

**Screen and Pad Printing Ink for glass, ceramics, metals, aluminium, chrome-plated parts, coated substrates, and thermosetting plastics**

**Satin-gloss finish, high opacity, fast drying 2-component ink system, dishwasher-proof**

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## Field of Application

### Substrates

The screen printing ink Glass Ink GL is excellently suited to print onto

- Glass
- Ceramics
- Metals (incl. thinly anodised aluminium)
- Chrome-plated parts
- Varnished surfaces
- Thermosetting plastics

Equal surface tension of at least 38 mN/m ensures good adhesion. Furthermore, the glass surface must be clean and absolutely free of graphite, silicone, dust or grease (e.g. finger prints). Flame pre-treatment right before the start of the printing process generally improves adhesion.

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

Glass Ink GL is designed for indoor decoration prints onto promotional items of glass or ceramics such as pre-printed glass panes, bottles, and tiles.

This special ink has, compared to other 2-component inks, a very good adhesion to the substrate and is highly water-resistant. It can also be used for advertising materials made of glass and ceramics which demand a limited dishwasher resistance.

Glass Ink GL is not suitable for permanent outdoor use or direct exposure to UV light indoors due to the characteristics of the binder. After proper drying, GL is also suited for metal-coating with dark mirror protection varnishes.

Glass Ink GL also adheres very well onto a variety of metals, such as chrome-plated writing instruments.

GL can also be processed with a spray gun, but preliminary trials are necessary for this process. In order to avoid surface irregularities, we recommend to filter the thinned ink (25 µm screen) before processing.

## Characteristics

### Ink Adjustment

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

GL is a 2-component ink system. Prior to printing, it is essential to add hardener in the correct quantity and to stir homogeneously. The two different ratios are:

- 1) 5 % Hardener (GLH)  
20 parts by w. of ink + 1 part by w. of hardener
- 2) 10 % Hardener (GLH)  
10 parts by w. of ink + 1 part by w. of hardener

The second variation must be applied if high chemical resistance (e. g. rub resistance against chemicals like Ethanol, MEK oder Acetone) is required.

**Exception:** Only add 5 % hardener to White GL 070 or ink mixtures containing more than 50 % White.

When using hardener, 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 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 min.

## Pot life

The ink/hardener mixture is chemically reactive and must be processed within

8 - 12 h with 5 % hardener  
4 - 6 h with 10 % hardener

(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.

## Drying

Parallel to physical drying, i. e. the evaporation of the solvents used, the actual hardening of the ink film is caused by the chemical cross-linking reaction between ink and hardener. The standard values concerning progressive cross-linking reaction (hardening) of the ink film are as follows:

### Screen Printing: (ink film 5-12 µm)

Extent of drying	Temperature	Time
touch-dry	20 °C	approx. 30 min
overpr.	20 °C	approx. 50 min
final hardness	20 °C	approx. 4-6 days
	140 °C	approx. 30 min

### Pad Printing:

Extent of drying	Temperature	Time
touch-dry	20 °C	approx. 2-3 min
final hardness	20 °C	approx. 4-6 days
	140 °C	approx. 30 min

Chemical cross-linking will be accelerated and improved by higher temperatures. For very high demands for water-resistance (dishwasher, etc.), 10 % hardener must be added (except for GL 070 White = 5 % hardener) and Glass Ink GL must be baked at 140 °C for 30 min. If the ink was mixed with 10% hardener and the drying process takes place at room temperature, the water resistance of the ink film may be reduced. Preliminary trials are essential.

## Attention

GL 022 has a limited temperature resistance (up to 80 °C) and should, therefore, not be used for mixtures of sensitive colour shades as a colour shift may arise due to the baking process. As an equivalent substitute, a mixture of yellow and red can be used. Preliminary trials are always recommended.

For multi-colour prints, the different ink layers should be surface-dried only. The entire ink structure should be baked after the completion of the print. The ink film achieves its final adhesion and scratch resistance only 24 h after the baking process.

The times mentioned vary according to substrate, depth of cliché / mesh count, drying conditions, and the auxiliaries used. For quick printing sequences, we recommend forced air drying (about 200 °C for 2-3 sec) of the surface after each colour.

## Fade resistance

Only pigments of high fade resistance are used in the Glass Ink GL range. Please note, however, that GL is not suited for outdoor applications with direct sun irradiation or humidity contact as the epoxy resin tends to chalk and as a consequence, the shades will change their original colour soon. The pigments used are resistant to solvents and plasticizers.

## Stress resistance

After proper and thorough drying, the ink film exhibits outstanding adhesion, as well as rub, and scratch resistance. The printed ink film must be tempered for 30 min at 140 °C.

### Dish washer resistance:

- Domestic dish washer at least 300 cycles (65 °C at 130 min with customary cleaner Type B/ low alkaline detergent)
- Industrial dish washer (Winterhalter UC-L): at least 700 cycles acc. to DIN 10511

### Chemical Resistance:

- Perfume: 24 h test, G1-test
- Ethanol and glass cleansing agent: 500 DRS
- Aceton/MEK: 50 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 / 24 h

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

## Range

### Basic Shades

020	Lemon
021	Medium Yellow
022	Yellow Orange
032	Carmine Red
035	Bright Red
036	Vermilion
045	Dark Brown
055	Ultramarine Blue
057	Brilliant Blue
058	Deep Blue
064	Yellow Green
068	Brilliant Green
070	White
073	Black

### 4-Colour Process Shades Standard

429	Process Yellow
439	Process Magenta
459	Process Cyan
473	Process Black

### Transparent Shades

525	Transparent Yellow
535	Transparent Red
555	Transparent Blue
565	Transparent Green

### Press-Ready Metallics

191	Silver
192	Rich Pale Gold
193	Rich Gold

### Etch Imitation Effects

913	Milky Matt Varnish
914	Satin Transparent Varnish
915	Semi Structured Varnish

### Further Products

273	High Gloss Black
409	Transparent Base
910	Overprint Varnish

If magnets create problems with Black GL 073, please use the High-Gloss Black GL 273.

All etch imitation effects are intermixable and can be modified further in their structure and colour shade by adding the GL transparent shades (1-5 %).

The output of inks that are filled by weight may vary considerably owing to the specific density of the respective colour shade. This must be considered especially for white and mixtures with white.

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 291	High Gloss Silver	10-20%
S 292	High Gloss Rich Pale Gold	10-20%
S 293	High Gloss Rich Gold	10-20%

### Metallic Powders

S 181	Aluminium	17%
S 182	Rich Pale Gold	25%
S 183	Rich Gold	25%
S 184	Pale Gold	25%
S 186	Copper	33%
S 190	Aluminium, rub-resistant	12.5%

These Metallics are added to GL 910 in the recommended amount, whereas the addition may

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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. Due to their chemical structure, the processing time of mixtures with Pale Gold S 184 and Copper S 186 is even reduced to 4 h.

Owing to the smaller pigment size of Metallic Pastes it is possible to work with finer fabrics like 140-31 to 150-31. Owing to the bigger pigment size of Metallic Powders we recommend the use of a coarser fabric like 100-40, or a halftone cliché with a minimum depth of 25-30 µm.

Shades made of Metallic Powders are always 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

GLV	Thinner	5-10%
GLH	Hardener	5-10%
MP	Matting Powder	1-3%
SA 1	Surface Additive	0-10%
GLTPV	Thinner	
TPV 7	Thinner	
UR 3	Cleaner (flp. 42°C)	
UR 4	Cleaner (flp. 52°C)	
UR 5	Cleaner (flp. 72°C)	
AP	Antistatic Paste	
SV 1	Retarder	
SV 9	Retarder	
SV 10	Retarder	
ES	Printing Modifier	

Prior to printing, hardener must be added in the correct quantity and the mixture must be stirred homogeneously. Please see chapter ink adjustment for ratio recommendations. GLH is sensitive to humidity and is always to be stored in a sealed container.

After hardener has been added to the ink, thinner GLV (Screen Printing) or GLTPV / TPV 7 (Pad Printing) is added to the ink to adjust the printing viscosity. For slow printing sequences and fine motifs (Screen Printing), it may be necessary to add retarder SV 1 or SV 9/ SV 1 to the thinner GLV. For an additional thinning of the ink containing retarder, only pure thinner

should be used.

The addition of Surface Additive SA 1 can increase the resistance against abrasion and other mechanical stress. At the same time, it may improve the ink transfer from pad to substrate (recommended addition 3-5 %, max. 10 %).

By adding Matting Powder MP the ink film can be matted individually (preliminary trials in terms of adhesion and resistance are essential, white shades addition max. 2 %).

Printing Modifier ES / VM 1 can be used to rectify flow problems on critical substrates. If an excessive amount is added, flow problems are increased and adhesion may be reduced, especially when overprinting. The use of ES may reduce the degree of gloss.

If the colour shades 073/273/473/429 are used for overprints it is absolutely necessary to add Printing Modifier ES.

The use of ES, however, will reduce the optical density if finer mesh counts are used than recommended in chapter "Printing Parameters Screen Printing". In this case, please use Printing Modifier VM 1.

The addition of Antistatic Paste AP reduces the impact of static charge on the ink. It lowers the viscosity of the ink and non-polar components help to avoid "stringy" behaviour when printing onto non-polar substrates.

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

### Screen Printing

All types of commercially available polyester fabrics and solvent-resistant stencils can be used. For a good opacity on coloured substrates, we recommend a mesh count between 68-64 and 90-48, for printing fine details 100-40 to 120-34.

### Pad Printing

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All commercially available clichés made of ceramic, photopolymer, thin steel, and chemically hardened steel (10 mm) can be used. The recommended cliché depth is 18-21 µm.

As per our experience, all common printing pads consisting of materials cross-linked by condensation or addition can be used.

Glass Ink GL is suitable for closed ink cup systems as well as for open ink wells. Depending on type and usage of the machine, it is to accordingly adjust type and amount of the thinner used.

## 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:

- 3.5 years for basic shades 020-073 and 409-473, 273, 910-915
- 2.5 years for transp. shades 525-565
- 2 years for 191 & 193
- 1 year for 192

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 Glass Ink GL 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.

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