



Deutsche  
Akkreditierungsstelle  
D-PL-11130-01-02

paconsult

## TEST REPORT

**Project-No.:** 19-12006

**Test Specimen:** Two Thermo Suitcases

**Client:** bwh Spezialkoffer GmbH  
Saltenwiesesteige 54  
48477 Hörstel-Bevergern

**Responsible Persons:** Joachim Petzold (bwh Spezialkoffer GmbH)  
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### **Purpose:**

By means of a laboratory simulation two thermo suitcases are tested to temperature strains. The simulation is performed, according to the specification of the client – ISTA 7D 2007[1].

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### **Summary:**

The tests were performed successfully. During the tests, the temperature inside the suitcases was measured. The inside temperature limit was given by the client: 8°C

- The temperature inside the suitcase 51100 remained below the limit for approximately 40 hours.
- The temperature inside the suitcase 51400 remained below the limit for approximately 65 hours.

The evaluation of the results is performed by the client.

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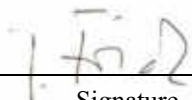
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### 3. Specimen

For the tests two thermo suitcases (see Figure 1) were provided by the client. Table 1 specifies the suitcases. In the following report, the specimens are abbreviated by EUT (Equipment Under Test).

**Table 1:** Specimen

EUT No	Specimen	Content	Dimensions in mm			Weight in g	Shipping Unit Construction
			Length	Width	Height		
1	Thermo Suitcase	0.5 kg Dummy Unit (Water Bottle filled with Water) 8 Small Cooling Pads	585	425	330	13400	Synthetic Outer Material with Thermo Cushioning
	Cool Case 51100						
2	Thermo Suitcase	0.5 kg Dummy Unit Unit (Water Bottle filled with Water) 8 Big Cooling Pads	850	600	430	25150	
	Cool Case 51400						

**Note:** The specified dimensions are identification values and not measurement results.



**Figure 1:** EUTs

The incoming goods control showed no visible damages at the specimens.

#### 4. Test and Equipment

The test standards and parameters were given by the client. Table 2 describes the tests, according to the specification.

**Table 2:** Test Parameters

ISTA 7D 2007: Temperature Test for Transport Packaging			
Seq.	Test Category	Test Type	Test Level
1	Atmospheric Preconditioning	Controlled Temperature (Method ASTM D4332 [2])	Suitcase: Laboratory ambient for 24 h Dummy: 8°C ±2°C for 24 h Cold Pack: -18°C ±2°C for 24 h
2	Atmospheric Conditioning 1 <sup>st</sup> Cycle	Controlled Temperature (Method ASTM D4332 [2])	22°C ±2°C for 4 h 35°C ±2°C for 2 h 30°C ±2°C for 12 h 35°C ±2°C for 6 h
3	Atmospheric Conditioning 2 <sup>nd</sup> Cycle	Controlled Temperature (Method ASTM D4332)	22°C ±2°C for 4 h 35°C ±2°C for 2 h 30°C ±2°C for 12 h 35°C ±2°C for 6 h
4	Atmospheric Conditioning 3 <sup>rd</sup> Cycle	Controlled Temperature (Method ASTM D4332 [2])	22°C ±2°C for 4 h 35°C ±2°C for 2 h 30°C ±2°C for 12 h 35°C ±2°C for 6 h

#### 4.1 Test Facility

The tests were performed in the laboratory of:

PAConsult GmbH - Site Hamburg  
 Birkenau 3  
 D-22087 Hamburg  
 info@paconsult.de  
 ISTA Member ID: ST-9678



#### 4.2 Laboratory Conditions

All tests were performed, if not stated otherwise in the test report, under the conditions listed in Table 3.

**Table 3:** Environmental Conditions

Temperature	15 °C - 35 °C
Relative Humidity	< 85 %
Air Pressure	860 hPa - 1060 hPa

#### 4.3 Equipment used for Test

The test equipment used in the laboratory of PAConsult GmbH in Hamburg is listed in Table 4.

**Table 4:** Test Equipment

Device	Manufacturer	Type	Serial number / Version	Date of last calibration
Climatic cabinet 4 (Espec)	Espec	PL-4J	15000422	2019/01
Climatic cabinet 1 (Espec)	Weiss Umwelttechnik	WK 340-70	58226045080010	2019/01
Climatic cabinet 8 (Espec)	CTS	CTS CS-70/600-5	83115	2019/01
Datenlogger 5	Ahlborn	Almemo 2290-8	H0208318G	2019/06
Thermocouple	Ahlborn	NiCr-Ni	C01	2019/03
Thermocouple	Ahlborn	NiCr-Ni	C03	2019/03
Thermocouple	Ahlborn	NiCr-Ni	C04	2019/08
Scale (Lab. 4)	Mettler Toledo	SB32000-P	2114375058	2018/07
<b>The calibration of the laboratory test equipment is performed annually (<math>\pm</math> 2 months).</b>				

## 5. Test Procedures

### 5.1 Pre-Conditioning

The dummy units inside the suitcases have to be pre-conditioned. The pre-conditioning parameters were given by the client and are as follows:

- $+8^{\circ}\text{C} \pm 2^{\circ}\text{C}$  for at least 24 hours

The cooling pads inside the suitcases have to be pre-conditioned. The following pre-conditioning parameters were given by the client as follows:

- $-18^{\circ}\text{C} \pm 2^{\circ}\text{C}$  for at least 24 hours

The suitcases were pre-conditioned at laboratory ambient (see Table 3 for details).

Figure 2 and Figure 3 show the test setups in the climatic cabinet.



**Figure 2:** Pre-Conditioning – Setup Dummy Units





Figure 3: Pre-Conditioning – Setup Cooling Pads

## 5.2 Conditioning

For the conditioning test the suitcases were filled with the pre-conditioned cooling pads and the pre-conditioned dummy units. A thermocouple was attached to each dummy unit and the suitcases were closed and put into a climatic chamber (see Figures 4 to 6). Table 5 shows the temperature conditions throughout the test inside the climatic chamber.

**Table 5:** Conditioning (Thermo Test) Parameters

Cycle	Temperature	Duration
1	22°C ±2°C	4 hours
1	35°C ±2°C	2 hours
1	30°C ±2°C	12 hours
1	35°C ±2°C	6 hours
2	22°C ±2°C	4 hours
2	35°C ±2°C	2 hours
2	30°C ±2°C	12 hours
2	35°C ±2°C	6 hours
3	22°C ±2°C	4 hours
3	35°C ±2°C	2 hours
3	30°C ±2°C	12 hours
3	35°C ±2°C	6 hours



**Figure 4:** Thermo Test Setup EUT 1





Figure 5: Thermo Test Setup EUT 2

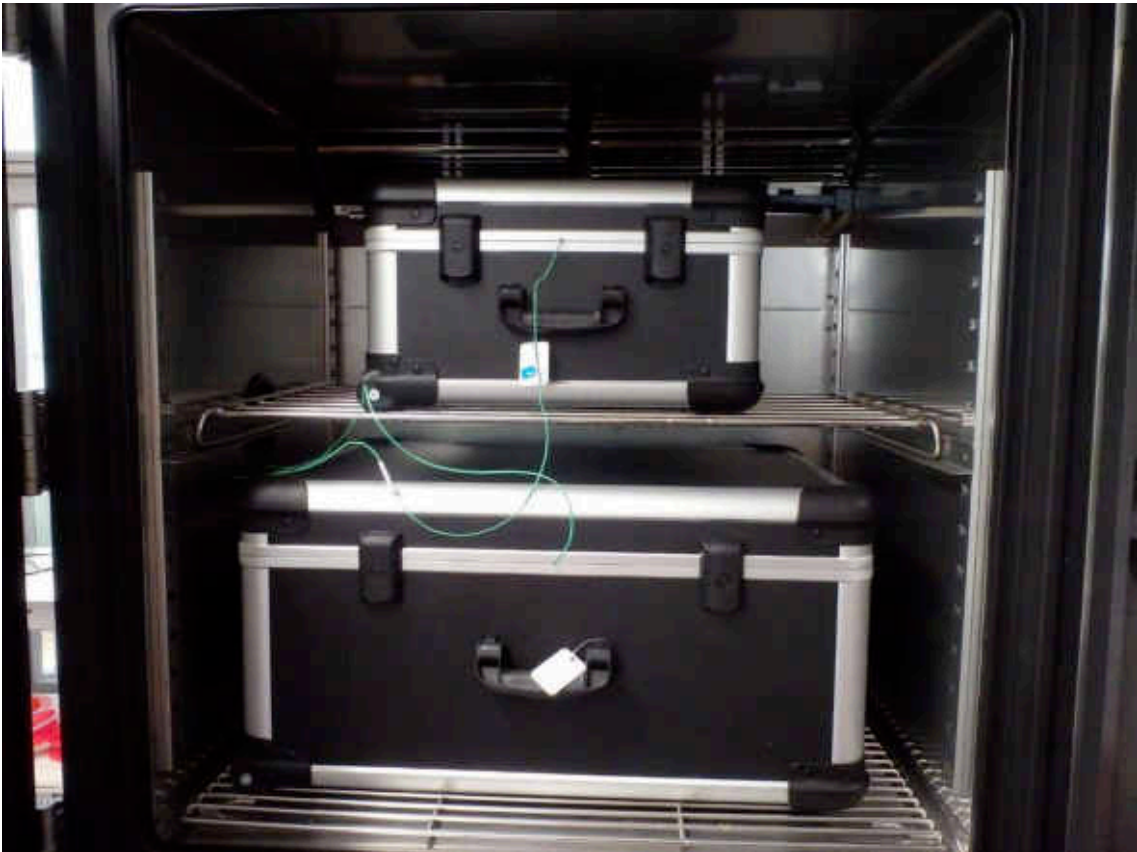


Figure 6: Thermo Test Setup Climatic Chamber

## 6. Test Results

### 6.1 Pre-Conditioning

The test was performed using the specified parameters in Table 2. During the test, no visible changes were observed. Figure 7 and Figure 8 document the test proceeding.

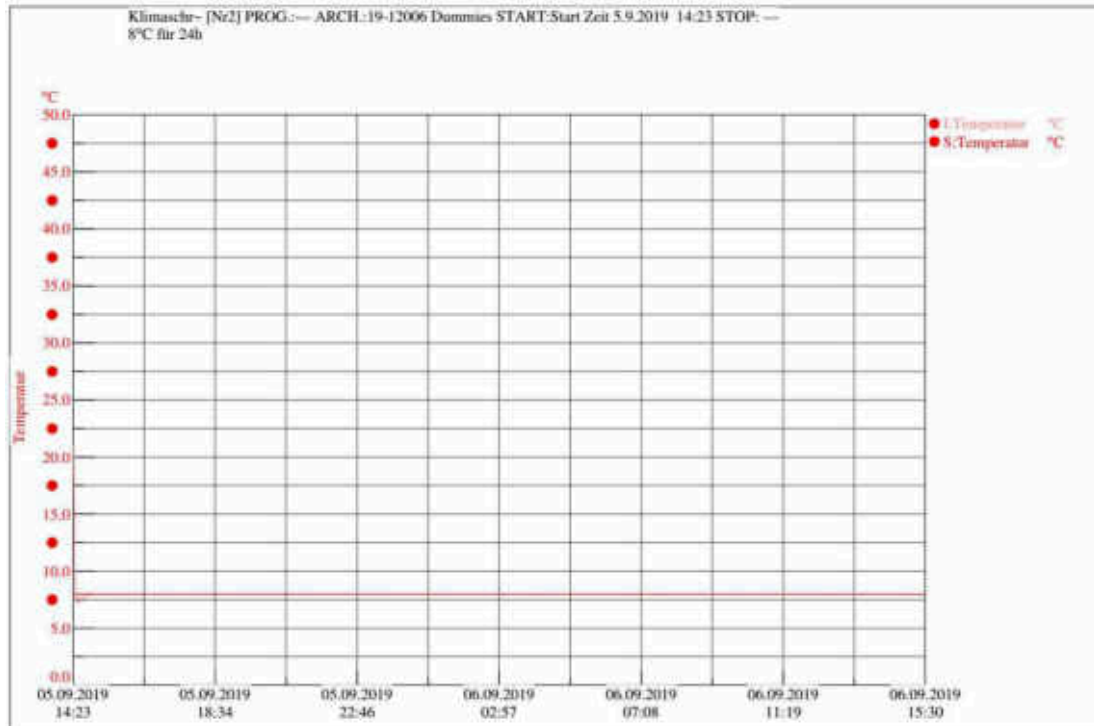


Figure 7: Climate Diagram Dummy Units



Figure 8: Climate Diagram Cooling Pads

### 6.2 Conditioning

The test was performed using the specified parameters in Table 2. During the test, no visible changes were observed. Figures 9 to 11 document the test proceeding.

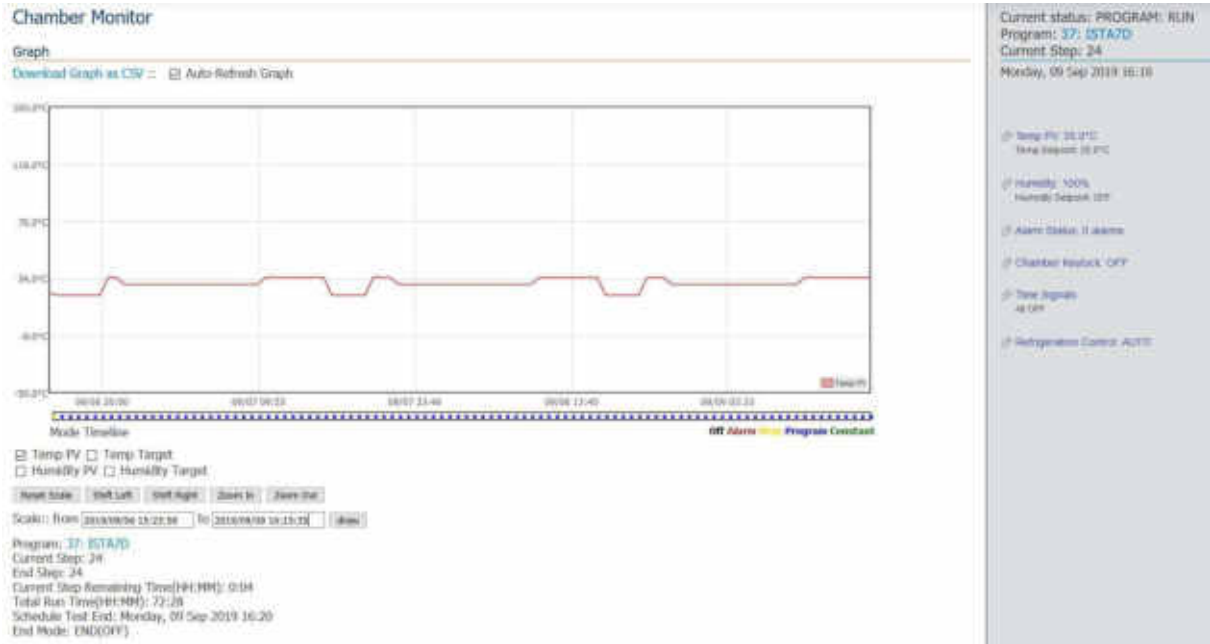


Figure 9: Temperature Conditions inside the Climatic Chamber

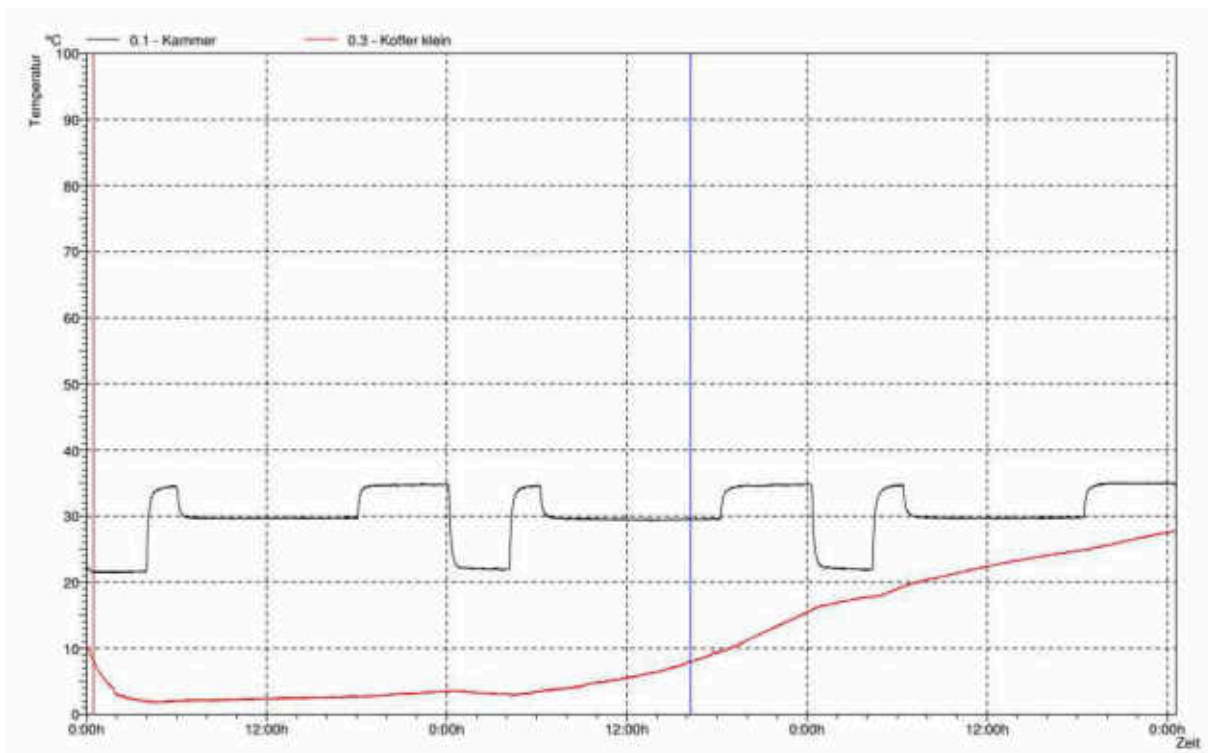
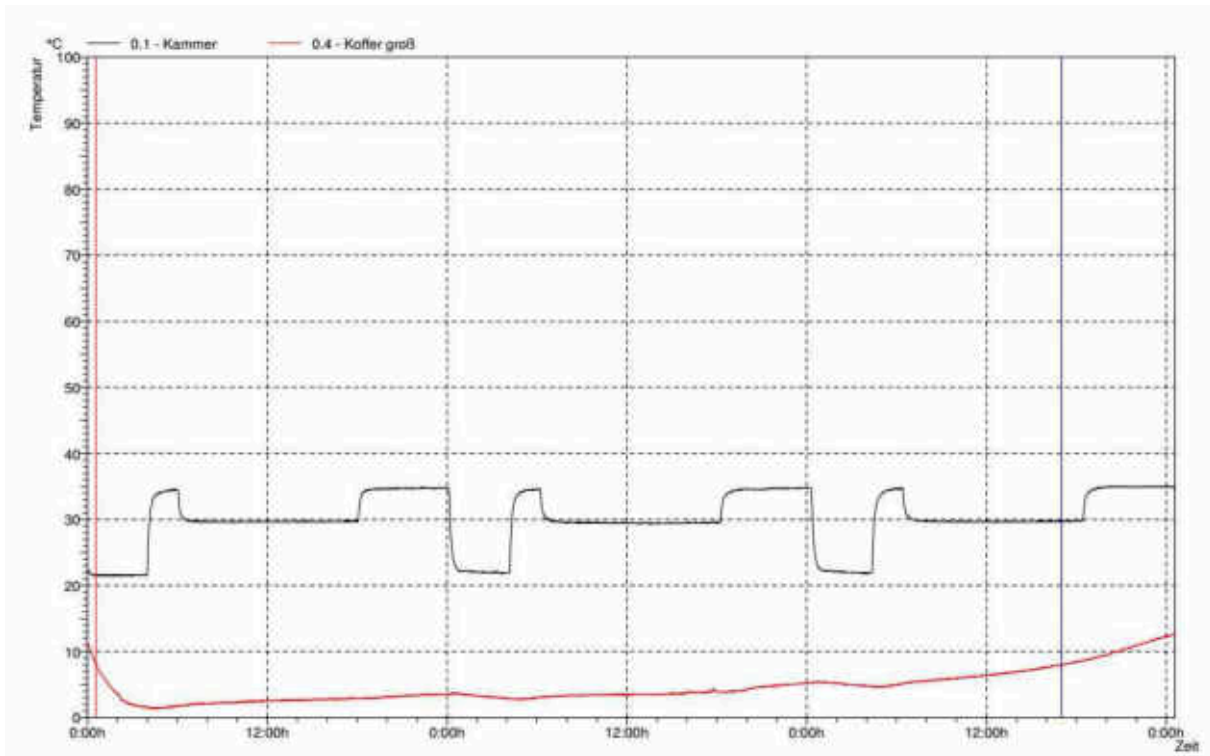


Figure 10: Temperature Conditions inside the Suitcase 51100 - EUT 1 (Blue Line ~ 8°C)



**Figure 11:** Temperature Conditions inside the Suitcase 51400 - EUT 2 (Blue Line ~ 8°C)

**Result:**

- The temperature inside the suitcase 51100 (EUT 1) remained below the limit for approximately 40 hours
- The temperature inside the suitcase 51400 (EUT 2) remained below the limit for approximately 65 hours

## 7. Summary

The tests were finished successfully. During the tests, the temperature inside the suitcases was measured. Table 6 summarizes all test results.

**Table 6:** Summary Results

Results Temperature Test (Measurement Tolerance $\pm 2^{\circ}\text{C}$ )	
EUT	Result
1	The temperature inside the suitcase 51100 remained below the limit for approximately 40 hours
2	The temperature inside the suitcase 51400 remained below the limit for approximately 65 hours

The visual inspection of the content and the evaluation of the results will be performed by the client.

## 8. References

- [1] ISTA 7D: Temperature Test for Transport Packaging; 2007
- [2] ASTM D4332: Standard Practice for Conditioning Containers, Shipping boxes, or Packaging Components for Testing; 2014

### Note

This test report may only be reproduced in its entirety and without alterations. Publication in parts is subject to the approval by the test laboratory. The test results refer exclusively to the designated test specimens. Test reports without signature are not valid.