LCR Hallcrest Smart Technology

- **Temperature Indicating Coatings, Pigments, Ink, Paint & Labels**
  - **Photochromic Paint, Ink, Dyes, Powder, Slurry and Masterbatch**

Definitions

Temperature indicating coatings and materials include chemical indicators, labels, pigments, paints or other indicators that change color when exposed to a certain temperature. These products are either irreversible and designed for one-time use providing evidence of attained temperature or are reversible and can change back and forth to provide an indication of the current temperature. Photochromic pigments, paints and inks change color when exposed to UV light reversing to colorless when removed from the UV light exposure.

Operating Principle

Temperature indicating labels, coating, paint, ink and pigments incorporate materials that exhibit thermochromism, a physical property that undergoes a change in color in response to a change in temperature. Photochromic paints exhibit a photochemical reaction to UV light changing from an essentially colorless state to colored.

Microencapsulating Thermochromic Liquid Crystals and Leuco Dyes increases accuracy, stability and life expectancy of the product. Leuco Dyes, Thermochromic Liquid Crystals and Chemical Indicators are thermochromic substances LCR Hallcrest offers as a label, coating, pigment and paint. Photochromic Paint is also available as a Powder, Slurry, Ink and Masterbatch.

Categories

Coating - Coatings are a layer of something deposited upon a material surface to add or enhance desired properties.

Pigment – a dry insoluble color matter or substance usually pulverized which when suspended in a liquid vehicle becomes a paint, ink, etc.

Paint – is a pigmented liquid mixture used on a substrate as a decorative or protective coating. Color changing paint can be used to monitor surface temperature and alert operators to potential hazards, maintenance requirements, etc.

Ink – A colored liquid or powder that is printed, sprayed, rolled to substrates to create markings, patterns or graphics. Color changing inks are smart and react to environmental fluctuations with color change.

Labels – an adhesive backed thin film for adhering to a surface with color changing material that can be either a reversible or a permanent change indicator with a scale or alert color.

Types

Thermochromic Liquid Crystals (TLC)

Thermochromic liquid crystals, similar to liquid crystal displays, are color changing crystals that undergo a reversible thermally induced color change. Traditional TLC's are microencapsulated and coated on a black backing. As they approach their temperature rating they pass through the colors of the spectrum in sequence from tan to green to blue before turning back to black. They are calibrated to display green at a rated temperature. TLC's can possess acute thermal sensitivity, detecting temperature changes as small as 0.2ºF and are available from -22ºF to 248ºF. LCR Hallcrest has developed and offers a single color liquid crystal that transitions from black to color without going through the colors of the spectrum, making it easier to read.

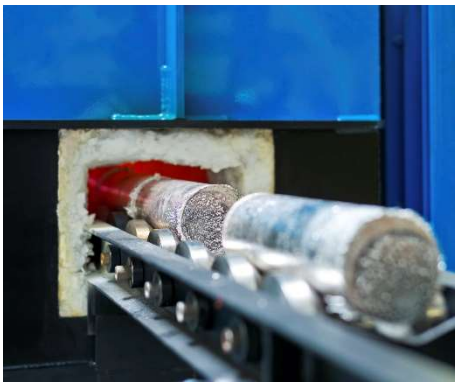
Chemical Indicators (CI)

Chemical indicators are typically irreversible temperature indicators. These one-time use products undergo a phase change when they reach their rated temperature. Normally, this involves a sharply defined melting point that triggers an interaction between a chemical compound and a substrate to produce a permanent color change. CI's are primarily used for temperature monitoring, providing evidence of attained temperature. Supplied as an adhesive strip or label they indicate whether temperature falls below or exceeds a rated temperature. LCR Hallcrest irreversible temperature labels are available from 84 - 554ºF.

Designed to provide proof of attained temperature.

Leuco Dyes (LD)

Leuco dye is a robust dye that contains molecules that exhibit two forms, one of which is colorless. They undergo a reversible color change that occurs over a temperature differential of approximately 5ºF (3ºC). Available in several different forms, slurry, powder, paint, water-based ink, epoxy, or masterbatch. Leuco dyes are engineered to change color over a broad range of temperatures (24-154ºC) and are available in several different colors.

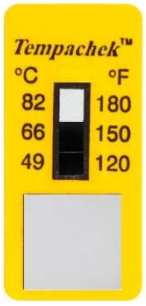


Irreversible Color Change Paint

Heat sensitive irreversible color change paint is used as a process and quality control indicator providing visual evidence of attained high temperature. Applications include, but are not limited to, metal fabrication and annealing, surface temperature management, machine equipment and operations. Perfect as a complement to electronic monitoring. Color density increases as temperature increases and is available from 140 to 392ºF

Photochromic

LCR Hallcrest Photochromic Inks change color when exposed to ultraviolet light, usually from the sun or a black light. The inks are effectively colorless indoors and turn into vibrant color outdoors. When brought back inside, the inks become clear again. The inks become intensely colored after only 15 seconds in direct sunshine and return to clear after about 5 minutes indoors. Sixteen standard plastisol colors including process colors and powders, slurry and dye are available.



Custom and or Combination Labels & Graphics

We offer thermometers with single color displays, multi-color displays, QR Codes and more in various sizes and shapes. Temperature labels can show current temperature or be irreversible to provide evidence of attained temperature. Reversible and irreversible color change temperature indicators can be united or combined with other environmental fluctuations. ***Paints, coatings, inks and labels can be set to your color and temperature specifications***. Our custom solutions will see to it that you get the perfect smart indicator for your needs.

Temperature and Hot Water indicator

Application – Industry - Certifications

Temperature indicating paints and materials are used to monitor cleaning and disinfection process in hospitals, wear and friction that can arise when drilling and machinery parts are overheated, to monitor the operation of engines and valves for warranty protection, measuring surface temperatures in electrical equipment and on printed circuit boards (PCB), optimization of temperatures in processing applications, and quality control of equipment used in firefighting and food preparation. Temperature sensing coatings, inks, labels and materials can be found in the following industrial areas.

- Automotive / Aerospace
- Drilling / Mining
- Defense / Military
- Electronics
- Environmental Monitoring
- Fire Fighting
- Food and Beverage
- Machine Tools
- Maintenance / MRO
- Manufacturing
- Medical / Healthcare
- OEM / Industrial
- Process / Quality Control
- Semiconductor / Wafer
- Testing and Measurement
- Transportation & Storage
- Research, Testing and Engineering

RoHS

CE

ISO 13845

CPSIA COMPLIANT

REACH REGISTRATION, EVALUATION, AUTHORISATION AND RESTRICTION OF CHEMICALS

- **FDA regulated, adhering to cGMP's**