

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

**Fast curing, glossy, very high scratch resistance, excellent alkaline, chemical, and dish washer resistance, no additional oven drying**

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## Field of Application

### Substrates

Ultra Glass UVGL is suited for the following substrates:

- Pre-treated flat glass for indoor use, e. g. mirrors, glass for furniture and dividers, gambling machines, etc.
- Pre-treated, cold-end coated packaging glass, e.g. drinking bottles
- Pre-treated cosmetic bottles
- Pre-treated restaurant glass, e.g. drinking glasses, ashtrays, vases
- Ceramics
- Metals
- Anodized aluminium
- Varnished surfaces

For a good adhesion, a uniform surface tension of the substrate with  $> 44 \text{ mN/m}$  is generally important. Furthermore, the glass surface must be absolutely free from graphite, silicone, dust or residues like grease or similar (e.g. fingerprints).

A pre-treatment of the glass by flaming immediately before printing will generally enhance the adhesion of the ink to the substrate. When using cold end coated glass, the flaming is critical. Best possible adhesion is achieved by Uvitro® 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.

## Characteristics

### Ink Adjustment

#### Recommendation

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

Ultra Glass UVGL is a 2-component ink system. Prior to printing, it is essential to add adhesion modifier in the correct quantity and to stir homogeneously:

#### 2% UV-HV 8:

922 - 962 basic shades  
980 black  
180 opaque black  
425 - 485 process shades  
904 special binder, 910 varnish  
UVGL-WV Window Varnish

#### 4% UV-HV 8:

970 white  
170 opaque white  
122 - 162 high opaque shades  
188 deep black  
913, 914 etch imitations  
UVGL-PG/PS Primer  
UVGL-RH/RL  
Colour matches containing  $> 50\%$  white or high opaque colour shades

#### 5% UV-HV 8:

Metallics (incl. UVGL 291)

When using hardener, the processing and curing temperature must not be lower than  $15^{\circ}\text{C}$  as irreversible damage can occur. Please also avoid high humidity for several hours after printing as the hardener is sensitive to humidity.

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## 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.

All UVGL basic shades are glossy and brilliant. They can also be metal-coated if required.

## Drying

Ultra Glass UVGL is a fast curing UV-ink. A UV-curing unit with one medium pressure Mercury Vapour Lamp (180- 240 W/cm) will cure the UVGL standard shades at a belt speed of 4800 passes/h resp. 20 m/min. UVGL 170 Opaque White, the etch imitations, as well as high-opaque shades, metallics, and primers cure much slower (3600 passes/h, resp. 12 m/min ca.).

UVGL is a post-curing UV ink which will achieve its final adhesion and resistances after 24 hours. It is a must, however, to carry out preliminary tests prior to printing.

The curing speed of the ink is generally depending on the kind of UV-curing unit (reflector), number, age and power of the UV-lamps, the printed ink film thickness, the inherent colour of the glass, as well as the number of passes of the UV-curing unit.

As with all UV-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.

## Fade resistance

Pigments of medium to high fade resistance are used for the Ultra Glass UVGL colour shades. Owing to the binding agents used, however, all UVGL 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 for UVGL standard shades and UVGL Primers without foil:

Dish washer resistance:

- Domestic dish washer at least 500 cycles (65° C at 130 min with customary cleaner Type B/ low alkaline detergent)
- **Attention:** UVGL 291 = approx. 150 cycles
- Winterhalter glass washer (85° C at 3 min): at least 3500 cycles
- **Attention:** UVGL 291 = approx. 1000 cycles

Chemical Resistance:

- Alkaline: 2.3% NaOH, 80° C for 30 min
- Perfume: 24 h test, G1-test
- Ethanol and glass cleansing agent: 500 DRS
- Aceton/MEK: 100 DRS

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

Humidity resistance:

- Condensation Water Test 70°C/100% RH/30 min
- Cold Water Immersion Test / 24h
- Frost Test -18° C

These resistances are achieved after min. 24 h post-curing at room temperature. If necessary, this process can be accelerated by a post-treatment for 30 min at 140 °C, while maximising the resistances at the same time.

In order to increase the mechanical resistance, we recommend an overprint with varnish UVGL 910. Bright colour shades, e.g. white, may darken if the print is constantly exposed to temperatures > 40° C.

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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            |

### 4-Colour Process Shades Standard

|     |                 |
|-----|-----------------|
| 425 | Process Yellow  |
| 435 | Process Magenta |
| 455 | Process Cyan    |
| 485 | Process Black   |

### High Opaque Shades

|     |                              |
|-----|------------------------------|
| 122 | High Opaque Light Yellow     |
| 124 | High Opaque Medium Yellow    |
| 130 | High Opaque Vermilion        |
| 132 | High Opaque Scarlet Red      |
| 136 | High Opaque Magenta          |
| 152 | High Opaque Ultramarine Blue |
| 156 | High Opaque Brilliant Blue   |
| 162 | High Opaque Grass Green      |
| 170 | Opaque White                 |
| 180 | Opaque Black                 |
| 188 | Deep Black                   |

### Press-Ready Metallics

|     |                   |
|-----|-------------------|
| 291 | High Gloss Silver |
|-----|-------------------|

### Etch Imitation Effects

|     |                           |
|-----|---------------------------|
| 913 | Milky Matt Varnish        |
| 914 | Satin Transparent Varnish |

### Further Products

|         |                               |
|---------|-------------------------------|
| 409     | Transparent Base              |
| 904     | Special Binder                |
| 910     | Overprint Varnish             |
| UVGL-PG | Primer f. Hot Stamping Gold   |
| UVGL-PS | Primer f. Hot Stamping Silver |

### Silicone-free Varnishes

|         |                               |
|---------|-------------------------------|
| UVGL-RH | Relief Varnish High Viscosity |
| UVGL-RL | Relief Varnish Low Viscosity  |
| UVGL-WV | Window Varnish                |

If required, these 4-clr-process shades can be used in combination with the ink line Ultra Glass UVGO.

All Metallic shades (including UVGL 291) are subject to an increased dry abrasion which can only be reduced by overvarnishing. We recommend UVGL 910. The dishwasher resistance of UVGL 291 is below regular UVGL level despite overvarnishing.

UVGL 904 is not super-transparent.

Any favoured design can simply be printed with UVGL 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 UVGL Primer is applied before.

Suitable foils:

We recommend the foil types GXO or GXI by "Peyer Graphic". Other types of foils by other suppliers can also be used, but must be checked in advance.

UVGL-RH (high viscosity) and UVGL-RL (low viscosity) are two silicone-free relief varnishes for printing tactile effects. UVGL-RH/RL are sold separately but in order to achieve best relief results, they should be used together in a ratio suiting the respective artwork (e. g. 50:50 / 80:20 / 30:70). **Attention:** If the motifs are printed this way, they are no longer silicone-free due to the addition of basic shades. So, they can only be overprinted with a varnish that contains silicone (e.g. UVGL 910).

UVGL-WV is super-transparent. UVGL-WV is silicone-free and therefore not mixable with other UVGL products, nor suitable for over-varnishing **prints containing silicone**.

For silicone-free products it is important to use only thoroughly cleaned stencils, squeegees, ink pumps, tubes (in the case of an automatic ink supply), and injectors for the manual ink filling of the stencil, etc. If cleaning is carried out with automatic screen washing systems, we recommend prior to printing an additional manual cleaning with a fresh cleaner not having had any contact with ink residues contain-

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ing silicone.

All basic and high opaque shades are intermixable. Mixing with other ink types (also with UV-GO!) should be avoided in order to maintain the special characteristics of this outstanding ink range.

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 191    | Silver                    | 15-25% |
| S 192    | Rich Pale Gold            | 15-25% |
| S 193    | Rich Gold                 | 15-25% |
| S-UV 191 | Silver                    | 14-25% |
| S-UV 192 | Rich Pale Gold            | 14-25% |
| S-UV 193 | Rich Gold                 | 14-25% |
| S-UV 291 | High Gloss Silver         | 10-25% |
| S-UV 293 | High Gloss Rich Gold      | 10-25% |
| S-UV 296 | High Gloss Silver         | 10-17% |
| S-UV 297 | High Gloss Rich Pale Gold | 10-17% |
| S-UV 298 | High Gloss Pale Gold      | 10-17% |

These metallics are added to UVGL 910 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. The dishwasher resistance must be tested individually. 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     | 2-5%  |
| UVV 6   | Thinner               | 1-10% |

|         |                              |        |
|---------|------------------------------|--------|
| UV-B1   | UV Accelerator               | 1-2%   |
| UV-TA 1 | Thickening Agent             | 0-1.5% |
| UV-VM   | Levelling Agent              | 0-1%   |
| VM 1    | Levelling Agent, for UVGL-WV | 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 mixture has a pot life of approx. 8 hours referred to an ambient temperature of 18-25°C.

The addition of thinner reduces the ink viscosity for vertical screen printing or automatic ink feeding with pump operation. 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 1 accelerates the curing speed if necessary and may increase the adhesion to the substrate owing to a better depth curing.

The liquid Thickening Agent UV-TA 1 increases the viscosity and improves the dot definition at higher processing temperatures.

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. UV-VM must be stirred homogeneously before printing. UV-VM must **not** be used for UVGL-WV.

Printing Modifier VM 1 (silicone-free) can be added to UVGL-WV to rectify flow problems. An excessive amount reduces the intercoat adhesion.

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.

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## Printing Parameters

The fabric selection depends on the desired curing speed and productivity, as well as the requested opacity. Generally, all fabrics from 120-34 to 165-27 (1:1 plain weave) can be used but we especially recommend a 140-31 mesh. For the printing of 4-colour process shades, we recommend a fabric between 150-27 and 180-27 (1:1 plain weave). A high and uniform screen tension (> 16 N) is further important to guarantee a defined ink deposit. UVGL can be processed with all solvent-resistant stencil techniques such as capillary films (15-20 µm), photo emulsions or combination stencils (Primers: 1:3 = squeegee side: substrate side).

UVGL-RH/RL:

Mesh: from 48-55 to 55-70, Squeegee: 75 Shore

We highly recommend the use of a flood blade.

## Shelf Life

Shelf life depends very much on the formula/reactivity of the ink system as well as the storage temperature. The shelf life for an unopened ink container if stored in a dark room at a temperature of 15 - 25 °C is:

- 1 year for UVGL 291
- 2.5 years for all other standard products

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 con-

firm 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 UVGL 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 printing inks

UV-inks contain some substances which may irritate the skin. Therefore, we recommend to take utmost care when working with UV-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.