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Rainbow Ink

Rainbow Ink is a solvent-based metallic ink for creating iridescent rainbow-like color effects on clear transparent PC, PMMA, Rigid PVC and pre-treated PET films, when printed on the reverse side of the materials (second surface print). Even by first surface decoration, interesting effects can be achieved.

Color Shades

Rainbow Ink 10/100

Premium quality
with fine pigments

Rainbow Ink 10/50

Standard quality
with fine pigments

Rainbow Ink 35/100

Premium quality
with coarse pigments

Rainbow Ink 35/50

Standard quality
with coarse pigments

Substrates

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.

In general please refer to our technical leaflet "General Information on Screen Printing Inks" which may be downloaded from our website www.proell.de, click Download ⇒ Screen Printing Inks ⇒ General information on screen printing inks.

Preparation

Stir well before each use!

Caution!!

Even lowest residues of silicone oils (content of defoamers and screen inks) will cause fish-eyes and pinholes. Take care to use absolutely clean equipment for the preparation of the printing mixtures as well as well degreased fabrics for the printing process.

Auxiliaries

**Thinner 6401
Stabilizer M1**

Important**Stabilizer M1:**

Before printing: Addition of 10 % is needed in order to give basic protection of the metall layer from corrosion. For long term protection it is necessary to overprint the rainbow ink with a suitable protective ink layer, otherwise the metal layer is attacked by acid or alkaline materials, water, steam and oxidizing substances. Please refer to chapter "Overprinting".



The mixture of Rainbow Ink and Stabilizer M 1 is press ready. If necessary, a small amount of Thinner 6401 can be added.

Addition of Stabilizer:

The stabilizer has to be mixed homogenously into the rainbow ink using a propeller mixer. Depending on the size of the vessel about 5 minutes at a speed of 300 rpm are recommended. Stirring should incorporate as little air as possible.

Never place leftovers of these mixtures back into the original can.

Fabrics

Due to the pigment particle size of up to 35 μm , fabrics from 77 – 120 threads/cm (195 – 305 threads/inch) are suitable.

Squeegee

Squeegees with an average hardness of 65° - 75° Shore A are recommended.

Drying

At 50 – 60 °C (122 – 140 °F) in a jet dryer and then 30 min at 80 °C (175 °F). (Pretests are required!)

The rainbow effect level depends on drying conditions as well as on the substrate and its surface quality.

Overprinting

For protection against mechanical and chemical damages (like scratches or corrosion) it is recommended to overprint the Rainbow Ink layer. Various ink and lacquer systems are suitable (see section "Preliminary Test Results of Forming Trials", pages 4 to 6).

Note:

The rainbow effect will be damaged if unsuitable solvent based inks and thinners are used for overprinting.

Pretests are necessary!

Even overprinted and thus sealed ink layers are not completely protected against atmospheric influences. Therefore, the user bears responsibility for durability tests (e. g. climate test).

For long term exterior application specified environmental tests are highly recommended.

Cleaning

Thinner 6401

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).

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.).

Preliminary Test Results of Forming Trials
please see page 5 – 6

Fabric	100-40 Y (100 threads/cm) (255 threads/inch)
Printing Parameters	<u>NoriPET® 093:</u> printed with 0,5 % Catalyst NoriPET® 005 <u>NORIPHAN® N2K 093:</u> printed with 2 % Catalyst NORIPHAN® N2K 005 <u>Thinning of the tested ink systems and lacquers:</u> as described in the respective Technical Information Sheets
Forming Parameters	Niebling High Pressure Forming Machine (HPF) High pressure time: 5 seconds, depressions are not shaped completely perpendicular
Mold/Tool	Cellular phone housing
Injection Molding	ABS: 250/260 °C (480/500 °F) PC 280/290 °C (535/555 °F)
Results	The rainbow effect appears only on smooth and transparent films by second surface printing. First surface prints on paper and smooth substrate are not wipe resistant. Choosing the correct parameters produces good forming results. To obtain satisfactory resistance in the climatic chamber it is necessary to use water-vapor-tight substrates and a sufficiently thick back-molded layer.
Climatic Chamber: Test Conditions	One cycle consists of 8 hours at 85 °C (185 °F) then 16 hours at 25 °C (75 °F). The relative humidity remains constant at 95 %. This cycle is repeated 5 times.

Preliminary Test Results

No.	Substrate	Print	Layers of Rainbow Ink	Backing Lacquer	Layers of Backing Lacquer	Drying	High Pressure Forming	Molding: Peel Values in N/cm	Climatic Chamber (Pröll Standard Testing Program 2)	Ø Wash-out Point
F1	Coated Paper Profisilk 150 g/m ²	first surface print	1 x	n. a.	-	Jet-dryer only	n. a.	-		
F2	Self adhesive PVC foil	first surface print	1 x	n. a.	-	Jet-dryer only	Very poor effect on first surface; no high pressure forming.	-		
F3	Rigid PVC White matt	first surface print	1 x	n. a.	-	Jet-dryer only		-		
F4	Rigid PVC White glossy	first surface print	1 x	n. a.	-	Jet-dryer only		-		
F5	Polystyrene White	first surface print	1 x	n. a.	-	Jet-dryer only		-		
F6	PMMA 99524	second surface print	1 x	Noricryl [®] 093	1 x	1 h 90 °C	250 °C/23 s/63 bar/70 °C MT 250 °C 23 s/63 bar/70 °C MT	ABS: 0,56	PMMA prevents humidity migration, thus climatic chamber test results ok.	7 mm
F7	PMMA 99524	second surface print	1 x	Noricryl [®] 093	2 x	1 h 90 °C	250 °C/23 s/54 bar/70 °C MT 250 °C/23 s/54 bar/70 °C MT	ABS: 0,56		7 mm
F8	PMMA 99524	second surface print	1 x	NORIPHAN [®] HTR 093	1 x	1 h 90 °C	250 °C/23 s/54 bar/70 °C MT 250 °C/23 s/54 bar/70 °C MT	PC: 0,28		14 mm
F9	PMMA 99524	second surface print	1 x	NORIPHAN [®] HTR 093	2 x	1 h 90 °C	250 °C/23 s/54 bar/70 °C MT 250 °C/23 s/52 bar/70 °C MT	PC: 0,25		15 mm
F10	PMMA 99524	second surface print	1 x	Thermo-Jet [®] 093	1 x	1 h 90 °C	250 °C/23 s/52 bar/70 °C MT 250 °C/23 s/63 bar/70 °C MT			
F11	PMMA 99524	second surface print	1 x	Thermo-Jet [®] 093	2 x	1 h 90 °C	250 °C/23 s/50 bar/70 °C MT forming ok (both prints)			
F12	PMMA 99524	second surface print	1 x	Aqua-Jet [®] KSF 093	1 x	1 h 90 °C	250 °C/23 s/47 bar/70 °C MT 250 °C/23 s/50 bar/70 °C MT			
F13	PMMA 99524	second surface print	1 x	Aqua-Jet [®] KSF 093	2 x	1 h 90 °C	250 °C/23 s/40 bar/70 °C MT forming ok 250 °C/20 s/40 bar/80 °C MT mold too hot, KSF flakes			

MT = mold temperature

No.	Substrate	Print	Layers of Rainbow Ink	Backing Lacquer	Layers of Backing Lacquer	Drying	High Pressure Forming	Molding: Peel Values in N/cm	Climatic Chamber (Pröll Standard Testing Program 2)	Ø Wash-out Point
F14	Rigid PVC Transparent	second surface print	1 x	Thermo-Jet® 093	1 x	1 h 60 °C	200 °C/23 s/30 bar/60 °C MT forming ok (both prints)			
F15	Rigid PVC Transparent	second surface print	1 x	Thermo-Jet® 093	2 x	1 h 60 °C	100 °C/23 s/30 bar/60 °C MT 150 °C/23 s/30 bar/60 °C MT Temperature too low, foil is not formed sufficiently. .			
F16	Rigid PVC Transparent	second surface print	1 x	Sorte P 093	1 x	1 h 60 °C	200 °C/20 s/34 bar/60 °C MT 200 °C/18 s/34 bar/60 °C MT			
F17	Rigid PVC Transparent	second surface print	1 x	Sorte P 093	2 x	1h 60 °C	200 °C/23 s/34 bar/60 °C MT 200 °C/23 s/40 bar/60 °C MT			
F18	PET EGB 180L	second surface print	1 x	NoriPET® 093	1 x	1 h 60 °C	PET foil cannot be formed using the cellular phone housing mold.			
F19	PET EGB 180L	second surface print	1 x	NoriPET® 093	2 x	1 h 60 °C				
F20	Makrofol® DE 1-1	second surface print	1 x	NORIPHAN® HTR 093	1 x	1 h 90 °C	300 °C/23 s/63 bar/90 °C MT 300 °C/23 s/63 bar/90 °C MT	PC: 0,07	PC does not prevent humidity migration. Rainbow Ink is tarnished, stained, oxidized.	10 mm
F21	Makrofol® DE 1-1	second surface print	1 x	NORIPHAN® HTR 093	2 x	1 h 90 °C	300 °C/23 s/63 bar/90 °C MT 300 °C/23 s/63 bar/90 °C MT	PC: 0,19		9 mm
F22	Makrofol® DE 1-1	second surface print	1 x	NORIPHAN® N2K 093	1 x	1 h 90 °C	300 °C/23 s/63 bar/90 °C MT 300 °C/23 s/63 bar/90 °C MT	PC: 0,05		13 mm
F23	Makrofol® DE 1-1	second surface print	1 x	NORIPHAN® N2K 093	2 x	1 h 90 °C	300 °C/23 s/63 bar/90 °C MT 300 °C/23 s/63 bar/90 °C MT	PC: 0,07		17 mm
F24	Bayfol® CR 1-4 print on the matt side	second surface print	1 x	NORIPHAN® HTR 093	1 x	1 h 75 °C	No rainbow effect on the matt side, thus no forming.			
F25		second surface print	1 x	NORIPHAN® HTR 093	2 x	1 h 75 °C				
F26		second surface print	1 x	NORIPHAN® N2K 093	1 x	1 h 75 °C				
F27		second surface print	1 x	NORIPHAN® N2K 093	2 x	1 h 75 °C				

Rainbow Ink in the IMD Process

The following points have to be taken into consideration, if Rainbow Ink is used in the IMD Process:

Preparation See page 1

**Overprinting/
Back Printing of
Rainbow Ink** Total coverage of the Rainbow Ink with a protection layer is recommended for the following reasons:

- Improved formability of the Rainbow Ink layer.
- Increased adhesion to the backmolded resin.

**Forming and
Injection Molding** Rainbow Ink-films can be formed only **to a certain extent**.
Under optimized conditions the overprinted rainbow ink layer can be backmolded with resin.
Low melting point resins with melting points below 290 °C (550 °F) and good heat transfer through the film into the mold are advantageous.
Due to the basic composition of Rainbow Ink, the peel test results of a film/ink/resin sequence (printed with Rainbow Ink) are poor in every case.

Note:
To avoid corrosion and flaking, the overprint should overlap the edges of the Rainbow Ink layer not less than 0.5 mm.
The suitability of Rainbow Ink for a particular project has to be checked individually by extensive pre-tests.

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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