802-0 - Fax +49 7161 802-200
www.zeller-gmelin.de - druckfarben@zeller-gmelin.de

Page 7 of 10





Article 3 of the Regulation 1935/2004 (impact on food) demands, that materials and articles do not transfer their constituents to food in quantities which could endanger human health or bring about an unacceptable change in the composition of the food or bring about a deterioration in the organoleptic characteristics thereof.

We urgently advise you to use for printing on food packaging only printing inks/lacquers which we specifically recommend for this application and which have a low-migration formulation.

A possible impact on the quality of food does not solely depend on the printing ink/lacquer itself but is depending on the complete production chain (ink laydown, UV-power, substrate, etc.). For this reason we can generally not confirm a compliance to Regulation 1935/2004 only based on the composition of the ink/lacquer.

Based on Article 17 (traceability) material and articles shall be ensured at all stages in order to facilitate control, the recall of defective products, consumer information and the attribution of responsibility.

All raw materials for ink/lacquer batches at Zeller+Gmelin are documented in writing on the Formula Component Report. Based on the batch number every raw material can be clearly traced back to the raw material batch.

Regulation (EU) 2023/2006

This so called GMP regulation (Good Manufacturing Practice) defines the requirements on the different participants in the manufacturing process of materials and articles intended to come into contact with food. It requests a system for quality assurance, control and documentation (§5-7). The EuPIA defined the requirements on printing ink manufacturers in the EuPIA-GMP.

Regulation (EU) No 10/2011 and Regulation (EU) 1282/2011

Regulation EU 10/2011 and 1282/2011 establishes the specific rules for plastic materials and articles to be applied for their safe use and repeals Commission Directive 2002/72/EC of 6 August 2002 on plastic materials and articles intended to come into contact with foodstuffs (2).

In this regulation, the so called PIM (Plastic Implementation Measure) limits are set for substances, which are allowed to be in direct contact with food and are allowed to migrate into the food up to the level listed in Annex I.

Substances used in printing inks must not (with few exemptions) get in direct contact with food and are therefore not listed in Annex I.

Paragraph (30) states, that Coatings, printing inks and adhesives are not yet covered by a specific EU legislation and therefore not subject to the requirement of a declaration of compliance.

For the migration of non-authorised substances through a functional barrier into food a limit of 0,01 mg/kg (10 ppb) is set.

Substances that are mutagenic, carcinogenic or toxic to reproduction should not be used without previous authorisation in food contact materials or articles and should therefore not be covered by the functional barrier concept.

CEPE / EuPIA – Exclusion Policy

CEPE is the European Council of producers and importers of paints, printing inks and artists colours whereas EuPIA is the European Printing Ink Group of CEPE. The printing ink industry voluntarily came up with the Exclusion Policy for specific substances many years ago.

Zeller+Gmelin is an active member in the EuPIA and subgroups. The raw materials used by Zeller+Gmelin for the formulation

ESALUX E4 Farbserie

06/2017-ESALUX E4 Farbserie-16

The statements made in this publication are according to our current knowledge. They do not absolve the user from his own responsibility to ascertain that our products are suitable for his process. They are intended to inform and advise and are subject to influence from the technical process.

This edition 06/2017-ESALUX E4 Farbserie-16 dated June 1, 2017 replaces the previous edition dated April 12, 2017.

With the present edition expires the validity of all older editions.

ZG Division: Printing inks

Zeller+Gmelin GmbH & Co. KG

Schlossstr. 20, 73054 Eisingen/Fils, Germany

Tel. +49 7161 802-0 - Fax +49 7161 802-200

www.zeller-gmelin.de - druckfarben@zeller-gmelin.de

Page 8 of 10





of our printing inks/lacquers meet the guidelines of the CEPE / EuPIA Exclusion Policy. This means that CMR 1A and 1B substances (cancerogenic, mutagenic and reprotoxic) plus T (toxic) and T+ (very toxic) are not used in our printing inks/lacquers.

Heavy Metals

CONEG stands for Coalition of North-Eastern Governors in the USA . One of their legislations, adopted by 18 states as of 1998, requires reductions in the amount of the four heavy metals mercury, lead, cadmium, and hexavalent chromium in packaging and packaging components sold or distributed in their member states. For Zeller+Gmelin printing inks/lacquers the limits for heavy metals as listed in the CONEG-Regulation (USA) are met. The Euro Norm 71.3 refers to the max level of heavy metals in childrens toys. For Zeller+Gmelin printing inks/lacquers the limits for heavy metals as listed in the DIN EN 71-3 are met.

Heavy metals are no part of our formulations.

Hazardous substances

Substances mentioned in the directive 2002/95/EC (RoHS) and directive 2011/65/EC are not intentionally used in our formulations printing inks/lacquers.

SVHC-substances (substances of very high concern): In our products no substances are used which are classified as CMR 1A & 1B, PBT (PBT pollutants are chemicals that are toxic, persist in the environment and bioaccumulate in food chains), vPvB (Substances that are potentially very persistent and very bioaccumulative) und endocrine disruptors (artificial hormones).

Furthermore we confirm that our printing inks/lacquers are in accordance with the EC regulation 1895/2005 (repeals the guide line 2002/16/EC).

ISO 9001

The production site of Zeller+Gmelin / Germany is certified according to DIN EN ISO 9001:2008 and DIN EN ISO 14001:2005 (corresponds to EN ISO 14001 edition Nov. 2004).

Swiss Ordinance 817.023.21

This ordinance regulates materials and articles intended to come into contact with food. On 01.04.2008 the ordinance was changed to include regulations concerning printing inks. Since 01.04.2010 only packaging which has been produced with conforming printing inks may be supplied to consumers. We urgently advise you to use for food packaging which is subject to this regulation only printing inks/lacquers which we specifically recommend for this application and which have a low-migration formulation.

Please note:

According to applicable law the manufacturer of the finished article and the filler have the full legal responsibility to ensure that their product is fit for its intended purpose and complies with the applicable rules (not the supplier).

Please also consider the relevant publications of the European Printing Inks Association EuPIA (<http://www.eupia.org>).

ESALUX E4 Farbserie

06/2017-ESALUX E4 Farbserie-16

The statements made in this publication are according to our current knowledge. They do not absolve the user from his own responsibility to ascertain that our products are suitable for his process. They are intended to inform and advise and are subject to influence from the technical process.

This edition 06/2017-ESALUX E4 Farbserie-16 dated June 1, 2017 replaces the previous edition dated April 12, 2017.

With the present edition expires the validity of all older editions.

ZG Division: Printing inks
Zeller+Gmelin GmbH & Co. KG
Schlossstr. 20, 73054 Eisingen/Fils, Germany
Tel. +49 7161 802-0 - Fax +49 7161 802-200
www.zeller-gmelin.de - druckfarben@zeller-gmelin.de

Page 9 of 10





There are many types of final packaging and the printing ink/lacquer is only one constituent. Since the parameters in the printing, packing and storage processes are not under the control of the printing ink manufacturer, the printing ink suppliers are not able to issue certificates or declarations of compliance which cover the legal responsibility of the entire packaging chain (Text from EuPIA-PIFOOD May 2007).

The statements made in this declaration are according to our current knowledge. They do not absolve the user from its own responsibility to ascertain that our products are suitable for his application.

ESALUX E4 Farbserie

06/2017-ESALUX E4 Farbserie-16

The statements made in this publication are according to our current knowledge. They do not absolve the user from his own responsibility to ascertain that our products are suitable for his process. They are intended to inform and advise and are subject to influence from the technical process.

This edition 06/2017-ESALUX E4 Farbserie-16 dated June 1, 2017 replaces the previous edition dated April 12, 2017.

With the present edition expires the validity of all older editions.

ZG Division: Printing inks
Zeller+Gmelin GmbH & Co. KG
Schlossstr. 20, 73054 Eisingen/Fils, Germany
Tel. +49 7161 802-0 - Fax +49 7161 802-200
www.zeller-gmelin.de - druckfarben@zeller-gmelin.de

Page 10 of 10

