

Introduction

Reusable containers are designed to be used repeatedly, or indefinitely, for the distribution, transport and storage of products. The growing use of reusable containers has been driven by environmental concerns, and the limited economic justification and governmental support for single-use units.

In recent years, however, various factors have turned the shift from single-use to reusable containers into a commercial opportunity. Government support and subsidies, high through-put manufacturing processes, and robust reverse logistics all provide strong incentive for the use of reusable containers.

Business owners and packaging engineers are now taking sustainability and reusability issues into account more profoundly than before when making decisions related to corporate growth, return of capital, reputation and risk management.

In response to this growing demand for reusable containers, Insulated Products Corporation (IPC) offers an advanced, reusable insulating product, PopupLiner, that is fully recyclable and built to thermally insulate the temperature-sensitive shipments inside a reusable container.



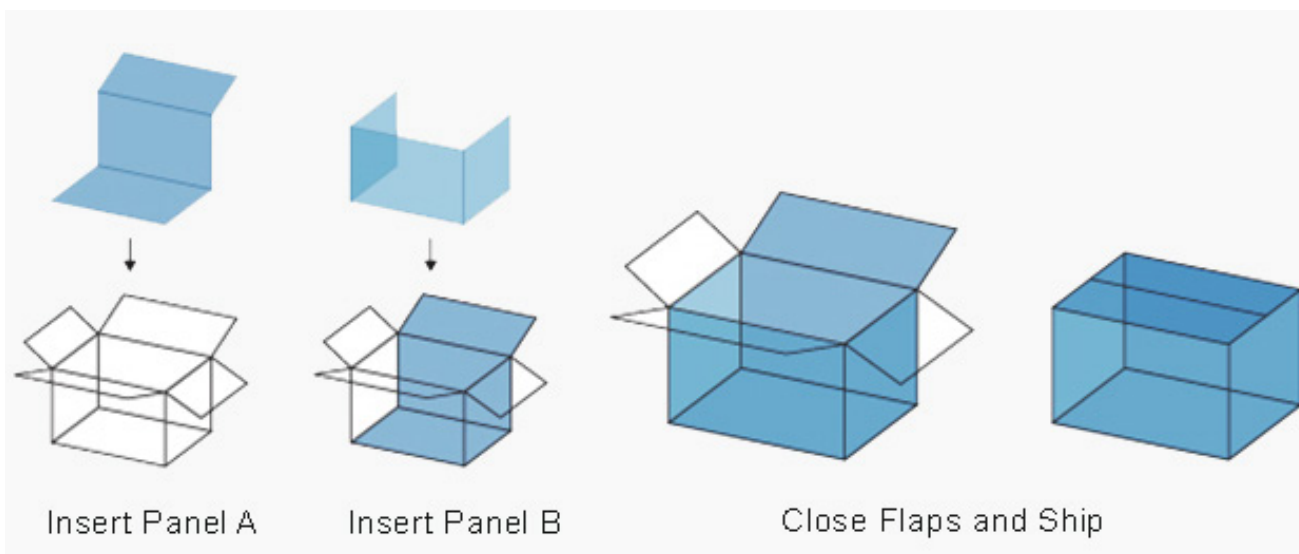
IPC's Recyclable Solution: PopupLiner

PopupLiner insulated box liners are IPC's innovative, high-performance, insulated shipping liners, custom-made to thermally shield temperature-sensitive products from extreme ambient temperatures.

Each PopupLiner set is composed of two three-panel, tri-fold liners, together making up a six-sided container. A PopupLiner box liner set is inserted into a six-sided container in two steps:

Step 1 – Panel A is placed inside a box covering the bottom, top, and one of the side faces of the box.

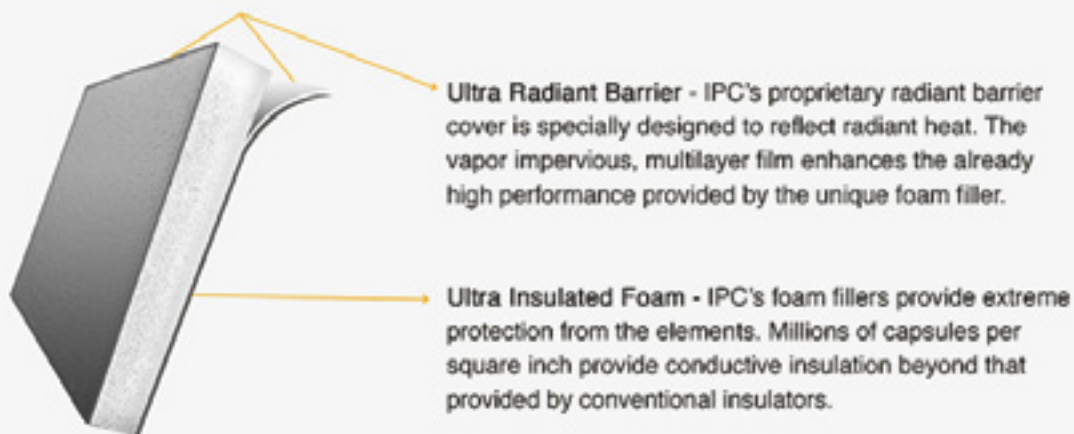
Step 2 – Panel B is placed on top of panel A covering the remaining side faces.



IPC's Recyclable Solution: PopupLiner

PopupLiner thermal box liners are made of polyurethane foam and a proprietary, ultra-radiant barrier that is engineered to reduce the flux of heat. The insulated shipping liners are unique in that they provide an alternative form of temperature-controlled packaging that is fully compressible using IPC's patented technology. The self-inflating and expanding thermal liners arrive compact, vacuum-packed in compression sleeves using proprietary technology, and automatically inflate to full thickness upon opening. The space-efficiency feature saves 75% in shipping and storage space when compared to the equivalent in rigid coolers.

PopupLiner box liners are effective for maintaining refrigerated, frozen, and room-temperature (RT) applications for over 48 hours. This makes these box liners perfect for 48 hour shipments of products such as frozen food and pharmaceuticals such as vaccines.



Cross Section of PopupLiner Insulated Box Liner

Thermal Validation Results

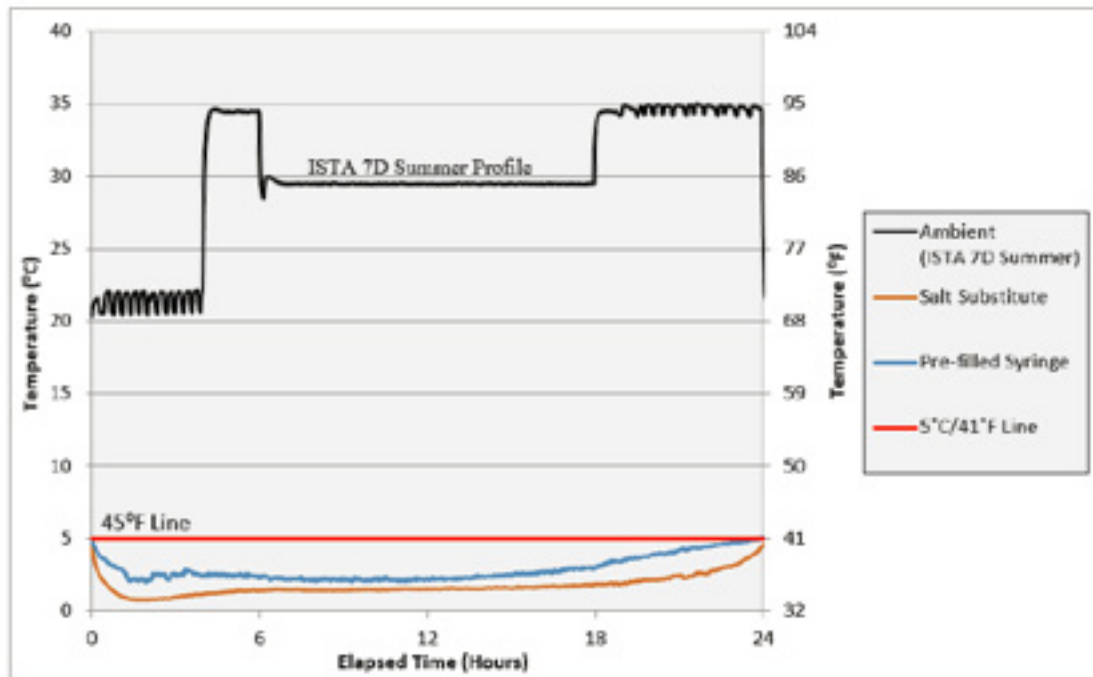
A test was designed to evaluate the thermal performance of the PopuLiner insulated box liner in maintaining refrigerated temperatures of pre-filled syringes and solid-dose tablets during transport under simulated hot conditions.

For this test, 2lb of syringes pre-filled with water and 4.75lb of solid-dose tablets were pre-conditioned at 3°C, before being placed inside a reusable container equipped with a PopuLiner thermal box liner with 1" wall. 15lb of refrigerant gel packs, pre-conditioned at -20°C, were placed on top of and underneath the products. T-type thermocouples, used as temperature probes, were inserted inside the syringes and tablets to measure the actual temperature. The reusable container was put inside an environmental chamber and tested under extreme summer conditions (ISTA 7D summer).



The temperature profiles of the oven and the products inside the PopuLiner thermal box liner are depicted in the figure below. Both products were kept below 41°F for 24 hours under the ISTA 7D summer temperature profile.

Thermal Validation Results



Temperature profile of the oven and all the components inside the reusable bin equipped with IPC's PopuLiner thermal box liner



PopuLiner Thermal Box Liner inside a reusable container



Pre-filled syringe with a temperature probe

Summary

Reusable containers are replacing single-use containers due to long-term economic and environmental benefits. In response to this trend, IPC is accommodating the needs of the market by providing the PopuLiner thermal box liner to protect the shipment of temperature-sensitive commodities.

IPC's PopuLiner thermal box liner can be manufactured to fit any reusable container and is available in various thicknesses to yield different levels of protection. An experiment was conducted to evaluate the performance of the PopuLiner thermal box liner in maintaining refrigerated temperatures within a reusable container. The container was exposed to extremely hot temperatures inside an environmental chamber.

The results of the test demonstrate that IPC's PopuLiner box liner kept the products at a temperature of below 41°F for 24 hours under simulated summer conditions. This shipping solution provides a reusable system, including both the container and the insulated liners, that can be repeatedly used to ship temperature-sensitive products.

About Insulated Products Corporation (IPC)

Founded in 1999, IPC has been an innovator of thermal-packaging solutions. We have spent over a decade studying, perfecting, consistently producing and delivering effective cold-chain thermal packaging to companies shipping medicines, foods, and industrial goods worldwide. IPC designs and manufactures, in-house, a variety of custom temperature-control products for the cold-chain shipping industry.

All of IPC's solutions provide high levels of performance, while remaining space-efficient and green. We thrive on special requirements, including custom sizes, extended shipping durations, unique temperature requirements, and sustainability.



Maintaining strict temperatures, maximizing payload, minimizing weight and preparation time are the cornerstones of IPC's cold-chain solutions. Contact us today to discuss your unique temperature-assurance packaging requirements. Contact us today to discuss your unique temperature assurance packaging requirements

