Preliminary Technical Information
6/2010

Test Product

Mirror Ink M3

Mirror Ink M3 – Silver, **improved climatic resistance**

Mirror Ink M3 is a solvent-based metallic screen printing ink to create mirror-like or SLC (surface like chrome) effects on various clear transparent plastic films or glass, when printing on the reverse side of the materials (back printing).

Features / Advantages	• press ready • good adhesion to PC, PET films and glass • good printing properties and easy processing • improved stability to humidity • high gloss
Substrate	**Excellent mirror effects can only be achieved on high gloss, transparent substrates (both substrate sides).**
Auxiliaries	Mirror Ink M3 is press ready. If thinning is necessary, **Thinner 6401** can be added. For printing on glass: Glass Hardener GC (0.5 – 1 %)
Mesh	Depending on the graphics to be printed, the printing sequence, and the percentage of thinning, a mesh count ranging from 77 to 150 threads/cm (195 to 380 threads/inch) is recommended.
Printing Usage	**Stir well before each use!** **Caution!!** **Even minimal residues of silicone oils (components of defoamers and screen inks) will cause fish-eyes and pinholes. Take care to use absolutely clean equipment for preparation of the printing mixtures along with well degreased fabrics for the printing process.**

Squeegee 65° to 75° Shore A

Drying The gloss level of Mirror Ink M3 depends on drying conditions as well as on the substrate and its surface quality.

To achieve a high quality mirror reflection, it is necessary to remove virtually all solvents and use an optimized drying process.

Jet drying of PC and PET films (EBG 180L):

1st section 50 °C (122 °F), 2nd section 80 °C (176 °F), 3rd section fresh air.

To improve the stabilization of the printed ink film, further drying at 80 to 90 °C (176 to 194 °F) for 30 min. is strongly recommended.

Jet drying of PMMA films (99524 by Röhm Evonik; printing side = side with blue protective film) and transparent rigid PVC:

1st section 50 °C (122 °F), 2nd section 50 °C (122 °F), 3rd section fresh air.

Subsequent drying in a well ventilated oven at 50 °C (122 °F) for 60 min. is necessary to further stabilize the printed ink layers. Prints on PMMA or rigid PVC do not pass the tape test.

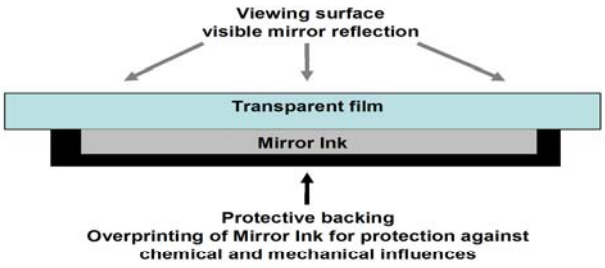
Jet drying of glass:

1st section 50 °C (122 °F), 2nd section 80 °C (176 °F), 3rd section fresh air.

Subsequent baking for 20 to 30 min. at 120 to 160 °C (248 to 320 °F) is necessary.

Cleaning Thinner 6401

Overprinting of Mirror Ink M3 For protection against mechanical or chemical damage (scratches or corrosion) it is recommended to overprint the Mirror Ink M3 layer. Residues of finger prints will considerably reduce the resistance of the mirror layer to climatic influences considerably.



Further reasons for overprinting:

- Improved formability of the mirror layer (see section "Forming").
- Increased adhesion to the backmolded resin.

Depending on the substrate, the following overprinting inks (adhesion promoters, screen printing inks) can be used:

- PC and PMMA films (solvent sensitive substrates):
  - **no further processing steps of the printed films:**
    on PMMA: Norifin® PP N
    on PC: NORIPHAN® XWR
  - **further IMD processing, forming and backmolding:**
    on PMMA or PC: AquaPress® ME or AquaPress® M1 White

  Provided that the mirror layer, printed on PC, is optimally dried, the IMD ink systems NORIPHAN® N2K or NORIPHAN® XWR are suitable for backprinting as well. In this case, immediate drying is mandatory.

  Note:
  NORIPHAN® N2K and NORIPHAN® XWR are not suitable for PMMA!

  If ventilation is not adequate, NORIPHAN® N2K or NORIPHAN® XWR will dry too slowly and the mirror may become dull.

- PET films (substrates not sensitive to solvents):
  NoriPET®, NORIPHAN® N2K, NORIPHAN® XWR

- Glass:
  Noritemp GC

For further information on the ink systems mentioned, please see the respective Technical Information Sheets, which can be downloaded from www.proell.de.

Note:

The mirror effect will be impaired if unsuitable solvent-based inks and thinners are used or drying conditions are unfavorable. Pre-tests are necessary!

The user is responsible for climate tests which are required when using Mirror Ink M3 for middle or long-term exterior applications.

Proell climatic test with Mirror Ink M3:

252 h / 60 °C (140 °F) / 95 % rel. humidity: only minor damage to mirror finish.

Printing conditions:

Mesh: 100-40 th/cm (255 th/in)
Film: Makrofol® DE 1-1, 250 µm
Drying: 30 min. at 90 °C (194 °F)

Hints for Processing AquaPress® for Overprinting Mirror Ink M3

AquaPress® ME or AquaPress® M1 White:
See corresponding Technical Information.

Addition of 2 % AquaPress® Hardener L 49858 is necessary!

Drying of AquaPress® layers:
3 h at 90 °C (194 °F) to prevent AquaPress® from sticking to forming tool.

Recommended forming tool temperatures:
AquaPress® ME: 100 °C (212 °F) maximum
AquaPress® M1: 110 °C (230 °F) maximum

Recommendation: Mesh 77 threads per cm (195 threads per inch) – two print runs

Forming

Mirror-like effects created by Mirror Ink M3 can be formed **only to a certain extent.**

Layers of Mirror Ink M3 become thinner during the forming process due to elongation. For this reason, backprinting of at least two layers is strongly recommended.

For good forming results, it is necessary to dry the mirror layer as well as the backing layers thoroughly.

In case of insufficient drying, the ink layer can adhere to the surface of the forming tool and solvent residues may form bubbles in the mirror layer when heated by the tool.

The relevant drying conditions for the respective inks can be seen from their Technical Information Sheets.

Injection Molding

The Mirror Ink M3 layer, protected by AquaPress® ME, AquaPress® M1 White, NORIPHAN® N2K or NORIPHAN® XWR, can be backmolded. In the latter case, depending on backmolding resin and substrate, the NORIPHAN® XWR layer must be overprinted with NORIPHAN® HTR, NORIPHAN® N2K or NoriPET®.

All backprinting inks must be dried thoroughly to avoid wash-out in the backmolding process.

Use resins with lower viscosity and melting temperatures below 260 °C (500 °F) and ensure good heat dissipation on the film side.

If Mirror Ink M3 is backprinted with 2 layers NORIPHAN® XWR 952, followed by one layer of NORIPHAN® HTR 952, the melting temperature of the resin can range from 280 to 290 °C (536 to 554 °F) and the tool temperature may be up to 80 °C (176 °F).

The peel test results of such combinations with Mirror Ink M3 are rather poor. This is a property of the metal layer, caused by its low inner cohesion.

Note:
The overprint should overlap the mirror ink edges by at least 2 mm. This protects the mirror layer from delamination as well as from corrosion and cloudiness.

The suitability of Mirror Ink M3 for a given project must be checked individually by extensive pre-tests.

Shelf Life

If Mirror Ink M3 has cooled or warmed during transportation or storage, please allow the product to adjust to room temperature to avoid unwanted humidity and/or condensation, which could contaminate the ink. This advice also applies to the auxiliaries added to Mirror Ink M3.

The shelf life stated on the label assures the ink's quality and refers to unopened original cans stored in a dry place at temperatures between 5 °C (40 °F) and 25 °C (75 °F).

Optimal shelf life of open cans can only be achieved if the can is tightly closed immediately after each use.

Substrates

Printing results, to a large extent, depend on the substrate as well as the printing and application conditions. We recommend checking your printing materials under your conditions of use before performing any production runs. Materials that are supposed to be identical may vary from manufacturer to manufacturer and even from batch to batch. Some substrates may have been treated with or contain sliding agents, antistatics or other additives which may impair the adhesion of the inks.

In general please refer to our technical leaflet "General Information on Screen Printing Inks" which may be downloaded from our website www.proell.de, click Download ⇒ Screen Printing Inks ⇒ General information on screen printing inks.

This is a test product which is still in development. For this reason, no assurances are currently given as to type conformity, processability or long-term performance characteristics. Therefore, the customer uses the product entirely at their own risk with no guarantee.

Before starting a production run, it is necessary to test samples of each newly designed part systematically with regard to the specifications for the intended use (e.g. climatic chamber, resistance, etc.).