



Noricryl®

Ink System for Second Surface IMD/FIM Technology with PMMA Films (back molding of screen printed films)

Area of Application

Noricryl® is a solvent-based one-component screen printing ink based on a high temperature resistant thermoplastic resin.

Characteristics

The ink system Noricryl® was developed for the IMD/FIM process (In-Mold-Decoration/ Film Insert Molding) with PMMA films (such as PLEXIGLAS®¹ 99524 and 99526) and displays the following key properties:

- **good formability**
- **high temperature resistance during injection molding**
- **good adhesion to printed film and injected resin**

Noricryl® is part of the Triple AIM®-solution² (Acrylic Insert Molding), the all-acrylic innovation in the IMD/FIM technology with PLEXIGLAS® films, PLEXIGLAS® resin and screen printing ink based on acrylic binder.

Equipment for Printing on Films to be applied to IMD/FIM Technology

- **Tunnel dryer, with final active cooling**
 - **3 heating sections with 80 °C (175 °F) minimum and high air exchange rate**
 - **active cooling adjustable to 15 °C (60 °F)**
- **Box oven adjustable up to 90 °C (195 °F)**
- **Racks for separate placing of printed sheets**

Different suppliers of IMD/FIM parts utilize different equipment for production, requiring individual adjustments of process parameters.

For this reason, production parameters of the same IMD/FIM parts may vary noticeably from supplier to supplier.

Finish

Glossy

The gloss level is decisively influenced by the structure of the substrate.

Color Shades

Basic Colors

HF = halogenfrei

109 Citron	412 Pink Transparent HF
112 Yellow HF	472 Violet
171 Yellow Transparent	566 Blue Transparent HF
213 Orange	570 Deep Blue HF
(not available in the U.S.A.)	669 Green Transparent
307 Red	945 White HF
318 Red Transparent HF	952 Black HF
320 Bright Red	093 Colorless HF

Special Colors

HF = halogen free

770 Silver HF
780 Silver Coarse HF

^{1,2} PLEXIGLAS® and Triple AIM® are registered trade names of Evonik Industries AG, Germany

Noricryl®

Mesh Count

Polyester mesh with 77-48 threads/cm to 150-31 threads/cm (195-48 threads/inch to 380-31 threads/inch). A stainless steel mesh may be used for special requirements.

The following mesh counts are recommended for standard silver:

Noricryl® 770 – 120-34 threads/cm (305-34 threads/inch) or coarser

Noricryl® 780 – 77-48 threads/cm (195-48 threads/inch) or coarser

Stencil

Solvent resistant emulsions must be used. Excellent results during long production runs are achieved by using Pröll Diazo-UV-Polymer Emulsion Norikop 10 HQ.

Auxiliaries

All of the auxiliaries mentioned below are free of halogens (HF).

Thinners and Retarder Paste

Thinner F 003 (fast)

Thinner M 212 (medium)

Thinner S 403 (slow)

Retarder Paste Noricryl® 097/002 (slow)

These auxiliaries can be mixed in any ratio to achieve an optimal printing and drying result.

Recommended addition of thinner:

Noricryl® 093 20 – 25 %

All other colors 15 – 20 %

To print fine details, Thinner S 403 can be used alone or in combination with Retarder Paste Noricryl® 097/002.

Cleaning of Screens and Utensils

Thinner M 212 or UNI-REIN A III

Drying

Noricryl® dries by evaporation of solvents in a jet dryer.

Tips on Drying

To achieve optimum results, drying in a jet-dryer should be done immediately after printing.

Drying speed can be increased by:

- 1.) drying at higher temperatures
- 2.) using dryers with good air exchange to remove the solvents.

When using a jet dryer with different sections, recommendations can be given as below:

- The temperatures of the heating sections should be around 70 – 75 °C (160 – 165 °F).
- The temperature of the heating sections should not exceed 75 °C (165 °F), since PMMA is sensitive towards distortion at higher temperatures.
- Last section: For cooling at ambient temperature.

The drying result depends on a lot of parameters such as ratio of thinner/retarder paste, thickness of ink film layer and efficiency of dryer.

Noricryl®

Conditioning / Post-curing

Complete evaporation of thinner residues in ink and film is necessary for further processing of printed films in the IMD/FIM process.

Thinner residues can lead to washout during the back molding process, or damage during the climatic test or use of the end product.

Fully benefiting from Noricryl®'s superior properties (adhesion, suitability for back molding, etc.) requires guaranteeing an absolute minimum of solvent residues.

Highest efficiency is achieved when printed films are put on drying racks after jet drying to be placed in a box oven having good air circulation as well as sufficient air exchange.

Post-curing conditions:

75 °C (165 °F) for 1 – 5 hours.

Bonding Strength

The adhesion of a film/ink/plastic bonding system depends on a number of variables (production, process, and structure of product). For this reason, specific tests with respect to individual requirements are essential.

For good adhesion, at least **2 fully covering layers of Noricryl®** should be printed. The first layer can be composed of almost fully covering graphic motifs.

Safety Precautions

Noricryl® inks are inflammable. Smoking or open flames are strictly prohibited during use of these products.

Processing Noricryl® inks requires normal hygiene in the workplace. Please see recommendations on label and read the material safety data sheets before use.

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).

Important

Allow the ink as well as all the auxiliaries to be added to adjust to ambient temperature in the closed container before use.

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 prior to 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 can contain sliding agents, antistatics or other additives which will impair the adhesion of the inks.

It is not always possible to produce a given part using IMD/FIM technology.

The resins used for back molding IMD/FIM ink systems are supplied as commercial technical products. They are different in chemical composition as well as the content of additives. Process parameters will also influence the quality of the finished IMD/FIM parts.

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.).

Recommendations for use of

Noricryl®

in IMD/FIM Technology

IMD/FIM Technology

IMD/FIM technology is distinguished by the interaction of several individual technologies:

- ink and printing
- forming
- cutting/punching
- back molding

The steps of the process must be optimized individually, then aligned with each other.

The Noricryl® Ink System

Noricryl® is a solvent-based screen printing ink system expressly developed for use in the IMD/FIM process. Noricryl® is suitable for printing on PMMA films (PLEXIGLAS®). The IMD/FIM screen printing ink is formulated to be compatible with the injection molding process using PMMA (e.g. PLEXIGLAS® resin 8 N).

Each batch of Noricryl® undergoes a specific quality control test. Test results can be made available to customers upon request. This does not constitute a guarantee regarding the long-term stability of back molded parts produced with Noricryl®.

Forming

The result of the forming process is strongly influenced not only by the choice of the forming technology, such as high pressure or thermal forming, but by the geometry of the parts produced as well. Forming requires specific know-how gained through experience.

Cutting

For optimum results in cutting PMMA, please follow the instructions of the film manufacturer.

Back Molding

A complex technology which **in any case** must be mastered to assure the successful application of Noricryl® in IMD/FIM technology. Specific know-how of the following parameters:

- geometry of injection gate
- temperature of molding resin
- choice of resin
- flow properties of resin
- pressure
- cycle time
- tool temperature
- cooling

is pre-requisite or must be gained through experience.

Here, the geometry of the parts to be produced is also of critical significance.

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.

This information supersedes all previous technical information.