

## LCR Hallcrest temperature label helps insure correct polypropylene shingle installation

Certain Teed, a manufacturer of quality building products, markets a premium polypropylene siding shingle that expands and contracts with temperature fluctuations. Ambient temperature was monitored during installation to insure proper spacing between shingles.

- **Requirement:** Ambient temperature monitoring was not getting the job done. It was determined that proper installation required a shingle surface temperature.
- Solution LCR developed a unique liquid crystal thermometer that covers the range of different shingles offered, measures surface temperature, is accurate, easy to read, cost effective and fits their manufacturing process.

#### Product Details

- o 11 event Liquid Crystal Thermometer
- o 0.375" x 2.25"
- Temp range 0-160F in 15F increments
- o Permanent grade adhesive
- Supplied on kiss-cut columns for easy siding installation
- o Colors: Black and White

#### Benefits

- Actual individual shingle surface temperature displayed for installer
  - Improved installation accuracy, decreases callbacks
  - Reduced warranty claims and reinstalling of the siding on completed houses
  - Solidified them as the industry leader with a commitment to quality





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AN1401 Rev00



## Reebok CCM ice hockey skates use a temperature label to ensure a custom fit

Reebok CCM in Canada was introducing a new line of ice hockey skates featuring a custom fit and wanted to add a temperature indicator to the skates to ensure that the U Foam foot form technology they were incorporating into the skates is used correctly. Skates would be heated, softening the U Foam allowing the user's foot shape to be molded into the skate.

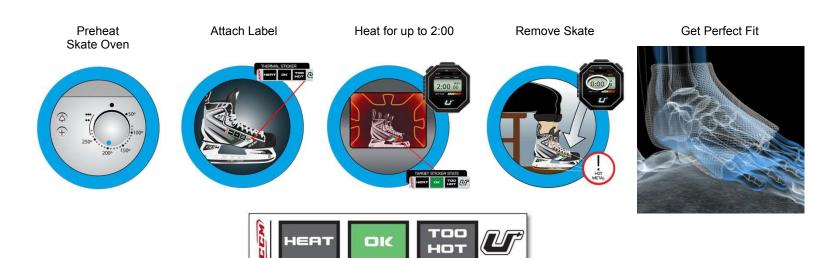
- Requirement: Reebok CCM required a label that would give an indication to the seller that the skates reached the ideal fitting temperature. Label needed to be on the skates during the heating process.
- **Solution:** LCR developed a unique liquid crystal thermometer that covered the requested temperature range, measured surface temperature accurately, was easy to read and cost effective.

#### Product Details

- o 3 event Liquid Crystal Thermometer
- o 2.50" x .50"
- o Temp range covered: 90-180°F, 30°F increments
- o Permanent grade adhesive
- Supplied in packs of 100 pieces
- o Colors: Black, White and Red

### Benefits

- Actual individual skate temperature displayed for the seller and user
- Fitting at proper temperature ensured best fit for the user
- o Solidified them as an industry leader introducing new technology with a commitment to quality



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SM1402 Rev00

LCRHallcrest is an international manufacturer of color and chemical changing temperature measurement labels, indicators and graphics with in-house design, development and manufacturing capability that offers solutions for unique temperature identification problems.





## Liquid crystal inks and sheets utilized in manufacture of color changing glass tiles

Moving Color contacted LCR Hallcrest with the idea of incorporating a color change technology into glass tiles for the architectural world. This color changing glass tile is activated by warm or hot shower water creating a change in tile color and a dramatic rainbow effect. The base color is designed to color coordinate with the decorating scheme and the change in color is intended to enhance the users experience when showering.

- Requirement: Moving Color needed a technology that could be applied to glass tiles and then sealed with their proprietary epoxy coating.
- Solution: LCR offered liquid crystal coatings and sheets that covered the requested temperature ranges as well as produced a visual 'pop' for the consumer when the tiles changed colors. Both products allowed Moving Color the flexibility to use them in various sized tiles.

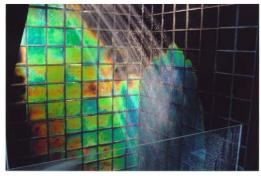
#### Product Details

- Sprayable Liquid Crystal coatings (various temperature ranges)
- Liquid Crystal Sheets (various temperature ranges)

### Benefits

- Showcased them as a pioneer in the architectural supply field as the color changing tiles have been featured on several home improvement television shows.
- Offered an infinite number of design possibilities.
- Provided Moving Color with a product line that could be offered to its high end clientele.





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AN1403 Rev00

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# Two environmentally driven color changing technologies are united creating a unique cart wash disinfection indicator for healthcare!

Cart washers are large scale disinfection washers used to sanitize surgical equipment that ranges in size from surgical carts used to convey surgical and patient transport equipment to instrument trays in the hospital setting. Cart washers use a combination of heat and water to get the job done. No test existed to test the mechanical efficiency of the cart washer.

- Requirement: A label to verify that during washing, water contacted the most difficult to reach surfaces of surgical carts and achieved the required temperature. Healthmark came to LCR Hallcrest (LCR) looking for a solution.
- Solution LCR developed a unique dual scale label that combines an irreversible temperature label with a hydrophilic ink that washes away when it gets wet. The Healthmark CartWashCheck™ label tells the operator that the products inside the washer have reached a sanitation temperature along with getting washed with water. These convenient tests can be quickly and easily adhered to any metal surface with the peel off adhesive that leaves no residue. This permanent change label documents attained temperature and water contact.

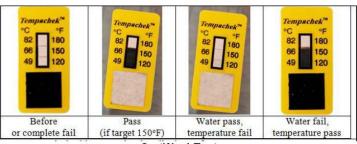
## Product Details

- o 3 event Temperature labels with Hydrochromic indicator
- o Size: 1.53" x0.7"
- Temp range:120-150-180F
- Removable adhesive
- o Colors: Black and yellow, hydro indicator turns from black to white

#### Benefits

- 1<sup>st</sup> of its kind to tell operators if temperature has been reached and if the cart was thoroughly washed during its cleaning cycle.
- Able to peel off and put it in your log for that wash cycle and items. No residual residue left behind
- Has an irreversible color change for both water and temperature

## **Images**



CartWashTest

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AN1404 Rev00



## Custom liquid crystal sheets used for an interactive point of purchase display

Ryan Scott, a manufacturer of POP displays, contacted LCR Hallcrest regarding the possibility of using liquid crystal technology in a foot board display application. Their client was an insole company looking to give consumers a quick and easy to read visual indication of what their arch type was at the in-store sales display.

- Requirement: Ryan Scott needed a technology that could be applied to existing foot boards and rigorous
  enough to withstand retail traffic, once over laminated with a thin protective film. Multiple temperature ranges
  was also a necessity due to various ambient conditions they would encounter at different sites.
- Solution: LCR offered liquid crystal sheets cut into the specified oval size that covered the requested temperature ranges as well as produced a visual signature of the consumer's feet indicating arch type.

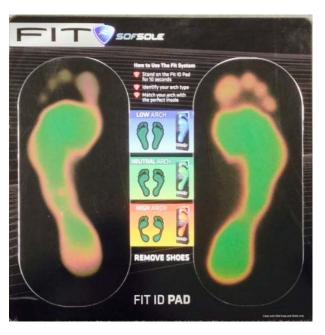
#### Product Details

- Liquid Crystal Sheets (various touch sensitive temperature ranges) cut into oval shapes
- Oval Size: 5.629" x 12.754"
- Provided with repositionable adhesive backing

#### Benefits

- o Cost effective and unique technology addition to Ryan Scott's POP display portfolio.
- Adaptable to various ambient conditions and able to accommodate multiple foot shapes and sizes.
- Customizable material giving Ryan Scott the ability to offer various foot board design layouts.





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AN1405 Rev00





## Conductive and Thermochromic Ink Combined to Create a Printed Circuit Battery Tester

Cyber Power Systems produce a battery backup unit for Verizon FIOS home equipment that uses standard D – cell batteries. These batteries needed to be tested at the point of use and Cyber Power challenged LCR Hallcrest to supply a low cost accurate battery tester that is reliable and easy to use.

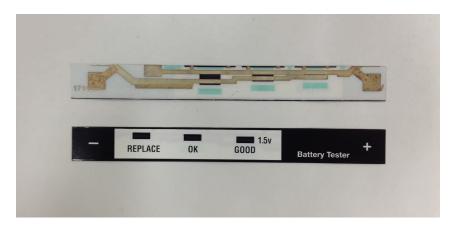
- Requirement: Low cost, accuracy, simplicity and ease of use summarize the design parameters specified by Cyber Power systems for testing common D- Cell batteries.
- **Solution A** combination of thermochromic and conductive inks were used to create an electrical circuit and thermochromic display that measured and displayed voltage. The circuit and display are printed on a thin flexible strip that is robust, reliable, low cost and always ready to use.

#### Product Details

- o 3 Event tester for 1.5 Volt Batteries
- Indicates: REPLACE, OK, GOOD Battery Status
- o Size: 4.5" x 0.5"
- Supplied on kiss-cut columns
- Colors: Black and White

#### Benefits

- o Inexpensive
- Un-obtrusive
- Convenient
- Accurate and easy to read



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AN1406 Rev 00



## Weather Resistant Truck Wheel Heat Indicator Label

LCR Hallcrest worked with industry experts to develop an indicator label designed to help truck drivers, maintenance personnel and safety inspectors improve vehicle visual safety inspections in line with CSA 2010\*. This label will alert the inspector to excessive wheel heat during visual inspections and will function after exposure to high heat, oil, power sprayers and truck washing chemicals.

- Requirement: Weather resistant irreversible label that indicates abnormal wheel end, bearing
  and brake component temperatures during regular visual inspections. Label must be low cost,
  easy to interpret, and exhibit extreme durability.
- Solution: A reverse printed label that turns to a bright orange at 250°F irreversibly. This specially
  designed label is designed to survive the extreme environmental conditions seen by heavy duty
  trucks.

#### Product Details

- Single Event Irreversible color change at 121°C/ 250°F
- Color change: White to Orange
- Size: 1.25" dia.
- Permanent grade adhesive
- o Supplied on kiss-cut columns for easy installation

## Benefits

- Inexpensive cost effective
- Helps improve vehicle safety inspections in line with CSA 2010
- Easy to Read Label that displays clearly visible color change
- Durable able to perform under extreme environmental conditions.
- Accurately identifies overheated wheel hub /hubcap surfaces
- Remains attached during maintenance procedures

\*CSA 2010, a safety program introduced in the USA, insuring that vehicle maintenance has become enforced as it is seen as the most important risk factor associated with heavy duty trucks and trailers.







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AN1407

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## Thermographic Liquid Crystal Thermometer Combined with QR Code

When Tinker & Rasor, a leading design, developer and manufacturer of electronic inspection equipment and reference electrodes was looking for a novel way to supply an inspector with the support documentation necessary to help with temperature correction in the field, LCR Hallcrest had an answer. This custom 7 event indicator uses red, green, and blue color change to indicate which reference multipliers to use when test calculations are needed based on temperature conditions.

An integrated QR Code allows users to access key support documentation while in the field, using a smart phone. This label is also equipped with a UV protective laminate for prolonged outdoor use.

- Requirement: A low cost thermometer that would provide continuous temperature
  monitoring of a half- cell (used in electrochemistry) and a QR code so in the event of a
  temperature excursion the user could access support documentation via the
  smartphone's QR code reader.
- Solution: LCR Hallcrest created a liquid crystal thermometer with an integrated QR code and UV protective laminate for outdoor use. The Blue and Red color change extremes make it easy to read and interpret.

#### Product Details

Events: 7

- Event 1. Black to BLUE below 59°F
- Event 2-6. Green 59°F 95°F
- Event 7. Black to RED above 95°F

Size: 2.9" X 0.75" Rounded Corners

Stock: 5 mil poly with UV protective over laminate

Adhesive: Permanent



## Benefits

- o Low cost thermometer for temperature measurement
- o Integrated QR code that supplies support documentation via smartphone
- o Custom sized to the relevant equipment
- o UV Protective laminate for prolonged use outdoors
- Reinforces company commitment to product support

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AN1408 Rev 00



# Retail Temperature Monitoring System for Hot and Cold Food Display Cases

Tesco, a multinational food retailer, and LCR Hallcrest teamed up to create a passive temperature monitoring system for food safety. This system is designed to work in current hot and cold food retail display cases, deli counters and walk in chillers and freezers. It is engineered to complement existing centralized electronic monitoring systems and function without power or maintenance and engage retail staff in food safety.

- Requirement: A portfolio of inexpensive temperature monitors that are accurate, easy to use, always on and will fit existing hot and cold retail display cabinets in addition to large backroom chillers and freezers.
- **Solution:** LCR Hallcrest created a series of reversible single color digital (alarm / no alarm) temperature monitors in various temperature ranges and sizes. These monitors:
  - o Fit into the generic shelf edge strip and monitor air flow temperature
  - o Are mounted on an 'L' bracket for deli counters
  - Scaled to be visible in large walk in freezers and chillers.

### Product Details

- Digital single color liquid crystal thermometers
  - Alarm / No Alarm
- 3 sizes (1.25" square to 9.5" x6.8") and 5 activation temperatures from 0°F to 145°F
- Adhesive backed



### Benefits

- Easy to read digital display- no interpretation necessary
- Multiple sizes for different locations
- Adhesive backed for ease of installation
- Requires minimal maintenance and training
- Promotes Food Safety at retail



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AN1409rev00



## Custom liquid crystal temperature label helps RHH Foam Systems produce quality insulation foam

RHH Foam Systems, (RHH), manufactures a polyurethane spray foam insulation kit, Versi – Foam, which is dispensed from a two component sprayable foam system where the chemical temperature needs to be just right to produce and dispense good quality foam. RHH contacted LCR Hallcrest looking for a temperature management system that would be ready to go at the installation site and could be stored with the product.

- **Requirement:** RHH Foam wanted an easy to read temperature label that would indicate the chemicals were at the right installation temperature.
- **Solution:** LCR developed a unique, custom three color liquid crystal thermometer that identifies the relevant range of chemical temperatures. This user friendly Blue, Green and Red temperature label makes it extremely easy for the installer to identify the chemical temperature by simply checking the color on the label and adjusting the chemicals according to the user instructions. Once the temperature is in the ideal range the system is ready to go.

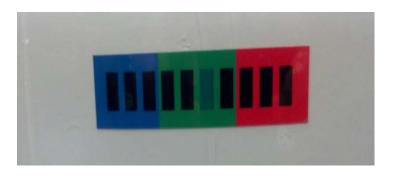
#### Product Details

- 10 event Liquid Crystal Thermometer
- o 20mm x 70mm
- Temp range -2 to 45°C
- o Permanent grade adhesive
- o Colors: Blue, Green and Red

### Benefits

- Individual temperature label is affixed to the disposable chemical container.
- Always ready to go no batteries.
- Custom temperature label is coordinated with mixing instructions.
- Ensures proper mixing and product application.
- o Reinforces the company's commitment to quality.





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AN 1410 Rev00

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# New LCR Hallcrest technology ensures bath water is correct temperature

Fisher-Price was looking to incorporate a water temperature monitor into a baby bath tub and contacted LCR Hallcrest. This water temperature indicator alerted the parents to water temperature extremes, allowing them to make the appropriate adjustments for baby comfort and safety.

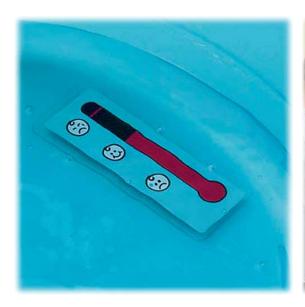
- Requirement: Fisher-Price requested a cost effective, easy to read, accurate temperature indicator at
  specified temperature points that could be affixed to the bottom of a baby tub and be submerged under water.
  Their preference was to have an indicator that was fool proof with a single color change indicating temperature
  versus the color play of our standard liquid crystal products.
- Solution: LCR satisfied their specifications with a temperature label that incorporated its proprietary single
  color above liquid crystal indicator technology that covered the requested temperature range and custom
  graphics that indicated bath water temperature. The indicator was also designed to be affixed to the bottom of
  the baby tub and submerged without damaging the liquid crystal thermometer.

### Product Details

- o SCA Red Liquid Crystal Indicator
- o Events: 3 (80, 90, & 100°F)
- o Size: 4.00" x 1.50" (LC Area: 3.00" x .25")
- o Stock: 5 mil with permanent adhesive backing

#### Benefits

- Cost effective solution that proved to be more accurate than other bath temperature products in the market
- Thermometer was designed as a clear label allowing for application on different colored tubs, assisting with production efficiency and minimizing inventory.





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AN1411 Rev00

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# Healthmark Introduces Room UV Disinfection Indicator Using Hallcrest's Irreversible Photochromic inks

Disinfection is an important issue in the overall effort to reduce cross contamination in hospitals. Healthcare providers have been struggling to ensure that rooms are fully disinfected between patients. Recently developed UV disinfection lights have become a powerful tool in the efforts to reduce cross-contamination in hospital rooms

- Requirement: A simple inexpensive test that provides proof that an area has been exposed to
  the correct UV light has been required and unavailable until now. The UV Check™ is the first test
  designed to provide visual evidence that 254nm of light was admitted to a room. These
  convenient pressure sensitive label tests can be easily affixed to any surface and feature a peel
  off adhesive that leaves no residue, once removed.
- **Solution** LCR developed a unique technology that irreversibly changes color when exposed to 254 nm light making this test possible. The label design tells the operator that the exposed surface areas inside the room have been exposed to the required amount of UV light sufficient for the disinfection process.

#### Product Details

- 1 event Irreversible UV indicator
- o Size: 2" x 0.5"
- o 254 nm
- Removable adhesive
- Supplied in packages of 10 labels
- Colors: White to Purple when exposed to 254 nm for 60 seconds
- Color reference guide used to match colors when exposed to 254nm



### Benefits

- o 1<sup>st</sup> of its kind to tell operators that a UV Disinfection has taken place.
- o Able to peel off and put it in your log. No residual residue left behind
- Has an irreversible color change with 254nm light
- o Can also be used on small personal electronics such as Smart Phones and tablets

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AN1412 Rev00



## **Temperature Label Alerts to Threat of Heat Related Illness**

Rio Tinto Minerals wanted to provide employees with a safety badge that they could reference to show early signs of dehydration. They were looking to add an ambient temperature thermometer and heat related illness awareness chart to the badge, thereby encouraging employees to be conscious of the environmental temperature and potential for heat related sickness.

- Requirement: Rio Tinto Minerals required a label that could indicate current temperature of the environment
  that their employees would normally be working in when outside, fit on the badge and allow for copy that alerts
  them to the relationship between temperature and heat related health issues.
- Solution: LCR provided a liquid crystal thermometer that covered the requested temperature range, continuously measuring outdoor temperature accurately, without glass or batteries, was easy to read, sized correctly and cost effective.

## Product Details

- o 7 event Liquid Crystal Thermometer
- o 1.75" x .50"
- Temp range covered: 86-140°F/30-60°C
- Permanent grade adhesive to allow thermometer to be applied to badge
- Supplied in packs of 100 pieces
- Colors: Black and White

## Benefits

 Outdoor temperature displayed for the benefit of the user to remind them to stay hydrated in extreme heat conditions.





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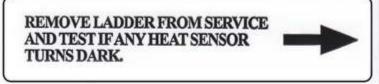




## **Custom Irreversible Indicator labels for Fire Ladder Safety**

Fire Ladders are regularly subjected to potentially dangerous temperatures. These temperatures are not only harmful to the firefighting staff, but also to the firefighting equipment. Exposure to excess heat can substantially degrade the integrity of aluminum and composite ladders. During routine equipment inspections it is critical to monitor ladder heat exposure to insure that fire ladder safety has not been comprised.

- Requirement: Ladder materials can lose significant load capacity if exposed to temperatures
  above 300°F. National Fire Protection Association Code NFPA 1932 now requires 4 heat
  sensors per ladder section. Each heat sensor has an expiration date printed on it. Any expired or
  triggered labels must be replaced only after a horizontal bend test has been performed on the
  ladder.
- Solution: LCR Hallcrest offers to its Ladder Safety customers a custom single event irreversible indicator that satisfies the code. Per ladder safety requirements the indicator turns from orange to Black at 300°F, with the specified expiration date clearly printed on the face of the label.
- Product Details
  - Single Event: Orange to Black color change at 300°F
  - Varying sizes and customizable shapes offered
  - o Permanent high temperature rated adhesive
- Benefits
  - Low cost
  - Unobtrusive
  - Accurate and reliable





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AN1414 Rev00



# Custom Temperature label with QR code helps monitor water temperature in hydroponic tanks

Growfresh supplies components and products that serve the hydroponic market. They identified a need to monitor water temperature in hydroponic tanks without upsetting new growth. Growfresh contacted LCR for a solution.

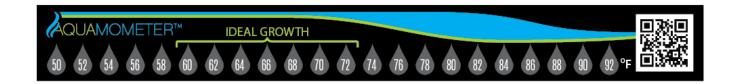
- Requirement: Growfresh needed an indicator to monitor water temperature inside hydroponic
  tanks from the outside. Most tanks on the market are supplied with thermometers that go in the
  water, not allowing for easy access to see current water temperature without disturbing seedling
  plants that are started on lids of tanks.
- Solution: LCR developed a custom liquid crystal thermometer that covers the requested temperature range, is accurate, easy to read, cost effective and also incorporates a QR code for consumers to scan and get additional information.

### Product Details

- o 22 event Liquid Crystal Thermometer
- o 8.75" x 1.00"
- Temp range 50-92°F in 2°F increments
- o Permanent grade adhesive
- Supplied Die-cut 100 thermometers per polybag
- Colors: Black, White, Emerald Green, and Process Blue

#### Benefits

- Water temperature displayed for consumer on outside of tank
- Indicator also allows consumer to see when water temperature is in ideal range for plant growth
- Seedling plants started on the lids of water tanks not disturbed when checking water temperature
- o Solidified Growfresh as an innovator in their industry with a commitment to quality



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## **Liquid Crystal Color Change Thermometer for Infant Warmer**

LCR Hallcrest and Embrace developed an easy to read temperature label for infant warmers that indicate proper operating temperature. These warmers have already saved an estimated 150,000 infants, mostly in developing countries. According to Embrace, "Over 1 million Infants die on their birthday. 98% of these deaths occur in the developing world. What's the leading cause of these Deaths? Preventable and treatable complications related prematurity and low birth weight, including hypothermia."

- Requirement: The Embrace warming device for Infants is heated prior to use with or without the use
  of electricity, therefore it is necessary to provide a monitor that does not require power yet delivers
  continuous temperature monitoring, insuring that the warmers operate within a temperature range
  that is safe and effective.
- Solution: LCR Hallcrest designed a custom Liquid Crystal Color Change thermometer that does not
  require power yet continuously monitors warmer temperature and alerts the caregiver to unsafe
  temperatures. This label combines two liquid crystal color change technologies that provide
  continuous temperature monitoring and a "TOO HOT" indicator. The Thermometer has a large
  viewing window that shows a moving green line which travels up or down depending on
  temperature. If the temperature of the Warmer is too high a red warning box appears.

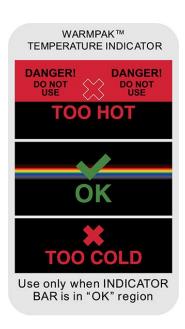
### Product Details

- Dual Technology Liquid Crystal
- o Moving Line Range: 29°C to 42°C
- Red Alert Window Range: +42°C
- Adhesive backing
- Graphic Indicators

#### Benefits

- Operates in Rural Environments
- Easy to Read Graphics
- Robust
- Cost effective





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## Clear Photo Reflective Pigments, Instagram®, Hidden Message and A Smartphone Create an Engaging Promotion

Miller Coors sought to create a promotional campaign that engaged consumers at the point of purchase. The point of purchase is usually a dimly lit to dark area. They proposed an advertising campaign/ contest that utilized the ubiquitous smartphone camera and the popular social media site, Instagram. Entry required that a flash picture was taken of a poster where a hidden message would appear in the picture only. Once the light source is removed, the image disappears but is captured as a photo on the phone. This picture was then posted to Instagram entering the consumer in the contest.

## • Requirement:

o A **clear** ink that could be over printed on posters and became visible when illuminated by a camera flash, not ambient light, then disappear ready for the next flash exposure.

### Solution:

- LCR Hallcrest developed a smart photo reflective clear pigment that lights up when exposed to a camera flash and can be printed on various surfaces.
  - Light activated silver reflective pigmented ink has been used on reflective tape and in safety applications but is visible at all times.

#### Product Details

- Available as a Solvent, UV or Plastisol screen ink
- o Can be printed on a dark or white substrate
- Substrates can be paper, particulate board, plastic or textiles

#### Feature / Benefits

- o Screen Printed Vivid results, durable, versatile & easy to set up
- Clear ink Overprint primary graphics
- o Flash Reflective ink Adds an interactive, engaging element to print media
- Plastisol Ink Prints well on textiles
- Solvent & UV Screen Prints well on Paper, Board, Plastic and Coroplast









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