

## InsulBox®

### Thermal Box Liners for

# INSULBOX®

INSULPLATINUM®

## INSULBOX® PRODUCT SCENARIO

- Wilpak Group International produces a range of custom InsulBox® thermal box liners, used to manage temperature sensitive goods in transit.
- The InsulBox® is constructed from InsulPlatinum®, a high performance, light weight and re-usable thermal barrier material, that is exclusive to Wilpak Group international.
- This thermal barrier system encloses the packaged goods to provide a controlled thermal environment, that passively manages product temperature during storage and transport.
- As a passive insulation system, the purpose of the InsulBox® is to delay the transfer of heat energy from the external environment to the internal environment for a reasonable period of time during transit.
- The InsulPlatinum® material is a heavy duty three layer, highly reflective air cylinder barrier, consisting of a foil/air-bubble/foil laminated configuration.
- InsulBox® offers a thermally effective, logistically efficient and environmentally thoughtful alternative to traditional polystyrene product, which is brittle, awkward to handle and hard to dispose of.
- This InsulBox® solution has been seen by pharmaceutical manufacturers and distributors as an opportunity to reduce operational risk, improve resource utilisation, minimise environmental impact and demonstrate social responsibility.



## INSULBOX® PERFORMANCE TESTING

- Clients using InsulBox® thermal box liners typically need to validate this product internally, ensuring that the product performance meets specified local requirements.
- Accordingly, InsulBox® has been independently validated by pharma industry operator in practical commercial applications.



## Trial 1 – Inside Warehouse Standby (Controlled Environment)

### Overview

- A practical validation were the temperature sensitive pharma goods were contained within an InsulBox® while held on standby within the warehouse.
- Goods were left inside warehouse for a 30-hour period.
- The temperature of the goods was required to stay under 8 °C during the distribution journey
- InsulBox profile – A4 L 300 x W210 x H230mm
- Thermal barrier material - InsulPlatinum®

### Test Method

Location – Distribution Warehouse Melbourne, Australia

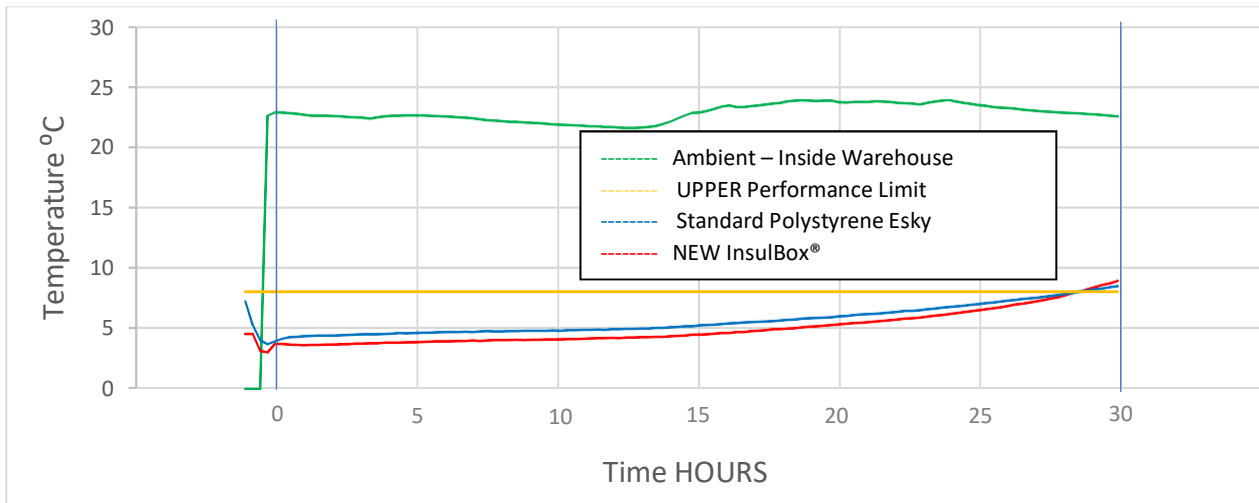
Timing – November 2018

Exposure Conditions – Seasonal Spring weather

#### Set-up

- External temperature (ambient) – data logger on outside surface of box, inside warehouse
- Internal temperature – data logger on inside surface of box (1. Polystyrene Esky, 2. InsulBox®)
- Payload - Typical mixed wholesale pharmaceutical order, with 1 kg frozen gel pack

### Performance Data



#### Data Temperature Range – Outside Open Air

- 30-hour exposure period (1.25 days)
- Maximum Ambient temperature of +24 °C (hour 12)
- Minimum Ambient temperature of +22 °C (hour 19)
- No Temperature spikes



## Performance Observations

- Internal temperature of both products stayed below the required 8°C for 28 hours.
  - After 25 hours, temperature within both the InsulBox® and Polystyrene Esky rose above 8°C.
- During hours 0 to 25, the internal temperature within the InsulBox® was approximately 1.5 degrees less than the Polystyrene Esky.
- As both products acquired heat energy from the external environment, the internal temperature of the passive insulation systems progressively increased over the course of the trial.
- Overall, the two products performed in a similar manner at room temperature, with the InsulBox® demonstrating a slightly better thermal performance over the trial period.



## Trial 2 – Commercial Distribution Route (Uncontrolled Environment)

### Overview

- A practical validation were the temperature sensitive pharma goods were contained within an InsulBox® during transport.
- Goods were transported from the central warehouse to the Pharmaceutical retailer by van for a 90+ hour period.
- The temperature of the goods was required to stay under 8 °C during the distribution journey
- InsulBox profile – A4 L 300 x W210 x H230mm
- Thermal barrier material - InsulPlatinum®

### Test Method

Location – Distribution Route: Metropolitan Melbourne to Cairns, Australia

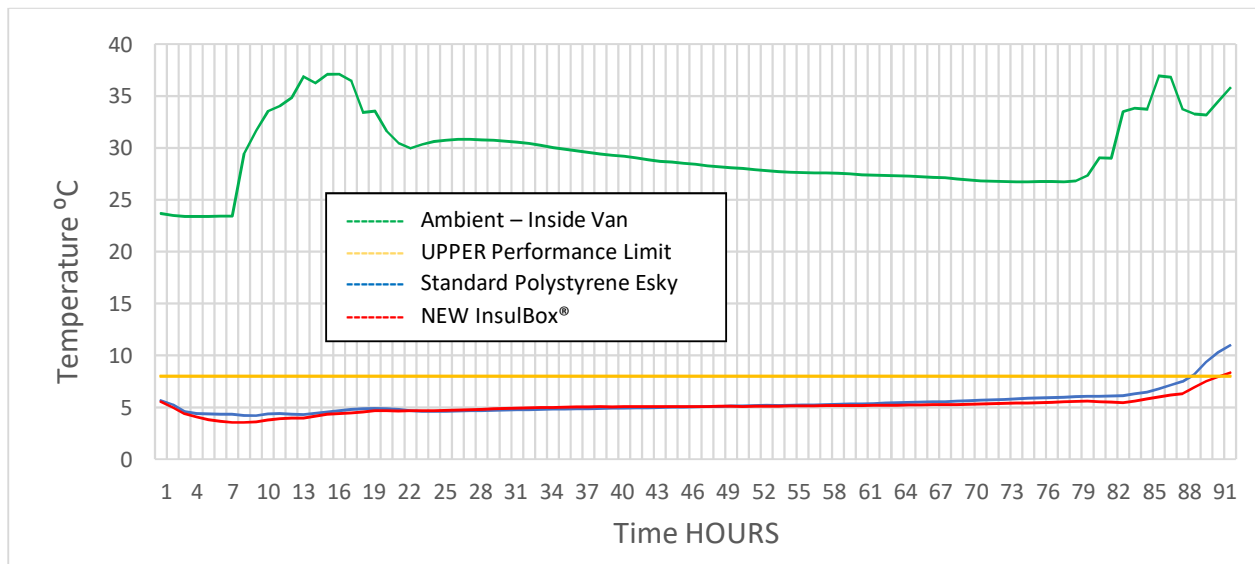
Timing – November 2018

Exposure Conditions – Seasonal Spring weather

#### Set-up

- External temperature (ambient) – data logger on outside surface of box, inside van
- Internal temperature – data logger on inside surface of box (1. Polystyrene Esky, 2. InsulBox®)
- Payload - Typical mixed wholesale pharmaceutical order, with 1 kg frozen gel pack

### Performance Data





### Data Temperature Range – Inside Van (Ambient)

- 90-hour journey period (approximately 3.75 days)
- Maximum Ambient temperature of +37 °C
- Minimum Ambient temperature of +23 °C
- Temperature spikes:
  - 14 °C (23 °C to 37 °C) during hours 3 to 13
  - 10 °C (27 °C to 37 °C) during hours 73 to 91

### Performance Observations

- Internal temperature of both products stayed below the required 8°C for 88 hours.
  - After 88 hours, the temperature within the Polystyrene Esky rose above 8°C.
- From hour 13 through to hour 73, both products presented a virtually identical internal temperature.
- During hours 3 to 13 and 73 to 91, the internal temperature within the Polystyrene Esky was 1+ degree higher, when external ambient temp rose 14 °C and 10 °C respectively.
- Overall, the two products performed on a par, with the InsulBox demonstrating a slightly better performance at the beginning and the end of journey, when heat increased rapidly.



## Trial 3 – Commercial Distribution Route (Uncontrolled Environment)

### Overview

- A practical validation were the temperature sensitive pharma goods were contained within an InsulBox® during open air exposure to the sun.
- Goods were left outside for a 24-hour period.
- The temperature of the goods was required to stay under 8 °C during the distribution journey
- InsulBox profile – A4 L 300 x W210 x H230mm
- Thermal barrier material - InsulPlatinum®

### Test Method

Location – Distribution Route: Metropolitan Melbourne to Cairns, Australia

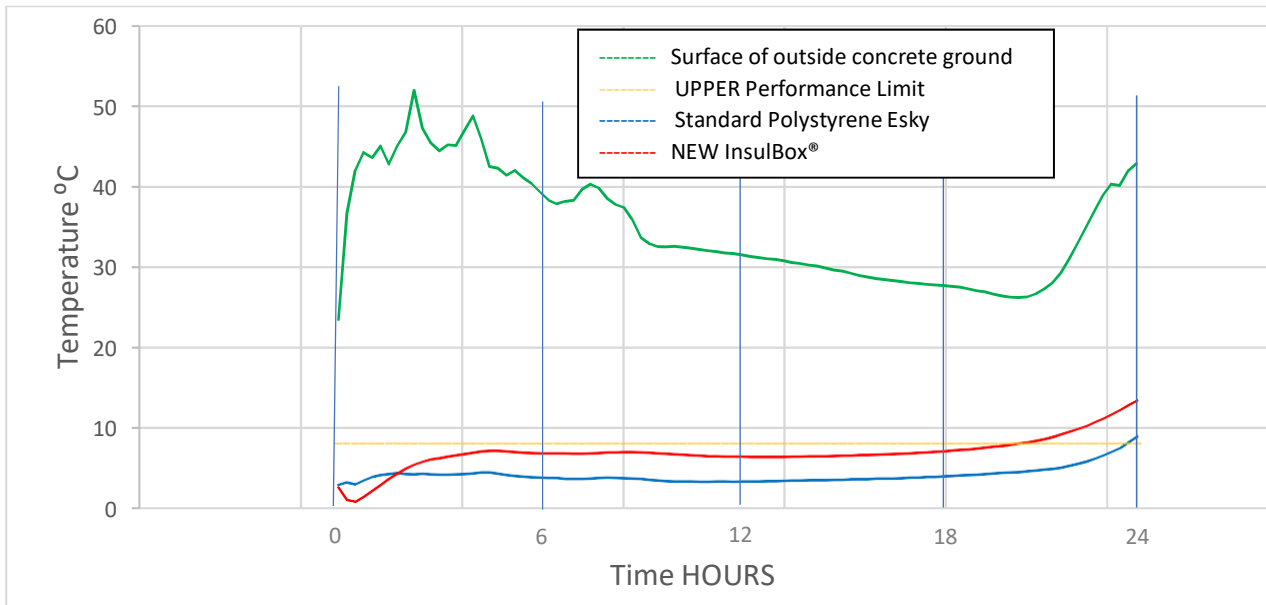
Timing – November 2018

Exposure Conditions – Seasonal Spring weather

Set-up

- External temperature (ambient) – data logger on open air concrete ground
- Internal temperature – data logger on inside surface of box (1. Polystyrene Esky, 2. InsulBox®)
- Payload - Typical mixed wholesale pharmaceutical order, with 1 kg frozen gel pack

### Performance Data





#### Data Temperature Range – Outside Open Air

- 24-hour exposure period (1 days)
- Maximum Ambient temperature of +52 °C (hour 2)
- Minimum Ambient temperature of +26 °C (hour 21)
- Temperature spikes:
  - 27 °C (25 °C to 52 °C) during hours 0 to 2
  - 16 °C (27 °C to 43 °C) during hours 20 to 24

#### Performance Observations

- Internal temperature of both products stayed below the required 8°C for 21.5 hours.
  - After 21.5 hours, temperature within the InsulBox® rose above 8°C.
- The initial external temperature spike caused the InsulBox® internal temperature to rise approx. 5 degrees in the first 4 hours, then stabilise below 8°C and reduce slightly for the next 17-hour period as the external temperature reduced, rising again with the second temperature spike to cause the internal temperature to exceed 8°C after 21.5 hours.
- During the initial temperature spike, the internal temperature of the polystyrene esky to rise by approx. 2 degrees in the first 4 hours then stabilise, rising again with the second temperature spike were the internal temperature rose above 8°C after 23.5 hours.
- During hours 3 to 24, the internal temperature within the InsulBox® was approximately 3 degrees higher than the Polystyrene Esky.
- Overall, the two products performed in a similar manner under extreme heat, with the polystyrene esky demonstrating a slightly better thermal performance over the trial period.



## OVERALL PERFORMANCE CONCLUSIONS

- As passive insulation systems, the InsulBox® and Polystyrene Esky systems were able to effectively to defer the transfer of heat energy from the external environment to the packed goods.
- During the three differing trial conditions, the InsulBox® and Polystyrene Esky performed in a similar manner.
- The extreme and rare temperature spike during Trial 3 did result in a greater internal temperature gain with the InsulBox during the exposure period, yet the InsulBox was still able to hold temperature within specification over time for most of the trial period.
- Typically, the InsulBox® was able to maintain a lower internal load temperature compared to that of the Polystyrene Esky.

## INSULBOX® VALUE PROPOSITION

INSULBOX® FEATURES	POLYSTYRENE CHALLENGES	INSULBOX® CUSTOMER BENEFITS
Manufactured with less energy and a lower volume of input materials	Manufactured through energy intensive process	<i>Less environmental impact to manufacture</i>
Can be constructed from Recycled plastic content	Manufacturing from Non-Renewable Resources	<i>Reduced demand for new materials Utilises recyclable materials</i>
Allows for volume flat packing, safe and efficient logistics	<i>Fixed hard structure, making it hard to store and return ship</i>	<i>Easy collection and return from end user</i>
Light weight, low profile and compact thermal protection barrier	Bulky Storage Parameters, consuming a large volume of racking space	<i>Easy and safe to handle Simple handling and logistics Reduced volume Storage</i>
Tough thermal barrier material allowing for reuse	<i>Limited reuse if damaged Potential single use only</i>	<i>Reusable and reliable over time Higher Utilisation of Resources Reduced waste and landfill end of life Reduced environmental impact</i>