



Mirror Ink M3

Mirror Ink – Silver, improved climatic resistance

Area of Application

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 printed on the reverse side of the materials (back printing).

Mirror Ink M3 is also available in colored versions. For individual mixtures liquid tinting agents ("Colorants") can be used. Details please see "page 5".

Characteristics

- press-ready
- good adhesion to PC, pre-treated 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).

While drying, the metal flakes are aligned parallel to the substrate's reverse side. Viewed through the transparent material from the first surface, the pigments create a mirror like effect.

Auxiliaries

Mirror Ink M3 is press-ready.
If thinning is necessary, **Thinner M 209** can be added.

For increasing printing viscosity:

Mirror Ink Additive L 56605 (0.5 – 2 %)

Mirror Ink Additive L 56605 can improve adhesion on some substrates: e.g. Autoflex EBG 180L

For improving the flowability of the ink:

Additive L 61529 (maximal addition 1 %)

This additive improves the density of the prints and the humidity resistance. By adding Additive L 61529 the scratch resistance of the printed mirror ink layer declines.

Therefore, if Additive L 61529 is added, efficient curing/drying of the printed mirror ink layer is necessary to maintain sufficient scratch resistance.

General hint: Any addition of additive reduces the gloss level of the mirror layer.

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.

By using too thick stencils, phenomena similar to drying of mirror inks in the screen/stencil can occur.

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Printing Preparation

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

Pre-Flooding

Any stripe and any levelling defect in the flooded ink layer will be visible on the print. Therefore thick pre-flooding is recommended.

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.

The higher the drying temperature and the longer the drying time, the better the gloss level, the higher the image sharpness and the better the scratch resistance.

Tunnel 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 mandatory, as well as using a well ventilated drying cabinet.

Tunnel drying of PMMA films (99524 by 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 drying cabinet at 50 °C (122 °F) for 60 min. is mandatory to further stabilize the printed ink layers. Prints on PMMA or rigid PVC do not pass the tape test.

Tunnel drying of glass:

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

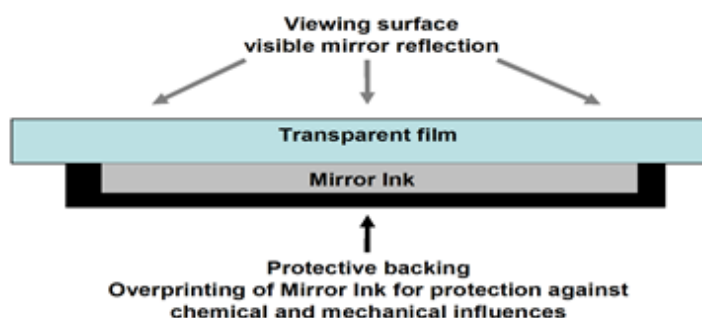
Subsequent baking for 30 min. at 120 °C (248 °F) or 10 min. at 300 °C (572 °F) is necessary (guide values). The higher the drying temperature, the shorter the drying time.

Cleaning

Thinner M 209

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.



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Overprinting without forming and backmolding:

To protect the printed layer from mechanical damage and to further improve its climatic resistance, the following ink systems can be used for backprinting (depending on the respective substrate):

Substrate	Ink system	Mesh	
		threads/cm	threads/inch
PC, PVC, Polystyrene, PMMA, PET	NoriCure [®] MPF	120-34 Y	305-34 Y
PC, PVC, Polystyrene, PMMA	Aqua-Jet [®] KF	120-34 Y	305-34 Y
Glass, PET	NoriGlass TPI	120-34 Y	305-34 Y

For the IMD process, overprinting is recommended for the following reasons:

- 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:

Substrate	Ink system	Mesh	
		threads/cm	threads/inch
PC	NORIPHAN [®] XWR	120-34 Y	305-34 Y
	NORIPHAN [®] N2K	120-34 Y	305-34 Y
	AquaPress [®] CA LT and HT	77-48 Y	195-48 Y
PET	NoriPET [®]	120-34 Y	305-34 Y
PMMA	AquaPress [®] CA LT and HT	77-48 Y	195-48 Y

Immediate drying of the backprinting inks is a must to prevent the mirror from corrosion.

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)

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 these inks can be seen from the respective Technical Information.

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Injection Molding

The Mirror Ink M3 layer, protected by AquaPress® CA LT and HT, NORIPHAN® N2K or NORIPHAN® XWR, can be backmolded. In the latter case, depending on backmolding resin and substrate, the NORIPHAN® XWR layer must be over-printed with NORIPHAN® HTR N, 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 N 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

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 opened cans can only be achieved if the can is tightly closed immediately after each use.

Important

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

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 Downloads ⇒ Solvent-Based Screen Printing Inks.

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Mirror Ink M3 Color Shades

For creating mirror color effects, the following shades in the Mirror Ink M3 range are available:

Mirror Ink M3 Gold 195	Mirror Ink M3 Green 695
Mirror Ink M3 Pink 395	Mirror Ink M3 Copper 895 (not available in a press-ready version)*
Mirror Ink M3 Violet 495	Mirror Ink M3 Black 995
Mirror Ink M3 Blue 595	

*Note: Colorant C801 Copper

Color shade Mirror Ink M3 Copper 895 is not available in a press-ready version, because it tends to gelling. For this reason, this color shade must be mixed from Mirror Ink M3 and Colorant C801 Copper immediately before printing.

Gelling can be decelerated by replacing a small amount of Mirror Ink M3 by Thinner M 209.

Example:

Mirror ink color shade

80 % Mirror Ink M3 + 20 % Colorant C801 Copper

can be matched as follows as well:

64 % Mirror Ink M3 + 16 % Colorant C801 Copper + 20 % Thinner M 209

When adding higher quantities of Thinner M 209, pre-test are necessary.

For intensive color effects, proportions of Colorants in the formulation can be increased up to 60 %.

Colorants (liquid pigment dispersions) for stirring in Mirror Ink M3 to create mirror color shades

Additionally, to the color shades mentioned above, further effects can be produced by mixing Mirror Ink M3 with Colorants.

Range of Colorants:

C101 Gold	C402 Violet	C801 Copper
C301 Red	C501 Blue	C901 Black
C401 Pink	C601 Green	

Drying:

Mirror Ink M3 colors have to be dried at 50 °C (122 °F) on any substrate.

Drying at higher temperatures decreases the intensity of the effect and the degree of gloss can vary from print to print.

To achieve good scratch resistance, post curing at 80 °C (176 °F) for 30 min. is recommended.

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.).

The information contained in the technical information/instruction sheets or other product information sheets is based on product testing conducted by Pröll. Because printing and environmental factors critically affect each individual ink application, the above mentioned information and instructions represent only general recommendations concerning product characteristics and directions for use and should not be construed as representing express warranties regarding the product. The information and instructions in no way release the purchaser from his obligation to verify and test the inks and their application for the specific request, regarding: product characteristics, weather resistance, mixing proportions, gloss, thinning, special mixtures, printability, drying speed, cleaning, effects on or of other materials to be contacted and safety precautions. All details contained in the instruction sheet "General Information on Screen Printing Inks" are to be considered. The further manufacture and use of products containing our inks by the purchaser takes place beyond our control, and the responsibility for further application and use of our product resides solely with the purchaser. Pröll disclaims any warranties, express or implied.

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