Ultra *Glass* LEDGF

Marabu

UV-LED-curable screen printing ink, formulated without the use of BPA/BPS (Bisphenol A/S), for packaging and restaurant glass, cosmetic glass, flat glass

Very fast curing, very high scratch resistance, excellent alcohol, alkaline, chemical, and dishwasher resistance, unrivalled initial adhesion

Vers. 1
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Field of Application

Substrates

Ultra *Glass* LEDGF is suited for the following substrates:

- Pre-treated, cold-end coated packaging glass, e.g. beverage bottles
- Pre-treated flat glass for indoor use
- Pre-treated cosmetic bottles
- Pre-treated restaurant glass

For a good adhesion, a uniform surface tension of the substrate with > 44 mN/m is generally important. Furthermore, the surface must be absolutely free from graphite, silicone, dust or residues like grease or similar (e.g. fingerprints). A pre-treatment of glass by flaming immediately before printing will enhance the adhesion of the ink to the substrate. When using cold end coated glass, flaming is crucial. Best possible adhesion and resistance is achieved by Uvitro®, Arcosil® or Pyrosil® pre-treatment.
Since all the print substrates mentioned may be different in printability even within an individual type, preliminary trials are essential to determine the suitability for the intended use.

Field of use

Ultra Glass LEDGF is particularly suited for the decoration on the outer surfaces of restaurant glass (drinking glasses) thanks to its non-BPA-formulation and its excellent resistances, in particular dishwasher resistance.

This ink series is not suitable for direct food contact nor for printing on food contact materials as substances contained in the formulation or introduced by contamination may migrate under certain conditions. **Materials that constitute a natural migration barrier are excluded.**
If this ink series is nevertheless used for printing on permeable food contact materials, the manufacturer of the printed product is responsible for ensuring that its products comply with legal or industry-specific requirements.
For printing on permeable food contact materials (= without appropriate migration barrier), we recommend our specially designed Ultra Pack UVFP.

Characteristics

Ink Adjustment

The ink should be stirred homogeneously before printing and if necessary during production.

LEDGF is a 2-component ink system. Prior to printing, it is essential to add adhesion modifier in the correct quantity and to stir homogeneously. When using adhesion modifier, the processing and curing temperature must not be lower than 15°C as irreversible damage can occur. Please also avoid high humidity for several hours after printing, as the adhesion modifier is sensitive to humidity.

Owing to the high reactivity of the ink, exposure to direct daylight and intense machine lighting should be minimised.

Pre-reaction time
It is recommended to allow the ink/hardener mixture to pre-react for 15 minutes.

Pot life
The ink/hardener mixture is chemically reactive and must be processed within 8 h (referred to 20-25 °C and 45-60 % RH). Higher temperatures reduce the pot life. If the mentioned times are exceeded, the ink's adhesion and resistance may be reduced even if the ink still seems processable.

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Drying

Ultra *Glass* LEDGF is a very fast curing UV-LED ink.

LED Curing:
LEDGF requires a wavelength range of 385 - 395 nm for LED curing.
The recommended distance to the substrate is 3 - 7 mm.

UV curing:
A UV-curing unit with one medium pressure Mercury Vapour Lamp (120- 180 W/cm) will cure the LEDGL standard shades at a belt speed of 3600 passes/h resp. 20 m/min.

Final drying:
After UV or LED curing, heat-forced drying is required to secure the entire printed ink build-up by means of oven drying (ready-to-use oven, continuous dryer) or suitable IR drying. Guidelines for temperature and time:

- Oven drying: 160° C /20 min. or 140° C/30 min.

- IR drying: 60-100 sec / OT: 140°C

This achieves the best possible adhesion to the glass and high resistance. If the requirements for the end product are less stringent, oven or IR drying may not be necessary at all.
High opaque shades have a slightly slower curing speed.

The curing speed of the ink is generally dependant upon the kind of UV-LED-curing unit (reflectors), number, age, and power of the UV-lamps or LEDs, the distance between UV/LED lamps and substrate (distance from the substrate to the actual LED array, not including the housing!), the printed ink film thickness, colour shade, substrate in use, as well as the exposure time to the curing unit.
Ultra *Glass* LEDGF shows outstanding initial adhesion and is yet a post-curing ink which will achieve its final adhesion and resistances after 24 hours. The ink film should pass a cross-cut tape test right after being cured, or after having cooled down to room temperature.
As with all radical curable printing inks, the presence of residual monomers and photoinitiators' decomposition products cannot be completely ruled out even after sufficient curing. If these traces are relevant for the application, this must be taken into account in individual cases, as this depends on the actual printing and curing conditions.
Please make sure that waste prints are also completely cured, otherwise they are subject to the same disposal rules as liquid ink residues (hazardous waste).

Fade resistance

Pigments of medium to high fade resistance are used for the LEDGF colour shades.

Stress resistance

After proper and thorough drying, the ink film exhibits outstanding adhesion, as well as rub, and scratch resistance. The following resistances have been achieved:

Dish washer resistance:

• Domestic dish washer: at least 350 cycles acc. to DIN 12875
• Industrial dish washer (Winterhalter UC-L): at least 600 cycles acc. to DIN 10511

Chemical resistance:
- Alcohol: 50 DRS
- Ethanol and glass cleansing agent: 500 DRS
- Acetone/MEK: 100 DRS

Test device: Taber® Abraser 5700,
DRS: Double Rub Strokes (350 g)

Humidity resistance:

- Condensation water test 80°C/100% RF/5h
- Cold water storage / 24h

Passing such tests requires optimum pre-treatment of the glass surface as well as post-treatment and final drying of the entire printed ink film.

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Range

Basic Shades

922	Light Yellow
924	Medium Yellow
926	Orange
932	Scarlet Red
934	Carmine Red
936	Magenta
950	Violet
952	Ultramarine Blue
956	Brilliant Blue
960	Blue Green
962	Grass Green
970	White
980	Black

High Opaque Shades

122	High Opaque Light Yellow
132	High Opaque Scarlet Red
152	High Opaque Ultramarine Blue
162	High Opaque Grass Green
170	Opaque White
180	Opaque Black
188	Deep Black

Further Products

910	Overprint Varnish

Please note:
Varnish LEDGF 910 is not LED but only UV curable. Ink mixtures containing LEDGF 910 must be UV-cured.

All shades are intermixable. Mixing with other ink types or auxiliaries must be avoided in order to maintain the special characteristics of this ink.

Auxiliaries

UV-HV 8	Adhesion Modifier	5%
UVV 1	Thinner	1-5%
UV-B 4	UV Accelerator	1-2%
UV-B 5	UV Accelerator, only suited for UV curing	1-2%
STM	Thickening Agent	0-2%
UV-VM	Levelling Agent	0-1%
UV-TA 1	Thickening Agent	0-1%
UR 3	Cleaner (flp. 42°C)	
UR 4	Cleaner (flp. 52°C)	
UR 5	Cleaner (flp. 72°C)	

Prior to printing, Adhesion Modifier UV-HV 8 must be added in the correct quantity and the mixture must be stirred homogeneously.
The addition of thinner reduces the ink viscosity if necessary. An excessive addition of thinner will cause a reduction of the curing speed, as well as of the printed ink film's surface hardness. The thinner becomes part of the cross-linked matrix when UV-cured and may slightly change the inherent odour of the printed and cured ink film.
UV-B 4 accelerates the deep curing.
UV-B 5 accelerates the surface curing.
The Thickening Agent STM enhances the ink's viscosity without significantly influencing the degree of gloss. Please stir well, the use of an automatic mixing machine is mandatory.
The Levelling Agent UV-VM helps to eliminate flow problems which may arise due to residuals on the substrate's surface or incorrect adjustment of the machines. An excessive amount may reduce the ink's adhesion when overprinting. UV-VM must be stirred homogeneously before printing.
The liquid Thickening Agent UV-TA 1 increases the viscosity and improves the dot definition at higher processing temperatures.
The Cleaners UR 3 and UR 4 are recommended for manual cleaning of the working equipment.
Cleaner UR 5 is recommended for manual or automatic cleaning of the working equipment.

Printing Parameters

All types of commercially available polyester fabrics and solvent-resistant stencils can be used. For a good opacity on coloured substrates, we recommend a fabric between 140-31 and 165-27 (plain weave).

Shelf Life

Shelf life depends very much on the formula/reactivity of the ink system as well as the storage temperature.
For an unopened ink container it is:

- 1 year for all standard LEDGF products

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We recommend our products to be stored in a dark, dry and well-ventilated surrounding, providing an ambient temperature of 5° - 35°C.
Please protect from heat and direct sunlight.
If storage conditions do not comply with this recommendation, the shelf life is no longer guaranteed.

Note

Our technical advice whether spoken, written, or through test trials corresponds to our current knowledge to inform about our products and their use. This is not meant as an assurance for certain properties of the products nor their suitability for each application.
You are, therefore, obliged to conduct your own tests with our supplied products to confirm their suitability for the desired process or purpose. The foregoing information is based on our experience and should not be used for specification purposes. All characteristics described in this Technical Data Sheet refer exclusively to the standard products listed under "Range", provided that they are processed in accordance with their intended use and only when used with the recommended auxiliaries. The selection and testing of the ink for specific applications is exclusively your responsibility. Should, however, any liability claims arise, they shall be limited to the value of the goods delivered by us and utilised by you with respect to any and all damages not caused intentionally or by gross negligence.

Labelling
For Ultra *Glass* LEDGF and its auxiliaries, there are current Material Safety Data Sheets available according to EC regulation 1907/2006, informing in detail about all relevant safety data including labelling according to EC regulation 1272/2008 (CLP regulation). Such health and safety data may also be derived from the respective label.

Safety rules for UV-LED printing inks
UV-LED-inks contain some substances which may irritate the skin. Therefore, we recommend to take utmost care when working with UV-LED-curable printing inks. Parts of the skin soiled with ink are to be cleaned immediately with water and soap. Please read the notes on labels and safety data sheets.

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