Mara® *Shield* Liquid Coatings

Marabu

UV-curable Liquid Coatings for roller-coating onto various substrates

Suitable for diverse applications, matt/ glossy, high mechanical and chemical resistance

Vers. 3
2015
01. Jul

Field of Application

Acting as a primer, finishing or protection, Mara® *Shield* UV-curable Liquid Coatings are applied in a roller-coating process, utilizing either a smooth or grooved applying roller to coat the substrate.

Substrates

Information on coating digital prints
UV-PGL is fully compatible with Marabu's Digital Printing Inks DUV-R and DUV-H. The Liquid Coatings UV-RG/-RM, UV-FXG/-FXM, and UV-CBG are, however, fully compatible with Marabu's solvent based and UV-curable Digital Printing Inks. It is fundamental to ensure good adhesion of the Digital Printing Inks to the substrate.
If you want to coat digital prints please make sure that inks for rigid substrates have been used, since they are chemically resistant to the Anti-Graffiti formulation. So-called "Hybrid-inks" are not compatible with Mara® *Shield* UV-AG.

Glass
The UV-Primer Mara® *Shield* UV-PGL is suitable for roller-coating (priming) onto flat glass.
UV-curable Digital Printing Inks often fail to adhere to glass. Sufficient adhesion is provided by roller-coating the glass panes with primer UV-PGL.
In order to achieve additional protection for high-quality products and/or an even degree of gloss, the motive can be overprinted edge-to-edge with UV-PGL.

Rigid substrates
UV-RG and UV-RM are suitable for roller-coating onto the below mentioned rigid substrates:

- Rigid PVC (including foamed PVC)
- Polystyrene (PS, ABS)
- Polycarbonate (PC)
- Polyester (PET-G)
- Various wood / plywood materials
- Aluminium composite panels (Dibond®)
- Cardboard, corrugated board

The UV-curable Liquid Coating Mara® *Shield* UV-AG is suitable for roller-coating onto the below mentioned rigid substrates:

- Rigid PVC
- ABS
- Polycarbonate (PC)
- Polyester (PET-G)
- Aluminium composite panels (Dibond®)

This Liquid Coating is basically a protective barrier against soiling, scribblings, or graffiti, which can be removed easily e.g. in public areas or transportation.

Tested markers / sprays:
- Marabu Do-It colour spray
- Edding 3000 – Permanent marker
- Edding 400 – Permanent marker
- Soennecken -Permanent marker
- Schneider 230 Permanent marker
- Staedler – Lumicolor permanent

Tested Cleaners /Removers:
- Isopropyl alcohol (IPA)
- 3M Graffiti Remover System®

Flexible substrates
UV-FXG and UV-FXM are suitable for roller-coating onto the following flexible substrates:

- Self adhesive PVC foils
- Tarpaulin materials (plasticised PVC)

UV-RG/-RM and UV-FXG/-FXM were designed as a protective overcoat for digital prints.

Cardboard Materials
UV-CBG is available for roller-coating onto these substrates:

Marabu GmbH & Co. KG • Phone +49 7141 6910 • info@marabu-inks.com • www.marabu-inks.com

Mara® *Shield* Liquid Coatings

- Cardboard, corrugated board
- Reboard® material

UV-CBG is suitable for roller-coating onto digital or screen prints on cardboard materials. These applications include e.g. displays, a variety of interior design objects made of Reboard® materials, and printed packaging. Owing to its slight flexibility, UV-CBG is also suitable for post processing steps such as folding or cutting.

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

For best results if coating/primering onto Float Glass, it is recommended to coat the fire side and not the tin side; easily determinable with tin side detectors.

For a good adhesion, a uniform surface tension of the substrate with > 44 mN/m is generally important. Furthermore, the glass surface must absolutely be free from graphite, silicone, dust or residues like grease or similar (e.g. fingerprints). Pre-cleaning with an appropriate glass cleaner and post-cleaning with demineralised water is recommended.

A pre-treatment of the glass by flaming immediately before printing will generally enhance the adhesion of the Primer to the substrate.
The glass pane is ready to be digitally printed onto directly after priming and UV-curing.
The UV-Primer UV-PGL is silicone-free and must therefore not come into contact with products which contain silicone. Prior to changing from a product containing silicone to a silicone-free product, the machine must be cleaned completely with utmost care.

Ink Adjustment

UV-RG/-RM, UV-FXG/-FXM, UV-CBG and UV-AG are press-ready but should be stirred homogeneously before use.

UV-PGL must be mixed homogeneously with Adhesion Modifier UV-HV8 prior to processing.
Addition: 2% parts of weight

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° C and 50% 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

Digital Prints
If digital prints are coated, you are obliged to conduct your own preliminary trials to confirm the compatibility for the intended use.
We recommend regular maintenance of the UV lamps of the Digital Printer and Roller Coater.
Digital prints must be fully cured before coating in order to avoid staining the applying roller.

According to our test results, the following time-frame must be kept for post-curing at room temperature (22°C and 55% rF):
Rigid UV-ink: at least 24h
Hybrid/flexible UV-ink: 3-4 days

Coating the Digital prints immediately is only possible if the curing process was fully completed by an additional UV curing process. In general, please allow solvent-based prints to dry for 24h before coating.

Liquid Coatings
A UV-curing unit with one or two medium-pressure mercury lamps (80-120 W/cm) cures Mara® *Shield* Liquid Coatings at a belt speed of 5 to 20 m/min. Coating dark surfaces generally requires more UV power (coverage 250-400%) than light coloured substrates.
Mara® *Shield* Liquid Coatings are slightly post-curing coatings. The ink film (Primer or Varnish + Digital print) has to withstand a cross-cut tape test after the UV-curing process and having cooled down to room temperature.

Marabu GmbH & Co. KG • Phone +49 7141 6910 • info@marabu-inks.com • www.marabu-inks.com

Mara® *Shield* Liquid Coatings

Mara® *Shield* Liquid Coatings achieve their final chemical resistance after 24 hours.

If UV-PGL is applied onto glass, this timeframe may be reduced as follows:
Oven (140°C/ 30 min.): after having cooled down
IR Flow Dryer (e.g.140°C/ 30 sec.): 8 h

The curing speed is generally dependant upon the kind of UV-curing unit (reflectors), number, age, and power of the UV-lamps, the layer thickness, substrate in use, as well as belt speed of the UV-curing unit.

Fade resistance

UV-PGL is suited for a limited outdoor use of up to 3 months.

Mara® *Shield* UV-RG /-RM, UV-FXG/-FXM and UV-AG are suitable for outdoor exposure of up to 3 years, referred to the middle European climate. The fade resistance of the finished product, however, also depends on the digital printing ink and the substrate used.

UV-CBG is intended for indoor use only.

Stress resistance

All Mara® *Shield* Liquid Coatings are resistant against water and also very resistant against alcohol-based customary cleaners. The chemical and mechanical resistance increases with the thickness of the layer. UV-AG is also very resistant against paint and graffiti.

Range

UV-AG	Anti-Graffiti
UV-CBG	Cardboard Gloss
UV-FXG	Flexible Gloss
UV-FXM	Flexible Matt
UV-PGL	Primer f. Glass
UV-RG	Rigid Gloss
UV-RM	Rigid Matt

	GU	Angle
UV-AG Anti Graffiti Varnish	85	60°
UV-CBG Gloss Varnish for cardboard	75	60°
UV-FXG Gloss Varnish for flexible substrates	85	60°
UV-FXM Matt Varnish for flexible substrates	10	60°
UV-PGL Gloss Varnish / Primer for Glass	80	60°
UV-RG Gloss Varnish for rigid substrates	80	60°
UV-RM Matt varnish for rigid substrates	10	85°

GU = Gloss Units

Auxiliaries

UV-HV 8	Adhesion Modifier, for UV-PGL	2%
UVV 1	Thinner	1-5%
UR 3	Cleaner (flp. 42°C)	
UR 4	Cleaner (flp. 52°C)	
UR 5	Cleaner (flp. 72°C)	

UV-HV 8 must be added to UV-PGL prior to printing.

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.
The addition of thinner, however, particularly influences the matt degree of UV-RM and UV-

Marabu GmbH & Co. KG • Phone +49 7141 6910 • info@marabu-inks.com • www.marabu-inks.com

Mara® *Shield* Liquid Coatings

FXM, and decreases the flexibility of UV-CBG (cutting, folding).

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

Roller Coater Settings
Variable parameters like the speed of the applying, transport, and doctor roller, as well as the regulation of the dosing unit must be adjusted individually dependant upon the application and the speed of production.
A speed ratio of 4:1 between applying roller and doctor roller is recommendable. Please refer to the machine manual for further details.
The viscosity of the Mara® *Shield* Liquid Coatings is attuned to common roller coater machines. Mara® *Shield* Liquid Coatings achieve their desired viscosity in the roller-coater after a lead time of 5 minutes prior to the start of production.

Layer thickness
The thickness of the layer can be influenced by various machine parameters such as the choice of applying roller (smooth or grooved), the regulation of the dosing unit, the roller pressure and the belt speed. In general, the chemical and mechanical resistance is dependant upon the layer thickness. Using UV-PGL as a primer, a layer thickness from 3 to max. 10µm, applied with either a smooth or a finely grooved roller has proved to be suitable. UV-RG/UV-RM, UV-FXG/-FXM, UV-CBG and UV-AG deliver best results using a grooved applying roller and a layer thickness of 15 to 25µm.
If UV-PGL is used for finishing/protection, a layer thickness of 15-25µm is recommendable.

Shelf Life

Shelf life is 2 years for an unopened ink container if stored in a dark room at a temperature of 15-25°C. The ambient temperature may fall below this value only once for max. 2-3 days. Under different conditions, particularly other 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 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 Mara® *Shield* Liquid Coatings and the 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.

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.

Marabu GmbH & Co. KG • Phone +49 7141 6910 • info@marabu-inks.com • www.marabu-inks.com