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NoriPET®

Ink System for Second Surface IMD Technology with Polyester Film

NoriPET® is a solvent-based two-component screen printing ink for second surface IMD/FIM technology with polyester film and the option to integrate membrane switch functions in an IMD/FIM part.

NoriPET® is optimized for the use on suitable PET films such as Autoflex® EBG 180 L and Autotex® V 200.

NoriPET® has been developed in request of

- formability and elasticity
- temperature resistance in injection molding
- good adhesion between printed film and injected resin (like ABS) without additional adhesive

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

- Pigmentation**
- NoriPET® inks do not contain any pigments based on toxic heavy metals (DIN EN 71, part 3).
 - NoriPET® basic colors are very brilliant and can be used for color matching.

Basic Colors

NoriPET®

109	Citron	472	Violet
112 <i>HF</i>	Yellow	566 <i>HF</i>	Blue Transparent
171	Yellow Transparent	570 <i>HF</i>	Deep Blue
213	Orange (not available in U.S.A.)	669	Green Transparent
308	Red	812	Brown
318 <i>HF</i>	Red Transparent	945 <i>HF</i>	White
320	Bright Red	952 <i>HF</i>	Black
372 <i>HF</i>	Bright Red Transparent	093 <i>HF</i>	Colorless
412 <i>HF</i>	Pink Transparent		

HF = halogen free

Special Inks**NoriPET®**

770 *HF* Silver

780 *HF* Silver Coarse

790 *HF* Silver Glossy (Press Ready)

HF = halogen free

Silver inks may be used to mix gold and other metallic colors.

Effect Pigment Colors

Additional metallic, color-flop, pearl effect, daylight and other pigments are available on request.

Caution

The peel strength (bonding) of the silver and effect inks is lower than that of the basic colors.
Back molding the special effect colors may alter the orientation of the pigment particles.

Mesh

We recommend yellow polyester fabric. NoriPET® standard colors: 90 – 150 threads/cm (230 – 380 threads/inch).

The following mesh counts are recommended for standard silver:

NoriPET® 770 – max. 120 threads/cm (305 threads/inch)

NoriPET® 780 – max. 77 threads/cm (195 threads/inch)

NoriPET® 790 – max. 100 threads/cm (255 threads/inch)

Stencil

Solvent resistant emulsions must be used. Excellent results during long production runs are achieved by using Pröll emulsion Norikop 8 HR.

Auxiliaries**Catalyst**

Catalyst NoriPET® 005 has to be mixed to the ink thoroughly prior to printing.

Addition: 1 – 3 %

Mixtures of NoriPET® ink and Catalyst NoriPET® 005 have a pot life of 8 – 12 hours in closed cans depending on temperature and humidity.

Thinner	Thinner NoriPET® 090	(fast)
Retarder	Retarder NoriPET® 097	(medium)
	Retarder NoriPET® 097/001	(slow)
	They can be mixed in any ratio to achieve an optimized printing and drying result.	
Antistatic-Additive	Norilin® C	
	To prevent static charging, especially when printing metallic inks.	
	Addition: 0,5 %	
Defoamer	Depending on process speed and thinning percentage additional defoamer may be necessary.	
	Quantity: 0,2 – 0,5 % Defoamer 9319	
Cleaning	Clean screens and equipment with Retarder NoriPET® 097 or UNI-REIN A III.	
Important	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.	
Drying	NORIPHAN® N2K dries by evaporation of solvents in a jet dryer. The chemical curing process of the printed films continuous in stack with no additional supply of oxygen.	

Hints 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:

- First zone: 80 °C (175 °F).
- The last section with high air exchange is for cooling the printed films to room temperature to avoid blocking in the stack.

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

Post-curing

For maximum heat resistance and a good long term adhesion of the injection molded parts, NoriPET® **must be post cured**.

For this reason post curing of the printed films prior to the molding process is strongly recommended. The best results are found when post curing is done directly after jet drying.

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

Post curing conditions:

80 °C (175 °F) for 0,5 hours.

The forming and injection molding step should be made shortly after printing and post curing.

Adhesion

Most important factors for adhesion and peel strength of injection molded parts are:

- Amount of Catalyst NoriPET® 005
- Time gap between drying and molding
- Post drying conditions
- Resin type and quality
- Resin temperature
- Film quality

Figure 1:

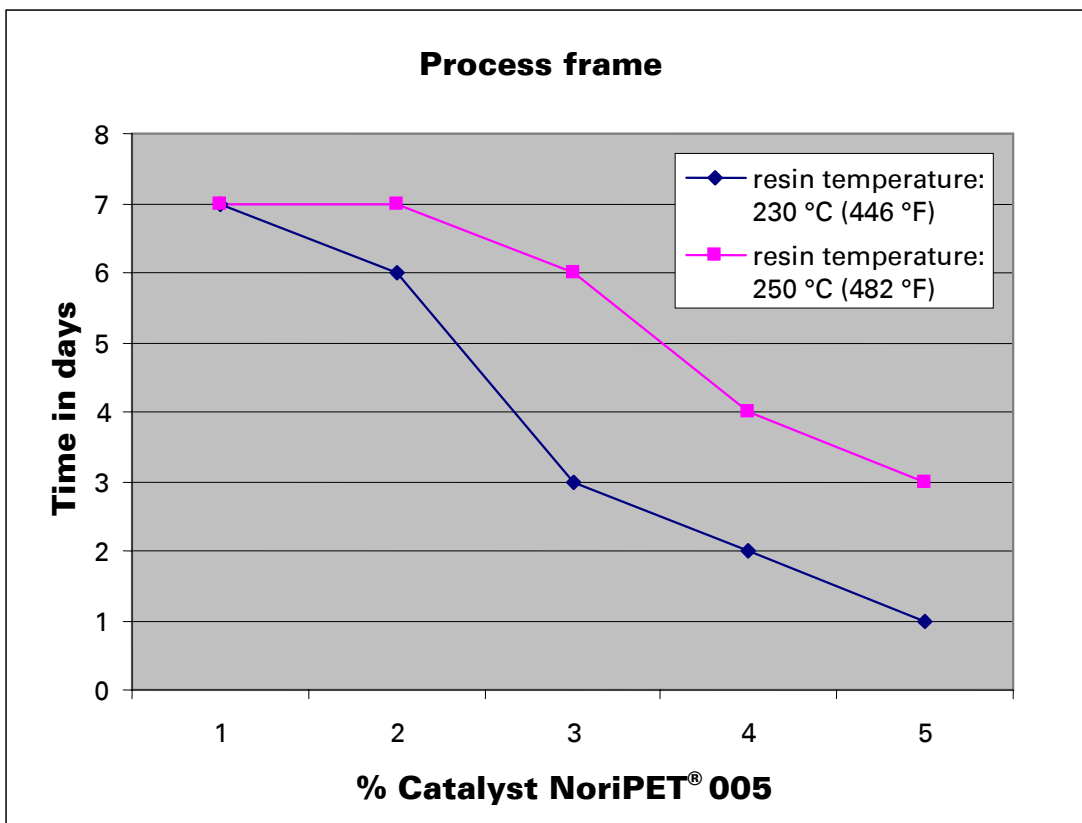
Process frame (time gap between drying and injection molding) for save adhesion depending on amount of catalyst and resin temperature:

Ink: NoriPET® 952/NoriPET® 093 1 : 1
Printing mesh: 100-40 threads/cm
(255 threads/inch) – twice printed
Film: Autoflex® EBG 180 L
Resin: ABS Novodur P2H-AT
Post drying: 0,5 h at 80 °C (175 °F)

The best adhesion is achieved when injection molding is done at high resin temperature (e. g. 250 °C, 480 °F) generally. With the addition of 1 – 2 % Catalyst NoriPET® 005 an optimum adhesion performance could be found within one week between printing/curing and injection molding. Additional amounts of Catalyst are decreasing the process window decisively, but a compensation is possible with increased resin temperature.

The post drying time and temperature should not exceed 30 minutes and 80 °C (175 °F).

Figure 1



Note:

The limitation by this process frame can be avoided by a final backing of one to two layers of NoriPET® 093 without Catalyst (screen mesh: 1 – 2 x 100-40).

To improve the intermediate adhesion this backing should be done prior to the post drying process.

**Safety
Precautions**

NoriPET® inks are flammable. Smoking or open flames are strictly prohibited during use of these products.

Working with NoriPET® inks requires the same hygienic practice at the work place as any other solvent based ink system. Please follow the advice and the instructions on the label and read the material safety data sheets prior to use.

Shelf Life

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

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).

Recommendations for use of

NoriPET®

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 NoriPET® Ink System

NoriPET® is a solvent-based screen printing ink system expressly developed for use in the IMD/FIM process. It is suited to printing polyester films such as Autoflex® EBG 180 L or Autotex® V 200 to be back molded, particularly with ABS resins.

Each batch of NoriPET® 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 NoriPET®.

Forming

Matched metal can be used as well as High-Pressure Forming. Forming depth is limited by the polyester film.

Back Molding

A complex technology which in any case must be mastered to assure the successful application of NoriPET® 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

are a pre-requisite or must be gained through experience.

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

To assure suitability for its intended use, each part or combination of materials must be systematically examined using proper testing procedures (climatic test, resistance test, etc.) before start of batch production.

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.