ENHANCED SPACE & THERMAL EFFICACY OF REMOVABLE THERMAL BOX LINERS

Introduction

Expanded polystyrene (EPS) coolers are among the most commonly used insulated shipping containers in the food and pharmaceuticals industries. There are some advantages in using EPS coolers, such as being thermally insulating, relatively lightweight, and cheap. However, due to its environmental impact and non-biodegradability, over 100 counties – including the counties of Los Angeles, CA; Portland, OR; New York, NY; Washington, DC – have already outlawed certain polystyrene foam products.

While some polystyrene is reused, the majority used for food or beverage containers are one-time use materials. Also cited as a potential drawback is the uncertainty about the long-term health effects of chronic exposure to EPS Styrofoam, particularly those used in the food industry. In addition, although lightweight, EPS coolers are extremely bulky and are shipped stacked. This renders the shipping and warehouse storage inefficient and unreasonably costly.

Given the aforementioned disadvantages, **IPC offers multiple thermal packaging solutions to replace current EPS coolers** while improving thermal performance and reducing the cost of frozen food transportation.

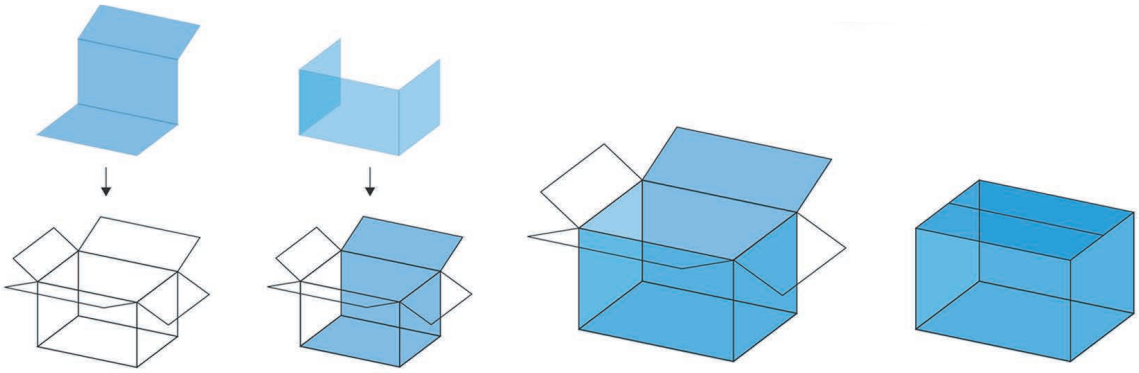
The Technology

PopupLiner thermal box liners are IPC's solution to bulky molded coolers. Each set of PopupLiner is composed of two, three-panel tri-fold liners for a six-sided box. The liners are unique in that they provide an alternative form of temperature-control packaging – that is both fully collapsible and compressible using IPC's patented technology.

(Patent #US 8,333,279)

PopupLiner Insulated Box Liner panels

Easy Assembly



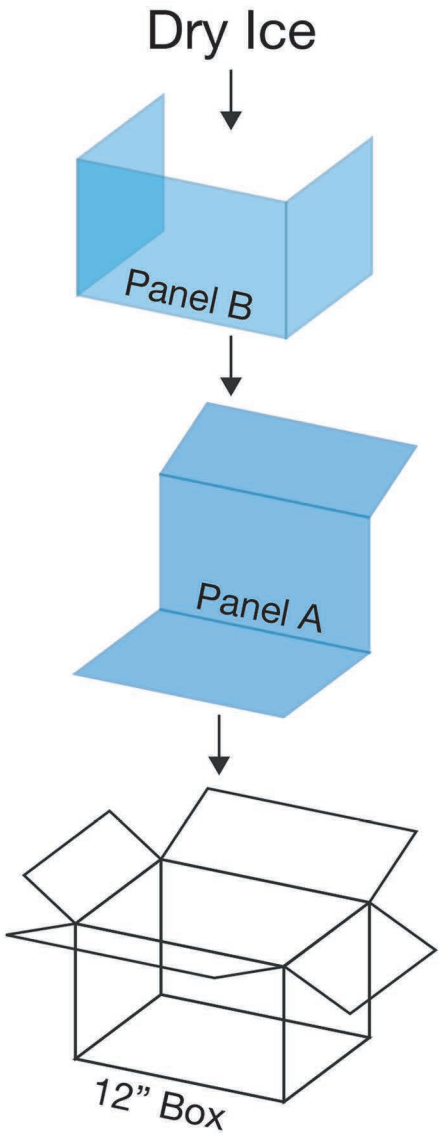
COMPACT & COMPRESSED

The self-expanding liners arrive compact and vacuum compressed in compression sleeves and will expand automatically to full thickness upon opening.

Thermal Performance Comparison of IPC Products to EPS Coolers

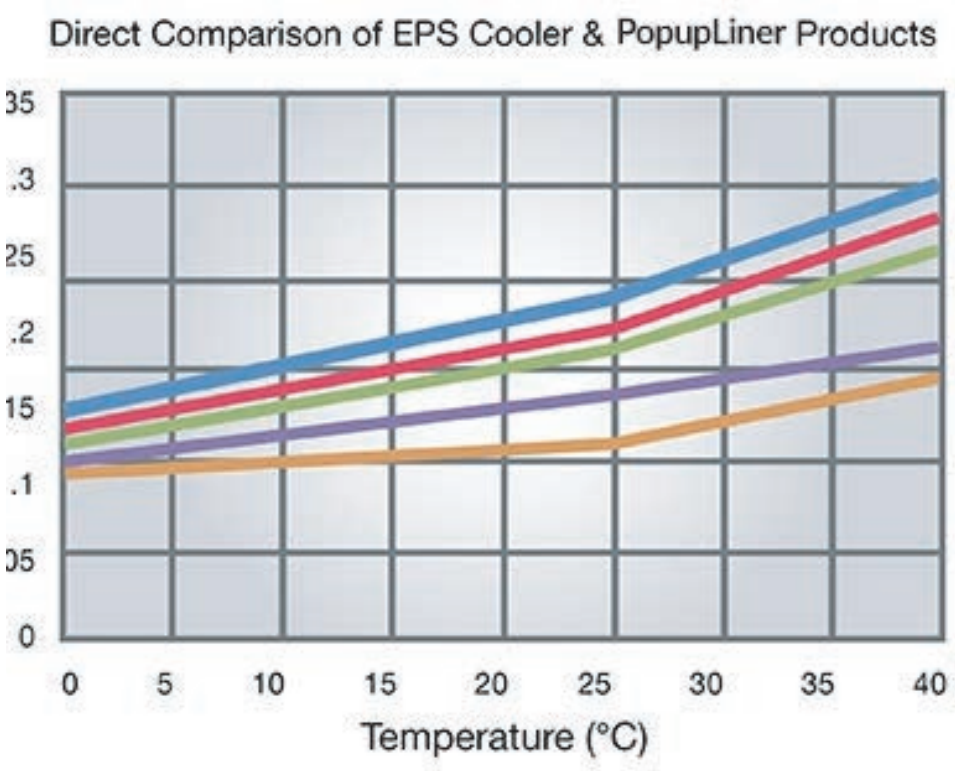
To assess the thermal performance of IPC insulated containers against EPS shipping coolers, multiple products have been tested under controlled conditions in an industrial thermal chamber. The experiments were designed to compare the sublimation rate of dry ice in IPC insulation products and EPS coolers under different thermal conditions. The same amount of dry ice (5 lb) was placed in each insulated box, they were exposed to various temperatures (0°C, 25°C and 40°C), and the remaining dry ice was intermittently measured throughout the experiments.

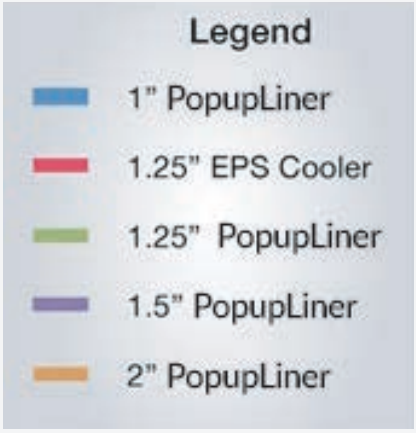
The weight of the dry ice versus elapsed time was plotted and the consumption rate of dry ice (pounds/hour) for all of the samples was derived from the slope of the dry ice weight versus elapsed time. It was established that **at 25°C, 1.5" thick PopupLiner and 2" thick PopupLiner save 19% and 33% in the consumption of dry ice, respectively.** At 40°C, 1.5" thick PopupLiner and 2" thick PopupLiner saved 28% and 32% in consumption of dry ice, respectively.



Exploded view of IPC's PopupLiner

Thermal Performance Comparison of IPC Products to EPS Coolers





Weight loss rate of dry ice versus temperature for different thicknesses of PopupLiner & EPS cooler.

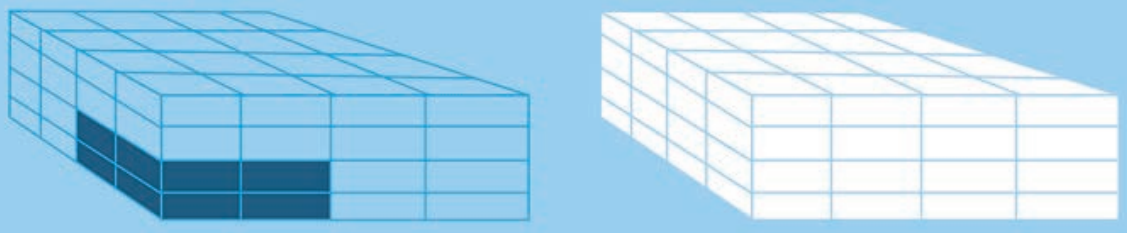
Space-Efficiency:
A Deciding Factor in Cold Chain

Unlike EPS shipping coolers that are bulky and are shipped in their final form, IPC's insulated boxes arrive collapsed and compressed.

Using compressed IPC products will save 75% in shipping and warehouse space as compared to same numbers of EPS coolers.

The space savings is evident in the picture below. This staggering space-efficiency feature helps IPC's clients receive industry-best pricing made possible by the reduced inbound freight cost as well as savings in labor achieved via the reduced handling requirements.This makes IPC's products one of the most cost-efficient substitutes for EPS shipping coolers on the market today. In addition, IPC's PopupLiner insulated panels absorb shock and stress from rough handling.

Shipping size comparison of PopupLiner & molded coolers



PopupLiner
1000 cubic feet

Molded Coolers
4000 cubic feet

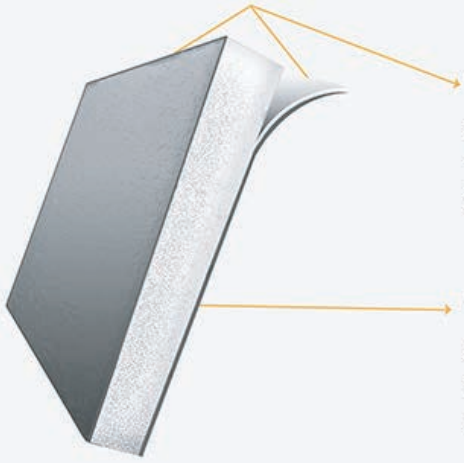
Summary

The results of the comparative study demonstrated the superiority of the temperature-controlled products designed and manufactured by IPC.

Although EPS coolers are one of the most widely used tools for thermal packaging in the industry; some of the disadvantages such as suboptimal thermal performance, high storage volume, and non-biodegradability render their use unjustifiable.

IPC can provide alternative thermal solutions for EPS coolers with no tooling cost while providing 75% savings in shipping space and up to 33% reduction in the amount of dry ice required.

These solutions offer affordable added protection without the downsides of high shipping expense and large storage requirements normally associated with insulating products such as EPS coolers.



Ultra Radiant Barrier - IPC's proprietary radiant barrier cover is specially designed to reflect radiant heat. The vapor impervious, multilayer film enhances the already high performance provided by the unique foam filler.

Ultra Insulated Foam - IPC's foam fillers provide extreme protection from the elements. Millions of capsules per square inch provide conductive insulation beyond that provided by conventional insulators.

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 temperature control materials provide high 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 cold chain solutions. Contact us today to discuss your unique temperature assurance packaging requirements.

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