

1-component, heat curing pad printing ink

SERIES 725-79500

High resistant pad printing ink for technical applications on duroplastics and metals

High opaque, semi-glossy pad printing ink for industrial applications on different duroplastics (specially IC's and resistors), metals and coated surfaces.

Based on high chemical resistant resins, this ink line is specifically designed for the semi-conductor market.

Substrates

The created properties of this ink line are without problems on a wide range of rigid substrates such as duroplastics based on phenol and epoxy resins used for semi-conductors and resistors. Also possible are different metals like iron, steel, stainless steel, aluminum and a lot of different coatings and nonporous materials like polyester and epoxy powder coatings.

This wide variety of printable materials as well as the multifarious surface properties makes it absolutely necessary for own printing tests under local conditions with regard to the intended purpose prior to starting the production.

Due to the constant further development and optimizing of Series 725 the number of practical substrates may still increase.

Applications

Operational areas are specific the electronic industry, specially the semi-conductor application and the manufacture of electronic components including conventional and low stress molding articles.

In some cases the IC's are surface polluted with process dependent additives; than a pre-treatment is advantageous. Suitable are high-energy flames like hydrogen or plasma-treatment. This is necessary to burn up the migrated additives or auxiliary agents of molding process. An other positive effect is the optimizing of surface tension to improve the adhesion of printing inks. Nearly the same properties are available with a chemical treatment, for example cleaning with Series 10-063.

Characteristics

This modern, high opaque pad printing ink is suitable for open inkwell equipment and also for the conception of closed cup (pot) systems. The Series 725 is free of iron containing materials, so the printing problems, produced through magnetizing of metal plates, filling knife, metal squeegee or metal caps are eliminated. The ink line is developed to combine rheologic properties for the full area print with very smooth surface and for the fine detail print with exact definition. The offered solvents (Series 725-017, thinner; Series 725-018 and Series 10-02637, retarders; Series 700-019, accelerator) guarantee a opti-

mized transportation of ink from plate through pad to the substrate and a fast tack-free drying on the printed material.

Auxiliary agents

The pad printing inks Series 725 are developed for user-friendly handling. This means, that a normal reduction of viscosity with the offered thinner Series 725-017, addition amounts app. 10-15% by weight results a constant long-term consistency for open and closed machinery equipment's. The ink should have a viscosity level of app. 5-8 seconds, measured with the Viscospatula (narrow slot spatula). The rotative technology requires a higher dilution with thinner; we recommend accelerator Series 700-019, addition around 15-20 weight-%.

Other additives offering useful possibilities of modification are specified in the Technical leaflet Series 700: Auxiliary agents for pad printing inks.

The addition of additives changes the actual product properties so that the spectrum of printing stock as well as the resistances may be modified, in some cases to a negative result.

Pigments and Light Fastness

Points to the future, the high opaque ink line Series 725 is heavy metal free and follow the Europe regulation EN 71, part 3 (Safety of toys, migration of certain elements). All pigments used in Series 725 shows a light fastness of 6-8 according to wool scale (DIN 16525). If the color shades are reduced with high amounts of white or transparent systems, light fastness might be reduced.

As standard colors we offer

Serie 725-79500	White, opaque
Serie 725-33	Black, opaque
Serie 725-100	Silver

In addition are all color shades available, following the special color modalities.

Drying/Curing

The composition of the solvents ensures both, long-lasting stability of the viscosity in the ink troughs and ink containers, and quick release of solvents in the dabbing process. The pad printing system Series 725 doesn't show any corona formation (fogging on the plate/block), ensures an unproblematic transfer as well as fast drying on the printed material.

This ink line is developed for Snap-cure production. It means that this system can be activated with high tem-

perature for short time (f.e. IR-lock or Leister) to close up the ink surface. This pre-cured system is ready for the backing process without offsetting when parts are stacked after IR cure in strip making applications.

The series 725 has passed MIL STD resistance to solvent testing on low stress molding compounds after Snap-curing which raises the surface of the device to 170°C for app. 5 seconds. It's necessary that the surface temperature of the printed compound must reach this temperature level to prevent printed strips from sticking together when stacked. It's recommended that cure be evaluated on each application due to variations in infrared cure units and substrates.

After the Snap-curing we recommend for the main backing process following conditions:

°C							
200	█						
180	█	█					
160	█	█	█				
140	█	█	█	█			
120	█	█	█	█	█		
100	█	█	█	█	█	█	
90	█	█	█	█	█	█	█
	5	10	20	30	45	60	90
	min						

The measured curing time starts in the moment when the ink film had reached the recommended curing temperature. Not backed ink films shows a good overprintability, heat cured inks can't be overprinted. Corresponding to the actual electronic compounds we recommend a backing process of 45 to 60 minutes at app. 120°C (250°F).

By heat curing processes it's important to have a knowledge of temperature conditions in different parts of used oven. In cases of bad ventilation there are higher temperatures around the heating areas and lower temperatures in the middle and opposite parts of the oven. The given recommendations are valid for the low temperature parts of backing units.

Resistances

Following information's are given for full cured ink films after application in accordance with Printcolor Screen Ltd. recommended procedures.

The adhesion on right treated materials is excellent and meets the cross-cut test following DIN EN ISO 2409, ASTM D 3002, NCCA No. II-5 and X-1 (cross-cut characteristic Gt 0 / 5 B) including an additional tape adhesion test (tape type 3M 569, 3M 360, Beiersdorf BDF 4105).

The mechanical resistances are approved with abrasion tester following ASTM D 1792, MIL-C-3004, FTMS 141a Method 6141.

The well cured ink films have a very good chemical resistance. Internal tests with most common solvents following ASTM D 2486, DIN 53778 wet abrasion scrub tester, afford the statement of more than 100 wet double strokes without any visual defects on the ink surface.

Specific tests on low stress molding conductors with good cured prints shows excellent chemical resistances to the following test methods and instructions after application in accordance with Printcolor Screen Ltd. prescribed procedures:

- SAGA Marking Permanency Test
- Solvent resistant tests following (SG) QAI-5-140, 1.0
- MIL-STD-883 C, Method 2015.B
- MIL-STD-883 E, Method 2015.11

- Motorola-STD 12 MRH 00154A
- MPT (Mark Permanence Test)

Time and temperature are very important factors to improve product properties. The resistances of cured ink films are increased by higher temperatures and longer stay in oven during backing process. This ink layers shows a maximized crosslinking effect and as result the best chemical and mechanical resistances.

All described tests are made with 15 different low stressed and conventional molded conductors, pre-treated with H₂-flame for 4 seconds, IR-cured 170°C/5s and end-cured by 120°C/45 minutes. After a regeneration time of 24 hours all chemical and mechanical tests are made following the explained regulations.

Printing blocks / Cliché

Pad printing ink Series 725 doesn't contain any ingredients which attack polymer clichés or cause oxidation's on steel printing blocks. Both printing equipment's are suitable, whereby a screening (positive contact screen) is special in case of polymer clichés advantageous for the production and printing process. Etching depths of app. 30µm for steel blocks and around 20µm for polymer clichés, depending on the motif are practicable and do not require any special preliminary test's.

Pads

The choice of the correct type of pad, shape and Shore-hardness depends on the printing article (form, structure, surface tension, etc.). It's independent of pad printing ink Series 725 which accepts all types of pads. The handling of pads is generally binding, i.e. delubrication of new printing pads, careful handling, no solvents, cleaning with adhesive tape, etc. Silicone-activation of old pads may be achieved with additive Series 10-03775.

Cleaning

Wet pad printing ink or not completely cured inks can be removed with all commercial solvent based cleaning agents of little polarity. Pad printing-specific universal cleaning agents like Series 700-URT and Series 700-BRT are the most suitable. Removal of completely cured pad printing ink Series 725 is time consuming and only possible using very aggressive media (decoaters). If cleaning of the pads by adhesive tape doesn't work, low aggressive cleaning agent Series 10-009 may be applied by a cotton towel.

Storage

Under normal conditions (limited change of temperature, medium temperature 15-25°C, humidity 20-70%) we guarantee a shelf life of 12 month. For metallics be valid a storage time of 6 month.

Viscosity/Visco-Stability

The pad printing ink Series 725 contains special stabilizing agents for long-term quality preservation. The development of this ink line is more especially made for the climate conditions in Asia (higher temperatures, extremely humidity). So one of the main items of development were to guarantee an equal viscosity level under more difficult circumstances.

The viscosity is prepared as follow:

Viscosity					
mPas					
35000	■	■	■	■	■
40000	■	■	■	■	
45000	■	■	■		
50000	■	■			
55000	■				
60000	■				
65000					
	20	30	50	70	100
	Rotation speed per minute				

All measurements are made under standardized conditions (22°C, 65% humidity). Equipment is a Brookfield DV 2+ rotation viscometer, spindle RV 7 following ISO 2884. Stock stability were simulated under aggravating circumstances. A quantity of 2000g Serie 725-79500 (white) were conditioned at 50°C for a time of 3000 hours. The product characteristics, especially the viscosity were checked all 300h.

Viscosity														
mPas														
42000														
40000														
38000			■	■	■	■	■	■	■	■	■	■	■	■
36000			■	■	■	■	■	■	■	■	■	■	■	■
34000	■	■	■	■	■	■	■	■	■	■	■	■	■	■
32000	■	■	■	■	■	■	■	■	■	■	■	■	■	■
30000	■	■	■	■	■	■	■	■	■	■	■	■	■	■
	0	300	600	900	1200	1500	1800	2100	2400	2700	3000			
	hours													

Brookfield DV 2+ rotation viscometer, spindle RV 7 following ISO 2884

Packing

Series 725 are available in 0,5, 1 and 5 kg polyethylene containers. White is also offered in 2kg PE-containers. Removed residues of ink can be supplied to the Polyolefine-recycling. Packaging containing unhardened residues of ink are subject to the special waste disposal regulations (waste disposal key (Abfallschlüssel) 080302 for EC, waste disposal key (Sonderabfall) X(1640) for Switzerland).

Precautionary measures

Read material safety data sheet prior to processing.

The material safety data sheets according to OSHA form contain indication of hazardous ingredients, TLV-level and instructions for precautions when processing, handling and storing as well as first aid. The information given in the MSDS refers to processing as described in this technical leaflet. The statements in our leaflets have been made to the best of our knowledge and are given without any obligation. They serve to advise our business associates, **but it is absolutely necessary** to make your own printing tests under local conditions, with regard to the intended purpose prior to starting the printing job. In case of any doubts please contact our technical advisors. The application, use and processing of the products delivered by us are beyond our control. This is subject to your responsibility and there is no liability or guarantee on our part.

In case of justified complaints the manufacturer can only be made liable for the countervalue of the used ink system.

Addition of not mentioned products or competitors products are on your own risk and releases Printcolor Screen Ltd. of any later demands, especially in cases of damage and loss caused by alien products.

All former leaflets are no longer valid.