Temperature-Controlled Packaging for Reusable Containers Using IPC's GreenLiner Thermal Box Liner

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 throughput 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, GreenLiner, that is fully recyclable and built to thermally insulate the temperature-sensitive shipments inside a reusable container.
**IPC's Recyclable Solution: GreenLiner**

GreenLiner 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 GreenLiner set is composed of two three-panel, tri-fold liners, together making up a six-sided container. A GreenLiner 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.

GreenLiner 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.

GreenLiner box liners are effective for maintaining refrigerated, frozen, and room-temperature (RT) applications for over 48 hours.
A test was designed to evaluate the thermal performance of the GreenLiner 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 GreenLiner 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 GreenLiner 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.

This confirms that, when used with enough refrigerant gel packs, GreenLiner thermal box liners provide satisfactory thermal protection against extreme conditions.
Summary

Reusable containers are taking over single-use containers due to long-term economic and environmental benefits. In response to this trend, IPC is accommodating the market need by presenting GreenLiner thermal box liner to protect the shipment of temperature-sensitive commodities.

IPC's GreenLiner thermal box liner can be manufactured to fit any reusable container and is offered in various thicknesses to yield different protection intensities. An experiment was planned to evaluate the performance of the GreenLiner thermal box liner in maintaining refrigerated temperatures of interior components of a reusable container. The container was exposed to extreme hot temperatures inside an environmental chamber.

The results of the test herein demonstrated that IPC's GreenLiner box liner maintained the temperature of the products below 41°F for 24 hours under simulated summer conditions. This shipping solution provides a reusable system, including 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 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.