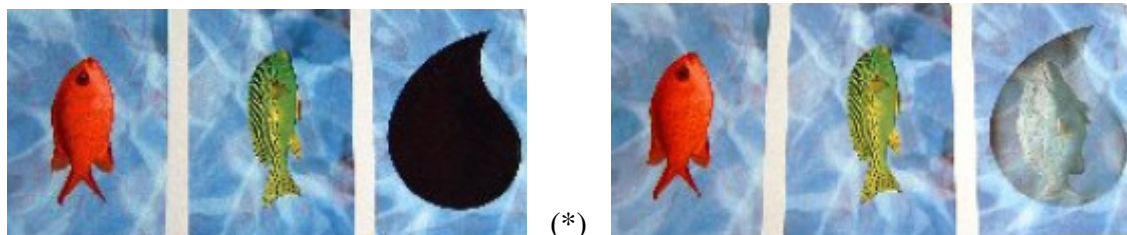


## Astonishing Sensory impressions due to thermochromatic effects

*As one of the leading supplier of special inks for screen printing we will introduce a very exceptional effect today: Screen printing inks which change their color by reaching a certain temperature. A very interesting product for a lot of innovative graphic and industrial applications.*

### What are thermochromatic inks and how do they work?

Thermochromatic inks belong to the group of sensor effects. Under influence of temperature a change of their optical behaviour takes place. A black or colored mass tone loses at the arrival of a defined temperature the color forming properties and becomes completely transparent. Therefore an underprinted information becomes visible or a second color appears. The pigments used in our formulas are filled micro capsules. They contain a special dye and a chemical activator dispersed without contact in a medium with a defined melting temperature. If the defined temperature of the medium is reached it becomes liquid; the two ingredients get in contact and lose their optical color. This effect is reversible when the temperature drops back and can be repeated a few thousand times.



### Which target temperatures and colors are available?

Principally target temperatures between  $-15^{\circ}\text{C}$  and  $65^{\circ}\text{C}$  can be realised. The sensitivity of the color change moves between  $2^{\circ}\text{C}$  and  $10^{\circ}\text{C}$ . Below  $33^{\circ}\text{C}$  the sensitivity is higher and above  $33^{\circ}\text{C}$  it becomes increasingly lower. The change from color to transparent starts at the target temperature and reaches its maximum with the highest transparency approximately  $2 - 4^{\circ}\text{C}$  above the target temperature. The available standard temperature ranges are  $20^{\circ}\text{C}$  for cold drinks,  $31^{\circ}\text{C}$  for finger rub activation and  $43^{\circ}\text{C}$  for warm drinks.

The 9 available colors can be regarded as a matching system allowing the simulation of a large number of color references. Also temperature ranges can be combined in order to achieve multiple temperature related colors. The use of non thermochromatic inks in the formulation provides even more opportunities to obtain secondary colors. However these inks must be highly transparent and the use of white or carbon black is not recommended as they would diminish the effect. Within our central service "Effect Styling" we are pleased to match and mix suitable combinations according to your requirements.

Practice has showed that thermochromatic Black is, due to its ideal price performance, the preferred Thermochrome color.

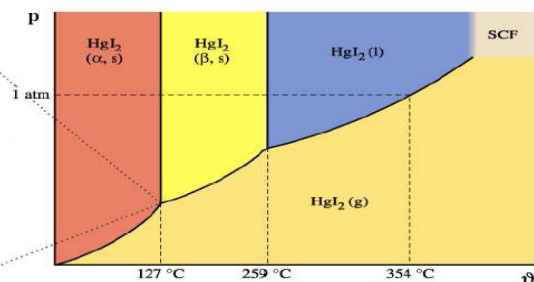
(\*) Pictures from Stainer Schriften und Siebdruck, Lofer / Austria

Printcolor Screen Ltd. offers Thermochromatic inks in Standard Series 560 (fast UV-curing ink range with outstanding adhesion range on various substrates) and additionally in Series 320, which is the solvent based counterpart. Thermochromatic effects can be also offered as special formulations in most other ink ranges of the comprehensive Printcolor Screen Ltd. portfolio.

### What do I need to know for production?

Our thermochromatic inks are highly pigmented but not highly opaque; they are rather translucent. If a pre-printed information should be hidden by a thermochromatic ink the design should be screened down to a low contrast. The best opacity can be achieved with standard black. When using a 43 L/cm polyester mesh in most cases a good hiding result - even of higher contrast designs - can be achieved. Because of the small pigment size between 2 and 6  $\mu\text{m}$  relatively fine mesh counts can be used in order to save cost and when no hiding power is needed. If printed on absorbing substrates a varnish should be printed first for optimum results. The available thermochromatic screen printing inks from Printcolor Screen Ltd. have short-term temperature stability up to approximately 160 °C. At longer dwell times or higher temperatures there is a risk of hysteresis in line with a change of the set temperature point. All formulations are suitable for a long time interior use. However any outdoor use is limited due to the low long-term UV-resistance of the dyes in use. In order to protect the thermochromatic print mechanically and at the same time to increase the transparency of the thermoactivated color layer, it should finally be overprinted with a corresponding varnish. In order to meet the most varying requirements suitable varnish systems are available.

At the temperatures which usually occur at curing / drying the thermochromatic inks during production the inks will be activated and therefore transparent when they come out of the dryer.



In order to allow for visual inspection during processing random prints should be put in a fridge for sufficient time until the color develops back. The thermochromatic inks from Printcolor Screen Ltd. are non-toxic. Against refund of the analytical they can be checked and certified for use on toys against EN71 Part 3. The storage stability under ambient conditions in sealed containers is 12 month from date of manufacturing.

### Where are these inks already used?

Thermochromatic screen printing inks from Printcolor Screen Ltd. are already successfully used in temperature warning applications for hot drinks, tubes, kitchen- and electro ware. As well in interactive mail shots, promotional games and lottery. Also, ready to use indication for micro wave food and cold drinks, visual control for deep frozen products and finally as a security feature on product labels, value packaging, membership cards, tickets and much more.

When do you discover your special application for this innovative technology from Printcolor Screen Ltd.? Order your sample kit for your internal evaluation of this promising effect product even today or contact your local Printcolor agent for further information: [www.printcolor.ch](http://www.printcolor.ch)