

**UV-curable screen printing ink for rigid PVC, polystyrene, pre-treated polyethylene (PE) and polypropylene (PP), coated substrates, metals, and glass**

**High gloss, fast curing, good opacity, very high chemical resistance, versatile applications**

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## Field of Application

### Substrates

Ultra *Plus* UVP is suited for the following substrates:

- pretreated PE and PP
- powder and wet-coated substrates
- metals
- glass (decorative indoor use without influence of humidity)
- rigid PVC, polystyrene
- ABS/SAN
- PETG/PETA
- PC
- self-adhesive PVC film
- PMMA

Before printing onto PE and PP, please keep in mind that the substrate surface must be pretreated by flaming. By this process, the surface tension will rise and from 48 – 54 mN/m, a very good adhesion is possible. The surface treatment can be tested by appropriate test inks or a water test where a wetted bottle must hold the closed water film for about 20 sec. Furthermore, the substrate surface must be absolutely free of disturbing residues such as grease, oil, and finger sweat.

With the adequate additives and auxiliaries, UVP adheres to some metals, such as e. g. aluminium or strip steel, and to glass.

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

The Ultra *Plus* UVP is used for container printing, as well as graphical and industrial screen printing where most critical substrates (for UV

inks) are used or if highest resistances to chemicals and high-gloss are demanded. In this case, UVP may also be used on self-adhesive foils.

Adhesion of Ultra *Plus* UVP is very good on PVC, however, please keep in mind the material embrittlement of PVC in general (we always recommend preliminary trials!).

On die-cast parts of polystyrene, e.g. lipstick cases, you can achieve good adhesion as well.

This ink series is not suitable for direct food contact nor for printing on food contact materials as substances contained in the formulation or introduced by contamination may migrate under certain conditions. Materials that constitute a natural migration barrier are excluded.

If this ink series is nevertheless used for printing on permeable food contact materials, the manufacturer of the printed product is responsible for ensuring that its products comply with legal or industry-specific requirements.

For printing on permeable food contact materials (= without appropriate migration barrier), we recommend our specially designed Ultra Pack UVFP / Tampa® RotaSpeed TPHF.

## Characteristics

All Ultra *Plus* UVP colour shades are brilliant at high gloss and best possible opacity. Ultra *Plus* UVP has a hard cross-linking and will therefore brittle in case of highest chemical and mechanical resistances. Owing to this, UVP is hardly formable and cannot be moulded. If you want to cut and punch in the printed ink film, preliminary trials are essential.

### Ink Adjustment

#### Recommendation

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

Due to the various substrates and different printing machines, printing speeds and UV dry-

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ing units existing in the market, UVP can be modified with various additives in its reactivity, viscosity, and adhesion characteristics.

## Drying

Ultra Plus UVP is a fast curing UV ink. A UV curing unit with two medium pressure Mercury Vapour Lamps (capacity 80 - 120 W/cm) or one lamp (capacity 150 - 180 W/cm) is curing UVP at a belt speed of 10 - 20 m/min or 4800 passes/h. Opaque White UVP 170 and Opaque Black UVP 180 are drying more slowly (approx. 15 m/min) due to their high amount of pigments.

The curing speed of the ink is generally dependent upon the kind of UV-curing unit (reflectors), number, age, and power of the UV-lamps, the printed ink film thickness, colour shade, substrate in use, as well as the printing speed.

Ultra Plus UVP is a post-curing UV ink which will achieve its final adhesion and resistances after 24 hours. The ink film should pass a cross-cut tape test after having cooled down to room temperature. After 24 hours, the printed ink film achieves its maximum resistance to fillers and water as well as rub resistance.

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.

Please make sure that waste prints are also completely cured, otherwise they are subject to the same disposal rules as liquid ink residues (hazardous waste).

## Fade resistance

Pigments of medium to good fade resistance are used for all Ultra Plus UVP shades. Therefore, the prints are suitable for indoor and limited outdoor use for up to one year in Central European climate.

For shades mixed by adding a high percentage (> 20 %) of white or varnish, we recommend an overcoat with our Special Binder UVP 904.

## Stress resistance

After proper and thorough drying, the ink film exhibits outstanding adhesion as well as rub, scratch, and block resistance and is highly resistant to solvents (see DIN 16 524), alcohol (Ethanol 99.8 %), finger sweat, battery acid, and other usual fillers. The resistance to water can be increased by adding Adhesion Modifier UV-HV 4 or UV-HV 7 (according to the kind of drying).

## 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

### High Opaque Shades

170	Opaque White
180	Opaque Black

### Further Products

904	Special Binder
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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.

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## Metallics

### Metallic Pastes

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%

### Metallic Powders

S 181	Aluminium	17%
S 182	Rich Pale Gold	20%
S 183	Rich Gold	20%
S 184	Pale Gold	20%
S 186	Copper	25%
S 190	Aluminium, rub-resistant	17%

These metallics are added to UVP 904 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. 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 larger pigment size of Metallic Powders we recommend the use of a coarser fabric like 100-40.

All metallic shades are displayed in the Marabu "Screen Printing Metallics" colour chart.

## Auxiliaries

UV-HV 7	Adhesion Modifier	1.5-10%
UVV 2	Thinner	1-10%
UV-B1	UV Accelerator	1-2%
UV-HV 4	Adhesion Modifier	0.5-4%
STM	Thickening Agent	0.5-2%
UV-HV 1	Adhesion Modifier	0.5-2%
UV-VM	Levelling Agent	0.5-1.5%
UR 3	Cleaner (flp. 42°C)	
UR 4	Cleaner (flp. 52°C)	
UR 5	Cleaner (flp. 72°C)	

UV-HV 7 is suited for printing on glass. Subsequent heat-forced drying at 160°C for 30 min is very important. Pot life of the ink/hardener mixture is at least 8 h.

UV-HV 7 can also be used on other substrates such as metals or plastics. Preliminary trials are essential.

Colour shades, Black: 1.5 % parts by weight  
White, Special Binder: 10 % parts by weight

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.

UV-B 1 accelerates the curing speed if necessary and may increase the adhesion to the substrate owing to a better depth curing.

UV-HV 4 (white shades max. 2 %) improves the adhesion on highly cross-linked substrates or when over-printing overcured colour shades. The best possible adhesion and scratch resistance is achieved after 12 - 24 h (preliminary trials are necessary!).

UV-HV 4 must be stirred well into the ink. Ink mixtures with UV-HV 4 are not storable, so we recommend to prepare mixtures which can be processed within 2-4 h.

The Thickening Agent STM enhances the ink's viscosity without significantly influencing the degree of gloss. Please stir well, the use of an automatic mixing machine is recommended.

UV-HV 1 may be added to rectify adhesion problems on substrates like coated papers, paperboards like "Chromolux", or metals. UV-HV 1 is not suited for applications on plastic. It must be stirred well into the ink. Ink mixtures with UV-HV 1 are not storable, so we recommend to prepare mixtures which can be processed within 8 h.

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. An excessive amount may reduce the ink's adhesion when overprinting. UV-VM must be stirred homogeneously before printing.

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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

Selection of fabric depends on the printing conditions, the desired curing speed and yield as well as the required opacity. Generally, you can use all fabrics from 120-34 to 180-27 threads. Generally, a high even stretching of the fabric (> 16 N) is important allowing a smooth ink application. For UV inks, all commercially available capillary films (15-20 µm) or solvent resistant photo emulsions and combined stencils can be used.

## Shelf Life

Shelf life depends very much on the formula/reactivity of the ink system as well as the storage temperature.

It is 1 year for an unopened ink container if stored in a dark room at a temperature of 15-25°C. 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 selec-

tion 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 *Plus* UVP 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.