Report
No. BITO 20230922-MBD43271

Climate test of an ISO box
three climatic cycles
“MBD43271”

for

BITO-Lagertechnik Bittmann GmbH
Obertor 29
D-55590 Meisenheim

Project No.: 10239 MBD43271

D - 44319 Dortmund, 22 September 2023

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General Information

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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:	29 March 2023 until 19 September 2023
Test Engineers:	Marc Brinkmann B. Eng., Dipl.-Ing. Günter Winkler

Customer

Company:	BITO-Lagertechnik Bittmann GmbH
Street:	Obertor 29
Place:	D-55590 Meisenheim
Contact:	Peter Kerth
Phone:	+49 6753 / 122-159
Street:	Obertor 29
Place:	D-55590 Meisenheim

Specimens

Description:	ISO box MBD43271
Order Date:	7 March 2023
Delivery Date:	17 March 2023
State of Delivery:	the sample was without any damages or impairments
Specimen No.:	MBD43271

1. Scope

With one ISO box, manufactured by BITO-Lagertechnik Bittmann GmbH, D-55590 Meisenheim, customer defined climate tests (three different climatic cycles) had to be conducted. The test was run from 29 March 2023 until 19 September 2023. 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 three different climatic profiles (constant temperature, 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 all 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 / number: 4327 / 6-31361
- Cooler battery dimensions: 195 x 130 x 23 mm (L x W x H)
- ISO box name / number: 4327 / 6-31357
- ISO box, lid number / material: 6-51293 ISO-Lid 4327 / PP
- ISO 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 ISO 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 ISO box was stored in climatic cabinet at customer defined climatic profiles – Three different profiles were defined: constant climate, 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.

Constant temperature:

ISO box:	container lid opened and box lid removed, 5 °C for at least 24 h
Packaged products:	2 PET bottles filled with 200 ml each, 5 °C for at least 24 h
Cooler batteries:	two cooler batteries, one on each side, -20 °C for at least 72 h

Summer profile:

ISO box:	container lid opened and box lid removed, 4 °C for at least 24 h
Packaged products:	2 PET bottles filled with 200 ml each, 4 °C for at least 24 h
Cooler batteries:	three cooler batteries, one on each side and in the lid, -20 °C for at least 72 h

Winter profile:

ISO box:	container lid opened and box lid removed, 6 °C for at least 24 h
Packaged products:	2 PET bottles filled with 200 ml each, 6 °C for at least 24 h
Cooler batteries:	three cooler batteries, one on each side, -20 °C for at least 72 h, one cooler battery in the lid, 21 °C for at least 24 h

Climatic tests

Three different climatic tests had to be conducted. For the first test a constant temperature of 20 °C was set. The following table show the two remaining set 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	8 °C	4 h	10 h
4	16 °C	2 h	12 h

Climatic loggers were placed on the packaged products. Used climatic loggers:

Testo 174H, serial number: 83893239, calibration date: 2023-03-15, annual

Testo 174H, serial number: 83895071, calibration date: 2023-01-04, annual

Testo 174H, serial number: 83874170, calibration date: 2023-03-15, annual

Testo 174H, serial number: 84067967, calibration date: 2023-03-15, annual

Testo 174H, serial number: 83918810, calibration date: 2023-03-15, annual

Used climatic cabinets:

MKF 720, MFK Pro 1020

4. Test Specifications

ASTM D4332-22

5. Results

All three climatic tests were passed. At the first test “constant climate” the container was able to hold the temperature inside in the temperature tolerance between 2 °C and 8 °C for 17:00 h. At the second test “summer profile” the container was able to hold the temperature inside in the temperature tolerance between 2 °C and 8 °C for at least 19:45 h. At the third test “winter profile” the container was able to hold the temperature inside in the temperature tolerance between 2 °C and 8 °C for 20:15 h.

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

Dortmund, 22 September 2023

Test-Engineers: Marc Brinkmann Günter Winkler

6. Appendix

10 Figures (photos and date sheets)

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state of delivery
(17 March 2023)

Fig. 1 / 10
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state of delivery
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Preconditioning
cooler batteries: freezer

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Preconditioning
packaged products and container: climatic cabinets

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Climatic cabinets: MKF 720, MFK Pro 1020

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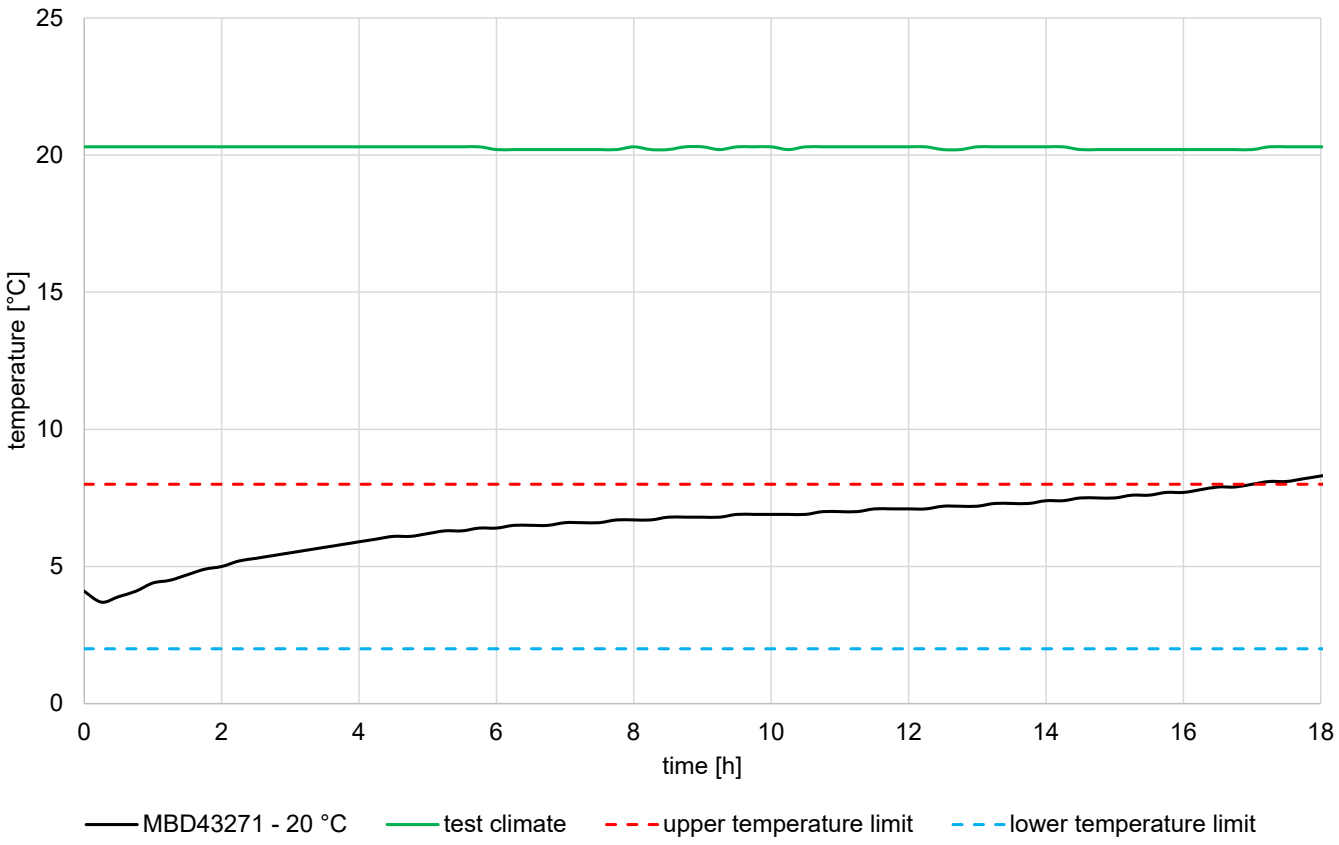

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MB43271 – test climate: constant 20 °C
04.04. – 05.04.2023

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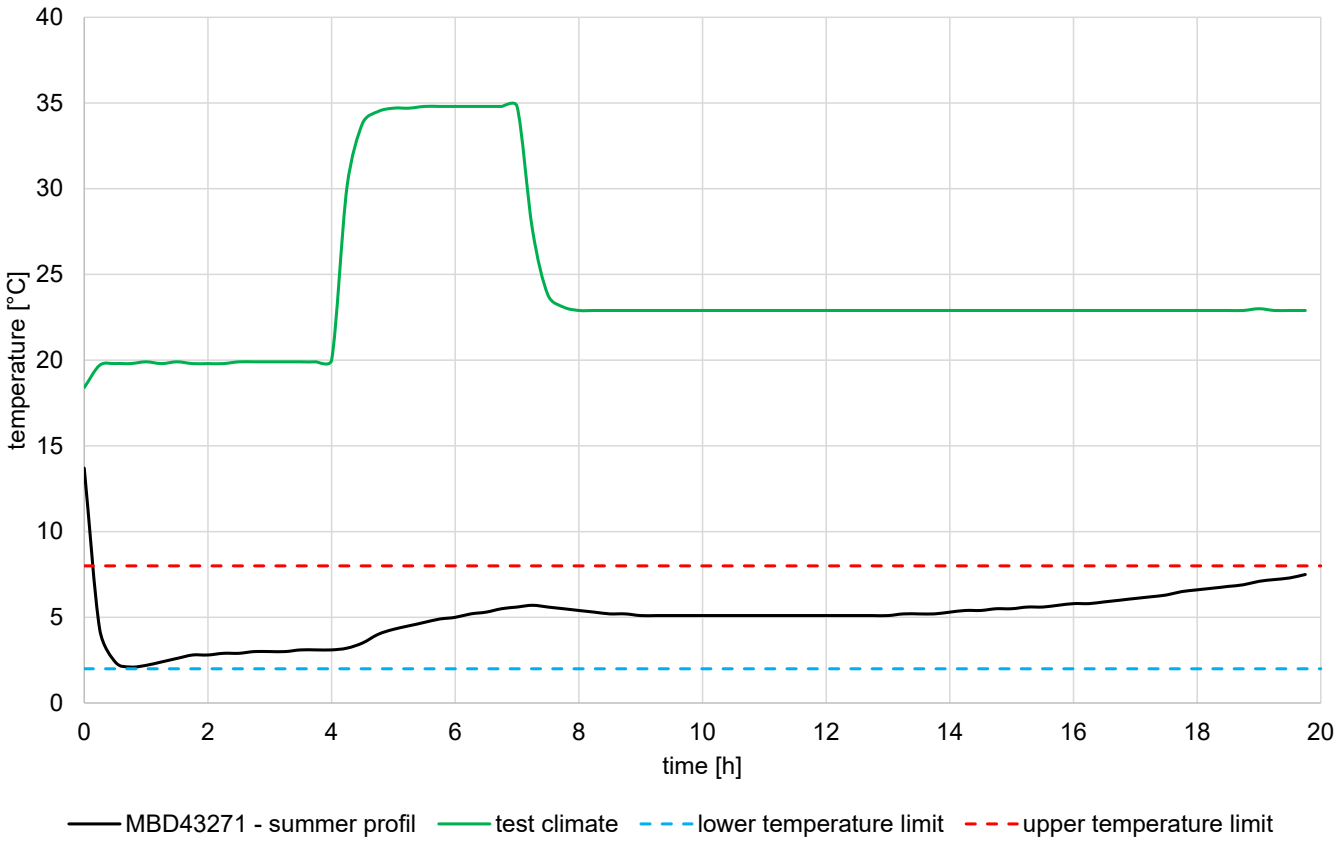

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MBD43271 – test climate: summer profile
29.03. – 30.03.2023

Fig. 9 / 10
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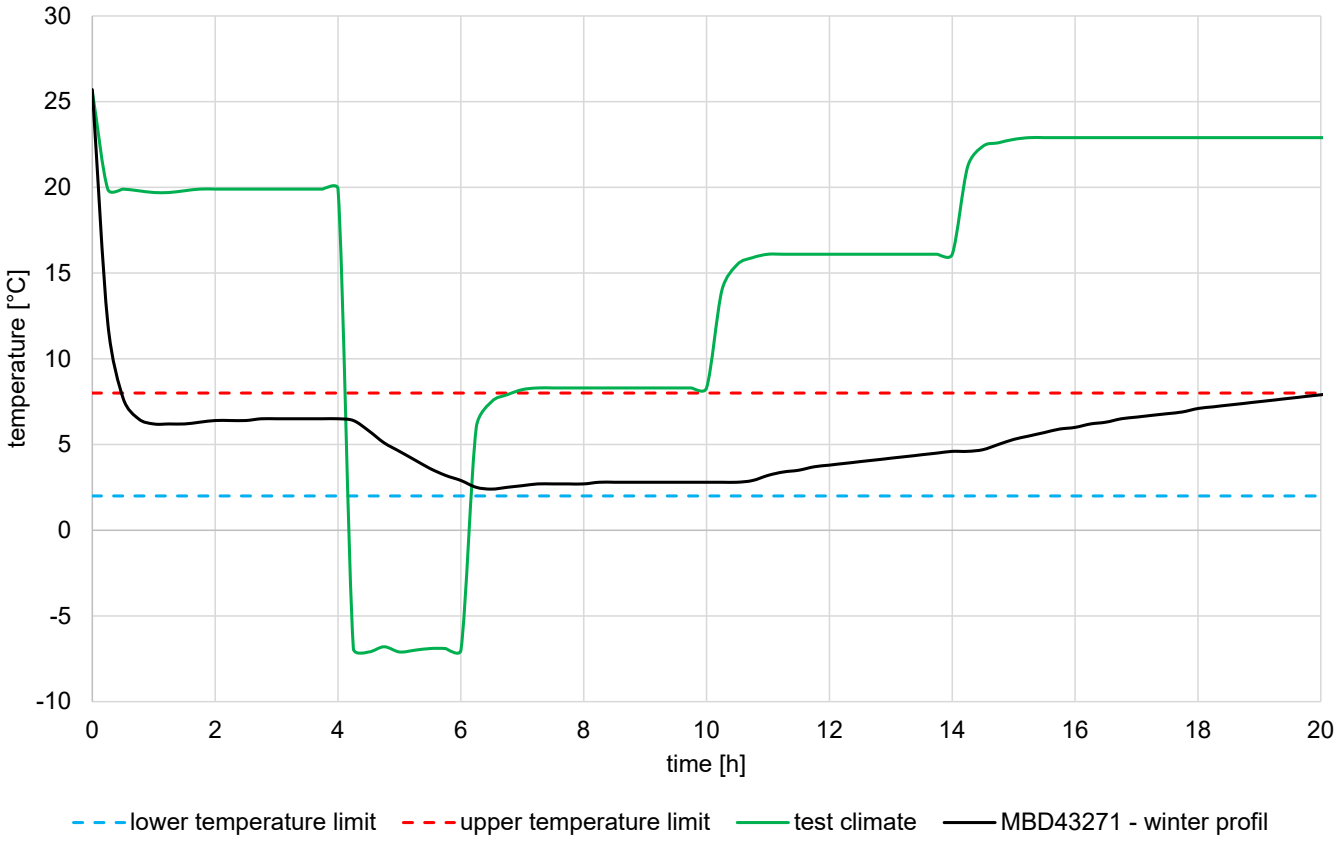

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MBD43271 – test climate: winter profile
18.09. – 19.09.2023

Fig. 10 / 10
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