

# Printing of Polyester Sheet Materials

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Polyester is increasingly used as an alternative substrate to PMMA and PC. Due to the growing popularity, a detailed presentation about this material and its possibilities within screen printing is provided below.

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## 1.0 The Substrate „Polyester“

PET is a thermoplastic synthetic material which is produced via a polycondensation process. Terephthalic acid and ethylene glycol are the original media for condensation. The linear and saturated compound arising from them is called polyethyleneterephthalate (PET), shortly polyester.

### 1.1 Polyester Types

There are four different structures of polyester:

- amorphous, glycol-modified copolymers with an increased impact resistance (PETG)
- HT (High Temperature) co-polyester
- amorphous PET (PETA)
- crystallizing PET (C-PET)

By modifying the PETA variant with glycol, the crystallite melting point of polyester is strongly increased and a non-crystallizing PETG material is originated. Compared to PETA, PETG displays an excellent vacuum formability (no white colouring) as well as an enhanced impact resistance.

With HT (High Temperature) copolyester, a modified and improved PETG material is the basis, but with an increased temperature and thermoforming resistance, as well as a reduced risk of crazing.

Polyester materials mainly used are transparent but coloured variations also exist.

### 1.2 Fields of Application

As with PMMA (acrylic glass) and PC (polycarbonate), polyester sheets are frequently used for advertisement signage as well as other industrial applications but also for construction sites. Typical products which are printed and subsequently vacuum-formed include backlit signage, sales displays, bicycle helmets, soft-drink dispensers, and many more.



## 1.3 Manufacturers' Arguments in Favour of PET

- High impact resistance (higher than PMMA but lower than PC)
- High resistance to temperatures (up to 90°C) for HT-PETG (higher than PMMA, PETG, PETA, but lower than PC)
- Best fire-resistant classification (B1 and/or B2), better than PMMA and PC
- Lower forming temperatures compared to PMMA and PC, therefore reduced energy needs
- High chemical resistance

## 1.4 Trade Names

There are sheets available with thicknesses ranging from 1 to 10 mm. Opaque and coloured variations are also offered. The following list of materials is not claimed to be complete and is sorted in alphabetical order.

### PETG (transparent)

COPOL	Quinn-Plastics
Quinn PETG	Quinn-Plastics
Quinn PETG UV	Quinn-Plastics
Simolux	Simona
Simolux UV	Simona
Veralite 200	I.P.B.
Veralite 202	I.P.B.
VIVAK,	Bayer Polymer
VIVAK UV	Bayer Polymer

### HT (high temperature)-PETG

Spectar HT	Quinn-Plastics
Spectar HT-UV	Quinn-Plastics
VIVAK HT	Bayer Polymer
VIVAK HT UV	Bayer Polymer

### PETA (transparent)

AXPET	Bayer Polymer
Hostaglas	Bay Plastics Ltd.
Veralite 100	I.P.B.

## 2.0 The Screen Printing Ink

Generally, solvent-based as well as UV-curable ink systems can be used successfully for printing onto all types of polyester.

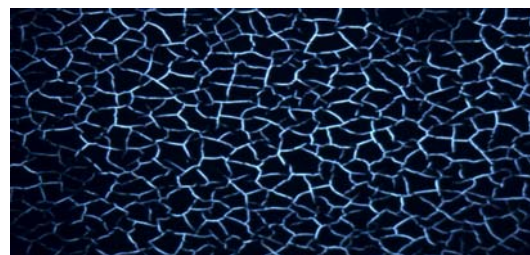
### 2.1 Requirements on the Screen Ink

- no crazing of the printed ink film
- good forming and deep-drawing properties
- highly fade-resistant colour shades suited for long-term outdoor use
- high opacity
- lowest possible effect of the ink on the substrate regarding impact resistance
- high mechanical and chemical resistances
- excellent mesh opening, important for slow printing sequences in the case of large format printing.

### 2.2 Tips for Printing onto PET

It must be emphasized that it is not easy to print onto polyester material (in particular onto PETG and PETA) since crazing of the ink may arise (even after several days), and/or the adhesion may be insufficient if the ink selection was not correct. It is therefore critical to choose the right ink system carefully as well as to pay attention to the following criteria:

- White shades and mixtures with white are most critical (high pigmentation reduces flexibility)
- thick ink films (coarse fabrics < 77 or multi-layered prints) will likely lead to problems such as crazing
- if drying is carried out in a tunnel dryer immediately after printing, the risk of crazing will be reduced to a minimum and impact resistance will be best.
- Selection of a suitable thinner/ retarder such as PSV, SV 1, or SV 5 e. g.



## 2.3 Marabu Ink Recommendations

The customer's job requirements are decisive in defining the correct ink type. At present, we can recommend the following ink types for different requirements. On the right hand side, you will find the recommended backing white:

### PETG

#### 1) 1-c solvent-based/ basic shades

Tunnel drying or rack drying

- Maraflex FX White: FX 970
- Maragloss GO White: FX 970
- GO mixtures with white FX 970
- Maramold MPC White: MPC 970

#### 2) 1-c solvent-based/ basic shades

Only suited for **direct** tunnel drying

- Libraprint LIP White: LIP 971 \*
- Maraswitch MSW White: MSW 970 \*\*

\* LIP 971 will achieve its best tape adhesion only after the vacuum-forming process

\*\* We recommend to add 2% WM 1 to MSW 970

If LIP is used, we recommend LIP 971 for mixtures with white. In the case of black or mixtures with black, please use LIP 488 instead of LIP 980.

#### 3) 1-c solvent-based/ 4-clr. process shades

- Libraprint LIP 4x8 set White: LIP 971 \*  
(vacuum-formable) and FX 970

\*\* LIP 971 will achieve its best tape adhesion only after the vacuum-forming process

#### 4) 2-c solvent-based/ basic shades

- Marastar SR : H 1 = 8 : 1
- Marapoly P : H 1 = 8 : 1

#### 5) UV-curable/ basic and 4-clr. process shades

- Ultraform UVFM (vacuum-formable)
- Ultragraph UVAR
- Ultragraph UVGR (only for indoor use)

### PETA

#### 1) 1-c solvent-based/ basic shades

- Maraflex FX White: FX 970
- Maragloss GO White: FX 970
- GO mixtures with white FX 970
- Maramold MPC White: MPC 970

#### 2) 1-c solvent-based/ 4-clr. process shades

- Libraprint LIP 4x8 set White: FX 970

#### 3) 2-c solvent-based/ basic shades

- Marastar SR : H 1 = 8 : 1
- Marapoly P : H 1 = 8 : 1

#### 4) UV-curable/ basic and 4-clr. process sh.

- Ultraplus UVP + 2% UV HV 4
- Ultrastar M-UVSM + 2% UV HV 4

### HT PETG

#### 1) 1-c solvent-based/ basic shades

- Maragloss GO White: FX 970
- Maramold MPC White: MPC 970
- Libraprint LIP White: LIP 970, 971
- Libragloss LIG White: LIG 070
- Libraspeed LIS White: LIS 070, 971
- Marastar SR White: SR 070, 270
- Maraswitch MSW White: MSW 970

#### 2) 1-c solvent-based/ 4-clr. process shades

- Libraprint LIP 4x8 White: LIP 970  
and 4x9 sets and LIP 971
- Libraspeed LIS 4x8 White: LIS 970  
and 4x9 sets and LIS 971
- Libragloss LIG White: LIG 070

#### 3) 2-c solvent-based/ basic shades

- Marastar SR : H 1 = 8 : 1
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#### 4) UV-curable/ basic and 4-clr. process sh.

- Ultraform UVFM (vacuum-formable)
- Ultragraph UVAR
- Ultragraph UVGR (only for indoor use)

### 3.1 Fade Resistance

Printed display panels are often destined to a medium-term or long-term outdoor use. Please note, therefore, that not all colour shades of the recommended ink series are highly fade-resistant.

Especially for the critical colour ranges of yellow, orange, and red, Libraspeed LIS and Marastar SR have a clear advantage thanks to their highly fade-resistant basic shades. In special cases, it is to align the customer's requirements with the characteristics of the ink used.

For more information, please refer to the technical data sheet of the corresponding ink series.

### 3.2 Foot Note

The information given in this TechINFO has been compiled as to the best of our knowledge and proven successful in practice for many years. Nevertheless, prior to the start of the actual print run, it is an obligation to verify and document all details and recommendations relating to the printing conditions (printing features, drying, vacuum-forming, post-processing) as well as to the substrate in use.

Please pay particular attention to crazing which can also arise (especially on PETG) a couple of days after printing.

Further details can be seen from our technical data sheets. In the case of any questions, please feel free to contact us, our AWETA team is always pleased to help you.