

EVERYTHING YOU NEED TO KNOW ABOUT  
**COLD CHAIN & TEMPERATURE  
CONTROLLED PACKAGING**



**TPC** **PACKAGING  
SOLUTIONS**  
TAPE Products Company

# EVERYTHING YOU NEED TO KNOW ABOUT **COLD CHAIN & TEMPERATURE CONTROLLED PACKAGING**



The term “cold chain” refers to the logistics network designed to maintain a product’s optimal temperature as it moves through the distribution chain to its end destination. While cold chain once referred only to products requiring low-temperature conditions, the term has now evolved to include the handling of any temperature-sensitive product, including those requiring room-temperature conditions or protection from hot or cold environments.

This eBook provides an overview of cold chain and temperature-controlled packaging solutions, how they work, the various types available, and the many industries in which they are implemented.

# WHAT IS COLD CHAIN/ TEMPERATURE-CONTROLLED PACKAGING?

Cold chain logistics includes all technologies and processes used to create the controlled conditions that protect temperature-sensitive goods. One important element of the cold chain is temperature-controlled packaging, which is designed to maintain an item's optimal temperature from the time it is produced until its final use.

Temperature-controlled packaging protects foods, beverages, bio-pharmaceutical products, and other sensitive or perishable items from temperature deviations that can render them unsafe or ineffective.

Some of the most common materials used to create temperature-controlled packaging include:

1

## INSULATION MATERIALS.

Insulation materials such as Styrofoam, flexible thermoplastics, and textiles form a protective barrier that prevents heat transfer.

2

## PHASE-CHANGE MATERIALS.

Phase-change materials such as dry ice or refrigerant gel packs can be placed within an item's shipping container to maintain low temperatures.

3

## HEATING ELEMENTS.

Powered heating blankets, induction drum heaters, and other electrical systems can be used to store or ship items requiring elevated temperatures.

# WHAT IS COLD CHAIN/ TEMPERATURE-CONTROLLED PACKAGING?



Temperature-controlled packaging helps address specific pain points or logistical challenges throughout the cold chain, including:

**1**

## **COLD CHAIN LIMITATIONS.**

Temperature-controlled packaging provides a way to maintain a product's temperature in situations where other methods, such as temperature-controlled warehousing or transportation, are unavailable.

**2**

## **TRANSPORTING OR STORING MIXED LOADS.**

Food distributors and supermarkets are often tasked with transporting or storing several food items with varying temperature requirements in the same vehicle or warehouse. Temperature-controlled packaging provides a way to keep individual products at different temperatures within a shared space.

**3**

## **COMPLYING WITH REGULATORY REQUIREMENTS.**

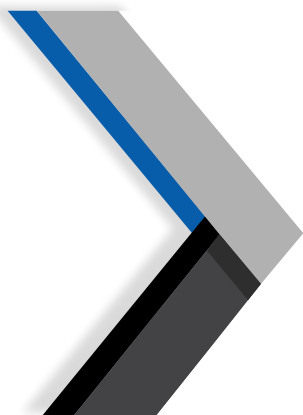
The FDA and other regulatory organizations set high standards regarding the shipping and storage of sensitive medicinal products and perishable food items. Temperature-controlled packaging solutions can be tailored for specific temperature ranges, helping manufacturers and distributors to comply with increasingly strict regulatory standards.



# TYPES OF COLD CHAIN/TEMPERATURE CONTROLLED PACKAGING SOLUTIONS

Temperature-controlled packaging solutions come in various types, each of which is designed to provide protection for specific cold chain applications. These include:

## THERMAL/INSULATED SHIPPERS

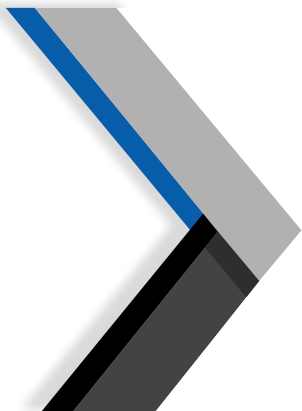
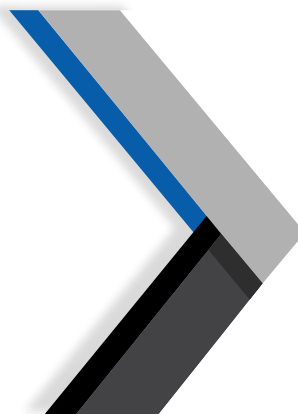


### REFLECTIVE BUBBLE MAILERS.

The reflective bubble mailer's bubble interior is designed to cushion the item and prevent heat transfer while its foil exterior reflects radiant heat. Suitable for maintaining ambient, refrigerated, or frozen temperatures, this type of packaging is often used to ship perishable food products and temperature-sensitive medical samples.

### INSULATED PALLET LINERS.

Insulated pallet liners are lightweight insulated sheets that line the interior of shipping containers to maintain refrigerated or frozen temperatures. These liners are typically used when shipping bulk quantities of a product by pallet.



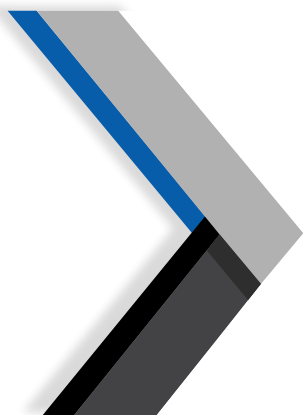
### INSULATED PALLET COVERS.

Insulated pallet covers are blankets that protect perishable foods, medical samples, pharmaceutical products, and other sensitive materials from extreme heat or cold damage during shipment.

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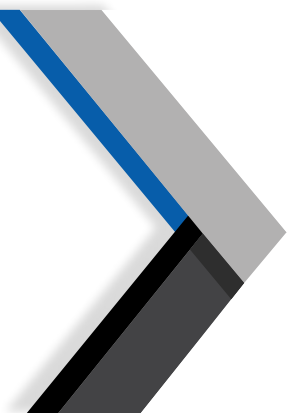
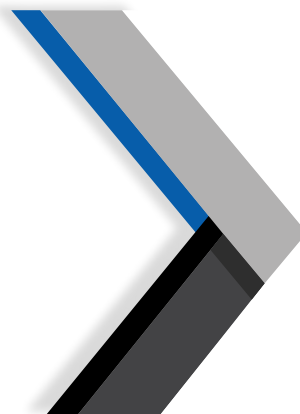


### CURBSIDE RECYCLABLE SHIPPERS.

Temperature-controlled curbside recyclable shippers are constructed from fully recyclable materials, providing an environmentally friendly option that can be conveniently recycled by the recipient.

### COTTON- AND PLANT-BASED SUSTAINABLE SHIPPERS.

Constructed completely from renewable materials, cotton- and plant-based sustainable shippers provide an effective and eco-friendly option for shipping temperature-sensitive items without contributing to the depletion of natural resources.



### EPS MOLDED COOLERS.

Available in various sizes, thicknesses, and foam densities, expanded polystyrene (EPS) coolers are lightweight shippers made for safely shipping and storing foods, pharmaceuticals, and other temperature-sensitive items.

# TYPES OF COLD CHAIN/TEMPERATURE CONTROLLED PACKAGING SOLUTIONS

Temperature-controlled packaging solutions come in various types, each of which is designed to provide protection for specific cold chain applications. These include:

## GEL PACKS



### POLYMER ICE PACKS.

Polymer ice packs are portable bags filled with super-absorbent polymers that absorb water to become a gel. Once cooled, polymer ice packs can be placed around perishable foods and other items to keep them cool during transport.

## SEMI-RIGID FOAM BRICKS.

Semi-rigid foam bricks can maintain their shape during freezing or thawing, allowing them to provide better surface contact with the item and improved temperature control during transit. The bricks are injected with coolant and vacuum-sealed to provide a consistent shape and weight.



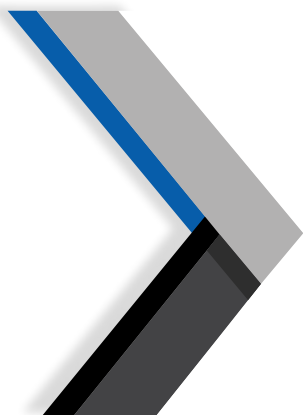
### NO-SWEAT GEL PACKS.

With their multi-layered exterior, no-sweat gel packs help absorb moisture and prevent condensation damage to the product and packaging during shipment or storage.

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## GEL PACKS



### DRAIN-SAFE PACKS.

Drain-safe packs are composed of an environmentally friendly refrigerant that can be safely and conveniently washed down the drain by the recipient.

## COLD-TEMPERATURE TAPES

When exposed to cold temperatures, most tapes and adhesives become brittle and less effective at forming secure seals. Cold-temperature box sealing tape is specially formulated to withstand temperatures as low as -40 °F, ensuring that the package will remain tightly sealed throughout the cold chain.

## COLD-TEMPERATURE STRETCH FILMS

Cold-temperature stretch films are designed to retain their cling and containment around the load, even when exposed to cold, dust, or constant shifting during transit. Wipe down of the film tail helps to further secure the load and prevent issues during automated handling procedures. Other features of the film include:

- ABILITY TO RUN ON ANY EQUIPMENT
- HIGH CLARITY FOR EASY BARCODE SCANNING
- HIGH STRETCH LEVEL WITH EXCELLENT PUNCTURE RESISTANCE



# TYPES OF COLD CHAIN/TEMPERATURE CONTROLLED PACKAGING SOLUTIONS

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## TEMPERATURE INDICATORS & RECORDERS

Temperature indicators and recorders provide a way to closely monitor temperatures throughout each stage of the cold chain. Having this data is vital for detecting temperature deviations and making critical adjustments that will improve the overall integrity of the cold chain process. It also provides documented proof that a product was kept at the appropriate temperatures for the duration of its journey.



# COLD CHAIN/TEMPERATURE CONTROLLED PACKAGING APPLICATIONS

Temperature-controlled packaging is a critical element of the cold chain in several industries, including:

1

## MEDICAL AND PHARMACEUTICAL.

The rapidly growing and tightly regulated pharmaceutical industry has been a driving force behind the development of innovative, high-performance packaging solutions. Maintaining specific temperatures during transport and storage is critical to the efficacy and safety of medications, vaccines, and other pharmaceutical products. With the proper temperature-controlled packaging, everything from pharmaceuticals to biological samples can be safely shipped and stored at specific temperatures until time for use.

2

## FOOD & BEVERAGE.

With roughly 40% of foods requiring refrigeration, the food & beverage industry is another major consumer of temperature-controlled packaging. The rising popularity of meal kit and grocery delivery services has further increased the demand for high-quality packaging solutions that can protect the integrity of perishable food products until they reach the final consumer.

3

## CHEMICAL.

Certain high-purity chemicals must be kept within very specific temperature ranges to minimize degradation. Temperature-controlled packaging plays a significant role in protecting the integrity of temperature-sensitive chemicals as they are shipped to manufacturing plants, agricultural facilities, and research institutions.

# COLD CHAIN & TEMPERATURE CONTROLLED PACKAGING AT TPC PACKAGING SOLUTIONS



Temperature-controlled packaging plays a critical role in maintaining optimal temperatures during the storing, shipping, and handling of pharmaceuticals, biological samples, food products, and other sensitive or perishable items.

For over 50 years, TPC Packaging Solutions has worked with clients from various industries to provide innovative cold chain packaging solutions that meet some of the strictest shipping and storage standards. Using the latest technologies and trends to guide our process, we are committed to helping our clients find ways to reduce their expenses and optimize the efficiency of their operations.

Our cold chain packaging solutions include everything from insulated shippers and gel packs to cold-temperature tapes, stretch films, and temperature-monitoring devices.

**FOR MORE INFORMATION ABOUT OUR  
TEMPERATURE-CONTROLLED PACKAGING  
SOLUTIONS, PLEASE  
[REACH OUT TO US TODAY.](#)**





# ABOUT TPC PACKAGING SOLUTIONS

With more than 50 years of expertise in working with companies and products in nearly every industry, **TPC** provides new ideas that improve our partner's efficiency and effectiveness in the workplace.

Offering selected corporate rebates and product-specific loyalty programs, TPC provides customized tapes and packaging solutions for many areas of business including manufacturing, fabricating and assembly, packaging, protecting and shipping, facilities repair and maintenance; marking identification and coding, building, and construction and HVAC.

**CONTACT US**



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