

Cold Chain 101



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What is Cold Chain?

Whether a product is sitting in a warehouse or being shipped across the country or across the globe, if temperature matters, that product is part of the cold chain. Until recently, the term “cold chain” referred only to products that needed to be cooled. Now it has expanded to also include products that must be kept at room temperature. More recently, as products that must be protected from the cold enter the mix, “cold chain” is morphing to “controlled temperature.”

Seafood and pharmaceuticals are two obvious examples of products needing cold chain handling, but the type of products requiring controlled temperatures is expanding dramatically. Chemical products (like paints and coatings), sometimes use temperature controlled shipping to prevent them from separating so they will maintain consistency and, therefore, perform better. Fruits and vegetables are another example. Cooling them immediately after they are picked, extends their shelf life by several days. Even potatoes – a rugged crop – experience changes in sugar content based upon their storage temperatures.

Among pharmaceutical manufacturers, most temperature controlled products are shipped in the 2°- 8°C range. The second most popular temperature range for shipping is 15°- 25°C – controlled room temperature (CRT). While generally, products requiring controlled room temperature are stable, regulators are increasingly asking for proof that temperatures were maintained.

Logistics providers are aware of the increasing need for controlling temperatures in multiple ranges, and are building out their facilities accordingly. Leading international carriers are building new warehouses with sections for frozen, cool and controlled room temperature products. Some air cargo carriers offer dedicated aircraft for temperature-sensitive goods.

Even some railroads are providing temperature-controlled shipping, with the ability to plug in reefers.

Temperature Monitoring

Even with these advances, temperature controlled products still need to be monitored. The reason is simple. Equipment, no matter how new, sometimes fails. Accidents happen.

Human error also is a factor. New logistics personnel, impressed with the thermal sensitivity of vaccines and the potentially deadly repercussions of temperature excursions, have placed packages in coolers until refrigerated carriers arrived for pickup. Some of those shipments actually froze, causing the very damage handlers tried to prevent. Other times, truckers actually disconnected cargo refrigeration equipment to conserve fuel.

During transshipment, when cargo containers are offloaded from ships and transferred to other vessels, reefers may not be plugged in to shore power. Likewise, once loaded, they may not be plugged back into the ship’s power.



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How products are packed makes a huge difference, too. For example, items that must be cooled should be chilled before they are packed. The refrigerator units in trucks and reefers aren't capable of chilling goods to the proper temperature. There's a common misconception that carriers' refrigeration units eliminate the need for pre-chilling. The reality, however, is that without pre-chilling, items in the center of the packaging may never reach the proper temperature. Oranges, for example, should be cooled to 38°F at the loading shed. Instead, they too often are packed at 70°F to 80°F and shipped.

Food attorneys say that temperature monitoring is one of the best things shippers can do to improve food safety and minimize recalls. Temperature monitors, affixed internally or to packages' exteriors, provide incontrovertible proof of the environmental temperatures sensitive goods experience as they move throughout the supply chain.

Regulations Demand Proof of Temperature

While the business case to deploy temperature monitors is compelling, their use is increasingly mandated by regulators throughout the world. In the U.S., the Hazard Analysis and Critical Control Point (HAACP) is a standard requirement with its own safety verification process.

To that, the FDA has added the Food Safety Modernization Act, which tightens safety and verification requirements for all types of foods. Its rollout is gradual. For example, in 2013 the FDA required food importers to develop plans — including steps for verification — to ensure the safety of foods purchased from foreign suppliers. In January 2014, the FDA proposed a rule for food sanitation standards during transport. The FDA stresses that ensuring proper refrigeration is a key component.

The highly-regulated pharmaceutical industry is experiencing even stricter requirements, as health authorities throughout the world adjust their national pharmaceutical good distribution practices to insist

upon documentation proving proper temperatures have been maintained throughout shipping. Without evidence that pharmaceuticals have been shipped and stored at proper temperatures, many nations will refuse to accept shipments.

Monitoring Options

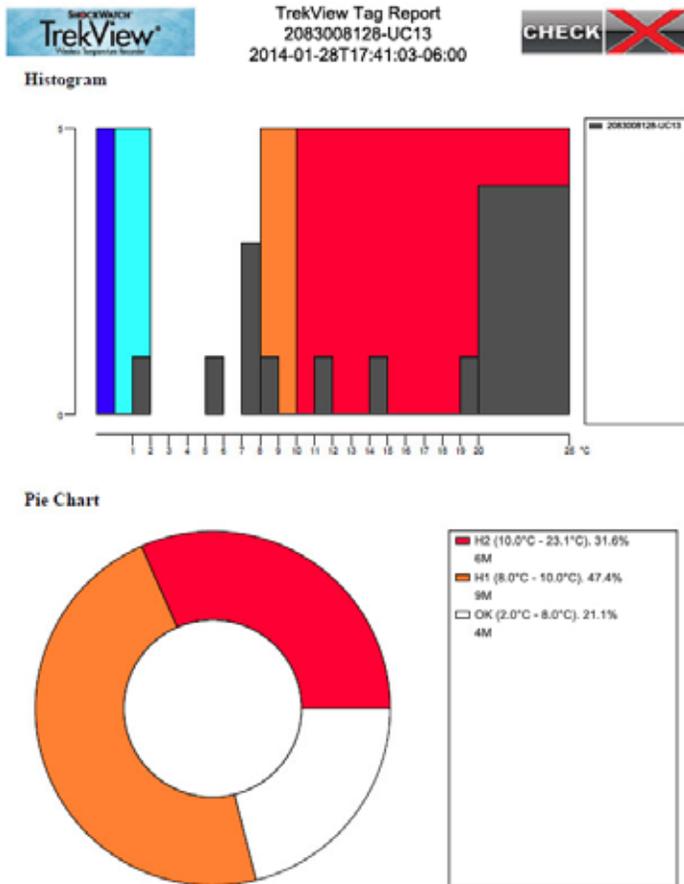
A wide variety of monitoring technology is available. For example, indicators that change color to flag temperatures that are too hot or too cold are an inexpensive solution for items that need simple go/no go information. Temperature recorders that provide more detail, such as the length and extent of temperature excursions are a good solution for more nuanced products, allowing them to be diverted to closer markets or evaluated to determine their safety or viability.

Temperatures are recorded at set intervals, enabling shippers to also know whether a package was opened — during customs clearance, for example — and when and where temperature excursions occurred.



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That information is important for a given shipment, but it also helps provide visibility throughout the entire cold chain. For example, by routinely monitoring shipments, shippers can develop a profile of temperature excursions correlated to such metrics as time of year, type of packaging, carrier, route and destination.

With that data, supply chain managers can make adjustments to minimize temperature excursions. For example, one pharmaceutical shipper used the information to alter the date it changed from winter to summer packaging.

Some of the more sophisticated solutions include wireless connectivity. These capabilities enable supply

chain or logistics professionals can be alerted instantly when – or before – excursions occur, enabling them to reroute the shipment or contact local agents to re-ice the product.

Reporting software takes the data to the next step, by making it useful long-term. By charting trends across multiple lanes for current or historic shipments supply chain managers can access the information they need and present it using graphics that can be understood at a glance.

An analysis of monitoring data also helps establish accountability when excursions occur, and thus minimize the chances of recurrence. For example, when GPS data from a data recorder determines a temperature excursion occurred on a shippers' own loading dock, the shipper can retrain its staff. If the excursion occurs in transit, it can work with its carriers to develop solutions, such as changing its labeling to make the temperature requirements more obvious and including information cargo handlers can use when excursions are imminent. This level of cold chain visibility is part of a comprehensive quality management system that is, increasingly, a part of cold chain best practices.

Merely packing a product in ice and putting it on a plane, or loading it into a reefer is no longer good enough. Increasingly sensitive products demand temperature monitoring to prove to receivers, regulators, insurers and attorneys whether they were transported at the proper temperatures. And, monitoring temperatures during shipment is just good business sense.

Companies do their utmost to ensure their products arrive in their most usable condition. If their products don't, the company deserve answers. Temperature monitors can help provide those answers.

For more information about how temperature monitors can improve your cold chain shipments, contact ShockWatch by phone (800) 393-7920, or visit us at www.shockwatch.com.