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NORIPHAN[®] N2K

The Ink System for Second Surface IMD/FIM Technology

NORIPHAN[®] N2K is a solvent based two-component screen printing ink for second surface IMD technology using PC films such as Makrofol[®]* and Bayfol[®]*.

NORIPHAN[®] N2K shows a good performance in second surface IMD technology:

- formability e. g. high pressure forming or thermoforming
- temperature and washout resistance during injection molding
- good permanent bonding with injection molding resins, preferably PC, PC/ABS and silicon rubber resin

NORIPHAN[®] N2K is optimized for the needs of processing thin films (e. g. 50 µm). Printed films decorated with NORIPHAN[®] N2K show no curling effect. NORIPHAN[®] N2K can also be used for metallized films in the masking/chemical etching process in IMD/FIM technology.

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

- Pigmentation**
- NORIPHAN[®] N2K inks contain no pigments based on toxic heavy metals (DIN EN 71, part 3).
 - NORIPHAN[®] N2K inks are based on high brilliance pigments. Nearly all shades can be mixed using basic colors.

Basic Colors

NORIPHAN[®] N2K

| | | | |
|---------------|--------------------------------------|---------------|-------------------|
| 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 the 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

* Makrofol[®] and Bayfol[®] are registered trade marks used by Bayer MaterialScience AG, Germany

Special Inks**NORIPHAN® N2K**

770 HF Silver
780 HF Silver Coarse
790 HF Silver Glossy (Press Ready)
944 HF White Opaque
953 HF Deep Black
954 HF Black Opaque

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 Count

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

The following mesh counts are recommended for standard silver:

NORIPHAN® N2K 770 – 120-34 threads/cm (305-34 threads/inch) or coarser
NORIPHAN® N2K 780 – 77-48 threads/cm (150-31 threads/inch) or coarser
NORIPHAN® N2K 790 – 100-40 threads/cm (255-40 threads/inch) or coarser

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 NORIPHAN® N2K 005 has to be mixed to the ink thoroughly prior to printing.

Addition: 2 – 3 %

Mixtures of NORIPHAN® N2K ink and Catalyst NORIPHAN® N2K 005 have a pot life of 8 – 12 hours in closed cans depending on temperature and humidity.

Thinner

NORIPHAN® N2K 090 (fast)

Retarder

NORIPHAN® N2K 097 (medium)
NORIPHAN® N2K 097/003 (slow)
NORIPHAN® N2K 097/006 (very slow)

| | |
|----------------------------|---|
| Retarder Paste | <p>NORIPHAN® N2K 097/002 (medium)</p> <p>NORIPHAN® N2K 097/007 hohe Viskosität (slow)</p> <p>Auxiliaries may be mixed with each other in any desired proportions.</p> <p>Recommended amount of addition for Thinner and Retarder: 15 – 20 %.</p> <p>To print fine details, Retarder NORIPHAN® N2K 097/003 or NORIPHAN® N2K 097/006 can be used alone or in combination with Retarder Paste NORIPHAN® N2K 097/002 or NORIPHAN® N2K 097/007. The following proportions are recommended:</p> <p>10 – 20 % NORIPHAN® N2K Retarder Paste 5 – 10 % NORIPHAN® N2K Retarder</p> |
| Matting Agent | <p>Matt Paste NORIPHAN® N2K 098</p> <p>Addition: approx. 20 %</p> |
| Antistatic Additive | <p>Norilin® C</p> <p>To prevent static charging, especially when printing metallic inks.</p> <p>Addition: 0.5 %</p> |
| Defoamer | <p>Defoamer 9242</p> <p>To prevent any possible flaws in color gradient (craters, bubbles). Adding too much Defoamer 9242 causes white spots.</p> <p>Addition: max. 0.5 %</p> |
| Cleaning | <p>Clean screen and equipment with UNI-REIN A III.</p> |
| Important | <p>Printing results are dependent on the substrate as well as conditions of printing and application. We expressly recommend testing your substrate under your particular conditions before starting a print run. Materials presumed to be identical may vary from manufacturer to manufacturer or from batch to batch. Certain substrates may have been treated with or contain lubricants, anti-static agents, or other additives which could impair the adhesion of the ink.</p> |
| Drying | <p>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.</p> <p>Note: To protect PC films from the effects of solvents, jet dryers should be used for small trial runs. Rack drying is not recommended.</p> |

Tips on Drying

Drying performance can be improved by:

- drying at higher temperatures
- use of infrared rays
- completely exhaust evaporated solvents lingering in the tunnel dryer – good air exchange.

The following settings are recommended for use with 3 zone dryers:

- First zone: 80 °C (175 °F).
- Second Zone:
In the second zone, the maximum temperature for processing heat sensitive Bayfol® films is 80 °C (175 °F).
The maximum drying temperature for processing pure PC films (Makrofol®) is 100 °C (210 °F). If additional infrared emitters have been installed in the second compartment, they may be used to increase the efficiency of the drying operation.
- Third Zone: Is for cooling at ambient temperature.

Drying results depend on the combination of thinner and retarder along with the thickness of the ink layer.

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 NORIPHAN® N2K's superior properties (adhesion, suitability for back molding, etc.) requires guaranteeing an absolute minimum of solvent residues.

Post-curing is done after printing the last color; the ideal conditions for each product must be determined individually.

For best results, dry separately on a rack in a well ventilated box oven.

Conditions:

Post-curing at 75 – 90 °C (165 – 195 °F) for 5 hours.

Maximum temperature 70 – 80 °C (160 – 175 °F) for processing heat sensitive films of PC blends such as Bayfol® CR.

In case of an application of too high temperatures with Bayfol® CR a change into bluish coloring of the film could be observed.

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.

**Safety
Precautions**

NORIPHAN® N2K inks are inflammable. Smoking or open flames are strictly prohibited during use of these products.

Processing NORIPHAN® N2K inks requires normal hygiene. Please see recommendations on label and read the material safety data sheets before use.

Shelf Life

Do not open containers which have been cooled or heated through storage or transport until contents have attained room/ambient temperature. This also applies to auxiliaries used for adjustment.

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).

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.