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Technical
Data Sheet

Marabu

Mara® *Shield* Liquid Coatings

UV-curable Liquid Coatings for roller-coating
onto various substrates. Suitable for diverse
applications, matt/glossy, high mechanical
and chemical resistance

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

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/RM and UV-RGX/-RMX 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-PMMA170 is specially developed for superior adhesion on Plexiglas/PMM.

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 rollercoating onto the following flexible substrates:

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

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

Ink properties

For best results of 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-RGX/-RMX, UV-FXG/-FXM, UV-PMMA170 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.

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.

Curing

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 postcuring coatings. The ink film (Primer or Varnish + Digital print) has to withstand

a crosscut tape test after the UV-curing process and having cooled down to room temperature. **Mara® *Shield* Liquid Coatings** achieve their final chemical resistance and adhesion after 24 hours.

If **UV-PGL** is applied onto glass, this time frame 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 dependent 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

Mara® Shield UV-RG, UV-RGX, UV-FXG, and UV-AG are suitable for outdoor use for up to 3 years in the temperate Central European climate. The outdoor durability of the final product also depends on the digital printing ink and substrate used.

UV-PGL and UV-PMMA170 are suitable for outdoor applications for up to 3 months.

UV-RM, UV-RMX, and UV-FXM are primarily designed for indoor use. When used outdoors, only limited durability can be expected.

Range

- UV-AG Anti-Graffiti
- UV-FXG Flexible Gloss
- UV-FXM Flexible Matt
- UV-PGL Primer f. Glass
- UV-RG Rigid Gloss
- UV-RM Rigid Matt
- UV-RGX Rigid Gloss Anti Ghosting
- UV-RMX Rigid Matt Anti Ghosting
- UV-PMMA170 PMMA white

	GE	MW	
UV-AG Anti Graffiti Varnish	85	60°	
UV-FXG Gloss Varnish for flexible substrates	85	60°	
UV-FXM Matt Varnish for flexible substrates	35	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	35	60°	
UV-RGX Gloss Varnish for rigid Substrates Ghosting	85	60°	
UV-RMX Matt Varnish for rigid Substrates Ghosting	50	60°	

GU = Gloss Units

Auxiliaries

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

Adhesion promoter 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 crosslinked matrix when UV-cured and may slightly change the inherent odor of the printed and cured ink film. The addition of thinner, however, particularly influences the matt degree of UV-RM, UV-RMX and UV-FXM.

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.

Shelf Life

The shelf life for an unopened ink container if stored in a dark room at a temperature of 15 - 25°C is:

- 2 years for all standard products
- 1 year for UV-RMX, UV-RM, UV-FXM
- 9 months for UV-PMMA170

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 will be reduced. In such cases, the warranty given by Marabu expires.

Printing Parameter

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 dependent 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 dependent 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-PMMA170 and UV-AG deliver the 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.

Note

Our technical advice whether spoken, written, or through test trials corresponds to our current knowledge to inform about our products and their purpose. This is not meant as an assurance for certain properties of the products nor their suitability for each application.
Therefore, you are 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.

Labeling

For Mara® *Shield* Liquid Coatings 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 on safety data sheets.

Marabu – Colors made for life

- Certification to international standards ISO 9001, 14001
- Leading-edge research and development enables us to design innovative products to meet the very latest real-world challenges of our customers
- Corporate responsibility – particularly environmental protection – is at the heart of our business. We have underlined this commitment by creating a dedicated department for product and environmental safety
- We systematically reduce hazardous substances in our products, making our standards among the highest in the industry
- Our international service and support network of subsidiaries and partners offers assistance and advice wherever you are

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