TEST REPORT

CUSTUMER:	**Transformadores e Serviços de Energia das Américas Ltda.**
TEST ITEM:	**VOLTAGE REGULATOR CONTROL**
MODEL:	**TVC-MP**
TEST NAME:	**Cold Test**
REPORT NUMBER:	**THBTD04-R02** **VERSION: 1**

INPE.LIT.PX.048/18

PREPARED BY:			APPROVED BY:		
Name	Viniclus 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-R02
Proposal Plano de Trabalho:	1010-2018 A
Process eLIT Nº:	1010.18
Service:	941775
Service Order:	0034.18
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 60068-2-1 - Part 2-1 – Test Ab.
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 21 of 2018
Test End:	June 25 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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COLD TEST

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 Cold Test 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 60068-2-1– Part 2-1 – Test Ab".

2. PERIOD OF THE TEST

The test began at 04:57PM the day 06/21/2018 and completed at 05:50PM the day 06/25/2018.

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 1 hour.
- Minimmum Temperature: (-40 ± 2)°C for 96 hours.
- Transition: (-40 ± 2)°C to (23 ± 2)°C in 1 hour.
- Equipment Condition: OFF.
- Number of Cycles: 01.
- Total Duration of the Test: 98 hours.

7. TEST RESULTS

The present results refer, only to the "Cold Test" 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.

- 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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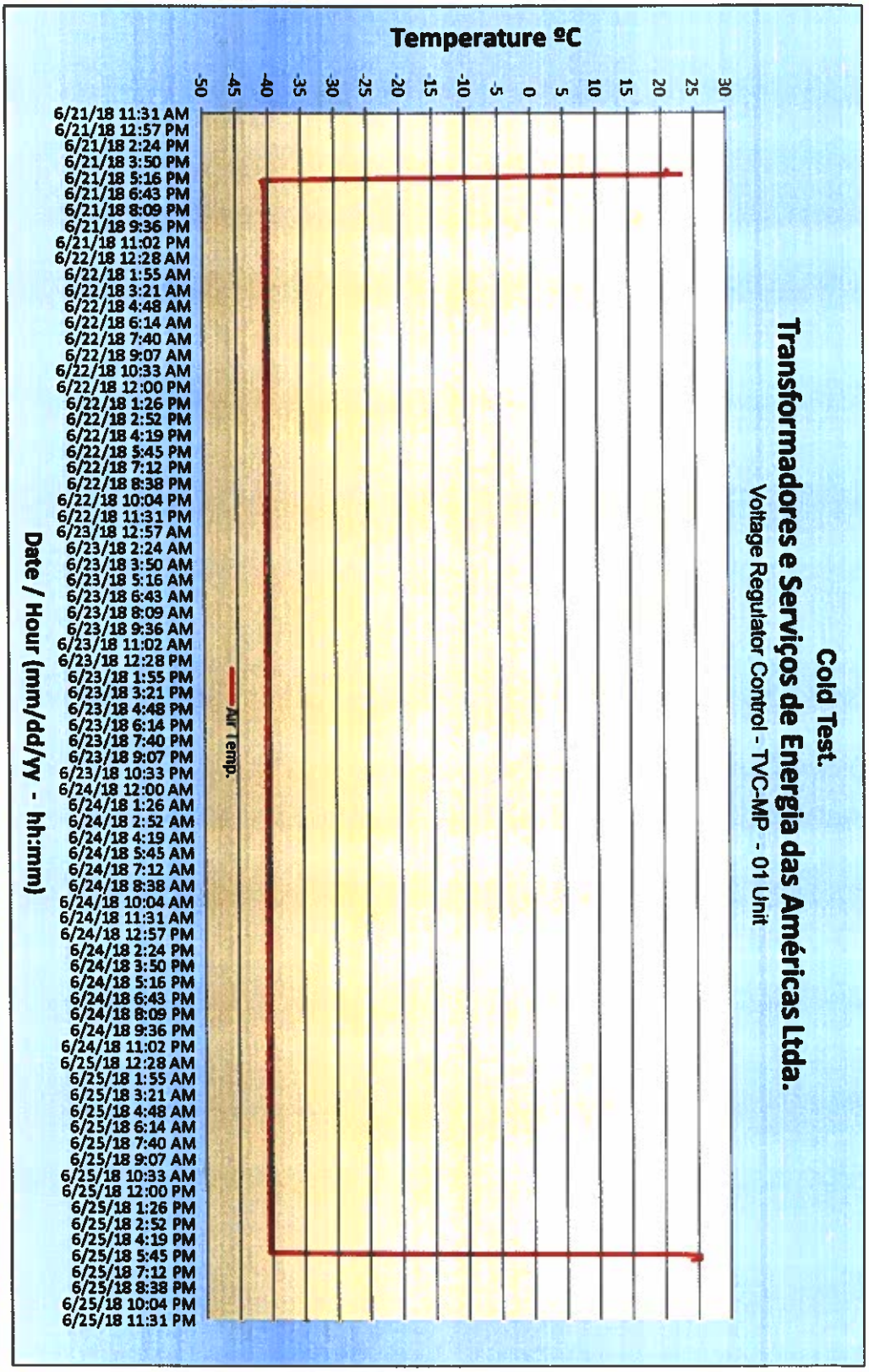
APPENDIX B: GRAPHICS – TEST GRAPHIC DATA.



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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:	**Dry Heat Test**
REPORT NUMBER:	**THBTD04-R04** **VERSION: 1**

INPE.LIT.PX.048/18

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

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VERSION CONTROL

Page	Version	Date	Modification Reference
	1		- Original Version.

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CUSTUMER INFORMATION

Report Number Nº:	THBTD04-R04
Proposal Plano de Trabalho:	1010-2018 A
Process eLIT Nº:	1010.18
Service:	941765
Service Order:	0036.18
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 60068-2-2 - Part 2-2 – Test Bb.
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 25 of 2018
Test End:	June 29 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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DRY HEAT TEST

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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 Dry Heat Test 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 60068-2-2– Part 2-2 – Test Bb".

2. PERIOD OF THE TEST

The test began at 5:45PM the day 06/25/2018 and completed at 07:40PM the day 06/29/2018.

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

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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 (85 ± 2)°C in 1 hour.
- Maximmum Temperature: (85 ± 2)°C for 96 hours.
- Transition: (85 ± 2)°C to (23 ± 2)°C in 1 hour.
- Equipment Condition: OFF.
- Number of Cycles: 01.
- Total Duration of the Test: 98 hours.

7. TEST RESULTS

The present results refer, only to the "Dry Heat Test" 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:

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

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- 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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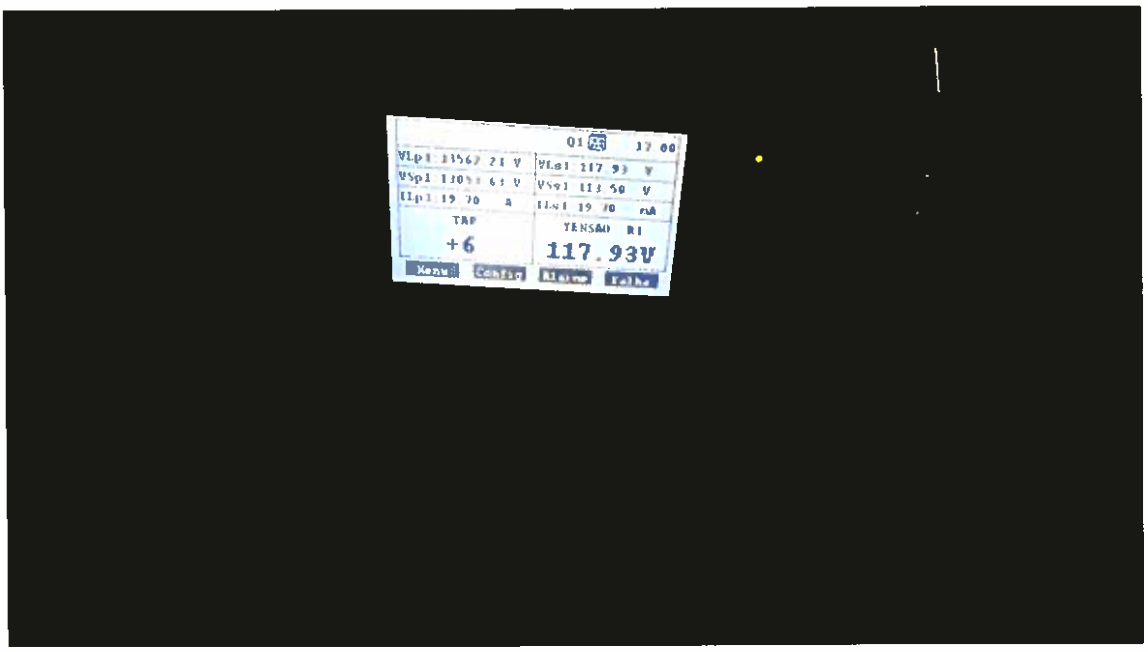
Photograph 03: Specimen(s) After the Test.



Photograph 04: Specimen after the test

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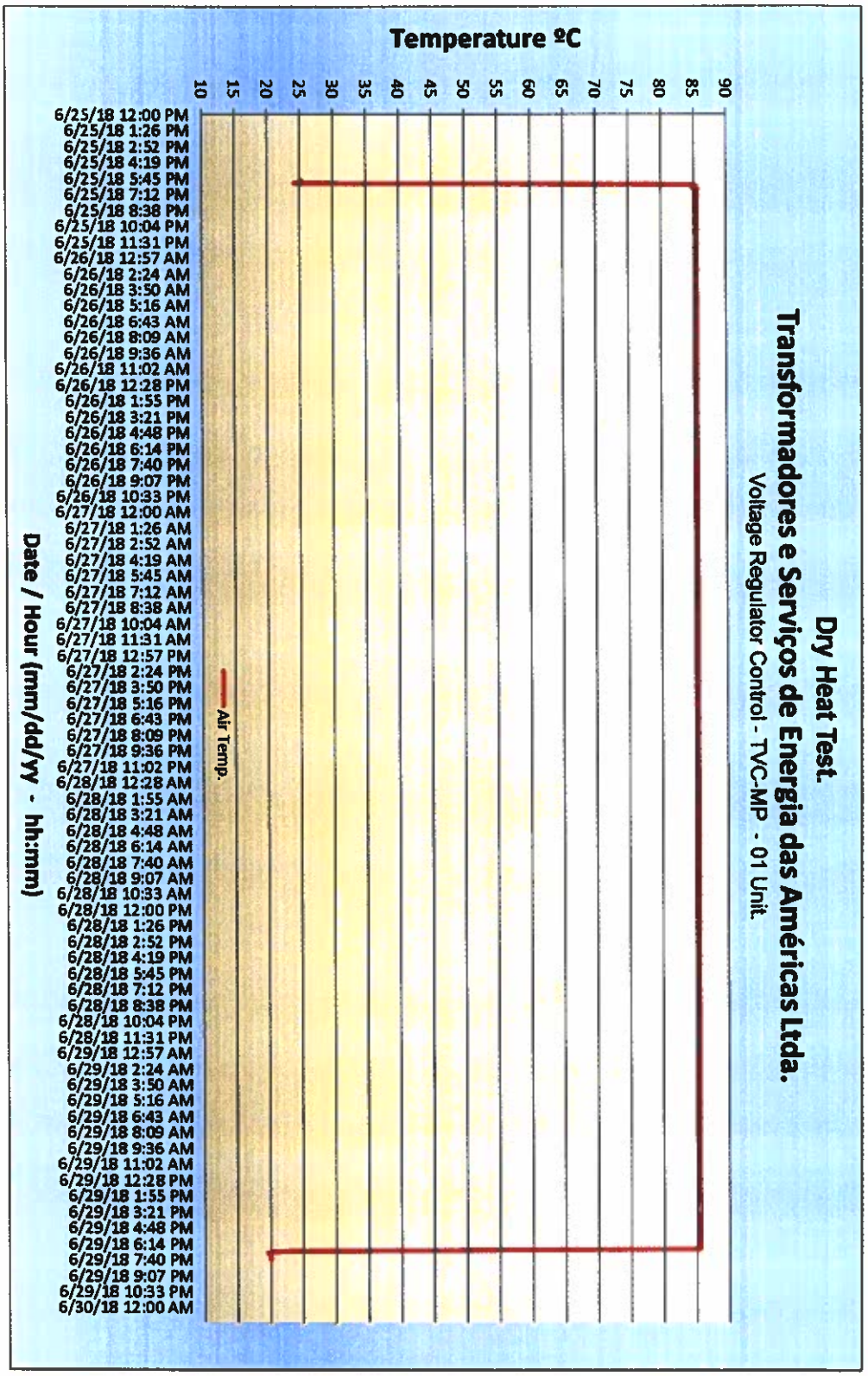
APPENDIX B: GRAPHICS – TEST GRAPHIC DATA.



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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 - ON**
REPORT NUMBER:	**THBTD04-R06** **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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CUSTUMER INFORMATION

Report Number Nº:	THBTD04-R06
Proposal Plano de Trabalho:	1010-2018 A
Process eLIT Nº:	1010.18
Service:	941755
Service Order:	0038.18
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 18 of 2018
Test End:	July 19 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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