

**UV-LED-curable screen printing ink for packaging and restaurant glass, flat glass used indoors, glazed ceramic, metals, anodized aluminium, varnished surfaces, and PETG**

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

## Field of Application

### Substrates

Ultra Glass LEDGL 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
- Glazed ceramics
- Metals
- Anodized aluminium
- Varnished surfaces
- PETG

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<sup>®</sup>, Arcosil<sup>®</sup> or Pyrosil<sup>®</sup> 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 LEDGL is particularly suited for the decoration on the outer surfaces of restaurant glass (drinking glasses) thanks to 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.

LEDGL 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 tempera-

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tures 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.

## Drying

LEDGL is a very fast curing UV-LED ink.

### LED Curing:

LEDGL requires a wavelength range of 385 - 395 nm for LED curing.

### 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 4800 passes/h resp. 20 m/min. Primers and high-opaque shades take longer to cure (3600 passes/h, resp. 12 m/ min ca.).

The curing speed of the ink is generally dependent 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 LEDGL 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 LEDGL colour shades. Owing to the binding agents used, however, all LEDGL shades are suited to a limited outdoor use of up to 3 successive months.

## 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 500 cycles acc. to DIN 12875
- Industrial dish washer (Winterhalter UC-L): at least 700 cycles acc. to DIN 10511

Metallic shades generally have a reduced dishwasher resistance.

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)

If necessary, the curing process can be accelerated by a post-treatment for 30 min at 140 °C, while maximising the resistances at the same time. Bright colour shades, e.g. white, may darken if the print is constantly exposed to temperatures > 40° C.

## 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

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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

902	Bronze Binder
904	Special Binder
913	Milky Matt Varnish
LEDGL-	Primer f. Hot Stamping Gold
PG	
LEDGL-PS	Primer f. Hot Stamping Silver

Special binder 904 was developed especially for mixing with coloured shades and should not be printed purely.

LEDGL 913 can be used as a matt varnish or as a full-surface etch imitation for visual and haptic reproduction of etched glass surfaces, with high abrasion resistance in filling lines.

Any favoured design can simply be printed with LEDGL Primers on the glass surface. The printed motif then acts as a cliché for the hot stamping foil which is applied by roll-on or stroke stamping, and only adheres to the areas where LEDGL Primer is applied before.

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

All basic shades are included in our Marabu-ColorFormulator (MCF). They build the basis for the calculation of individual colour matching formulas, as well as for shades of the common colour reference systems HKS®, PANTONE®, and RAL®. All formulas are stored in the Marabu-ColorManager software.

## Metallics

### Metallic Pastes

S-UV 291	High Gloss Silver	0-25%
S-UV 293	High Gloss Rich Gold	0-25%
S-UV 296	High Gloss Silver	0-17%

These Metallics are added to LEDGL 902 in the recommended amount, whereas the addition may be individually adjusted to the respective application. We recommend preparing a mixture which can be processed within a maximum of 8 h since metallic mixtures usually cannot be stored.

Owing to the smaller pigment size of Metallic Pastes it is possible to work with finer fabrics like 140-31 to 150-31. Metallic shades are subject to an increased dry abrasion which can only be reduced by overvarnishing. All metallic shades are displayed in the Marabu "Screen Printing Metallics" colour chart.

## Auxiliaries

UV-HS 1	Hot Stamping Additive	8-20%
UV-HV 8	Adhesion Modifier	4%
UVV 1	Thinner	1-10%
UV-B 4	UV Accelerator	1-2%
UV-VM	Levelling Agent	0-1%
UR 3	Cleaner (flp. 42°C)	
UR 4	Cleaner (flp. 52°C)	
UR 5	Cleaner (flp. 72°C)	

UV-HS 1 allows hot stamping at lower temperatures and is only added to the primer if applied onto painted glass or in combination with multi-coloured UV screen prints. Recommended addition: 10%

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 cured, and may slightly change the inherent odour of the printed and cured ink film.

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UV-B 4 accelerates the deep curing.

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 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. It is 1.5 years for an unopened ink container if stored in a dark room at a temperature of 15-25°C. Under different conditions, particularly higher storage temperatures, the shelf life is reduced. In such cases, the warranty given by Marabu expires.

## 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 LEDGL 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.