



Screen printing ink for directly injected plastic parts using FIM/IMD in-mold technology, printed on polycarbonate films

Glossy, 2 component ink, high flexibility, high temperature resistance, excellent adhesion to injection-moulded resins (PC)

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Field of Application

Mara® Mold MPX is a solvent-based screen printing ink. It is best suited for printing onto the reverse side of PC decorating foils, and for direct injection with PC or PC/ABS (85 % PC/ 15 % ABS).

Technical recommendation

The FIM/IMD process is a combination of several tasks like printing, deformation, cutting, punching, and injection-molding technology. Specialized knowledge of the complete process is required to achieve good results, and preliminary tests are essential to establish a working process. Subsequent projects may need different parameters for optimizing different designs.

Substrates

Polycarbonate films are used for this process.

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 FIM/IMD process to produce mold components is a key technology for different applications, e. g. in the automotive, medical, household sector.

Characteristics

Mara® Mold MPX is a silicone-free ink system. For silicone-free products it is important to use only thoroughly cleaned stencils, squeegees, ink pumps, tubes (in the case of an automatic ink supply), and injectors for the manual ink filling of the stencil, etc.

If cleaning is carried out with automatic screen washing systems, we recommend prior to

printing an additional manual cleaning with a fresh cleaner not having had any contact with ink residues containing silicone. Care should be taken with some adhesive tapes, used to protect the outer areas of the print region, as the release agent of the tape may be silicone.

Ink Adjustment

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

Mara® Mold MPX is a 2-component ink system. Prior to printing, it is essential to add hardener in the correct quantity and to stir homogeneously.

When using hardener, the processing and curing temperature must not be lower than 15°C as irreversible damage can occur. Please also avoid high humidity for several hours after printing as the hardener is sensitive to humidity.

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 20-25 °C and 45-60 % 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.

Drying

To achieve best results in forming and molding processes, a proper drying process is essential. The prints should have very low levels of residual solvents.

We recommend tunnel drying with three hot air zones at 80 °C / 175°F followed by an active cooling zone. The tunnel dryer should have a high air exchange rate. If available in the tunnel



dryer, also IR lamps can be added after the second hot air zone with typically 50% power. After printing is completed, the prints are put on a drying rack and stored in a box oven for 3 hours at 80°C/175°F for the final tempering process. Wickett dryers may also be an option.

Taking the number of layers (resp. layer thicknesses) and the type of drying equipment in consideration, an intermediate drying can be necessary in the drying rack for 5 min. at 80°C/175°F, or alternatively an additional tunnel drying process.

The processing window for the printed films is 3 weeks.

Fade resistance

Only pigments of high fade resistance (blue wool scale 7-8) are used for the production of the Mara® Mold MPX range.

Range

Basic Shades

| | |
|-----|----------------|
| 922 | Light Yellow |
| 932 | Scarlet Red |
| 936 | Magenta |
| 950 | Violet |
| 956 | Brilliant Blue |
| 960 | Blue Green |
| 962 | Grass Green |
| 970 | White |

High Opaque Shades

| | |
|-----|------------------------------|
| 180 | Opaque Black |
| 181 | Opaque Black, non-conductive |

Transparent Shades

| | |
|-----|-------------------|
| 585 | Transparent Black |
|-----|-------------------|

Press-Ready Metallics

| | |
|-----|---------------|
| 191 | Silver |
| 197 | Medium Silver |

Further Products

| | |
|-----|-------------------|
| 910 | Overprint Varnish |
|-----|-------------------|

All shades are intermixable. Mixing with other ink types or auxiliaries must be avoided in order to maintain the special characteristics of this ink.

Auxiliaries

For FIM /IMD applications, other than the below mentioned additives **must not** be used.

| | | |
|-------|---------------------|-------|
| H 5 | Hardener | 2-9% |
| UKV 1 | Thinner | 0-15% |
| SV 5 | Retarder | 0-10% |
| UR 3 | Cleaner (flp. 42°C) | |
| UR 5 | Cleaner (flp. 72°C) | |

The final quantity to be added can only be determined in the individual process and is also highly dependant upon the produced part.

The less hardener, the better for a higher degree of forming, the more hardener, the better the wash-out and adhesion to the molding resin.

Hardener H 5 is sensitive to humidity and is always to be stored in a sealed container. Shortly before use, the hardener must be added to the ink and stirred homogeneously. The mixture ink/hardener is not storable and must be processed within pot life.

The combined addition of Thinner UKV 1 and Retarder SV 5 is needed for full area prints.

For slow printing sequences and fine motifs, we recommend the addition of SV 5.

The cleaner UR 3 is recommended for manual cleaning of the working equipment. Cleaner UR 5 is recommended for manual or automatic cleaning of the working equipment.

Printing Parameters

All types of commercially available polyester fabrics and solvent-resistant stencils can be used. We recommend mesh counts between 90-40 and 140-30 threads/cm.

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 tem-

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perature 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 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.

Labelling

For Mara® Mold MPX 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.