



## HOW TO EFFECTIVELY MANAGE THE COLD CHAIN FOR YOUR THERMOSENSITIVE PRODUCTS

Poor management of supply mechanisms generates huge costs and leads to uncontrolled losses. According to the FDA, the pharmaceutical industry faced 8065 product recalls in 2009 alone due to lack of adequate measures in place to control the cold chain.

This document is an introduction to the cold chain with the aim of informing life sciences professionals and stakeholders in the pharmaceutical industry about the priorities to consider to effectively implement a regulatory compliance program.

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# 8065

In 2009 alone, the pharmaceutical industry faced 8065 product recalls on the global scale.

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Thermosensitive products require special storage, transportation and distribution conditions.



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## THE COLD CHAIN CONCEPT

The cold chain refers to a temperature-controlled supply chain. It includes a series of storage and distribution activities that keep temperature-sensitive products within a given temperature range, throughout the supply chain. A deficiency of cold chain monitoring mechanisms, or non-compliance of these mechanisms, can affect the product's intrinsic properties and therefore cause risk to the end user.

A significant number of therapeutic products are thermosensitive and require handling by the cold chain. Among these products are vaccines, insulin, and blood products. In some cases, even brief exposure to temperatures outside of a specific range can irreversibly denature products.

Many organizations and regulatory agencies around the world have recognized the importance of warehousing and distribution mechanisms for temperature-sensitive products, leading to the emergence of a range of publications and guidelines, such as:

- ✓ USP Proposals (PSD)
- ✓ WHO Good Distribution Practices
- ✓ Canadian Guidelines on Drug Control during Storage and Transport (Guide-0069)
- ✓ CRF 21 Part 11, PICS, Annexe 11
- ✓ CSA Standards (Z902-04)

These standards are intended to guide industry and health care professionals on how to comply with policies and regulations that govern their operations. They also serve as guidance to staff assessment and verification of compliance.



## MANAGING THE COLD CHAIN

Companies that distribute temperature-sensitive products are required to meet the guidelines of regulatory agencies by ensuring that their products are stored and distributed under proper conditions. To do so, life sciences professionals should establish a system for managing and monitoring the quality of the cold chain, and employ this system consistently.

It is highly recommended to have an effective management structure, qualified and trained personnel and reliable equipment. Excellence in cold chain logistics requires a thorough understanding of monitoring mechanisms.

### QUALITY ASSURANCE DEPARTMENT

Oversees all the resources in place to ensure compliance.

### QUALITY CONTROL DEPARTMENT

Conducts the necessary tests to prove, with supporting documentation, that the methods are adequate.

All policies and mechanisms relating to the cold chain should be governed by a series of written and approved procedures. These documents cover the management of environmental conditions, the traceability of the instruments used, verification of vehicles, qualification of transport containers, product returns, staff, and so on.

When a functional information system is set up, it is essential that the various departments involved work together on risk analysis to identify the critical parameters and constraints of a cold chain management system. This analysis is a key step to optimize the cold chain. Once this has been accomplished, the various departments should work to develop procedures and standards closer to reality, according to the characteristics of the product.

Uncoordinated management of the cold chain greatly increases the chances of it becoming broken. A breakage in the cold chain occurs when the transport, storage, or handling conditions of a product are not recorded. It is therefore essential to establish temperature control tools.

## TEMPERATURE CONTROL TOOLS

There are currently a lot of instruments and equipment found on the market dedicated to the storage, transportation and monitoring of temperature-sensitive products. The judicious choice of these tools is key for the departments concerned.

Cold rooms, fridges and freezers are generally used for the storage of sensitive products. For transport, isothermal transport boxes, vaccine carriers, or containers for international transport are typically used.

Many factors must be considered in the selection and management of these facilities, such as:

- ✓ The amount and type of products to be stored or transported
- ✓ Variations in temperature between the place of departure and destination
- ✓ Climate changes
- ✓ Possible power outages
- ✓ Duration

## STORAGE OF THERMOSENSITIVE PRODUCTS

Regardless of the type of equipment used to store products, it must be [qualified](#), [mapped](#) and equipped with an [alarm system](#) connected to a telephone exchange. This system will immediately notify a responsible person in case of breakage or equipment failure. For highly sensitive products, it is suggested to provide a source of emergency cold to avoid unnecessary risks. It is recommended to separate the power source of the storage chamber from that of the alarm system.

For monitoring temperatures, it is recommended to use thermostats with digital display along with chart recording temperature sensors, which will continuously show the differences in temperature and duration.

All measuring instruments must be identified and calibrated at least once a year. The records must be reviewed and approved by qualified personnel. The documents relating to daily temperature records and calibration must be archived and available for verification and auditing. The temperature distribution in the storage enclosures must be presented on request.



## TRANSPORT OF THERMOSENSITIVE PRODUCTS

Life sciences companies have several tools to keep sensitive products in the temperature range required during transport, such as [isothermal packaging](#) and temperature-controlled transport. Isothermal packaging uses [ice packs](#), whose role is to work with the packaging in order to maintain the required temperature for a given period.

To track temperatures during transport, businesses can use temperature indicators or data loggers. [Temperature indicators](#) respond to an energy input and are used to see if temperatures have exceeded a given temperature range. They do not record data and do not inform the user of the time and range values. [Data loggers](#) can track temperature changes over time. They are programmable instruments that collect data to analyze variations in temperature relative to time.

Thanks to technological development, these recorders, when placed in the transport vehicle near the products, are capable of providing the driver with real-time communication of the cargo temperature and warn the driver when the temperature falls outside of the specified range. These tools are at the cutting edge of technology and provide prompt action in accordance with regulatory requirements.

These tools, however, must be qualified and calibrated regularly, taking into account the various parameters and constraints to ensure that the cold chain remains unbroken at all times.





## CONSTRAINTS DURING THE DISTRIBUTION OF PRODUCTS

Respect for the cold chain involves knowing the constraints that surround it. When setting up a cold chain policy, it is important to identify and analyze possible constraints, such as:

- ✓ The volume of goods transported;
- ✓ The temperature range. This parameter can affect the choice of packaging, the cold source and the particular means of transport;
- ✓ The impact of exposure to temperatures outside of a specific range on product quality;
- ✓ Knowledge of transport times;
- ✓ Knowledge of outside temperature profile during transport;
- ✓ Thermal inertia, directly proportional to the mass of the product and its weight in water.

## PITFALLS TO AVOID WHEN DISTRIBUTING PRODUCTS

The development of an efficient cold chain also requires knowledge of the pitfalls in the distribution of products. One of the common pitfalls is the risk of freezing a product to be stored at a positive temperature. If the separation barrier between products and heat stabilizers, or ice packs, is not effective, there is a risk of freezing. This risk is significantly increased during transport, hence the importance of using qualified tools in the cold chain.

To ensure that the cold chain is not broken, it is essential to read and regularly note storage enclosure temperatures and place temperature loggers near the product, whatever the season, or time of transport.

For countries still using the imperial system, it is essential to clarify the possible labeling and use the two measurement systems in order to avoid misinterpretation. Proper labeling also reduces the risk that a package or a storage unit is opened by mistake.

Specific cold chain labeling will attract the attention of all stakeholders and will raise awareness of the importance of a suitable storage place, or of a sending priority. To be effective, the icon or label must be visible and legible.

Finally, it is important not to neglect specific events such as strikes, holidays, or time differences. These elements can disrupt the transport of goods and the process flow of the cold chain.



## YOUR COLD CHAIN EXPERT

Cryopak is a cold chain solutions provider for the pharmaceutical, life sciences, biotech and food industries. The company manufactures items for temperature-sensitive shipping needs, including insulated shipping containers, gel packs, phase change materials and temperature monitoring devices, and also offers package design and testing services in its ISTA certified labs. Cryopak delivers superior products and service from an industry-leading team of experts whose primary goal is to ensure and protect product integrity.

Cryopak is headquartered in Edison, New Jersey, with locations across the United States, Canada and France.

Need help with cold chain? [Ask the expert!](#)



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