

REPORT No 11546

Date of issue: February 16, 2026

Status: FINAL REPORT

IEC 60068-2-30

ENVIRONMENTAL TESTING

TEST Db: DAMP HEAT, CYCLIC (12 h + 12 h CYCLE)

Program: SQO-EV4 Round 8

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Prepared by:	Reviewed by:	Approved by:
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1. FOREWORD

This report summarizes the results of the **SQO-EV4 (Round 8)** proficiency testing program on the determination of the suitability of equipment for use under conditions of high humidity - combined with cyclic temperature changes. This program is carried out under a simultaneous participation format, according to the A.3.1 classification of the ISO 17043 standard (“Model 2 - Figure A.1”).

South Quality conducted the testing program from November 2025 to January 2026. The aim of the program was to assess the ability of laboratories to competently perform the nominated tests.

2. ORGANIZATION

Program Coordinator:	Lic. Esther Casas
Assistant Technician:	Berenice Ferrel
Statistic:	Lic. Manuel Tozaki
Supervision:	Eng. Emiliano Medina

3. OBJECTIVE

The objective of this proficiency testing program is to visually and functionally inspect the equipment under test, using the following standard:

Standard
IEC 60068-2-30: 2005

To verify this, electronic equipment has been selected.

Participants in this program have not been informed in advance about the expected behavior of the samples they receive.

As part of the usual practice of this program, three different sample combinations may be sent to participants.

- i. Sample A (PASS) + Sample B (PASS).
- ii. Sample A (PASS) + Sample B (FAIL).
- iii. Sample A (FAIL) + Sample B (FAIL).

4. PARTICIPANTS

In the present round, 22 companies have participated with the following details:

CODE	Country	ISO 17025 accredited	Results delivered
01	Malaysia	Yes	Yes
02	South Korea	Yes	Yes
03	Colombia	No	No
04	Portugal	Yes	Yes
05	Argentina	No	Yes
06	Belgium	Yes	Yes
07	Spain	Yes	Yes
08	Peru	Yes	No
09	Chile	Yes	Yes
10	China	Yes	Yes
11	France	Yes	Yes
12	Spain	Yes	Yes
13	South Africa	No	Yes
14	Türkiye	Yes	Yes
15	Finland	Yes	No
16	Germany	Yes	Yes
17	Brazil	Yes	Yes
18	Netherlands	Yes	Yes
19	Italy	Yes	Yes
20	Mexico	Yes	Yes
21	France	No	No
22	Italy	Yes	Yes

5. HOMOGENEITY

A homogeneity study was conducted to verify compliance of the samples with the requirements of the IEC 60068-2-30 standard, using an ISO 17025-accredited laboratory.

Six batches, each consisting of 35 units of different electronic equipment, were prepared and tested to assess the result homogeneity.

Control procedures were carried out in accordance with ISO 33405:2024, clauses 7.4.1.1 and 7.4.1.2, applying stratified random sampling. Samples were selected using random number generation software.

The results of these tests appear below:

Size of each batch: **35 units**
 Tested samples from each batch: **8 units**
 Test conditions: **Variant 1 / 25-40°C / Cycles: 6**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE SAMPLES ANALYZED		
	BATCH: LEV3315	BATCH: LEV3316	BATCH: LEV3317
Visual inspection	YES	YES	YES
Functional performance	NO	YES	YES

Size of each batch: **35 units**
 Tested samples from each batch: **8 units**
 Test conditions: **Variant 2 / 25-55°C / Cycles: 6**

DETERMINATION	HOMOGENEITY OF RESULTS IN THE SAMPLES ANALYZED		
	BATCH: LEV3445	BATCH: LEV3446	BATCH: LEV3447
Visual inspection	YES	YES	YES
Functional performance	YES	NO	YES

Samples for this program are taken from the selected batches identified as **LEV3317**, and **LEV3445**.

The analysis of the test data indicated that the selected samples exhibited sufficient homogeneity for the program. Therefore, the results of participants identified as outliers cannot be attributed to sample variability.

6. SAMPLE INFORMATION

The following samples were sent for testing (Participant **Code 22**):

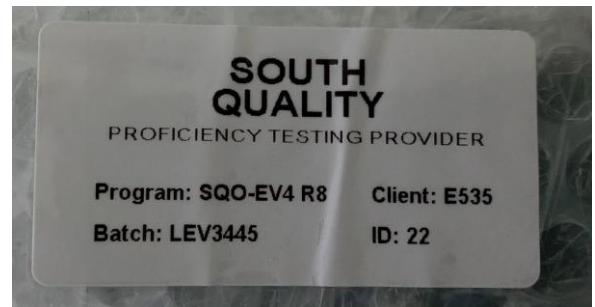
Batch:	LEV3317
Sample ID:	22
Characteristics:	ATX power supply - 220-240 V - 50/60Hz - 550W Trademark: NOGANET Model: ATX 550 P4

Batch:	LEV3445
Sample ID:	22
Characteristics:	ATX power supply - 220 V - 50Hz - 600W Trademark: ACONCAWA Model: ATX 600 X 24 P 2S

7. IMAGES



SAMPLES



8. ASSIGNED RESULTS

The assigned results are obtained from the results reported by all participants (**Consensus values**).

9. STATISTICS

The results must be treated as qualitative.

For qualitative results, the comparison will be made directly against the assigned results, so any difference will be evaluated as **Unsatisfactory**.

The assessment involves assigning a compliance verdict (PASS or FAIL) to each verification parameter (Visual and functional performance) carried out by each participant.

10. PARTICIPANTS RESULTS

LABORATORY CODE	LEV3317		LEV3445	
	Test conditions: Variant 1 / 25-40°C / Cycles: 6		Test conditions: Variant 2 / 25-55°C / Cycles: 6	
	Visual inspection	Functional performance	Visual inspection	Functional performance
01	PASS	PASS	PASS	PASS
02	PASS	PASS	PASS	PASS
04	NO VERDICT	NO VERDICT	PASS	PASS
05	PASS	PASS	PASS	PASS
06	PASS	PASS	PASS	PASS
07	PASS	PASS	PASS	PASS
09	PASS	FAIL	PASS	PASS
10	PASS	PASS	PASS	PASS
11	PASS	PASS	PASS	PASS
12	PASS	PASS	PASS	PASS
13	PASS	FAIL	PASS	FAIL
14	PASS	PASS	PASS	PASS
16	PASS	PASS	PASS	PASS
17	PASS	PASS	PASS	FAIL
18	PASS	PASS	PASS	PASS
19	PASS	PASS	PASS	PASS
20	PASS	PASS	PASS	PASS
22	PASS	PASS	PASS	PASS

ASSIGNED RESULTS			
LEV3317		LEV3445	
Visual inspection	Functional performance	Visual inspection	Functional performance
PASS	PASS	PASS	PASS

11. EVALUATION OF PERFORMANCE

Laboratory Code 01: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 02: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 03: The laboratory did not send the results before the deadline.

Laboratory Code 04: The laboratory obtained **SATISFACTORY** results in the parameter verification for sample LEV3445. No results were reported for sample LEV3317.

Laboratory Code 05: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 06: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 07: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 08: The laboratory did not send the results before the deadline.

Laboratory Code 09: The laboratory obtained an **UNSATISFACTORY** result in the functional performance verification of sample LEV3317. However, **SATISFACTORY** results were obtained for the remaining parameters.

Laboratory Code 10: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 11: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 12: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 13: The laboratory obtained a **UNSATISFACTORY** result in the functional performance verification of both samples. However, **SATISFACTORY** results were obtained for the remaining parameters.

Laboratory Code 14: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 15: The laboratory did not send the results before the deadline.

Laboratory Code 16: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 17: The laboratory obtained an **UNSATISFACTORY** result in the functional performance verification of sample LEV3445. However, **SATISFACTORY** results were obtained for the remaining parameters.

Laboratory Code 18: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 19: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 20: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

Laboratory Code 21: The laboratory did not send the results before the deadline.

Laboratory Code 22: The laboratory obtained **SATISFACTORY** results in the verification of all parameters.

12. CONCLUSIONS

The overall performance of the participating laboratories in the **SQO-EV4 (Round 8)** program, based on the expected results, is as follow:

- Participants Codes **01, 02, 04, 05, 06, 07, 10, 11, 12, 14, 16, 18, 19, 20** and **22** achieved **SUFFICIENT** performance in comparison with the expected results and do not require any action.;
- Participants Codes **09, 13,** and **17** achieved **INSUFFICIENT** performance in comparison with the expected results and must take corrective action for the tests in which their results differ from the expected values (see Annex B).

The criteria used for the evaluation of the overall performance are as follows:


- **SUFFICIENT** performance: No unsatisfactory results were obtained.
- **INSUFFICIENT** performance: At least one unsatisfactory result was obtained.

APPENDIX A

A1 - PARTICIPANT DATA

Company: **Emilab S.r.l a socio unico**
 Laboratory: **Applus Laboratories - Emilab**
 Country: Italy
 Client ID: E535
 Contact person: Devis Sattolo - Quality Manager
 (devis.sattolo@applus.com)

A2 - INSTRUCTIONS



INSTRUCTIONS

PROGRAM:	Environmental testing Test Db: Damp heat, cyclic (12 h + 12 h cycle)
CODE:	SQO-EV4
ROUND:	8
STANDARD:	IEC 60068-2-30
COORDINATOR:	Lic. Esther Casas (ecasas@ptsouthquality.com)

DSQ-012 - REV 06 -
SQO-EV4 R8
October 2025
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1 - General

This document serves as a guide for managing the results of the **SQO-EV4 (Round 8)** program.

2 - Standard

IEC 60068-2-30: 2005

3 - Participant

EMILAB S.R.L A SOCIO ÚNICO Applus Laboratories – Emilab	CODE 22
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4 - Tests involved

TEST
Determination the suitability of equipment for use under conditions of high humidity - combined with cyclic temperature changes

5 - Samples

CODE	SAMPLE	QUANTITY
LEV3317-22	ATX power supply - 220-240 V - 50/60Hz - 550W Trademark: NOGANET Model: ATX 550 P4	1
LEV3445-22	ATX power supply - 220 V - 50Hz - 600W Trademark: ACONCAWA Model: ATX 600 X 24 P 2S	1

6 - Notes

- a) The deadline for the delivery of results is **December 23, 2025**.
- b) Participants must submit the results using the usual report employed by their laboratory.
- c) The samples are to be handled as routine lab samples, with all testing, documentation, and reporting adhering to **IEC 60068-2-30**.
- d) Samples must be retained until the end of the program, which concludes with the submission of the final report.
- e) To review the results, test images would be appreciated. Images can be attached at the end of this document or sent by email.

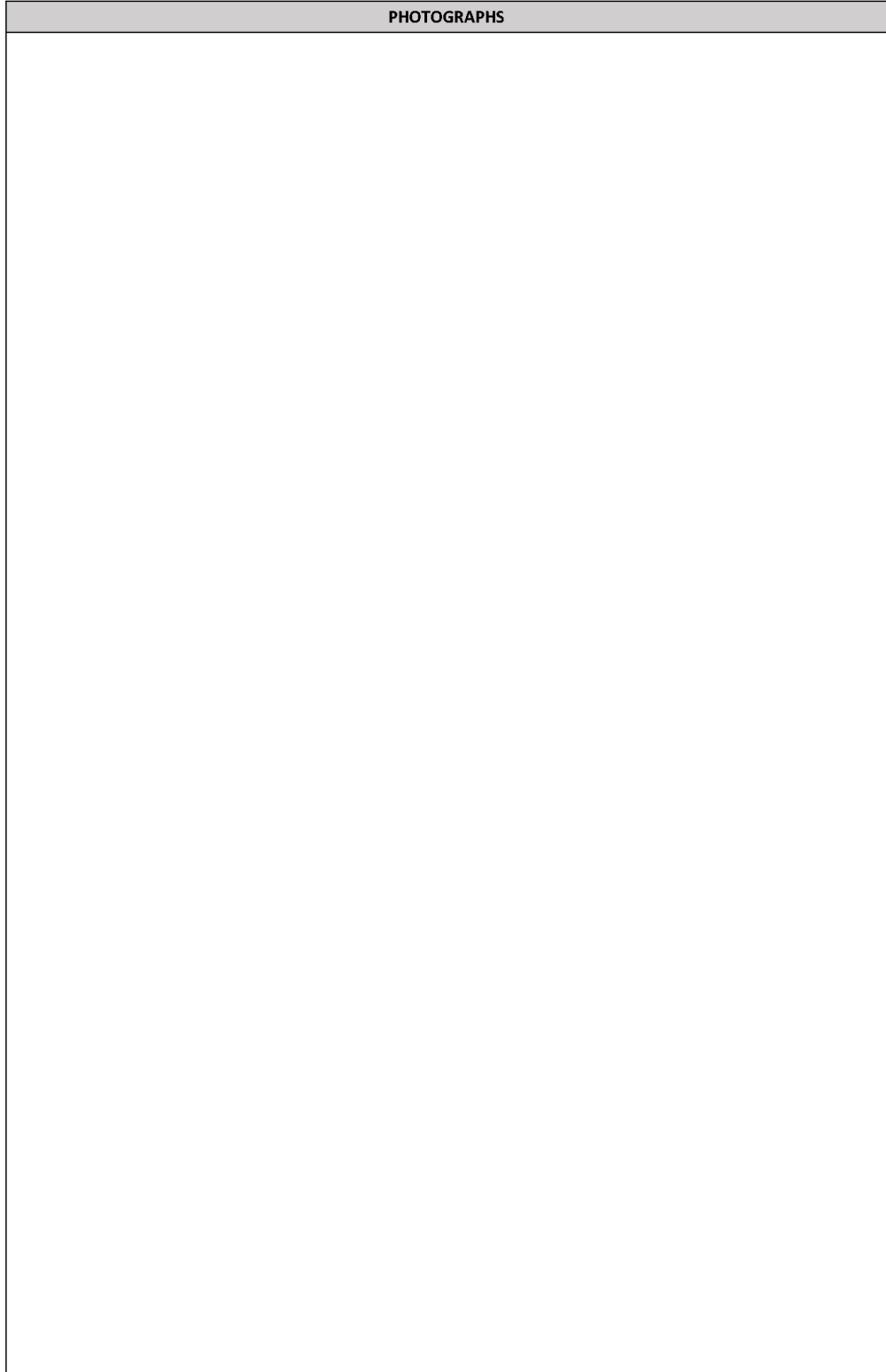
7 - Test conditions

CODE	CONDITION	TEST SEVERITIES
LEV3317-22	Powered-on (220V/50Hz) – No load	Variant 1 / 25-40°C / Cycles: 6
LEV3445-22	Powered-on (220V/50Hz) – No load	Variant 2 / 25-55°C / Cycles: 6

8 - Parameters to determine

CODE	PARAMETERS (BEFORE & AFTER)
LEV3317-22	VISUAL INSPECTION VOLTAGE
LEV3445-22	VISUAL INSPECTION VOLTAGE

PHOTOGRAPHS



A3 - PARTICIPANT RESULTS (TEST REPORT #25-05696)

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TEST REPORT

Applicant's name	South Quality	
Address	Pareja 3981 - Villa Devoto (C1419GVG) Ciudad Autónoma de Buenos Aires - ARGENTINA	
Manufacturer	Nogonet - Aconcawa	
Address	1021 Libertad, Buenos Aires Ciudad Autónoma de Buenos Aires 1012, ARGENTINA	
Test specification:	-	
Test method:	IEC 60068-2-30: 2005	
Test plan:	Test Plan: Instructions - SQO-EV4 R8 - CODE 22, Rev-06 Approval Number: - Approval Date: - Author: E. Casas Customer email of November, 20 th 2025	
Device Under Test	ATX Power supply	
Date of test report issue	19 th December 2025	
Validity	See section 1.2	
Author/s of Test report	Emanuele Galante	
Engineer/s	Emanuele Galante	
Technical Manager/s (+ signature)	Emanuele Galante	
Approved by (+ signature)	Stefano Petrini (Laboratory Manager)	
Testing Laboratory	Emilab Srl a Socio Unico	
Address	Via F.lli Solari 5/A - 33020 Amaro (UD) - Italy	



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Test Information Summary

Test Overview		Result
Test ID:	Test Db: Damp heat, cyclic (12 h + 12 h cycle)	Compliant
Test specification:	Test Plan: Instructions - SQO-EV4 R8 - CODE 22, Rev-06	
Test method:	IEC 60068-2-30: 2005	



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1.0 General Information

1.1 Testing Laboratory

Testing procedure and testing location:

Testing Laboratory:

Testing location / address	Emilab Srl a Socio Unico Via F.lli Solari 5/A – 33020 Amaro (UD) – Italy Tel +39 0433 468625 Fax +39 0433 494739 Email: info.emilab@applus.com
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Participants:

-

1.2 Sampling and Documentation

The samples and any specific hardware and software simulators and accessories, hereinafter called auxiliary apparatus and the related information (samples and auxiliary apparatus) was delivered by customer under his own responsibility. The results contained in this report reflect the results for this particular model and serial number tested in combination with the auxiliary apparatuses. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report. The laboratory takes no responsibility for the auxiliary equipment and for the information provided by the customer. This report shall not be reproduced, except in full, without the written approval of the Issuing testing Emilab laboratory.

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Unless otherwise explicitly indicated using the month in alphabetical form, all dates in this report are presented in the format day/month/year (dd/mm/yyyy).

1.3 Test scheduling and general conditions

Scheduling:

Date of receipt of EUT.....	14/11/2025
Date (s) of performance of tests.....	03/12/2025 – 16/12/2025
EUT Number.....	25LA00289/01, 25LA00289/02

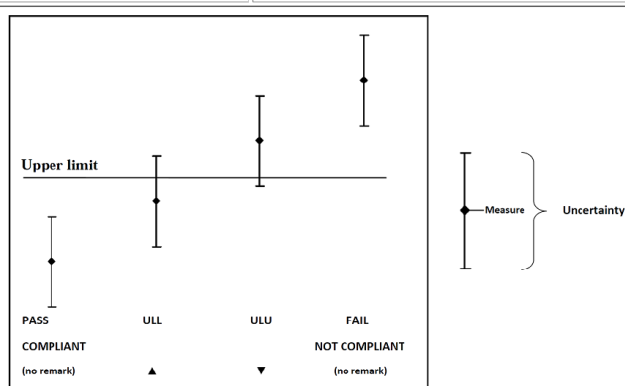
Environment Conditions

If not otherwise specified:
 Temperature: 18-28 °C
 Humidity: 20-90 %
 Pressure: 86-106 kPa

1.4 Test case of final verdicts

The results consider the measurement uncertainty, where applicable, using the following scheme

- test case does not apply to the test object :	N/A (Not Applicable)
- test object does meet the requirement..... :	Compliant or PASS
- test object does not meet the requirement :	Not Compliant or FAIL



Results marked with a NOT COMPLIANT or FAIL do not meet specifications with a probability of approximately 95%, the total uncertainty interval is located outside the specified limits. The level of risk for a false NOT COMPLIANT or FAIL is <2.5%. Results marked with a COMPLIANT or PASS meet specifications with a probability of approximately 95%, the total uncertainty interval is located inside the specified limits. The level of risk for a false COMPLIANT or PASS is <2.5%. Measurement results are marked with a "PASS▲" / "COMPLIANT▲" or "FAIL▼" / "NOT COMPLIANT▼" (uncertain) if the uncertainty interval is partly within and partly out of the specified limits. A clear compliance statement is not possible. The level of risk for false PASS or false FAIL is <50%

All results not marked are located within the specified limits even when extended by the uncertainty interval.

1.5 Uncertainty

The reported expanded uncertainty of measurements is stated as the standard uncertainty of measurement, multiplied by the coverage factor $k=2$, which for a normal distribution corresponding to a coverage probability of approximately 95%.

1.6 Terms, definitions and abbreviations

With reference to IEC 60050-161

ALSE	Absorber-Lined Shielded Enclosure
AN	Artificial Network
ASTM	American Society for Testing & Material
AV	Average Detector
BU	Before to use
CAN	Controller Area Network
DC	Direct Current
DMM	Digital Multi Meter
DUT	Device under Test
ECU	Engine Control Unit
EMC	Electromagnetic Compatibility
EMI	Electromagnetic Interference
EUT	Equipment under Test
FC	Fault Condition
FFT	Fast Fourier Transform
FG	Function Generator
FSC	Functional Status Classification
GND	Ground
I/O	Input/Output
IEC	International Electrotechnical Commission
IP	International Protection
ISO	International Organization for Standardization
LED	Light Emitting Diode
LIN	Local Interconnect Network
LISN	Line Impedance Simulation Network
LV	Low Voltage
OC	Operating Conditions
OM	Operating Mode
OVP	Overvoltage Protection
PA	Power Amplifier
PAS	Power Amplifier System
PK	Peak Detector
PLC	Programmable Logic Controller
PWM	Pulse Width Modulation
QP	Quasi-Peak Detector
RE	Radiated Emission
RF	Radio Frequency
RMS	Root Mean Square
RT	Room Temperature



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2.0 Device Under Test

2.1 Device description and setup information

The following information has been provided by the applicant/matrix manufacturer under his own responsibility

Description	ATX Power supply
Trade Mark	-
Manufacturer.....	Nogamet - Aconcawa
Model/Type reference	ATX 550 P4 (DUT /01), ATX 600 X 24 P 2S (DUT /02)
Voltage.....	220-240 Vac
Current.....	-
Frequency.....	50/60 Hz
Power.....	550 W (550 P4), 600 W (600 X 24 P 2S)
Serial Number	-
Number of samples tested	2
Internal customer EUT Number.....	LEV3317-22 (/01), LEV3445-22 (/02)
Sample stage / level	-
Hardware stage / level	-
Software stage / level	-
Modification stage.....	-
Operating Mode.....	Mode 1: DUT supplied at 220Vac 50 Hz, open load
Wiring harness	-
Monitoring	Before and after test: Visual inspection, output voltage
Acceptance criteria	No visible damages, DUT outputs work properly
Info.....	Test performed following also additional info contained in customer email of November, 20 th 2025, object: "RE: SQO-EV4 R8 - Sample shipping".

2.2 Deviation from the test specification or test method

Deviation from the test specification or test method: N/A



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3.0 Test Db: Damp heat, cyclic (12 h + 12 h cycle) – Test Conditions

Technician/s	E. Galante	
Test ID:	Test Db: Damp heat, cyclic (12 h + 12 h cycle)	
Test specification:	Test Plan: Instructions - SQO-EV4 R8 - CODE 22, Rev-06	
Test method:	IEC 60068-2-30: 2005	
Parameters required prior to the test	Laboratory Ambient Temperature	18 to 28 °C
	Relative Humidity	20 to 90 %
Parameters recorded during the test	Laboratory Ambient Temperature	21 - 24 °C
	Relative Humidity	31 - 36 %
Date (s) of test execution	03/12/2025 – 16/12/2025	
Supplementary information:		
<p>Purpose: This test simulates the thermal load on the component by cyclic temperature changes with high humidity during vehicle operation. It is used to verify the resistance of the component against damp heat.</p> <p>Test Parameters:</p> <ul style="list-style-type: none"> - DUT operating mode: Mode 1 - Test variant: Variant 1 on DUT /01; Variant 2 on DUT /02 - Test temperature profile: According to IEC 60068-2-30: 2005, Variant 1 and Variant 2 - High temperature: 40 °C (DUT /01 – Variant 1); 55 °C (DUT /02 – Variant 2). - Low temperature: 25 °C. - Number of cycles: 6. <p>Requirement: No visible damages on DUT. Output voltage measurement after test.</p> <p>Note: The conductivity value, of water used for test, measured is of 5 µS/cm, corresponding at a resistivity value of 2000 Ωm.</p>		

3.1 Test Equipment Used – Test Db: Damp heat, cyclic (12 h + 12 h cycle)

Id. Number	Equipment	Model	Manufacturer	Calibration date	Interval
EL109118	DataLogger T/UR	HL-1D	Rotronic	27/05/2025	1 year
EL122419	DMM	34465A	Keysight	21/07/2025	1 year
EL041610	Climatic Chamber	WK3-180/40	Weiss	26/08/2025	1 year
EL141520	pH/conductivity meter	PCE-PHD1	PCE-Group Italia Srl	B/U	
EL144320	Electronic Stabilizer	FSTEL2K5M	Tecnowave	11/11/2025	1 year
MR000044	Calibration Solution 84uS/cm	-	Chemifarm srl	24/07/2024	2 years

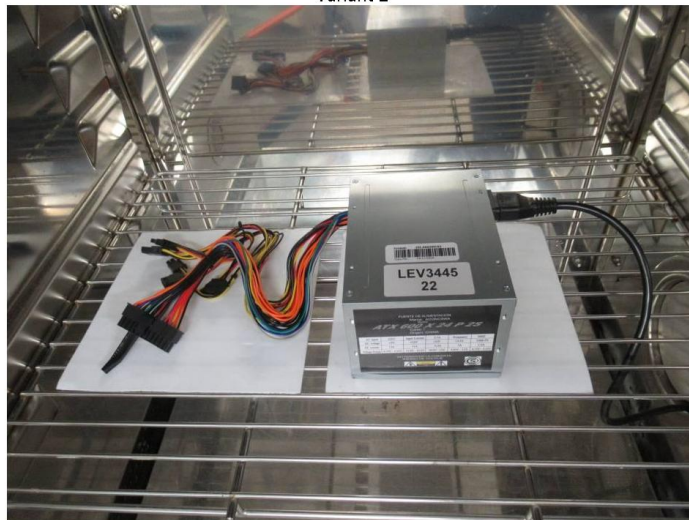
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3.2 Photo of the test setup – Test Db: Damp heat, cyclic (12 h + 12 h cycle)

Variant 1



Variant 2

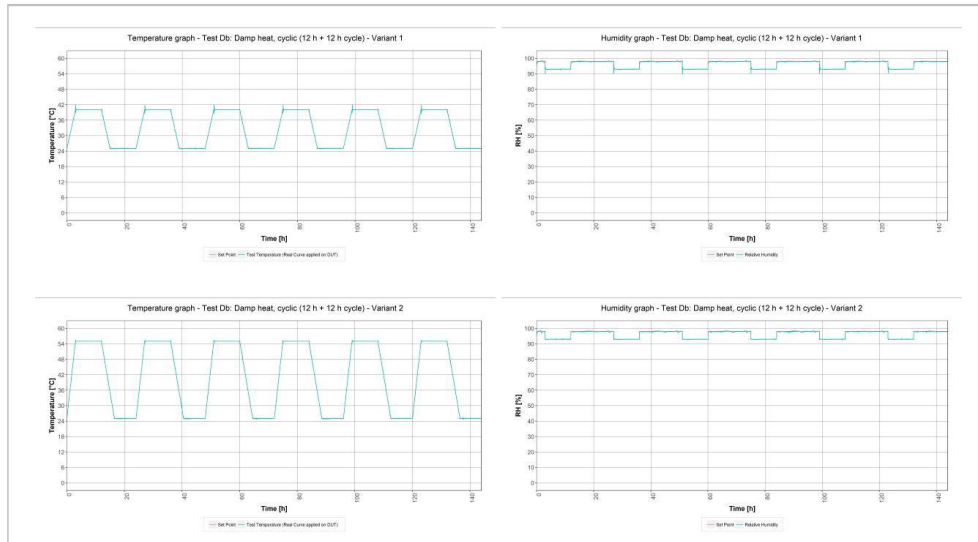




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3.3 Graphical representation temperature – Test Db: Damp heat, cyclic (12 h + 12 h cycle)



TRF No. MD-23 rev.14

Applus+ Laboratories – Italy

3.4 DUT pictures before and after test – Test Db: Damp heat, cyclic (12 h + 12 h cycle)



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TRF No. MD-23 rev.14

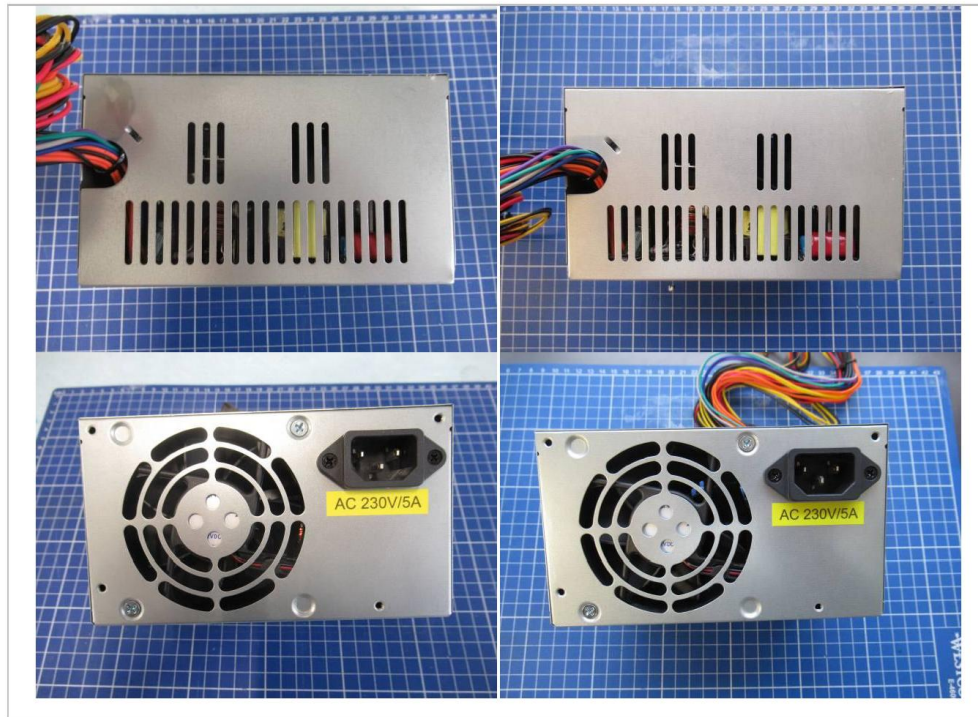
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DUT /02, before and after test



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3.5 Functional Verifications before and after test – Test Db: Damp heat, cyclic (12 h + 12 h cycle)

DUT	Output color	Output voltage before test [V]	Output voltage after test [V]	Delta [V]	Limits
25LA00289/01	Orange	3,3	3,3	0,0	-
	Blue	-11,3	-11,3	0,0	-
	Red	5,2	5,2	0,0	-
	Purple	5,2	5,2	0,0	-
	Yellow	12,0	12,0	0,0	-
25LA00289/02	Orange	3,3	3,3	0,0	-
	Blue	-11,4	-11,4	0,0	-
	Red	5,2	5,2	0,0	-
	Purple	5,2	5,2	0,0	-
	Yellow	12,1	12,1	0,0	-



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3.6 Results – Test Db: Damp heat, cyclic (12 h + 12 h cycle)

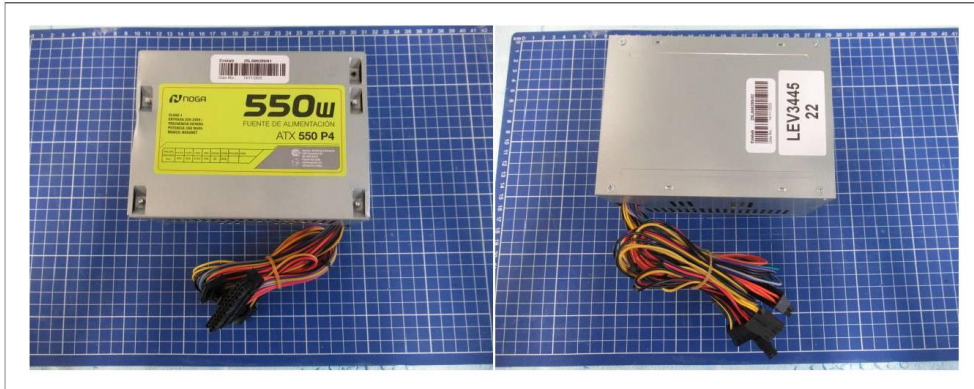
DUT	Test Mode	Level	Performance criteria	Behavior detected	Note
25LA00289/01	1	Variant 1	No visible damages. Output voltage check after test	No visible degradation. DUT works properly after test. No sensitive output voltage variations	DUT defects related to shipment ignored for judgment according to customer communication.
25LA00289/02	1	Variant 2	No visible damages. Output voltage check after test	No visible degradation. DUT works properly after test. No sensitive output voltage variations	-

RESULT (P/F): P F

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Annex.1 DUT pictures

ATX 550 P4 and ATX 600 X 24 P 2S



Annex.2 Uncertainty

A.2.1 Measurement of Environmental parameters

 Temperature: ± 1 °C

 RH: ± 4 %

A.2.2 Temperature test using Climatic Chamber

Temperature:

Temperature (°C)	Uncertainty (°C)
-40,0°C ≤ T < 0,0°C	2,0
0,0°C ≤ T ≤ 70,0°C	1,0
70,0°C < T ≤ 120,0°C	2,0
120,0°C < T ≤ 150,0°C	2,6

 Gradient: $\pm 0,1$ °C/min

Humidity:

Temperature (°C)	RH (%)	Uncertainty (%)
25,0	20,0-95,0	3,4
40,0	20,0-95,0	3,0
55,0	20,0-85,0	2,7
85,0	20,0-85,0	2,8

A.2.3 Voltage Measurement by using Multimeter

34465A			
DC Voltage	N. Digits	6,5	
Val.max	Range	Distribution	U
(V)	(V)		(A)
0,1	0,1	Normal	1,0E-05
1	1	Normal	4,7E-05
10	10	Normal	4,2E-04
100	100	Normal	5,7E-03
1000	1000	Normal	5,8E-02

*****END OF TEST REPORT*****

APPENDIX B

VOID

----- END OF REPORT -----