Report
No. BITO 20240426-MBD43271

Climate test of an Insulation Box
two climatic cycles
“MBD43271”

for

BITO-Lagertechnik Bittmann GmbH
Obertor 29
D-55590 Meisenheim

Project No.: 12247 MBD43271

D - 44319 Dortmund, 26 April 2024

VDZ GmbH
Giselherstr. 34
D - 44319 Dortmund

Phone: +49 (0)231 1397 262 20
Fax: +49 (0)231 1397 262 49
E-Mail: mail@vdz-gmbh.de

General Information

Laboratory

VDZ GmbH
Giselherstr. 34
D - 44319 Dortmund
Phone.: +49 231 1397 262 20
Fax: +49 231 1397 262 49
E-Mail: mail@vdz-gmbh.de

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: MBD43271 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.:	MBD43271

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: MBD43271 / 6-11124
- Container outer dimensions: 410 x 300 x 290 mm (L x W x H)
- Container volume: 22 liters
- Container material: PP
- Container production date: 01/23

- 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: 4327 / 6-31357
- Insulation Box, lid number / material: 6-51293 ISO-Lid 4327 / EPP
- Insulation Box, box material: Neopor

- Inner layer name / number: 4327 / 6-31359
- 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	– Preconditioning of Insulation Box according to customer specifications – Preconditioning of packaged products (dummy load) according to customer specifications – Preconditioning of cooler batteries according to customer specifications
2	Climatic tests ASTM D4332-22	– One Insulation Box was stored in climatic cabinet at customer defined climatic profiles – Two different profiles were defined: summer profile, winter profile – Measurement of climate inside the container (logger on packaged products) and outside the container (test climate)
3	Evaluation	– Evaluation and graphical representation of the results

Preconditioning

Different values were relevant for each profile during preconditioning.

Summer profile:

Insulation Box: container lid opened and box lid removed, 23 °C for at least 24 h

Packaged Products: 1 PET bottle filled with 400 ml, 6 °C for at least 24 h

Cooler Batteries: three cooler batteries, one on each side and one 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, 23 °C for at least 24 h

Packaged Products: 1 PET bottle filled with 400 ml, 6 °C for at least 24 h

Cooler Batteries: three cooler batteries, one on each side, -18 °C for at least 72 h, one 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.

Two temperature loggers were used overall. One at the packaged “dummy” product 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: 83874170, calibration date: 03/2023, biennial, inv-no.: 2114
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 D4332-22

7. Results

Summer Profile:

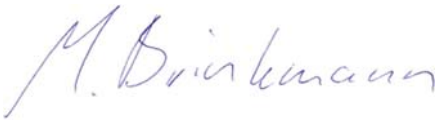
Temperature Limits	Time till reached
Limit Low (2 °C)	not reached
Limit High (8 °C)	16:30 h

Winter Profile

Temperature Limits	Time till reached
2 °C	not reached
8 °C	21:24 h

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

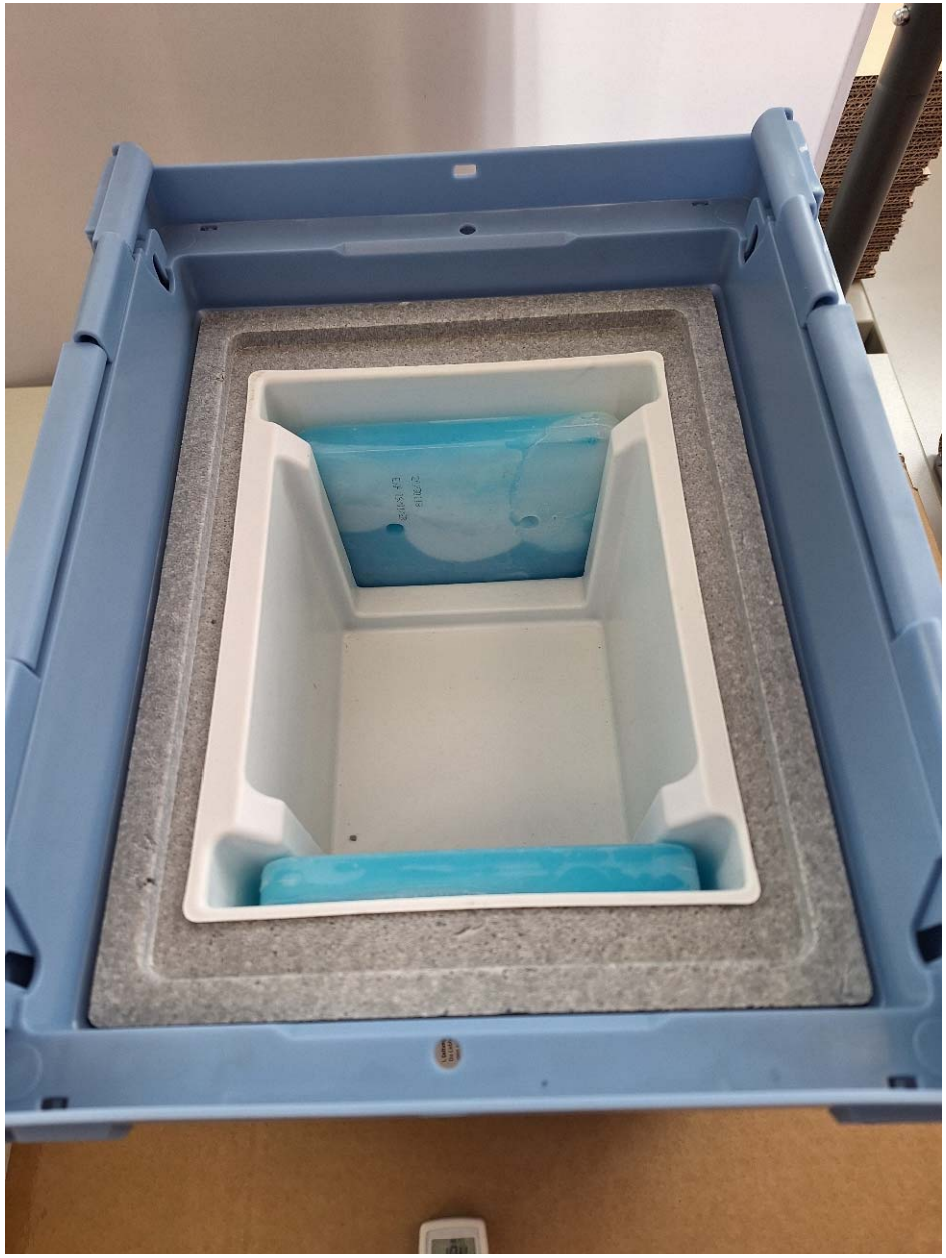
Dortmund, 26 April 2024

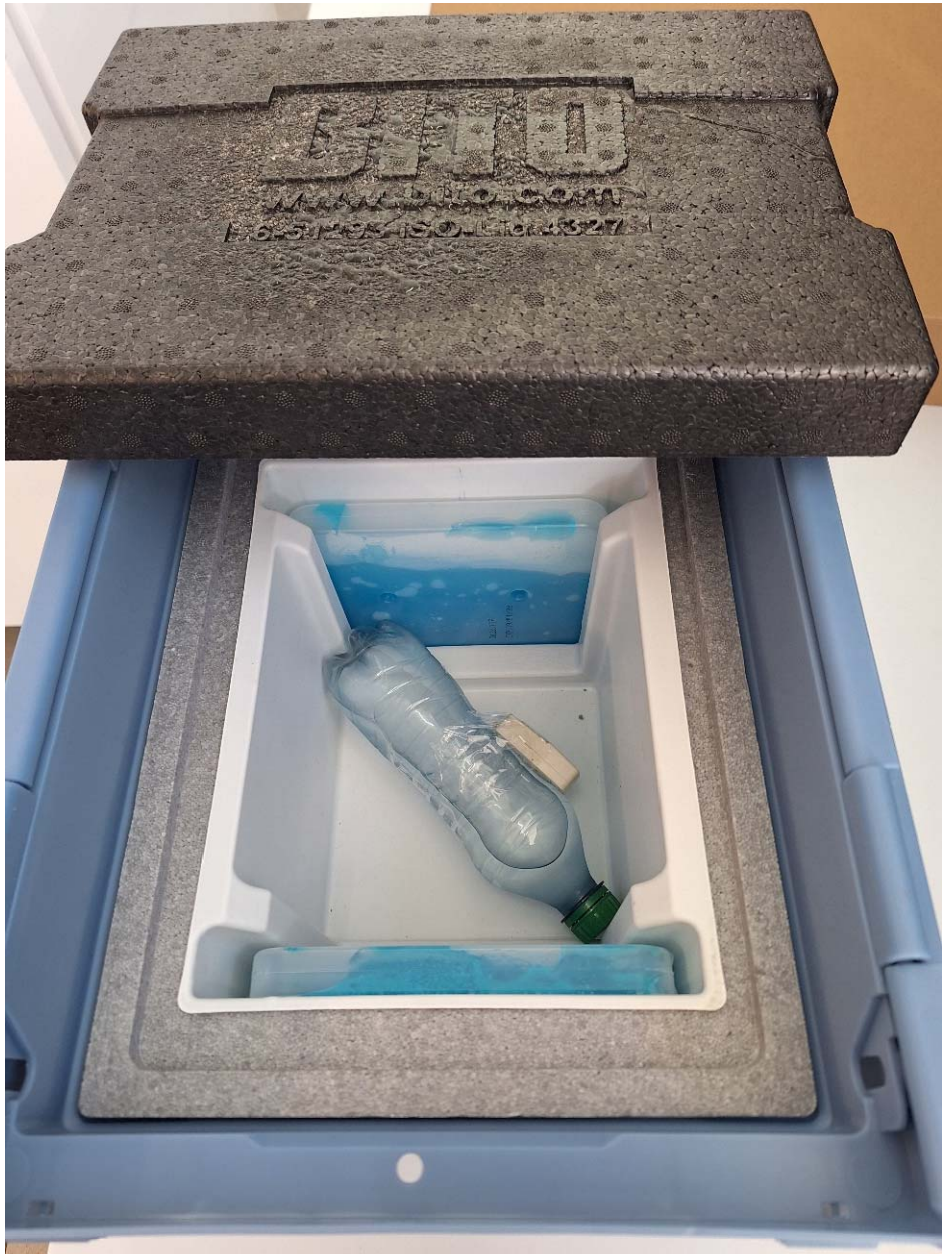


Test-Engineers: Marc Brinkmann Günter Winkler

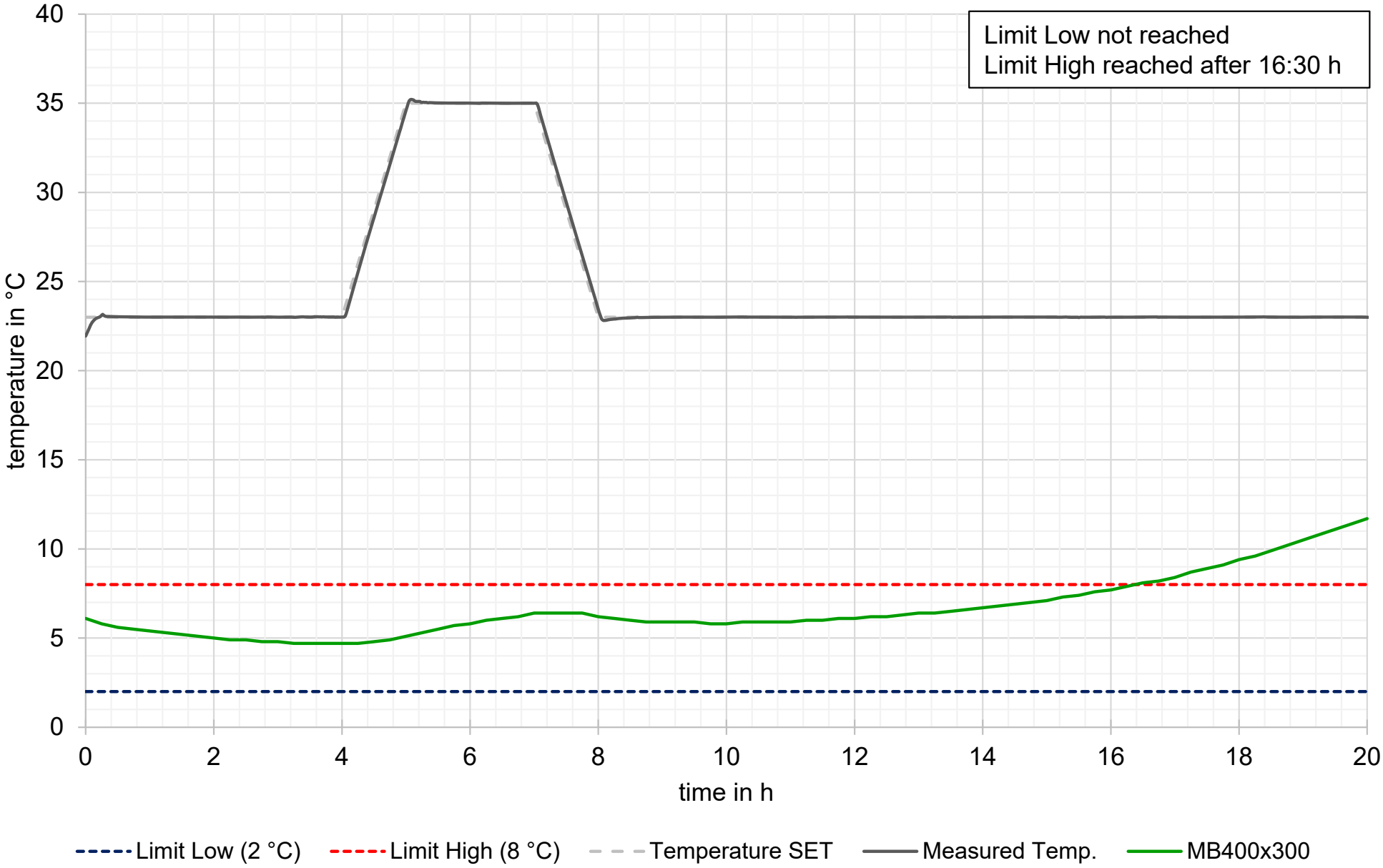
8. Appendix

5 Figures (photos and date sheets)





Insulation Box containing 3 x Sofigram



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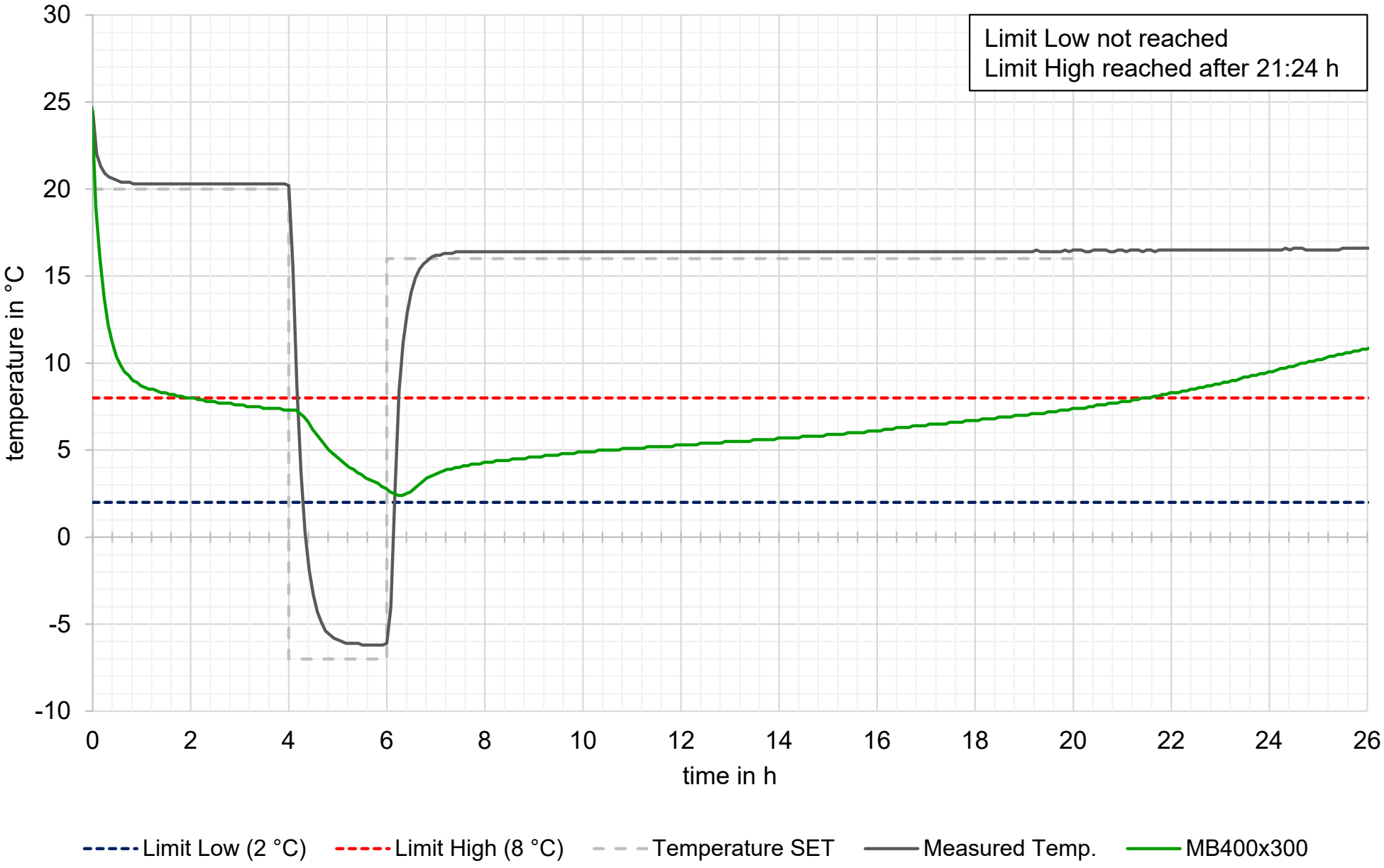
Temperature Measurement summer profile MBD43271
Insulation Inlay grey with black EPP-Lid; 400 ml product bottle
2x Sofigram 450 g, -18 °C + 1x Sofigram Lid, -18 °C, 15 min thaw



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Temperature Measurement winter profile MBD43271
Insulation Inlay grey with black EPP-Lid; 400 ml product bottle
2x Sofigram 450 g, -18 °C + 1x Sofigram Lid, +23 °C, 10 min thaw

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