

 Advanced Cooling Solutions	Datum:	17.12.2013	Version:	002
Name:	Documentation Summer/Winter			
Verpackung:	System Packaging Icatch Solid Insulated for BITO- Plastic Re-useable Containers			
Kunde:	BITO-Lagertechnik Bittmann GmbH			
Profil(e):	Summer 12 hrs. / Winter 12 hrs.			

Qualification System Packaging Icatch Solid Insulated
Insulated graphited EPS foam box
Useable volume: 16.4 liters
BITO-Lagertechnik Bittmann GmbH
Summer-/Winter Profile 12 hours

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created	Name	Signature	Date

checked	Name	Signature	Date
1	Sven Rölle		

approved	Name	Signature	Date
1	Markus Baumgärtner		

Start-up time:

Transport simulation summer without inlay: Friday, 06.Dec.2013 at 12:30 p.m.

Transport simulation summer with inlay: Friday, 06.Dec.2013 at 12:30p.m.

Transport simulation winter without inlay: Friday, 13.Dec.2013 at 16:32 p.m.

Transport simulation winter with inlay: Friday, 13.Dec.2013 at 16:32 p.m.

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Goal:

In order to guarantee that temperature-sensitive products in Bito Insulation packaging systems do not incur any temperature-dependent damage in transit, it is essential that they be satisfactorily decoupled from external environmental influences. For the duration of transport, the temperature range between +2°C and +8°C in the product space must be maintained for a maximum of 12 hours. For this reason, system packaging is used which consists of an insulated box made of graphited EPS foam with a useable volume of 16.4 liters, a plastic re-useable PP container with a locking system as well as the prescribed number of passive cool packs Icecatch Solid Insulated 950g.

To simplify the cleaning of the multiple-use system packaging, there is the option to extend the insulated graphited EPS foam box through the use of a thermo-formed lining. Such packaging systems can be used for domestic transport. The goal is to provide evidence of the thermal capability of system packaging for the sending of market and study goods to distributors and end customers.

In order to guarantee this, the quantity of passive cooling elements Icecatch Solid Insulated 950g suitable for the destination, type and duration of transport must be stated.

The following lab report provides evidence of the thermal capability of system packaging Icecatch Solid Insulated.

Lab Report:

The temperature in the system packaging Icecatch Solid Insulated is documented during the maximum transport time of 12 hours in both summer and winter. The temperature is measured directly on or in the product, if liquid. The surrounding temperature is simultaneously measured in order to document the thermal load of the system.

The temperatures of the test space are adjusted on the basis of the selected temperature curve and then recorded.

The expected product temperature should remain between +2°C and +8 °C:

This packaging procedure complies with the product's documented and applied packaging and shipping regulations. Therefore, the temperature of the product during transport is also a critical factor. It has a decisive influence on the stability and the performance capability of the product.

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Description of Materials and Equipment used:

Thermo-elements:

In order to determine exact data regards the temperature curve of the product, thermo-elements of the type K Nichrome-Nickel (NiCr-Ni) were used, whose measurement range extends from -200°C to +1370°C. The resolution of the thermo-elements was 0.1°C and the accuracy was +/- 0.3%.

Temperature loggers:

An EBI40 multi-channel data logger (Series numbers: 15115937, 15115936 and 15115939) with a temperature range of -200°C to +1.200°C was used. The accuracy was $\pm 0.5^{\circ}\text{C}$. The temperature loggers were calibrated in accordance with the attached Plant Certificates in May and June 2013.

Climate Chamber:

A climate chamber of the type PL-4 SP from the company Espec was used as the test area. The temperature can be set in the range of -40°C to +65°C. The test area is turbulently aired by means of a fan in recirculation mode. The climate chamber was calibrated in accordance with the attached calibration certificate on 01.February 2013.

System Packaging Icecatch Solid Insulated:

Article #: 19-80026
Consisting of base + lid
Exterior dimensions: 528x358x250mm
Material: graphited EPS foam
Foam weight: 25 g/l
Color: grey
Useable Inside Dimensions: 363x283x160mm
Useable Inside Dimensions: ca. 16.4 liters

Icecatch Solid Insulated 950g:

Article #: 19-80029
Dimensions: 280x190x25mm (unfrozen)
Weight: about 950g
Melting Range: $\pm 0^{\circ}\text{C}$
Thermal Capacity: liquid 4.2 kJ/(kg K)
Thermal Capacity: solid 2.08 kJ/(kg K)
Latent Heat: 330kJ/kg
The cooling elements must be stored for at least 72 hours at a temperature between -16°C and -20°C in the freezer and/or at room temperature between +18°C and +23°C.

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Plastic Re-useable Containers with Locking System:

Article #: MBD64271

Standard Dimensions: 610x400x340mm

Material: Polypropylene

Color: dove blue

Volume: 58 liters

Extra Load: 300 kg

Contents Loading: 35 kg

Plastic Inlay for 19-80026

Standard Dimensions: 460 x 300mm

Wall Thickness: 3mm

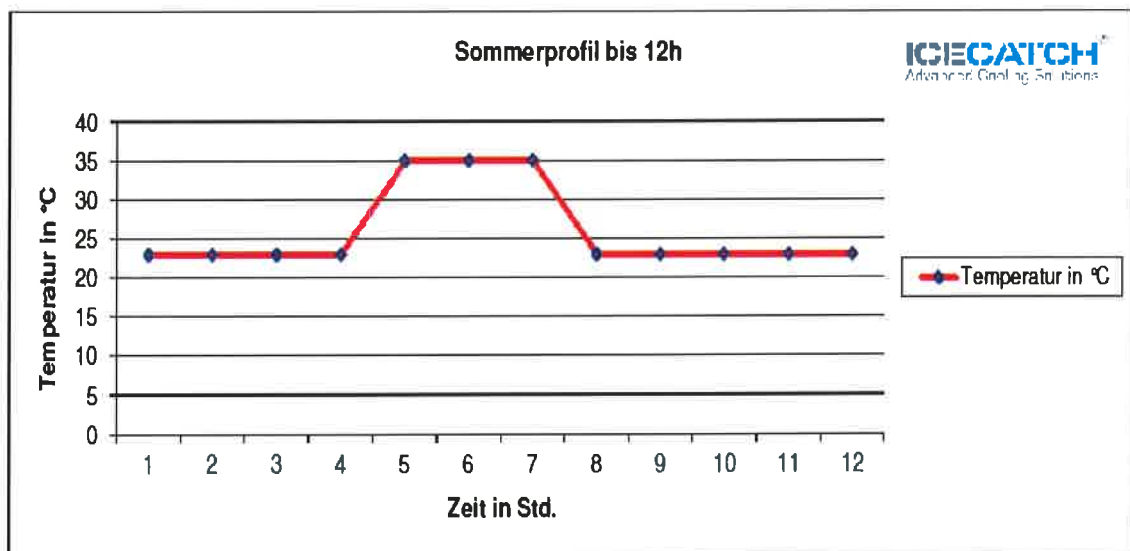
Material: Polystyrene

Color: white

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Temperature Profile Summer 12hrs:

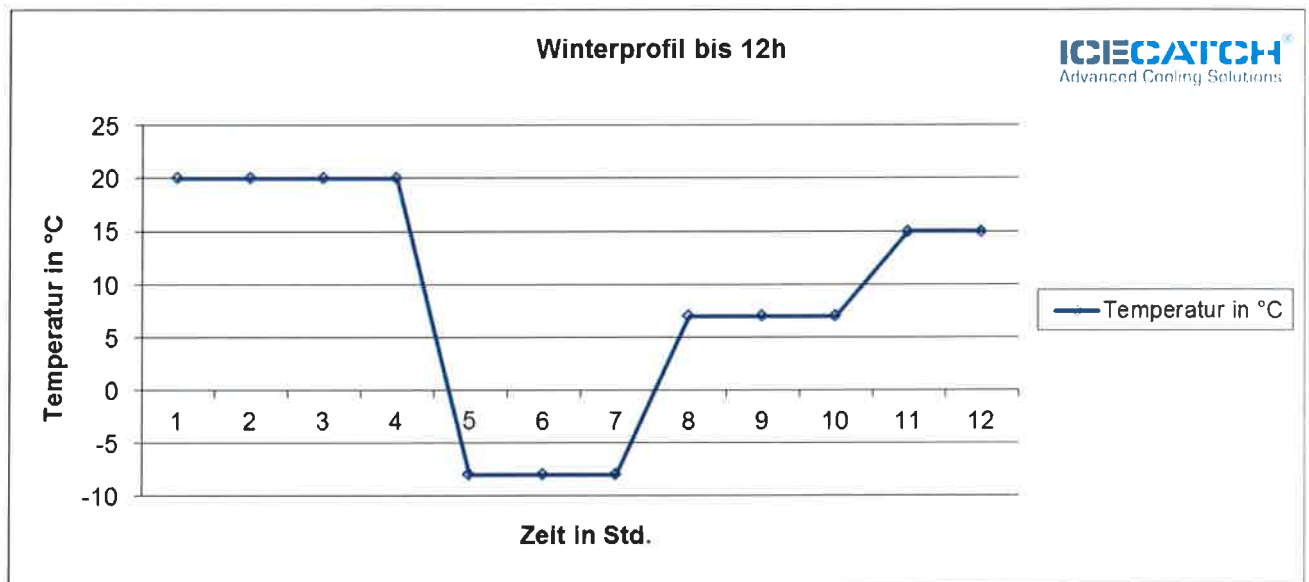
This profile is designed to simulate transport conditions during summer. Normal transport in summer involves a 4 hour lead time and storage prior to collection by a courier, simulated here by 4 hours at +23°C. In the evening hours the test package is handed over to the postal courier, after which it is transported by car at +35°C, as well as the final handoff at the relevant depot of the KEP service provider. The simulation ends in the early hours of the morning when the test package is loaded into the vehicle and delivered to the end customer at a temperature of +23°C.



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Temperature profile Winter 72hrs:

This temperature profile is designed to simulate transport conditions in winter. Here too, a 4 hour pre-run in storage at a temperature of +20°C is shown. The handover to the courier as well as the transport thereafter and the handoff at the relevant depot are simulated at a temperature of -8°C. The loading into the delivery vehicle and the transport are also simulated at a temperature of +8°C. At the final delivery to the end customer the temperature is +15°C.



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Equipping Instructions:

Number of cooling elements in summer 12hrs / Equipping instructions:

A total of 3 x Icecatch Solid Insulated 950g

The insulated box should be equipped with 2 cooling elements Icecatch Solid Insulated 950g, each standing upright position on the sides as with the Coolbrick Icecatch Solid Insulated 950g in the lid. The Coolbricks are to be stored for at least 72hrs at a temperature between -16°C and -20°C.

Number of cooling elements in winter 12hrs / Equipping instructions:

A total of 3 x Icecatch Solid Insulated 950g

The insulated box should be equipped with 2 cooling elements Icecatch Solid Insulated 950g , preconditioned over at least 72 hrs at a temperature of -16°C to -20°C, each standing upright position on the sides. In addition, one Coolbrick Icecatch Solid Insulated 950g, preconditioned over at least 72 hrs at room temperature of +18°C to +23°C, in the lid.

The insulated (unprinted) side of the Coolbricks must always face the product space!

Results:

Transport simulation summer 12hrs without inlay (Appendix 1)

Transport simulation summer 12hrs with inlay (Appendix 2)

Transport simulation winter 12hrs without inlay (Appendix 3)

Transport simulation winter 12hrs with inlay (Appendix 4)

Summary:

The requirements are shown in the results of the described transport simulations and are substantiated by the temperature records. Thus the described System packaging is suitable for transport in both summer and winter.

The transport simulation is reproducible at any time!