



# NoriAmid®

## for polyamide films

Halogen Free Ink System for IMD/FIM Technology  
(back molding of screen printed films)

### Area of Application

**NoriAmid® is a solvent-based two-component screen printing ink for IMD/FIM applications on polyamide films.**

### Characteristics

- **high wash out resistance**
- **high cohesion in compound**
- **long screen opening time**
- **formable**

### Equipment for Printing on Films within 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 single placing of printed sheets**

**Different supplier of IMD/FIM parts utilize different equipment for production which requires individual adjustments of process parameters.  
For this reason, production parameters of the same IMD/FIM parts at different supplier can be very different for best results from each origin.**

### Film

#### ISOFILM A4-00

#### Isosport Verbundbauteile GmbH

Industriestraße 2 - 8  
A-7000 Eisenstadt  
[www.isosport.com](http://www.isosport.com)

### Mixing Ratio

100 % **NoriAmid®**  
6 % Hardener 004  
5 – 10 % Thinner M 210 or Thinner M 206 (depending on image to be printed)

### Pot Life

4 – 6 hours

### Mesh Count

Polyester mesh 32 to 150 threads/cm (83 to 380 threads/inch)  
(when using very coarse fabrics: addition of up to 2 % Levelling Agent L61693)  
A stainless steel mesh may be used for special requirements.

**Adhesion Promoter**

**NoriAmid® APM** (please see „Molding“ and separate Technical Information)  
 one-component  
 0 – 10 % Thinner M 210 – mesh 100-40 threads/cm (255-40 threads/inch)

**Color Shades**

*HF = halogen free*

<b>Halogen Free Basic Colors</b>	108 Citron HF	445 Violet HF
	112 Yellow HF	471 Violet Transparent HF (not available in the USA)
	225 Orange HF	566 Blue Transparent HF
	318 Red Transparent HF	570 Deep Blue HF
	321 Bright Red HF	665 Green HF
	372 Bright Red Transparent HF	945 White HF
	412 Pink Transparent HF	952 Black HF
<b>Halogen Free Special Colors</b>	770 Silver HF	093 Colorless HF
	780 Silver Coarse HF	944 White Opaque HF
		953 Deep Black HF

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

**Effect Pigment Colors**

Further metallic, color-flop, pearl effect, fluorescent and other colors 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.

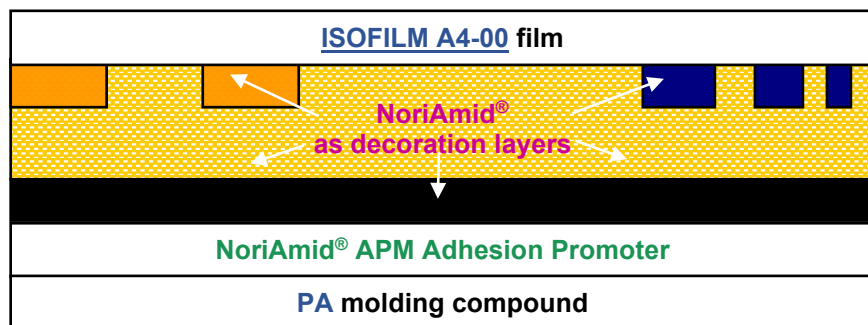
**Stencil**

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

**Printing Sequence**

*NoriAmid® as  
decoration ink*  
(at least 2 fully  
covering layers)

*NoriAmid® APM as  
adhesion promoter*



**Cleaning of Screens and Utensils**

UNI-REIN A III

**Drying for Solvent Evaporation**

Tunnel drying after each layer when using ISOFILM A4-00:

- 1. section: 80 – 90 °C (175 to 195 °F)
- 2. section: 80 – 90 °C (175 to 195 °F)
- 3. section: cooling 15 °C (60 °F) (with available active cooling)

Belt speed: 5 m/min. referring to tunnel length of 7 m.

After tunnel drying, printed ink films are **not resistant to blocking**.

In case of problems with overprinting different layers due to sticking issues, the sheets must be placed in a rack and dried at 65 °C (150 °F) for 10 – 15 min. Otherwise, the interim drying should be omitted (usually for graphic motifs/fine details). Multi drying of single areas should be avoided, due to decreasing adhesion to following layers.

Before applying adhesion promoter NoriAmid® APM, the NoriAmid® decoration layer must be dried at 65 °C (150 °F) for 10 – 30 min, to evaporate solvent residues, that would otherwise be trapped by the adhesion promoter. The optimum drying time must be evaluated in printing trials, since it strongly varies with each color tone. Black will require less time than color shades, white, lacquer or silver.

### Process Frame

NoriAmid® has a specific **process frame** that must be considered. The complete printing project, consisting of NoriAmid® decoration layers and adhesion promoter NoriAmid® APM, should be finalized within one day (8 hours), since otherwise the adhesion in-between the printed layers cannot be obtained. This has to be considered at organization of production particularly.

If the process frame time is exceeded, the peel values decrease from 30 N/cm to 0,5 N/cm.

After applying the adhesion promoter, there is no additional processing window for further processing. (e.g. forming, punching, back-molding).

### **Attention:**

Decoration color tones of NoriAmid® and Adhesion Promoter NoriAmid® APM must not be mixed.

### High Temperature Storage for Crosslinking Reaction

Immediately after applying adhesion promoter, temperature storage (tempering) in a box oven with fresh air supply is necessary to accelerate the chemical crosslinking reaction and to ensure optimum adhesion to the polyamide-film. The crosslink degree influences forming results and washout resistances.

With a temperature storage of 6 – 12 h with 70 °C (160 °F), a good crosslink degree can be obtained. The necessary temperature storage time must be evaluated individually through trails.

**ISOFILM A4-00 film** can also be temperature stored at 80 °C (175 °F) for 3 h or 90 °C (195 °F) for 1 h (tested without protection foil).

### Forming

For good forming results, a gap time of minimum 2 days after temperature storage is beneficial.

#### High pressure forming (referred to ISOFILM A4-00-Folie):

In the case of stretchings up to 12 mm, based on a film thickness of 250 µm, the following parameters are recommended to begin with the first optimization steps:

Top and bottom heat:	320 °C (610 °F)
Duration of heating:	8 – 12 sec.
Hot air temperature:	300 – 320 °C (570 to 610 °F)
Tool temperature:	100 – 120 °C (210 to 250 °F)
Pressure:	110 – 150 bar
Dwell time:	6 sec.

### Molding

To achieve a good adhesion to adhesion promoter NoriAmid® APM, the resin temperature must be at least 250 °C (480 °F).

NoriAmid® APM bonds to PA11, PA12, PA6 and fiber-glass reinforced PA6.6.

In order to avoid internal stress in the final part, the coefficients of film and injection molding resin should be as similar as possible.

Other suitable injection molding compounds are PMMA, PC or ABS, provided that the melt temperature is above 250 °C (480 °F). Pretests are necessary.

## 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 NoriAmid®** should be printed. The first layer can be composed of almost fully covering graphic motifs.

## Safety Precautions

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

Processing NoriAmid® inks requires normal hygiene. 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.).**

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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