



## DYNACOLOR™ DATA SHEET

### THERMOCHROMIC TEXTILE SCREEN INK

#### DESCRIPTION

**DYNACOLOR™** thermochromic screen inks, in printed form, are colored below a specific temperature, and change to colorless or to another, lighter color as they are heated through a defined temperature range. These inks are available in various colors and activation temperatures. Standard activation temperatures are 15, 31 and 45° C (59, 88 and 113° F). Other activation temperatures are also available, from -5° C to 65° C. The activation temperature is defined as the temperature above which the ink has completely changed to its final clear or light color end point. The color starts to fade at approximately 4° C below the activation temperature and will be in between colors within the activation temperature range. The color change is “reversible,” i.e., the original color will be restored upon cooling. See Color Availability Chart for a complete list of available colors. **DYNACOLOR™** textile screen ink is ideal for T-shirts and other apparel, promotional items, temperature indicating tags, etc.

#### TYPICAL PROPERTIES

Viscosity (at 25° C)	90-120 poise
Density (Approx.)	8.5 lb./gal
Appearance	Paste
Percent Solids (Approx.)	100%
Percent Volatiles (Approx.)	Negligible
Food Contact Compliance Status	N/D
Yield Range (Approx.)	5,000-20,000 in <sup>2</sup> /lb. (depending on film thickness)
Recommended Substrates	Textiles

#### STORAGE AND HANDLING

The inks have excellent stability when stored in a cool, dry place. The material is combustible and should not be used near open flame. Store between 68 and 80° F. Must be used within three months of purchase. Storage longer than six months not recommended. Consult product MSDS prior to use.

#### SPECIAL CARE INSTRUCTIONS

**DYNACOLOR™** textile screen inks require special printing and handling care. If the recommended procedures are followed, these inks should have the same printing characteristics as normal translucent screen inks. The special colorants used in CTI's **DYNACOLOR™** inks have a low toxicity and are generally regarded as safe. This ink is a plastisol ink, and should be handled with the same safety precautions as any plastisol inks.

- Mixing-Always mix the ink thoroughly before using.
- NOT Thinning-Do not dilute or thin ink. Many materials will destroy the thermochromic colorants. Do not mix or combine regular plastisol inks with **DYNACOLOR™** ink.
- Screens and Mesh-Use lower mesh screens with the thermochromic ink. 110 mesh to 160 mesh screens are recommended. Results may vary if the 160 mesh screen size is exceeded. (Anything over 250 should be experimented with before a large job is done.)
- Solvents and Cleaning-Always be sure that the screens, ink knives/spatulas, or any other equipment that comes into contact with the ink is completely dry and free of all solvents. The ink is sensitive to many chemicals and must be treated with care in this regard. Wipe down the screen with a lint-free rag. If a screen wash is required to prevent ink from dry-

ing on the screen, or to clean the screen while printing, use CTI approved solvents only. Be sure the screen is dry before starting to print again.

- Artwork-For best results, print on white or light colors. **DYNACOLOR™** prints as a normal translucent ink, not an opaque ink, and cannot cover or obscure other colors. Hidden messages printed with **DYNACOLOR™** and a non-changing base ink should be camouflaged with a matching pattern, or trapped with a matching base ink.
- Drying-Do Not Overheat! **DYNACOLOR™** plastisol inks dry at a normal plastisol curing temperature of 300° F to 330°F (149°C to 165°C). Degradation may occur if the ink is exposed to extremes of heat for long periods. Increase the drying time, rather than the drying temperature, to achieve proper plastisol curing.
- Garments-Provide washing and care instructions that reflect the sensitive nature of the materials. Wash in cold with mild detergent and no bleach. Hang to dry. Minimize exposure to direct sunlight. Do not iron.

## SENSITIVITY

Thermochromic materials are sensitive to adverse environmental conditions. These are listed below, along with a description of the nature of the sensitivity, and recommendations with regards to them.

**LIGHT:** Most significantly, long exposure to UV and some fluorescent lights can degrade color intensity and changing characteristics of the ink. Extreme exposure of more than several days of direct sunlight may degrade the color of the ink, though it will probably still change colors. More than 600 hours of a strong fluorescent light may also cause a loss of color in the thermochromic. This is true of many different pigments and dyes. In handling these materials, a good rule of thumb is to assume that they are about as sensitive to light as fluorescent pigments are.

**HEAT:** Extended exposure to very high temperatures, i.e., 100° F or higher, can also degrade the pigment. The effect of light exposure seems to be additive over time. However, with heat, the exposure only has an effect if a given temperature is constantly maintained for a given amount of time. For instance, if a printed piece is left in a car on a hot day, out of the sun, at a temperature of around 130° F for eight hours, one might see slight degradation of the piece. If the same piece is left in the car on a cooler day, say 100° F for the same amount of time, no degradation would be seen. This could happen for months on end before any degradation was seen, as long as the piece were returned to a cooler temperature for the other sixteen hours of the day. If the piece were left in an environment where it remained at 100° F for many days, one might then expect to see a reduction in color. In other words, the effect is time- and temperature-dependent.

**CHEMICALS:** Thermochromic materials are sensitive to chemical exposure as well. Since it is very unlikely that the printed piece will come into contact with deleterious chemicals under normal conditions, this should not be of great concern. On the other hand, because of the chemical sensitivity and softness of this ink, it also has excellent anti-alteration properties.

**CONCLUSION:** In short, this ink should be stored in a cool, dry place, away from direct exposure to light, especially sunlight. This is true of both the printed ink and the wet ink. Ink in the can should be used within six months of receiving it. If the color or color reaction is compromised in a security environment, one need only to continue to verify the authenticity of the document by other means; ghost watermark, bleed through inks, etc. We predict that with proper handling, the failure rate of the ink will be less than one half of one percent, and as mentioned above, this means that one need only continue to verify authenticity and not redeem the document for cash until confirmation is established.

**NOTE REGARDING HYSTERESIS:** Reversible thermochromics exhibit what is referred to as “hysteresis.” In other words, if a standard “Body Temperature” ink is raised to an extreme temperature, say above 150° F (as with a curing unit), then left to cool under normal ambient conditions (65° to 75° F), the ink may not achieve its full color, even after it reaches room temperature. Although, under normal circumstances the ink should have full color up to 7-8 degrees below the stated activation temperature, once exposed to this kind of temperature “spike,” one may need to lower the ink’s temperature to below 50° F to gain improved behavior. **ALL APPLICATIONS USING COLOR-CHANGING INKS OF ANY KIND SHOULD BE THOROUGHLY TESTED PRIOR TO APPROVAL FOR PRODUCTION.**

For further information or assistance, please contact Chromatic Technologies, Inc. at (888) 294-4CTI.

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