

**Report**  
**No. BITO 20240426-MBD64271**

**Climate test of an Insulation Box**  
**two climatic cycles**  
**“MBD64271”**

**for**

**BITO-Lagertechnik Bittmann GmbH**  
**Obertor 29**  
**D-55590 Meisenheim**

Project No.: 12247 MBD64271

D - 44319 Dortmund, 26 April 2024



## General Information

### Laboratory

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Certification:

ISTA Member ID: 10923, International Safe Transit Association

DAkkS: D-PL-11272-01-00, German Accreditation Body

### Testing

Place: D - 44319 Dortmund

Date: 18 March 2024 until 18 April 2024

Test Engineers: Marc Brinkmann B. Eng., Dipl.-Ing. Günter Winkler

### Customer

Company: BITO-Lagertechnik Bittmann GmbH

Street: Obertor 29

Place: D - 55590 Meisenheim

Contact: Marlon Zietek

Phone: +49 6753 / 122-9534

Street: Obertor 29

Place: D - 55590 Meisenheim

### Specimens

Description: Insulation Box: MBD64271  
Sofigram Cooler Battery

Order Date: 21 February 2024

Delivery Date: 5 February 2024

State of Delivery: the sample was without any damages or impairments

Specimen No.: MBD64271

## 1. Scope

With one Insulation Box, manufactured by BITO-Lagertechnik Bittmann GmbH, D - 55590 Meisenheim, customer defined climate tests (two different climatic cycles) had to be conducted. The test was run from 18 March 2024 until 18 April 2024. The purpose of the climate tests was to evaluate the capability of the packaging to resist temperature exposure during transport. For that matter the container was subjected to two different climatic profiles (summer profile, winter profile). An upper and lower temperature limit was specified by the customer. The temperature of the packaged products (dummy load) was required to be within this limit. A measurement of the temperature curve inside the container by climate loggers was carried out for both tests. By evaluating the measured data, it should be determined whether the temperature of the products remained within the tolerance.

## 2. Test Samples

For the climate test the following specimens were available:

- Container name / number: MBD64271 / 6-11120
- Container outer dimensions: 610 x 400 x 290 mm (L x W x H)
- Container volume: 47 liters
- Container material: PP
- Container production date: 12/22
  
- Cooler battery name / weight (Ø): Sofigram / 356 g
- Cooler battery dimensions: 195 x 130 x 23 mm (L x W x H)
  
- Insulation Box name / number: 6427 / 6-31357
- Insulation Box, lid number / material: 6-51294 ISO-Lid 6427 / EPP
- Insulation Box, box material: Neopor
  
- Inner layer name / number: 6427 / 6-31360
- Inner layer material: PS

\*Further packaging specifications are known by the customer.

### 3. Test Procedure

Test schedule according to customer specifications		
No.	Test Steps	Test level and duration
1	Preconditioning	<ul style="list-style-type: none"> <li>- Preconditioning of Insulation Box according to customer specifications</li> <li>- Preconditioning of packaged products (dummy load) according to customer specifications</li> <li>- Preconditioning of cooler batteries according to customer specifications</li> </ul>
2	Climatic tests ASTM D4332-22	<ul style="list-style-type: none"> <li>- One Insulation Box was stored in climatic cabinet at customer defined climatic profiles</li> <li>- Two different profiles were defined: summer profile, winter profile</li> <li>- Measurement of climate inside the container (logger on packaged products) and outside the container (test climate)</li> </ul>
3	Evaluation	<ul style="list-style-type: none"> <li>- Evaluation and graphical representation of the results</li> </ul>

#### Preconditioning

Different values were relevant for each profile during preconditioning.

#### Summer profile:

- Insulation Box: container lid opened and box lid removed, 6 °C for at least 24 h
- Packaged Products: 2 PET bottle filled with 400 ml each, 6 °C for at least 24 h
- Cooler Batteries: six cooler batteries, two on each side and two in the lid, -18 °C for at least 72 h

Before starting of the summer profile, the cooler batteries were left to thaw for 15 minutes.

#### Winter profile:

- Insulation Box: container lid opened and box lid removed, 6 °C for at least 24 h
- Packaged Products: 2 PET bottle filled with 400 ml each, 6 °C for at least 24 h
- Cooler Batteries: six cooler batteries, two on each side, -18 °C for at least 72 h, two cooler battery in the lid, 23 °C for at least 24 h

Before starting of the winter profile, the cooler batteries were left to thaw for 10 minutes.

Three temperature loggers were used overall. One at each packaged product “dummy” bottle and one to measure the temperature outside the container.

## Climatic tests

Two different climatic tests had to be conducted. The following tables show the two tested climatic profiles.

Summer Profile:

Sequence No.	Temperature	Duration to stay	Overall duration
1	20 °C	4 h	4 h
2	35 °C	3 h	7 h
3	23 °C	5 h	12 h

Winter Profile:

Sequence No.	Temperature	Duration to stay	Overall duration
1	20 °C	4 h	4 h
2	-7 °C	2 h	6 h
3	16 °C	6 h	12 h

## 4. Acceptance Criteria

Acceptance criteria were defined by the customer. These criteria refer to the product specific temperature limits determined during the preliminary tests by the customer.

Temperature Range	Acceptable Time Range
2 °C to 8 °C	Unlimited

When the terms Limit Low and Limit High are used in this report, the Temperature Range from 2 °C to 8 °C is meant.

## 5. Used Equipment

Climatic loggers were fixed directly on the packaged products. Used climatic loggers:

Testo 174H, serial number: 83893238, calibration date: 03/2023, biennial, inv-no.: 2113

Testo 174T, serial number: 58994087, calibration date: 02/2023, biennial, inv-no.: 2116

Testo 174T, serial number: 83829661, calibration date: 02/2023, biennial, inv-no.: 2118

Used climatic devices:

MFK Pro 1020 (climatic tests)

MKF 720 (pre-conditioning)

Nordcap Labor-Tiefkühltruhe EL 51 LT (pre-conditioning)

## 6. Test Specifications

ASTM 4332-22

## 7. Results

Summer Profile:

Temperature Limits	Time till reached
Limit Low (2 °C)	not reached
Limit High (8 °C)	18:00 h / 18:45 h

Winter Profile

Temperature Limits	Time till reached
2 °C	not reached
8 °C	23:03 h / 23:58 h

Details of the test procedure and of the results are documented in the Appendix.

Dortmund, 24 April 2024



Test-Engineers: Marc Brinkmann



Günter Winkler

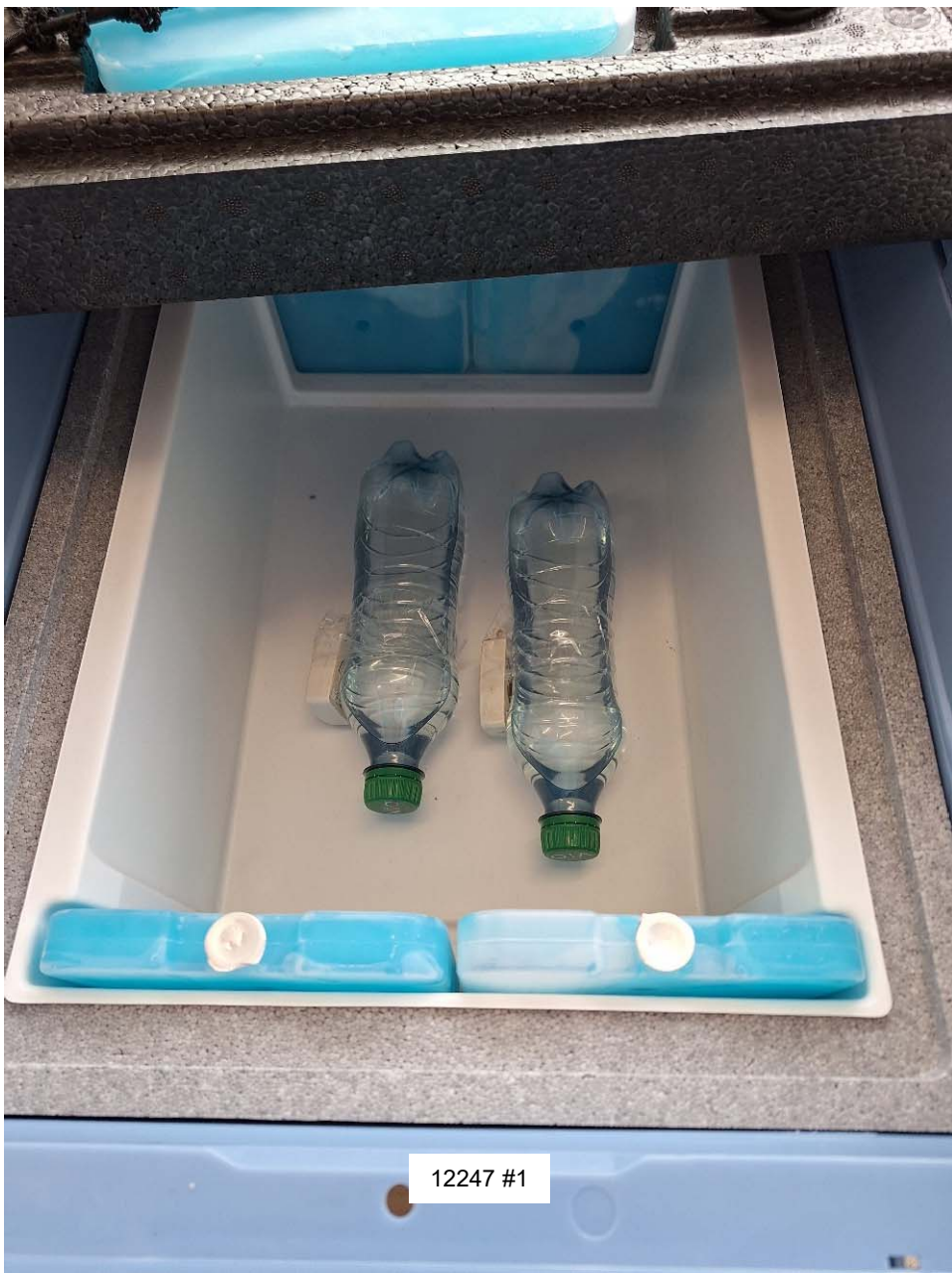
## 8. Appendix

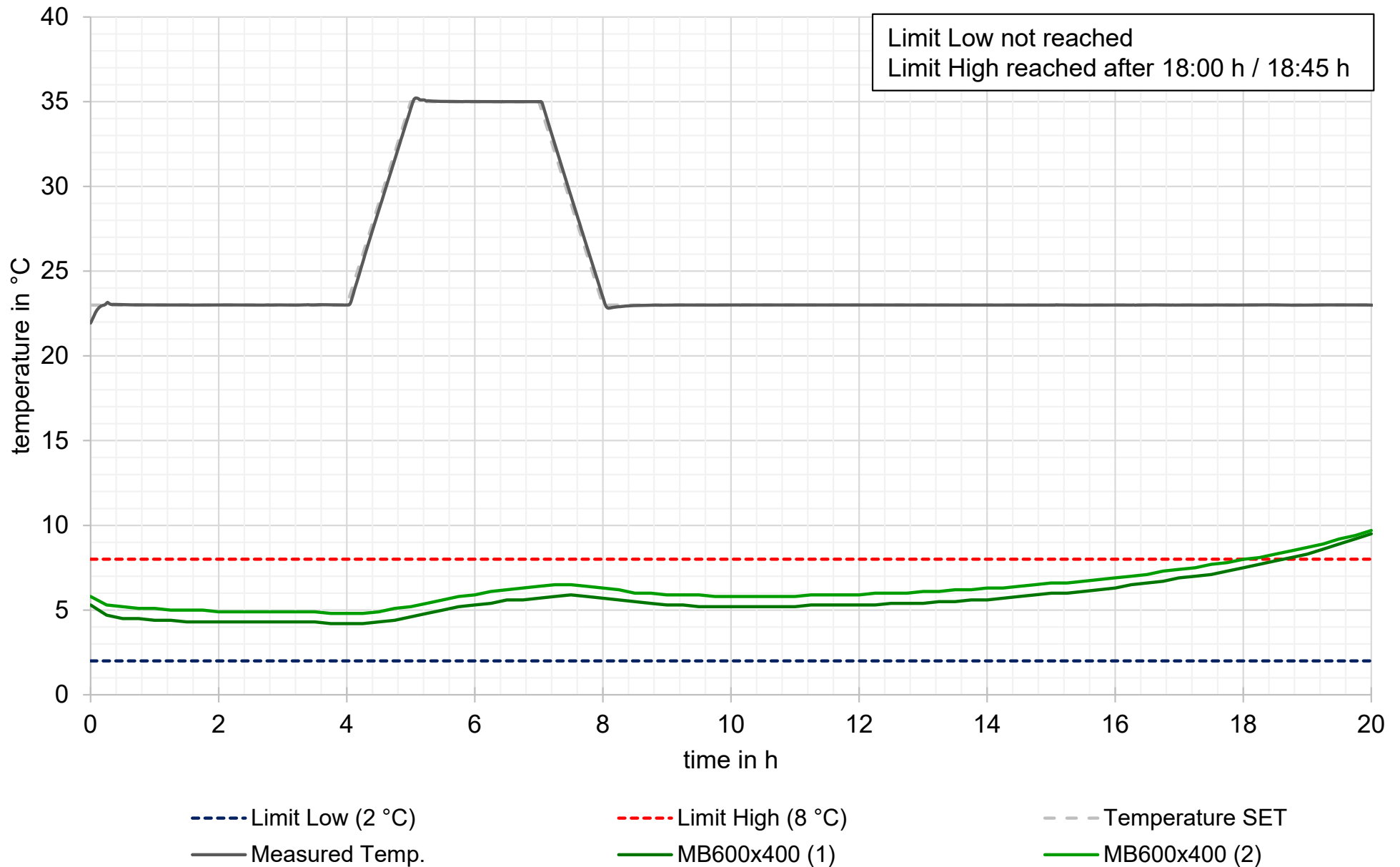
5 Figures (photos and data sheets)

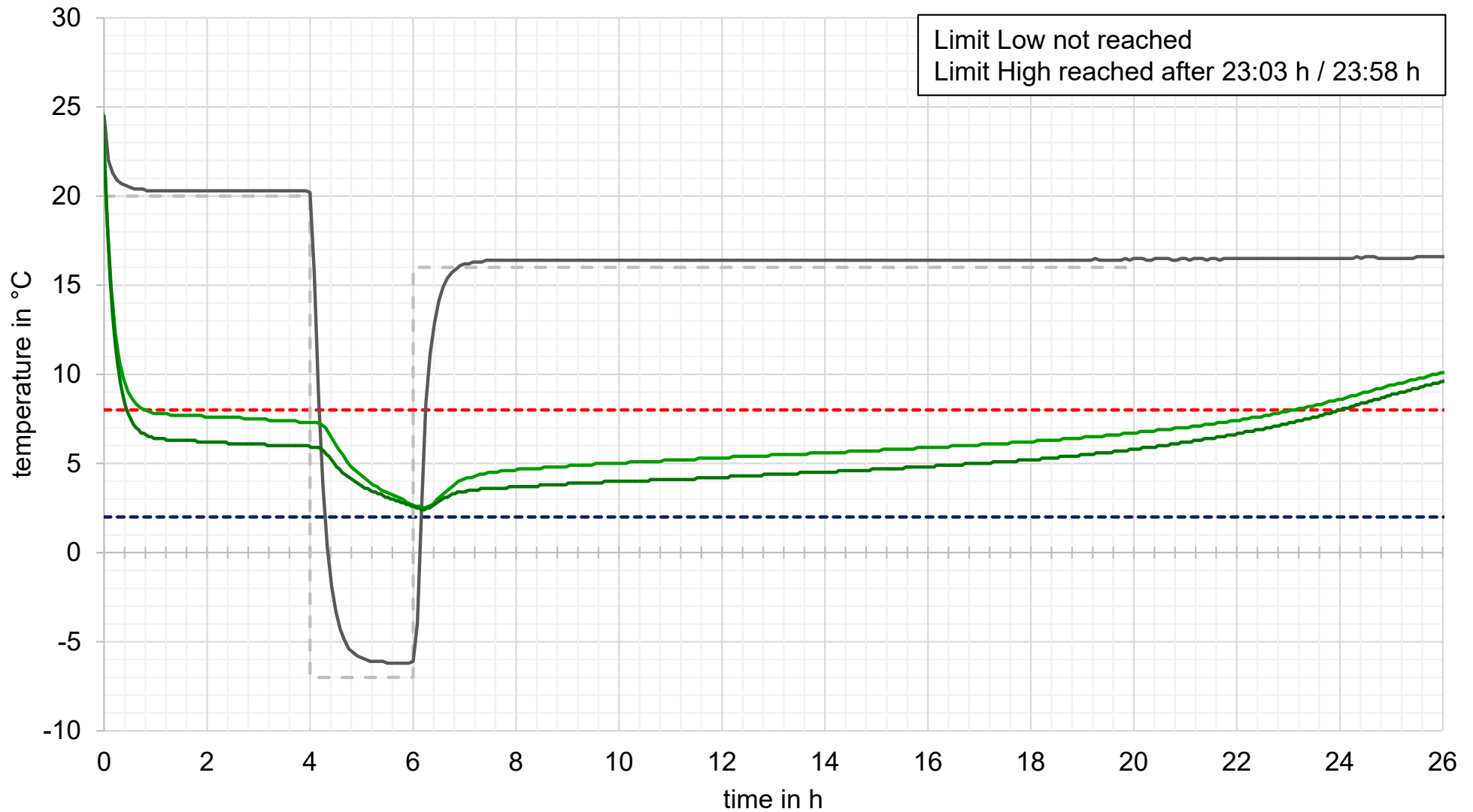












- - - Limit Low (2 °C)                      - - - Limit High (8 °C)                      - - - Temperature SET  
 — Measured Temp.                      — MB600x400 (1)                      — MB600x400 (2)