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RODOLFO PEREZ
Representante Legal
ELECTROPAR S.A.

CHANGE OF TEMPERATURE TEST - ON

0000117

1. INTRODUCTION

In response to the request of the company Transformadores e Serviços de Energia das Américas Ltda., the Laboratory of Integration and Test – LIT INPE, carried out in your facilities, the Change of Temperature Test - ON in the "VOLTAGE REGULATOR CONTROL".

The objective of the test was to submit the specimen(s) "VOLTAGE REGULATOR CONTROL" to a temperature variation condition, in according to specification environmental test "" IEC 60068-2-14– Part 2-14 – Test Nb".

2. PERIOD OF THE TEST

The test began at 01:39AM the day 07/18/2018 and completed at 08:30PM the day 07/19/2018.

3. SPECIMEN(S) IDENTIFICATION

- *Name*.....: **VOLTAGE REGULATOR CONTROL**
- *Amount*.....: 01 (one) unit.
- *Model*.....: TVC-MP

4. TEST FACILITIES

Climatic Chamber **Thermotron Model SE-1000-3-3 + LN2**;

Thermal System:

Temperature Range: -110 °C to +180 °C
Average Heating Rate: 5,6 °C/min
Average Cooling Rate: 3,5 °C/min

Humidity System:

Measuring and Control Psychometrically
Humidity Range: 10% to 98%

Temperature and Humidity inside Climactic Chamber:

The temperature-humidity data for the thermal and humidity profiles monitoring were provided by two Pt 100 Platinum sensors installed in the Climatic Chamber.

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5. TEST SPECIFICATIONS

5.1 Environmental Conditions

The climatic chamber is installed in the INPE / LIT Thermal Vacuum Laboratory that has the following environmental characteristics:

- Temperature: (23 ± 2) °C;
- Relative Humidity: (50 ± 10) %;

5.2 Specimen Monting

The specimen was positioned inside the climatic chamber, as shown in the appendix A.

5.3 Data Acquisition

The acquisition of the temperature was made every 1 (one) minute using the climatic chamber acquisition system.

6. DEVELOPMENT OF THE TEST

Test Sequence:

- Transition: (23 ± 2)°C to (-40 ± 2)°C in 30 minutes.
- Minimmum Temperature: (-40 ± 2)°C for 2 hours.
- Transition: (-40 ± 2)°C to (85 ± 2)°C in 1 hour.
- Maximmum Temperature: (85 ± 2)°C for 2 hours.
- Transition: (85 ± 2)°C to (23 ± 2)°C in 30 minutes.
- Equipment Condition: ON.
- Number of Cycles: 05.
- Total Duration of the Test: 36 hours.

7. TEST RESULTS

The present results refer, only to the "Change of Temperature Test - ON" at test conditions specified by the customer.

Functional tests were performed before and after the climatic test and according to the TSEA engineers the equipment did not show any changes in its operation.

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The following points were verified:

- In Automatic mode, using a Variac device. Elevate and lower position commands.

- Memory.

- Display of data and operation of the Control Panel.

- Communication Doors.

During the test after thermal stabilization the specimen was energized and performed a performance test.

After the performance test the specimne remained switched on in automatic during the whole test run.

The following points were verified:

- In Automatic mode, using a Variac device. Elevate and lower position commands.

- Memory.

- Communication Doors.

Appendix A presents the photographs of the installation of the specimen inside the Climatic chamber.
Appendix B presents the graph that describes the development of the temperature during the test.

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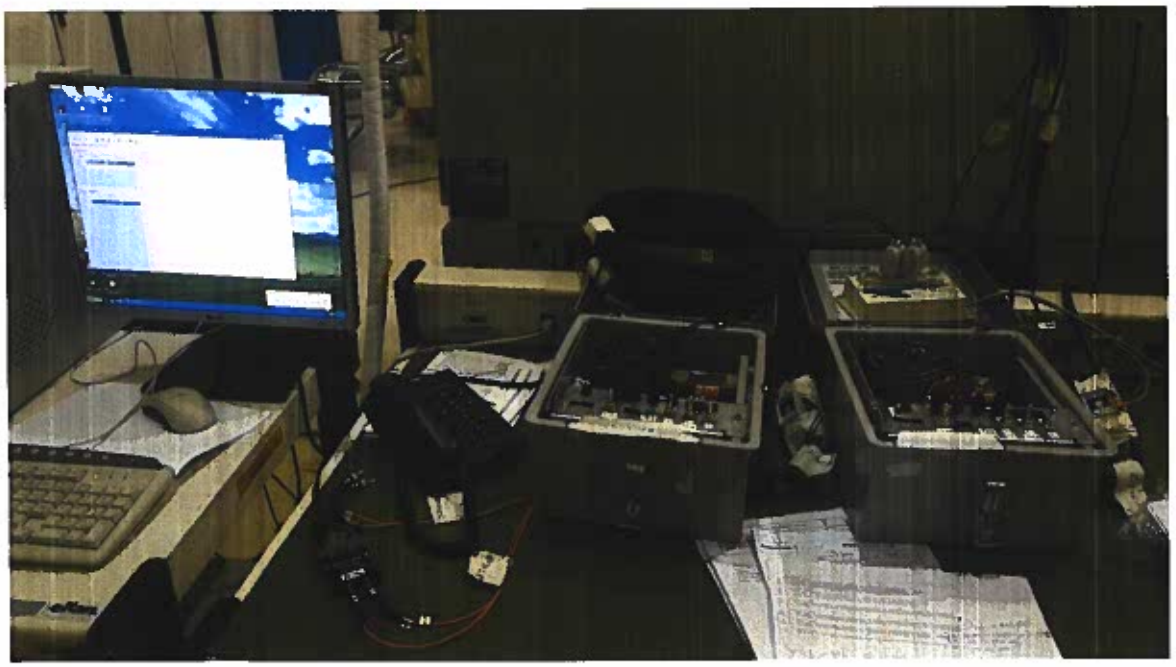
APPENDIX A : SPECIMEN INSIDE OF CLIMATIC CHAMBER

Photograph 01: Installation of the specimen inside the climate chamber



Photograph 02: Specimen setup

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Photograph 03: Specimen(s) After the Test.

Photograph 04: Specimen after the test

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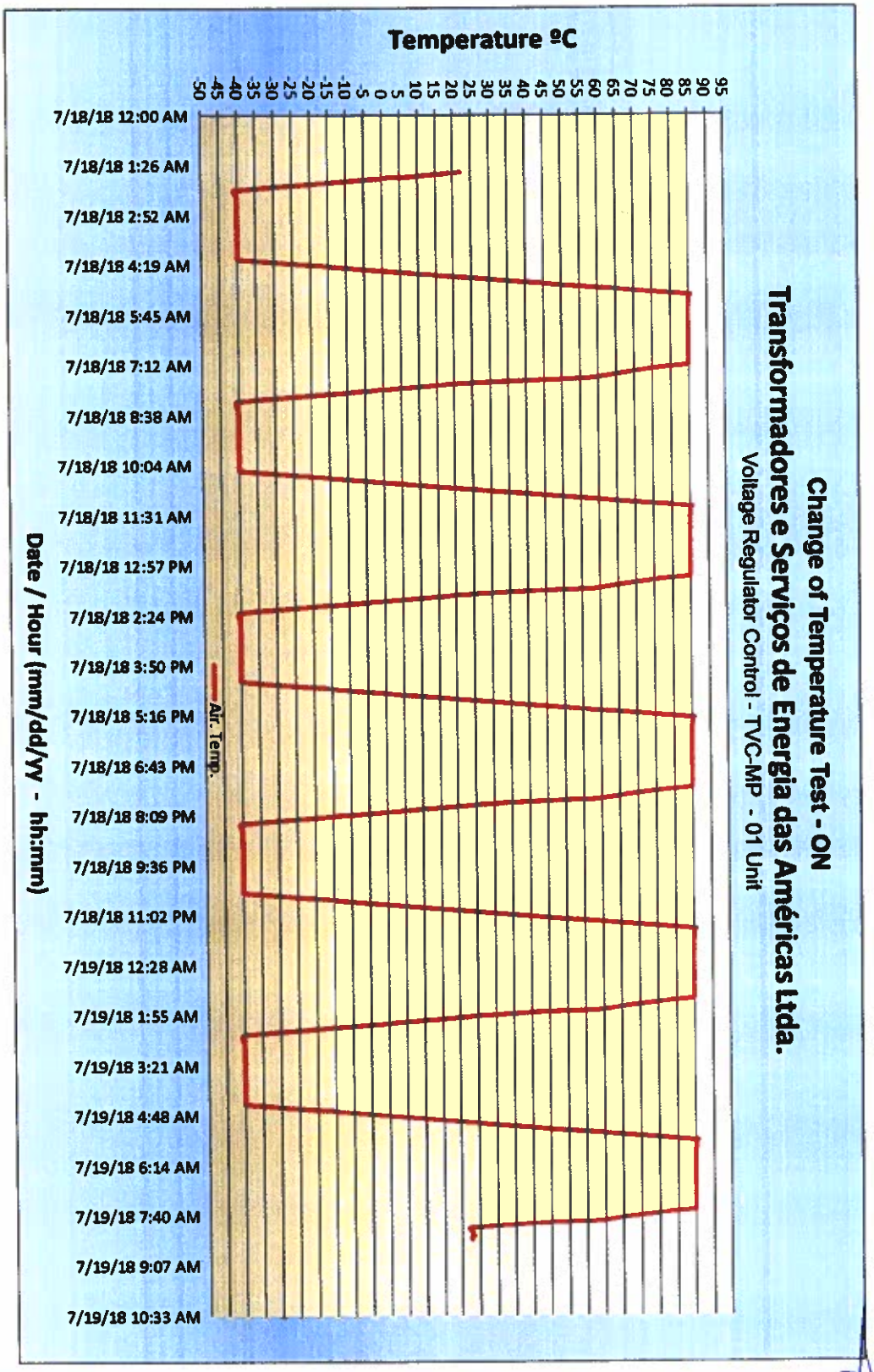
APPENDIX B: GRAPHICS – TEST GRAPHIC DATA.



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TEST REPORT

CUSTUMER:	**Transformadores e Serviços de Energia das Américas Ltda.**
TEST ITEM:	**VOLTAGE REGULATOR CONTROL**
MODEL:	**TVC-MP**
TEST NAME:	**Change of Temperature Test - OFF**
REPORT NUMBER:	**THBTD04-R08**
VERSION:	**1**

INPE.LIT.PX.048/18

PREPARED BY:			APPROVED BY:		
Name	Vinicius Derrico da Silva Test Executor	14 / 08/ 2018 Date	Name	Márcio Bueno dos Santos Technical Manager of the Thermal-Vacuum Laboratory	14 / 08 /2018 Date

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VERSION CONTROL

Page	Version	Date	Modification Reference
	1		- Original Version.

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CUSTUMER INFORMATION

Report Number Nº:	THBTD04-R08
Proposal Plano de Trabalho:	1010-2018 A
Process eLIT Nº:	1010.18
Service:	941750
Service Order:	0040.18
NIC Nº:	0937.18
Custumer:	Transformadores e Serviços de Energia das Américas Ltda..
Address:	Rodovia BR 381, 3045 – Bairro Amazonas Contagem - MG CEP: 32.240-090
Especimen / Product:	VOLTAGE REGULATOR CONTROL
Amount:	01 Unit
Reference Document(s):	IEC 60068-2-14 - Part 2-14 – Test Nb.
Test Result(s):	See the next pages of this document
Test Performed By:	Vinicius Derrico da Silva, Anderson Antônio da Rosa and Osvaldo Donizete da Silva.
Responsible Engineer:	Vinicius Derrico da Silva
Test Begin:	July 19 of 2018
Test End:	July 20 of 2018
Total Pages:	10
Laboratory:	National Institute for Space Research – INPE Laboratory of Integration and Test – LIT
Area Code:	LIT01 – Thermal-Vacuum Laboratory
Address:	Av. dos Astronautas, 1.758 - Jd. da Granja São José dos Campos – SP CEP: 12.227-010

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CHANGE OF TEMPERATURE TEST - OFF

0000122

1. INTRODUCTION

In response to the request of the company Transformadores e Serviços de Energia das Américas Ltda., the Laboratory of Integration and Test – LIT INPE, carried out in your facilities, the Change of Temperature Test - OFF in the "VOLTAGE REGULATOR CONTROL".

The objective of the test was to submit the specimen(s) "VOLTAGE REGULATOR CONTROL" to a temperature variation condition, in according to specification environmental test "" IEC 60068-2-14– Part 2-14 – Test Nb".

2. PERIOD OF THE TEST

The test began at 01:39AM the day 07/19/2018 and completed at 03:30PM the day 07/20/2018.

3. SPECIMEN(S) IDENTIFICATION

- *Name*.....: **VOLTAGE REGULATOR CONTROL**
- *Amount*.....: 01 (one) unit.
- *Model*.....: TVC-MP

4. TEST FACILITIES

Climatic Chamber **Thermotron Model SE-1000-3-3 + LN2**;

Thermal System:

Temperature Range: -110 °C to +180 °C
Average Heating Rate: 5,6 °C/min
Average Cooling Rate: 3,5 °C/min

Humidity System:

Measuring and Control Psychometrically
Humidity Range: 10% to 98%

Temperature and Humidity inside Climactic Chamber:

The temperature-humidity data for the thermal and humidity profiles monitoring were provided by two Pt 100 Platinum sensors installed in the Climatic Chamber.

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5. TEST SPECIFICATIONS

5.1 Environmental Conditions

The climatic chamber is installed in the INPE / LIT Thermal Vacuum Laboratory that has the following environmental characteristics:

- Temperature: (23 ± 2) °C;
- Relative Humidity: (50 ± 10) %;

5.2 Specimen Monting

The specimen was positioned inside the climatic chamber, as shown in the appendix A.

5.3 Data Acquisition

The acquisition of the temperature was made every 1 (one) minute using the climatic chamber acquisition system.

6. DEVELOPMENT OF THE TEST

Test Sequence:

- Transition: (23 ± 2)°C to (-40 ± 2)°C in 30 minutes.
- Minimmum Temperature: (-40 ± 2)°C for 2 hours.
- Transition: (-40 ± 2)°C to (85 ± 2)°C in 1 hour.
- Maximmum Temperature: (85 ± 2)°C for 2 hours.
- Transition: (85 ± 2)°C to (23 ± 2)°C in 30 minutes.
- Equipment Condition: OFF.
- Number of Cycles: 05.
- Total Duration of the Test: 36 hours.

7. TEST RESULTS

The present results refer, only to the "Change of Temperature Test - OFF" at test conditions specified by the customer.

Functional tests were performed before and after the climatic test and according to the TSEA engineers the equipment did not show any changes in its operation.

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The following points were verified:

- In Automatic mode, using a Variac device. Elevate and lower position commands.

- Memory.

- Display of data and operation of the Control Panel.

- Communication Doors.

The equipment under test remained switched off during the climatic test.

Appendix A presents the photographs of the installation of the specimen inside the Climatic chamber.

Appendix B presents the graph that describes the development of the temperature during the test.

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APPENDIX A : SPECIMEN INSIDE OF CLIMATIC CHAMBER

Photograph 01: Installation of the specimen inside the climate chamber

Photograph 02: Specimen setup

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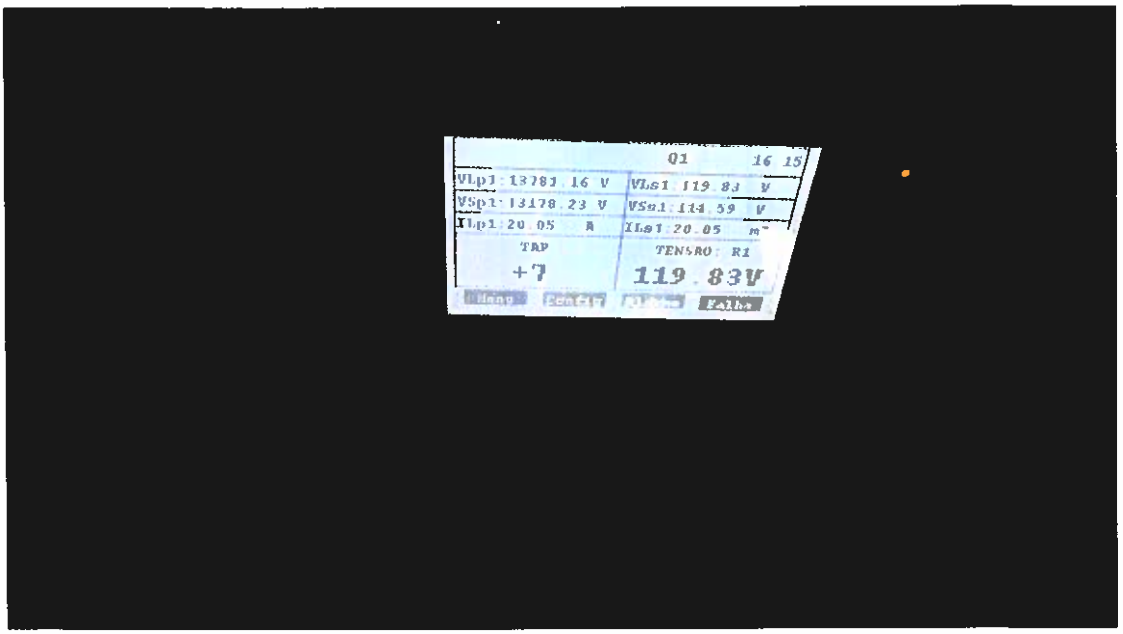
Photograph 03: Specimen(s) After the Test.



Photograph 04: Specimen after the test

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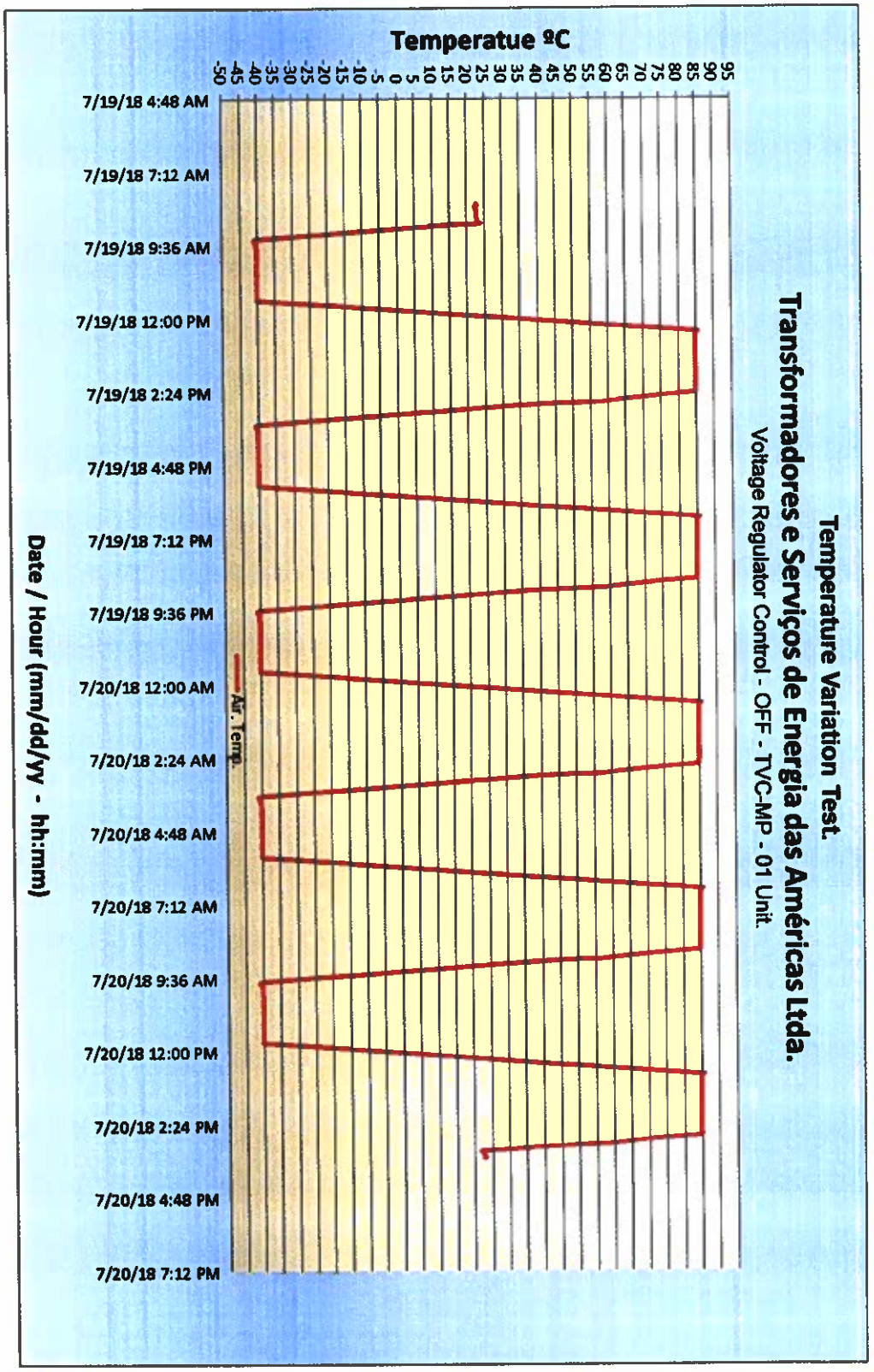
Representante Legal
ELECTROPAR S.A.

APPENDIX B: GRAPHICS – TEST GRAPHIC DATA.



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TEST REPORT

CUSTUMER:	**Transformadores e Serviços de Energia das Américas Ltda.**
TEST ITEM:	**VOLTAGE REGULATOR CONTROL**
MODEL:	**TVC-MP**
TEST NAME:	**Damp Heat, Steady State**
REPORT NUMBER:	**THBTD04-R10** **VERSION: 1**

INPE.LIT.PX.048/18

PREPARED BY:			APPROVED BY:		
Name	Vinicius Derrico da Silva Test Executor	14/ 08/ 2018 Date	Name	Márcio Bueno dos Santos Technical Manager of the Thermal-Vacuum Laboratory	14/ 08/2018 Date

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VERSION CONTROL

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	1		- Original Version.

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CUSTUMER INFORMATION

Report Number Nº:	THBTD04-R10
Proposal Plano de Trabalho:	1010-2018 A
Process eLIT Nº:	1010.18
Service:	941740
Service Order:	0042.18
NIC Nº:	0937.18
Custumer:	Transformadores e Serviços de Energia das Américas Ltda..
Address:	Rodovia BR 381, 3045 – Bairro Amazonas Contagem - MG CEP: 32.240-090
Especimen / Product:	VOLTAGE REGULATOR CONTROL
Amount:	01 Unit
Reference Document(s):	IEC 60068-2-78 - Part 2-78 – Test Cab
Test Result(s):	See the next pages of this document
Test Performed By:	Vinicius Derrico da Silva, Anderson Antônio da Rosa and Osvaldo Donizete da Silva
Responsible Engineer:	Vinicius Derrico da Silva
Test Begin:	June 29 of 2018
Test End:	July 09 of 2018
Total Pages:	10
Laboratory:	National Institute for Space Research – INPE Laboratory of Integration and Test – LIT
Area Code:	LIT01 – Thermal-Vacuum Laboratory
Address:	Av. dos Astronautas, 1.758 - Jd. da Granja São José dos Campos – SP CEP: 12.227-010

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Representante Legal
ELECTROFAR S.A.

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DAMP HEAT, STEADY STATE

1. INTRODUCTION

In response to the request of the company Transformadores e Serviços de Energia das Américas Ltda., the Laboratory of Integration and Test – LIT INPE, carried out in your facilities, the Damp Heat, Steady State in the "VOLTAGE REGULATOR CONTROL".

The objective of the test was to submit the specimen(s) "VOLTAGE REGULATOR CONTROL" to a temperature variation condition, in according to specification environmental test "" IEC 60068-2-78– Part 2-78 – Test Cab".

2. PERIOD OF THE TEST

The test began at 08:11PM the day 06/29/2018 and completed at 11:11PM the day 07/09/2018.

3. SPECIMEN(S) IDENTIFICATION

- *Name*.....: **VOLTAGE REGULATOR CONTROL**
- *Amount*.....: 01 (one) unit.
- *Model*.....: TVC-MP

4. TEST FACILITIES

Climatic Chamber **Thermotron Model SE-1000-3-3 + LN2**;

Thermal System:

Temperature Range: -110 °C to +180 °C
Average Heating Rate: 5,6 °C/min
Average Cooling Rate: 3,5 °C/min

Humidity System:

Measuring and Control Psychometrically
Humidity Range: 10% to 98%

Temperature and Humidity inside Climactic Chamber:

The temperature-humidity data for the thermal and humidity profiles monitoring were provided by two Pt 100 Platinum sensors installed in the Climatic Chamber.

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5. TEST SPECIFICATIONS

5.1 Environmental Conditions

The climatic chamber is installed in the INPE / LIT Thermal Vacuum Laboratory that has the following environmental characteristics:

- Temperature: (23 ± 2) °C;
- Relative Humidity: (50 ± 10) %;

5.2 Specimen Monting

The specimen was positioned inside the climatic chamber, as shown in the appendix A.

5.3 Data Acquisition

The acquisition of the temperature was made every 1 (one) minute using the climatic chamber acquisition system.

6. DEVELOPMENT OF THE TEST

Test Sequence:

- Transition: (23 ± 2)°C / (50 ± 3)%RH to (40 ± 2)°C / (93 ± 3)%RH in 1 hour.
- Maximmum Temperature: (40 ± 2)°C / (93 ± 3)%RH for 240 hours.
- Transition: (40 ± 2)°C / (93 ± 3)%RH to (23 ± 2)°C / (50 ± 3)%RH in 1 hour.
- Equipment Condition: ON.
- Number of Cycles: 01.
- Total Duration of the Test: 242 hours.

7. TEST RESULTS

The present results refer, only to the "Damp Heat, Steady State" at test conditions specified by the customer.

Functional tests were performed before and after the climatic test and according to the TSEA engineers the equipment did not show any changes in its operation.

The following points were verified:

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- In Automatic mode, using a Variac device. Elevate and lower position commands.

- Memory.

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- Display of data and operation of the Control Panel.

- Communication Doors.

After the performance test the specimen remained switched on in automatic during the whole test run.

The Following points were verified:

- In Automatic mode, using a Variac device. Elevate and lower position commands.

- Communication Doors.

Appendix A presents the photographs of the installation of the specimen inside the Climatic chamber.
Appendix B presents the graph that describes the development of the temperature during the test.

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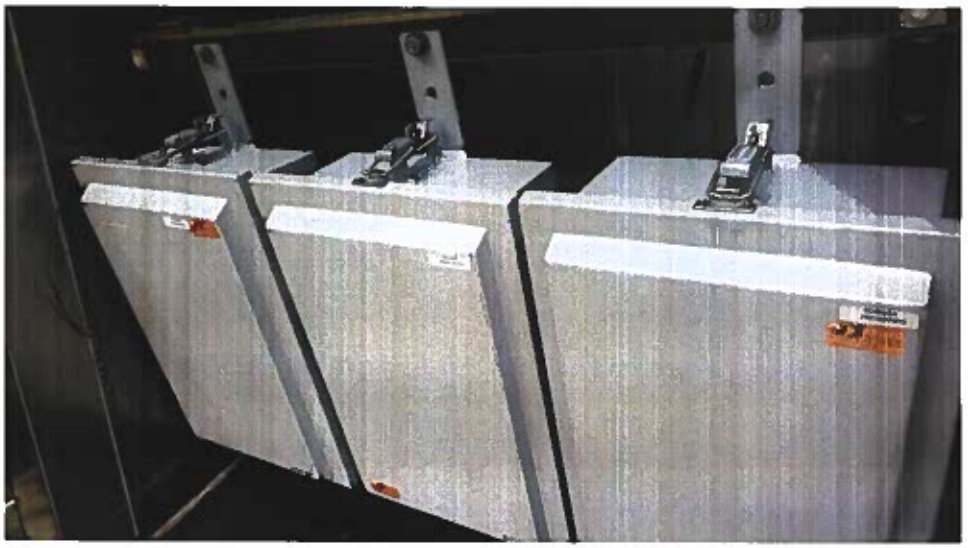
APPENDIX A : SPECIMEN INSIDE OF CLIMATIC CHAMBER



Photograph 01: Installation of the specimen inside the climate chamber

Photograph 02: Specimen setup

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Photograph 03: Specimen(s) After the Test.

Photograph 04: Specimen after the test

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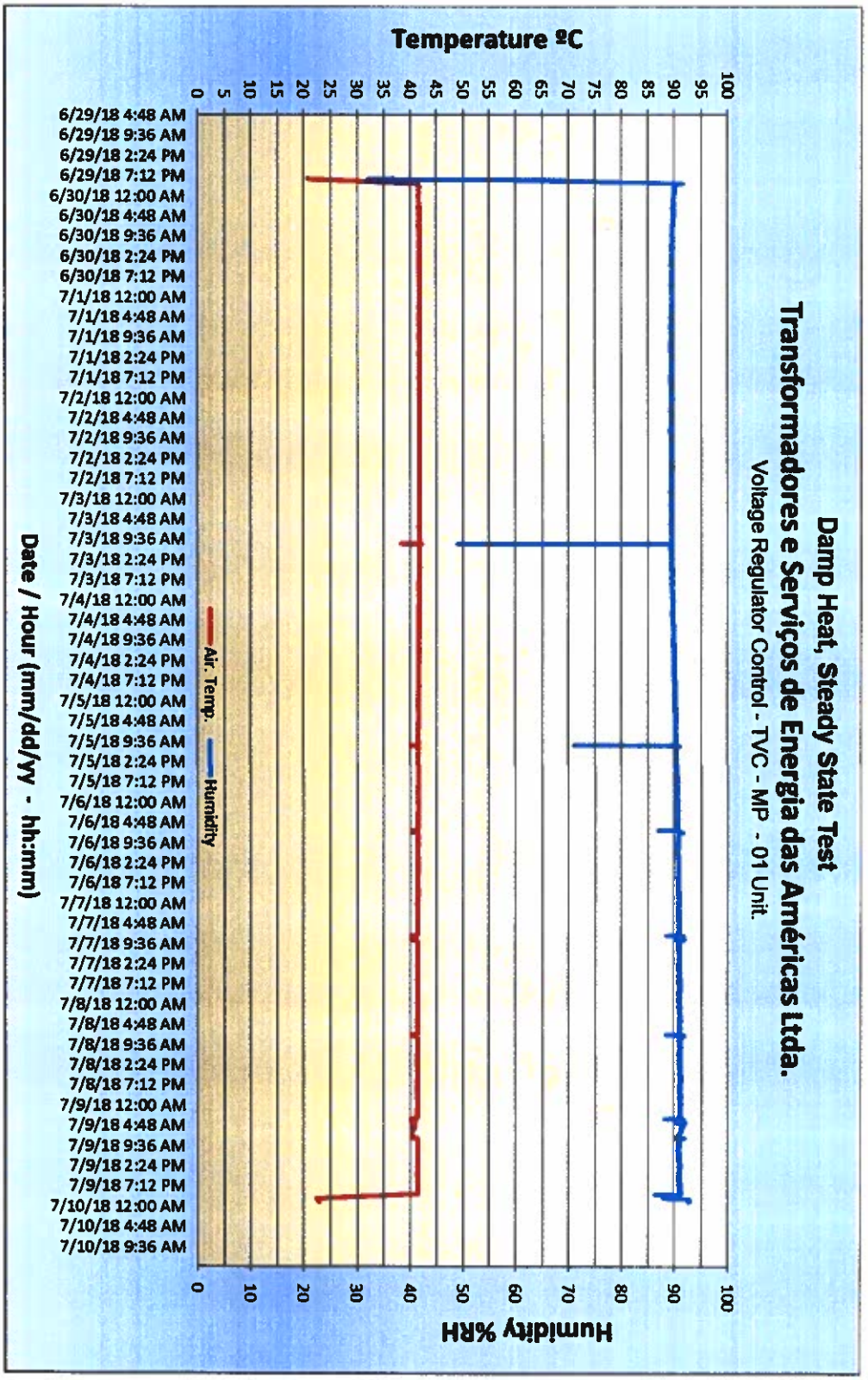
APPENDIX B: GRAPHICS – TEST GRAPHIC DATA.



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Representante Legal
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National Institute for Space Research
Integrate and Testing Laboratory – LIT

LIT

TEST REPORT

CUSTOMER:	**Toshiba South America Ltda**		
TEST ITEM:	**Electronic Control Single Phase Voltage Regulators**		
TEST:	**Damp Heat Test, Cyclic**		
REPORT NUMBER:	**THBTD02 – R03**		
DATE:	**November 13 of 2015**	VERSION:	1

INPE.LIT.PX.034/15

REVIEWED BY: _____
ENG. GEORGE FAVALE E FERNANDES

PREPARED BY: _____
ENG. VINICIUS DERRICO DA SILVA

RODOLFO PEREZ
Representante Legal
ELECTROPAR S.A.

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VERSION CONTROL

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	1		

REPORT OF TERMO-CLIMATIC TEST

Customer	**Toshiba South America Ltda.**
Document	INPE.LIT.PX.034/15
Report Number	THBTD02 - R03
Process LIT/PAC Nº.:	1589.15.PRO
Service	423376
SO	0051.15
Report Name	Test Report
Area Code	LIT-01
Test Kind	Damp Heat Test, Cyclic
Specimen	Electronic Control Single Phase Voltage Regulators
Manufacturer	Toshiba South America Ltda.
Test Begin	October 23 of 2015
Test End	October 29 of 2015
Report Date	November 13 of 2015

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Representante Legal
ELECTROPAR S.A.