

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

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.

Glass Ink GL can also be processed with a spray gun, preliminary trials are, however, necessary for this process.

We recommend to filter the thinned ink (25 µm screen) before processing, as otherwise there could be bubbles in the ink film.

Printing Conditions

Ideal printing conditions include a room temperature of 20-25° C and 45-60% humidity. 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.

Characteristics

Ink adjustment

Before the ink is printed, it is essential to add Hardener GLH in the correct quantity. This ink/hardener mixture must be stirred homogeneously and adjusted to the right printing viscosity by adding thinner and/or retarder in a correct quantity (stir again). This will slow down the immediately occurring hardening reaction taking thus the pot life to acceptable values. 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

Glass Ink GL



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.

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.

Pot life (processing period)

The pot life of the ink/hardener mixture is chemically reactive and can only be processed within a few hours. Higher temperatures reduce pot life.

Room temperature 20°C:

5% hardener GLH	12h pot life
10% hardener GLH	6h pot life

Room temperature 30°C:

5% hardener GLH	8h pot life
10% hardener GLH	4h pot life

If the room temperature (>30° C) or the mentioned times are exceeded, the ink's adhesion and chemical resistance may be reduced even if the ink is still fluid and therefore 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 5-12µ)

Extent of drying	temperature	time
touch-dry:	20°C	approx. 30 min
ready for overprinting:	20°C	approx. 50 min
final hardness	20°C	approx. 4-6 days
	140°C	approx. 30 min

Pad Printing:

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 (dish-washer, 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.

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 hours after the baking process.

The processing and curing temperature should not be lower than 15° C within the first 12 hours as irreversible damage can occur.

Also avoid high humidity for several hours after printing as the hardener is sensitive to humidity. After the print, until the hardening of the ink film, high air humidity (>60%) or direct contact with water (rain) must be prevented categorically for otherwise the linkage between the ink and the substrate will be impaired significantly.

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.

Glass Ink GL



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. If 10% hardener is added and the finished print is baked at 140° C / 30 min., the ink film will withstand 300 household dishwasher cycles (65° C main program, with customary cleaner Type B/ low alkaline detergent).

The chemical resistance against MEK and alcohol will withstand 50 double rub strokes (450g) after thorough drying (140° C, 30min.). For higher demands to rub-resistance (dry abrasion), we recommend to overcoat with Overprint Varnish GL 910 or Marapoly P 910.

Bright colour shades such as 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 (Yellow)
439	Process Red (Magenta)
459	Process Blue (Cyan)
473	Process Black (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
914	satin-gloss, transparent
915	semi-structured

Further products

273	High-Gloss Black
409	Transparent Base
910	Overprint Varnish / Bronze Binder

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

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-Color Manager software.

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 %).

Metallics

Various bronze pastes are available which can be mixed with GL 910. They can be chosen according to the required opacity, cost limit, visual impression, and curing characteristics. Due to the bigger pigment size of bronze powders, we recommend a coarser fabric like for example 100-40.

Bronze powders

S 181	Aluminium	6:1
S 182	Rich Pale Gold	4:1
S 183	Rich Gold	4:1
S 184	Pale Gold	4:1
S 186	Copper	3:1
S 190	Aluminium, rub-resistant	8:1

Bronze mixtures cannot be put into storage for later use. Therefore, prepare fresh mixes daily (to be processed within 8 h). 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.

All figures in brackets are guidelines which can be varied according to opacity and ink price. The ratio figures in brackets refer to the mixture Overprint Varnish 910 to bronzes whereas the first figure is standing for the parts by weight of Overprint Varnish 910.

Bronze shades are always subject to an increased abrasion which can only be reduced by an appropriate over-varnishing with GL 910.

High-Gloss Bronzes

S 291	High-gloss Silver	5:1-10:1
S 292	High-gloss Rich Pale Gold	5:1-10:1
S 293	High-gloss Pale Gold	5:1-10:1

Owing to the smaller pigment size of Metallic Pastes it is possible to work with finer fabrics like 140-31 to 150-31.

Auxiliaries

GLH	Hardener	5-10 %
GLV	Thinner	5-10 %
MP	Matting Powder	1-3 %
ES	Printing Modifier	0-1%
VM 1	Levelling Agent	0-1%
GLTPV	Spray Thinner	
TPV 7	Thinner	
SV 1	Retarder	
SV 9	Retarder, slow	
SV 10	Retarder, medium	
AP	Antistatic Paste	
UR 3	Cleaner (Flp. 42°C)	
UR 4	Cleaner (Flp. 52°C)	
UR 5	Cleaner (Flp. 78°C)	

Shortly before use, the hardener should be stirred into the ink. 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 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. For an additional thinning of the ink containing retarder, only pure thinner should be used.

By adding Matting Powder MP the ink film can be matted individually (preliminary trials in terms of adhesion and resistance are essential).

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 (max. 15 %) 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 plastics.

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

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.

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 selection and testing of the ink for specific application is exclusively your responsibility.

Should, however, any liability claims arise, they shall be limited to the value of the goods delivered by us and utilized by you with respect to any and all damages not caused intentionally or by gross negligence.

Labelling

For Glass Ink GL and its additives and 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 the present EEC regulations as to health and safety labelling requirements. Such health and safety data may also be derived from the respective label.