



National Technical Systems Test Report for Temperature, Humidity, and Vibration Testing of Voting Machines

Prepared For

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Performed By

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A handwritten signature in black ink, appearing to read "Andrew Garcia", positioned above a horizontal line.

Andrew Garcia
Preparer

A handwritten signature in black ink, appearing to read "John Hill", positioned above a horizontal line.

John Hill
Program Manager

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Revision History

Rev.	Description	Issue Date
0	Initial Release	08/15/2022

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1.0 Introduction

This document presents the test procedures used and the results obtained during the performance of an Environmental/Dynamics test program. The test program was conducted to assess the ability of the specified Equipment Under Test (EUT) to successfully satisfy the requirements listed in Section 2.0.

2.0 References

The following references listed below form a part of this document to the extent specified herein.

- Test Specification: MIL-STD-810D
- Pro V&V, Inc Purchase Order(s) 2022-013, dated 06/29/2022
- National Technical Systems (NTS) Quote(s) OP0620239, dated 06/27/2022
- ISO/IEC 17025:2017(E) *General Requirements for the Competence of Testing and Calibration Laboratories*, dated 11/1/2017

3.0 Product Selection and Description

Pro V&V, Inc selected and provided the test sample(s) to be used as the Equipment Under Test.

Table 3.0-1: Product Identification - Equipment Under Test (EUT)

Item	Qty.	Name/Description	Part Number	Serial Number
1	1	ClearMark 1	N/A	NTS01
2	1	AIO	N/A	4610001004
3	1	Scanner	N/A	4630001004
4	1	Thermal Printer	N/A	46200010004
5	1	Power Supply	N/A	Y1118NKF010033
6	1	ATI	N/A	ATI-32
7	1	ClearMark 2	N/A	NTS02
8	1	AIO	N/A	4610001011
9	1	Scanner	N/A	4630001011
10	1	Laser Printer	N/A	460012141VWM3
11	1	UPS	N/A	PY3JN2000193
12	1	Power Supply	N/A	Y1B23NKF012037
13	1	ATI	N/A	ATI-13
14	1	Thermal CONFIG 1	N/A	NTS03
15	1	AIO	N/A	4610001001
16	1	Scanner	N/A	4630001001
17	1	Thermal Printer	N/A	4620001001
18	1	Power Supply	N/A	Y1B23NKF012046
19	1	ATI	N/A	ATI-6
20	1	Thermal CONFIG 2	N/A	NTS04
21	1	AIO	N/A	4610001002
22	1	Scanner	N/A	4630001002
23	1	Thermal Printer	N/A	4620001002
24	1	Power Supply	N/A	Y1B23NKF012040
25	1	ATI	N/A	ATI-12
26	1	Thermal CONFIG 3	N/A	NTS05
27	1	AIO	N/A	4610001003
28	1	Scanner	N/A	4630001003
29	1	Thermal Printer	N/A	4620001003
30	1	Power Supply	N/A	Y1823NKF012045
31	1	ATI	N/A	ATI-3
32	1	Laser CONFIG 1	N/A	NTS06
33	1	AIO	N/A	4610001007
34	1	Scanner	N/A	4630001007
35	1	Laser Printer	N/A	4600112341W822



Item	Qty.	Name/Description	Part Number	Serial Number
36	1	Power Supply	N/A	Y1B23NKF012051
37	1	ATI	N/A	ATI-20
38	1	Laser CONFIG 2	N/A	NTS07
39	1	AIO	N/A	4610001009
40	1	Scanner	N/A	4630001009
41	1	Laser Printer	N/A	46001214VWMG
42	1	Power Supply	N/A	Y1B23NKF012039
43	1	UPS	N/A	PY3JU2000132
44	1	ATI	N/A	ATI-18
45	1	Laser CONFIG 3	N/A	NTS08
46	1	AIO	N/A	4610001010
47	1	Scanner	N/A	4630001010
48	1	Laser Printer	N/A	4600952318T2Y
49	1	Power Supply	N/A	Y1118NKF010079
50	1	UPS	N/A	PWLKP2000685
51	1	ATI	N/A	ATI-21

3.1 Security Classification

Non-classified

4.0 General Test Requirements

4.1 Test Equipment

The instrumentation used in the performance of these tests is periodically calibrated and standardized within manufacturer's rated accuracies and are traceable to the National Institute of Standards and Technology. The calibration procedures and practices are in accordance with ISO 17025:2017. Certification of calibration is on file subject to inspection by authorized personnel.

5.0 Test Descriptions and Results

Table 5.0-1: Summary of Test Information & Results

Section	Test	Specification	Test Facility	Test Date	Part #	Serial #	Test Result
5.1	Low Temperature	MIL-STD 810D Method 502.2	Longmont	08/02/2022-08/03/2022	N/A	NTS01, Y1B23NKF012037, PY3JN2000193, 460012141VWM3, 4630001011, 4610001011, NTS02, ATI-32, Y1118NKF010033, 46200010004, 4630001004, 4610001004, ATI-13	No issues found. Customer determination.
5.2	High Temperature	MIL-STD 810D Method 501.2	Longmont	08/01/2022-08/02/2022	N/A	NTS01, Y1B23NKF012037, PY3JN2000193, 460012141VWM3, 4630001011, 4610001011, NTS02, ATI-32, Y1118NKF010033, 46200010004, 4630001004, 4610001004, ATI-13	No issues found. Customer determination.
5.3	Humidity	MIL-STD 810D Method 507.2	Longmont	07/19/2022-08/11/2022	N/A	NTS01, Y1B23NKF012037, PY3JN2000193, 460012141VWM3, 4630001011, 4610001011, NTS02, ATI-32, Y1118NKF010033, 46200010004, 4630001004, 4610001004, ATI-13	A test deviation occurred. For details, refer to Notice of Deviation (NOD) #1.



Section	Test	Specification	Test Facility	Test Date	Part #	Serial #	Test Result
5.4	Temperature/ Power Variation	MIL-STD-810D Method 502.2 & 501.2	Longmont	08/08/2022- 08/10/2022	N/A	NTS03, 4630001007, 4600112341W822, Y1B23NKF012051, ATI-20, NTS07, 4610001009, 4630001009, 46001214VWMG, Y1B23NKF012039, PY3JU2000132, ATI-18, NTS08, 4610001010, 4630001010, 4600952318T2Y, Y1118NKF010079, PWLKP2000685, 4610001007, NTS06, 4610001001, 4630001001, 4620001001, Y1B23NKF012046, ATI-6, NTS04, 4610001002, 4630001002, 4620001002, Y1B23NKF012040, ATI-12, NTS05, 4610001003, 4630001003, 4620001003, Y1823NKF012045, ATI-3, ATI-21	No issues found. Customer determination.
5.5	Bench Handling	MIL-STD-810D	Longmont	08/03/2022	N/A	4610001011	No visual damage
5.6	Transportation Vibration	MIL-STD-810D	Longmont	08/03/2022	N/A	NTS01, Y1B23NKF012037, PY3JN2000193, 460012141VWM3, 4630001011, 4610001011, NTS02, ATI-32, Y1118NKF010033, 46200010004, 4630001004, 4610001004, ATI-13	No visual damage



5.1 Low Temperature

5.1.1 Test Procedure

MIL-STD 810D Method 502.2

5.1.2 Test Result

No issues found. Customer determination.

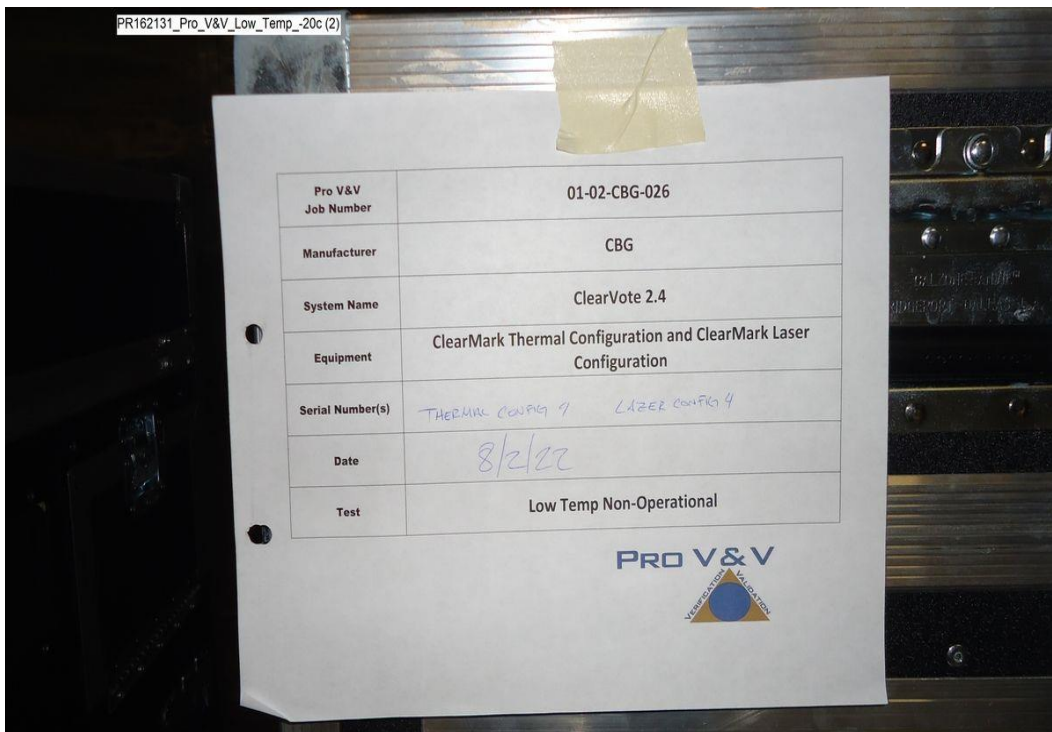
5.1.3 Test Datasheets

Test Log				
MJO No: PR162131		Customer: Pro V&V	Test Spec: MIL-STD_810D Method 502.2	Low Temperature Test
Date	Time	Log Entry		Tech
8/2/2022	8/2/2022	No visible evidence of damage before testing.		CS
8/2/22	0830	Customer performed pre-test on UUT and installed into chamber – No issues found		CS
8/2/22	1120	Start the following test profile		CS
		Ramp to +23c		CS
		Ramp to -20c		CS
		Dwell at -20c for 4hrs		CS
		Ramp to +23c		CS
8/3/22	0830	Customer performed post-test test on UUT – No issues found		KM
8/3/22	0900	Test complete		KM
		Note: All test pass or fail determinations decided by Pro V&V Inc.		

5.1.4 Test Photographs

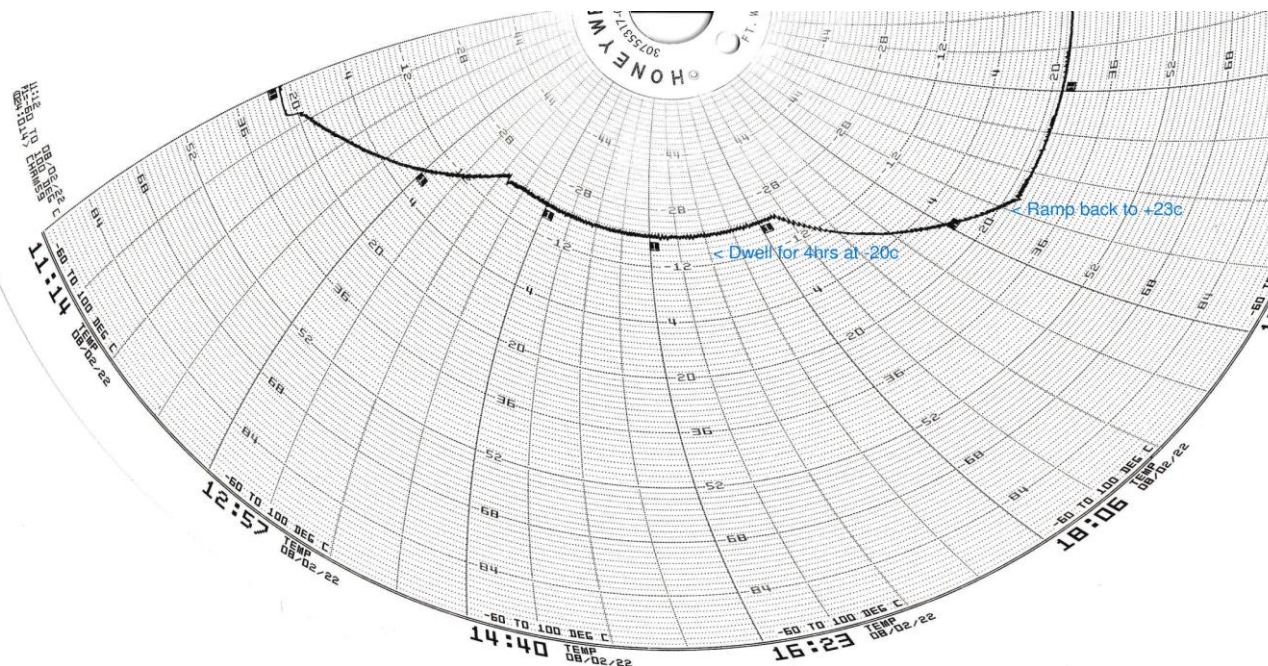


Low Temp -20c (1)

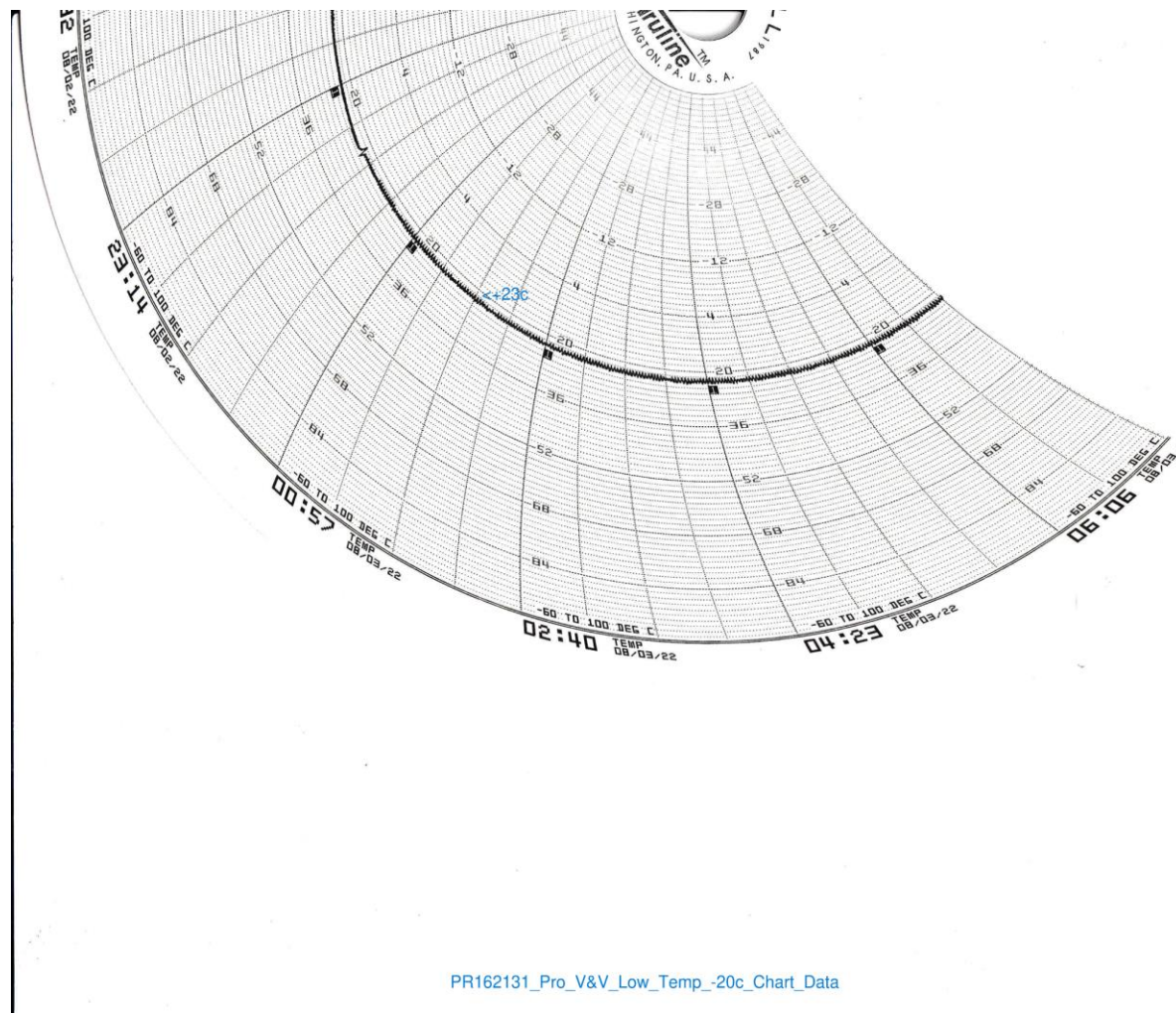


Low Temp -20c (2)

5.1.5 Test Data



PR162131_Pro_V&V_Low_Temp_-20c_Chart_Data



PR162131_Pro_V&V_Low_Temp_-20c_Chart_Data



5.1.6 Test Equipment List

Table 5.1-1: Low Temperature Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC061559	Chamber (Temperature/Humidity)	StorageTek	Large Walk In	09/29/2021	09/29/2022
WC061560	Controller (Temperature)	Watlow	F4	09/29/2021	09/29/2022
WC061561	Recorder (Chart)	Honeywell	DR45AT	09/29/2021	09/29/2022

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required



5.2 High Temperature

5.2.1 Test Procedure

MIL-STD 810D Method 501.2

5.2.2 Test Result

No issues found. Customer determination.

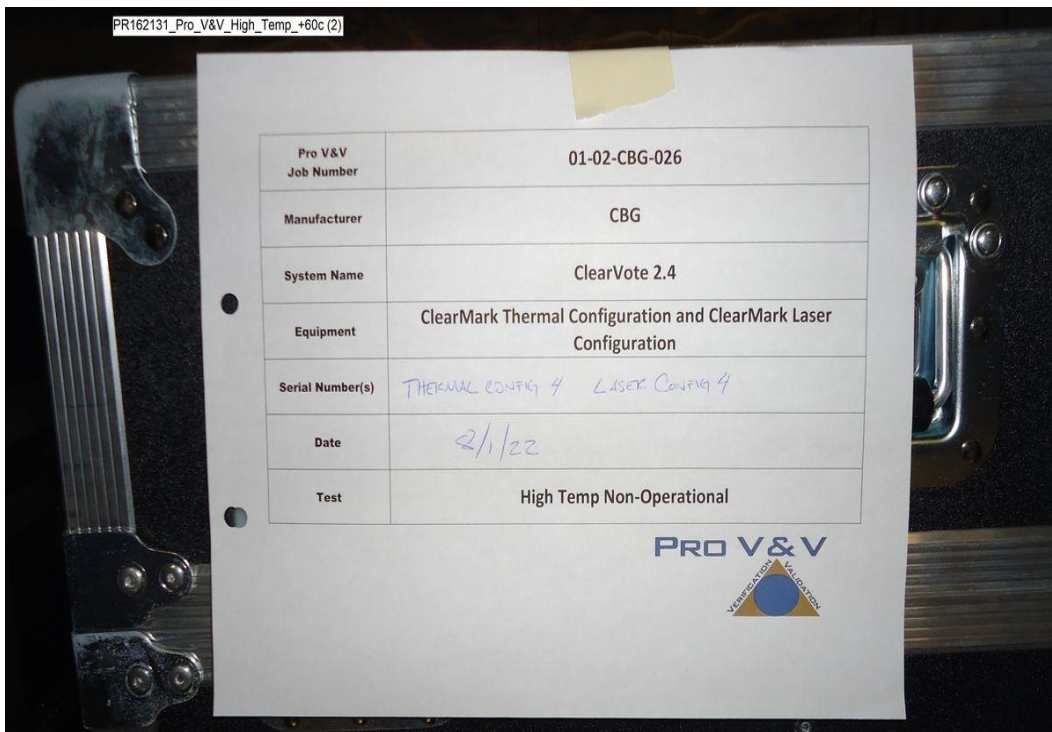
5.2.3 Test Datasheets

Test Log				
MJO No: PR162131		Customer: Pro V&V	Test Specification: MIL-STD_810D Method 501.2	High Temperature Test
Date	Time	Log Entry		Tech
8/1/2022	830	No visible evidence of damage before testing.		CS
8/1/22	0845	Customer performed pre-test on UUT and installed into chamber – No issues found		CS
8/1/22	1110	Start the following test profile		CS
		Ramp to +23c		CS
		Ramp to +60c		CS
		Dwell at +60 for 4hrs		CS
		Ramp to +23c		CS
8/2/22	0830	Customer performed post-test test on UUT – No issues found		CS
8/2/22	0845	Test complete		CS
		Note: All test pass or fail determinations decided by Pro V&V Inc.		

5.2.4 Test Photographs

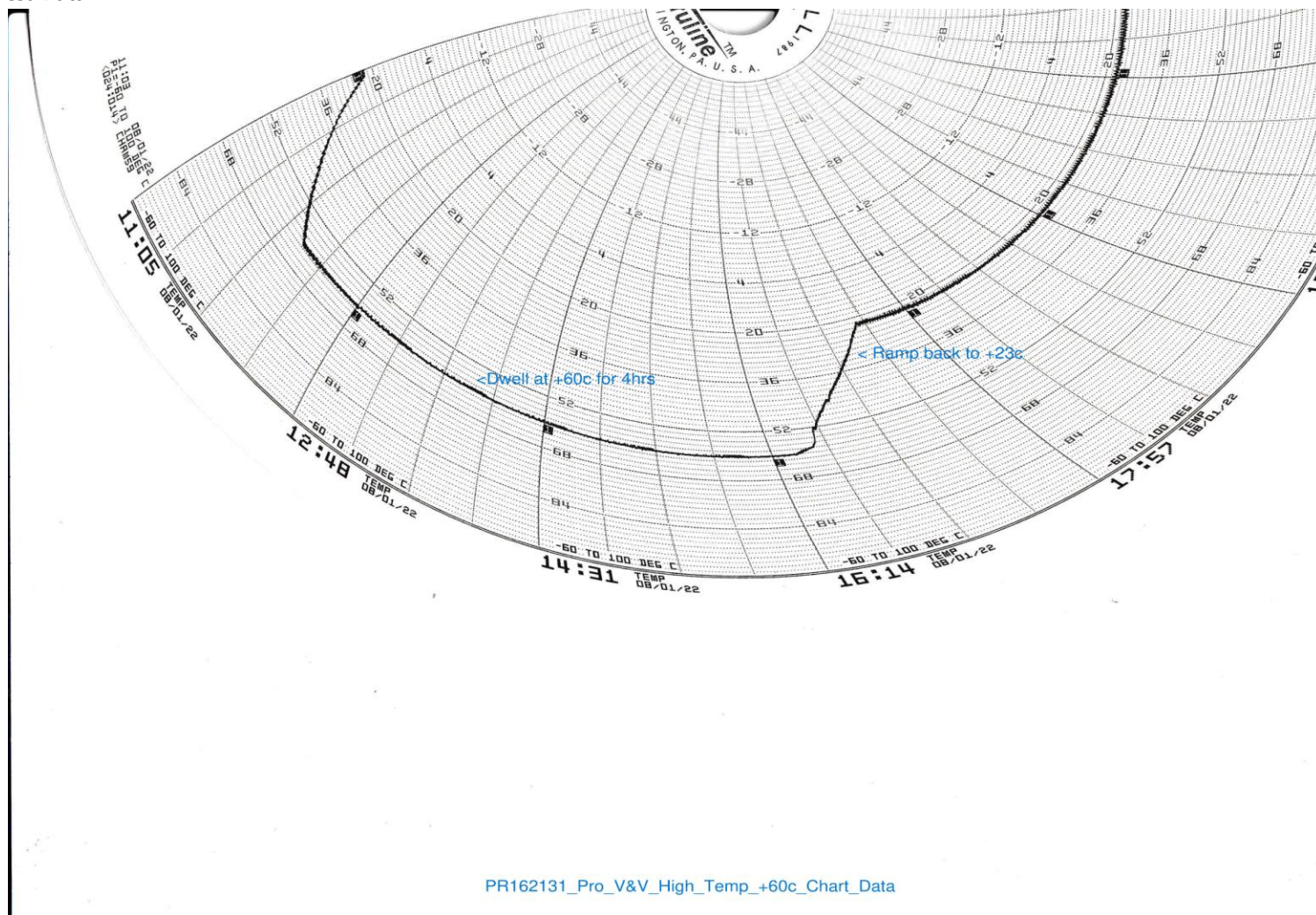


High Temp +60c (1)



High Temp +60c (2)

5.2.5 Test Data





5.2.6 Test Equipment List

Table 5.2-1: High Temperature Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC061559	Chamber (Temperature/Humidity)	StorageTek	Large Walk In	09/29/2021	09/29/2022
WC061560	Controller (Temperature)	Watlow	F4	09/29/2021	09/29/2022
WC061561	Recorder (Chart)	Honeywell	DR45AT	09/29/2021	09/29/2022

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required



5.3 Humidity

5.3.1 Test Procedure

MIL-STD 810D Method 507.2

5.3.2 Test Result

A test deviation occurred. For details, refer to Notice of Deviation (NOD) #1.

5.3.3 Test Datasheets

Test Log			
MJO No: PR162131		Customer: Pro V&V	Test Spec: MIL-STD_810D Method 507.2
Temperature & Humidity			
Date	Time	Log Entry	Tech
7/19/2022	1115	No visible evidence of damage before testing.	CS
7/19/22	1130	Customer performed inspection and functional test on UUT – No issues found	CS
7/19/22	1200	Install UUT in chamber	CS
7/19/22	1248	Start test profile MIL-810 Hot /Humid for 10-24hr cycles	CS
8/1/22	0845	Chamber 59 lost humidity control after 8 cycles. Customer performed functional test on UUT no issue found. Customer will want to run last 2 cycles when a chamber is available to complete all 10 cycles – NOD has been completed	CS
8/8/22	1020	Start remaining 2 cycles of 10-24hr cycles	CS
8/11/22	0900	Customer inspected UUT and performed post-test functional test and inspection on UUT – No issues found	CS
8/11/22	1030	Test complete	CS
		Note: All test pass or fail determinations are decided by Pro V&V Inc.	



5.3.4 Test Notice of Deviation (NOD)



NOTICE OF DEVIATION

Client:	Pro V&V	Job #:	PR162131	NOD #:	1
P. O. #:	N/A	Date of Deviation:	8/1/2022	CAR #:	N/A
Notification Made To: (Client Contact)	N/A	Notification Made By:	KM, CS		
If notification was not made, provide justification:	N/A				
Date:	8/1/2022	Via:	Verbal		
Test:	Temperature & Humidity Test	Test Item:	ClearMark 1 & ClearMark 2		
Specification:	MIL-STD_810D 507.2	Method	Model or P/N:	N/A	
Revision/Date:	N/A	Serial Number:	NTS01 & NTS02		

REQUIREMENTS: (Reference paragraph or section of specification)

Temperature & Humidity Test

DESCRIPTION OF DEVIATION

During the test the chamber lost humidity on the 8th day of testing.

DISPOSITIONS/COMMENTS/RECOMMENDATIONS:

Customer has accepted having 8 days of testing. Adding the last two days at a later time.

<u>Michael L. Walker</u> Michael L. Walker (Aug 4, 2022 11:19 CDT)	Aug 4, 2022	<u>Kerry Martin</u> Kerry Martin (Aug 4, 2022 10:23 MDT)	Aug 4, 2022
Client Disposition Authorization	Date	NTS Quality Representative	Date
		N/A	N/A
<u>John Hill</u> John Hill (Aug 8, 2022 10:21 MDT)	Aug 4, 2022		
NTS Project Manager	Date	Government QAR (if applicable)	Date

NOTE: IT IS THE CLIENT'S RESPONSIBILITY TO ANALYZE AND DISPOSITION DEVIATIONS ON CLIENT TEST PROGRAMS.

FOR NTS QA USE:	Tracking Code: 3
	Risk Level: Medium

Tracking Codes:

1. Employee Error - Training	2. Employee Error - Process	3. Test Equipment Problem	4. Equipment Limitations	5. Customer Item Problem	6. Other
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Risk Levels:

Low	Medium	High
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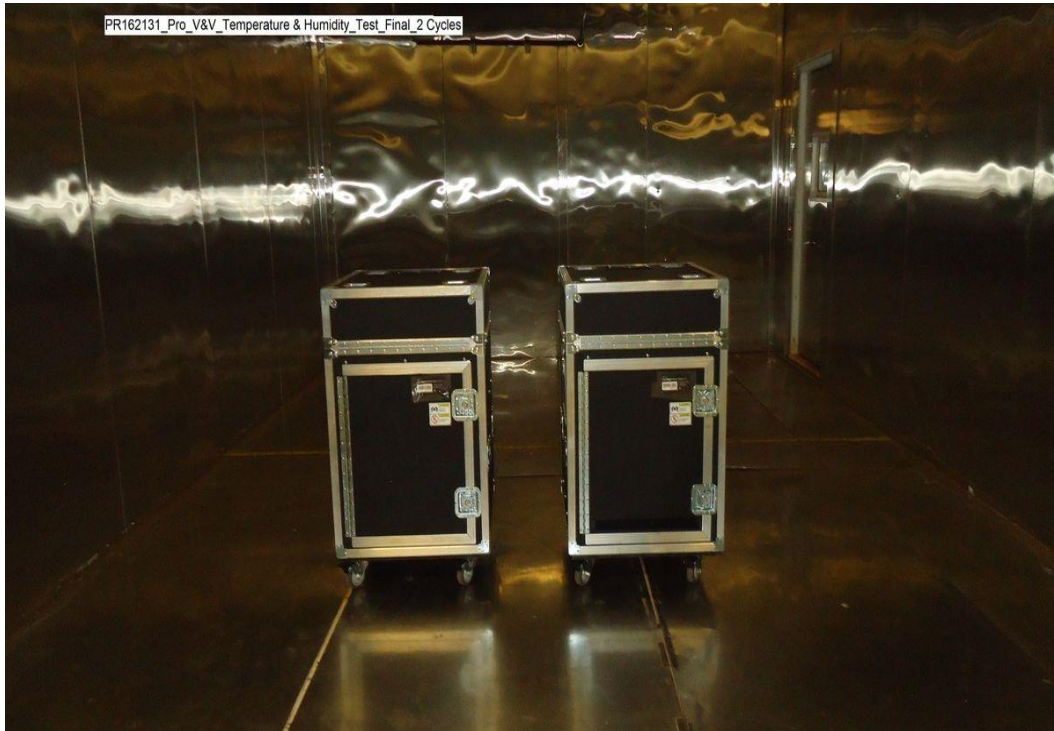
5.3.5 Test Photographs



Temperature & Humidity Test (1)



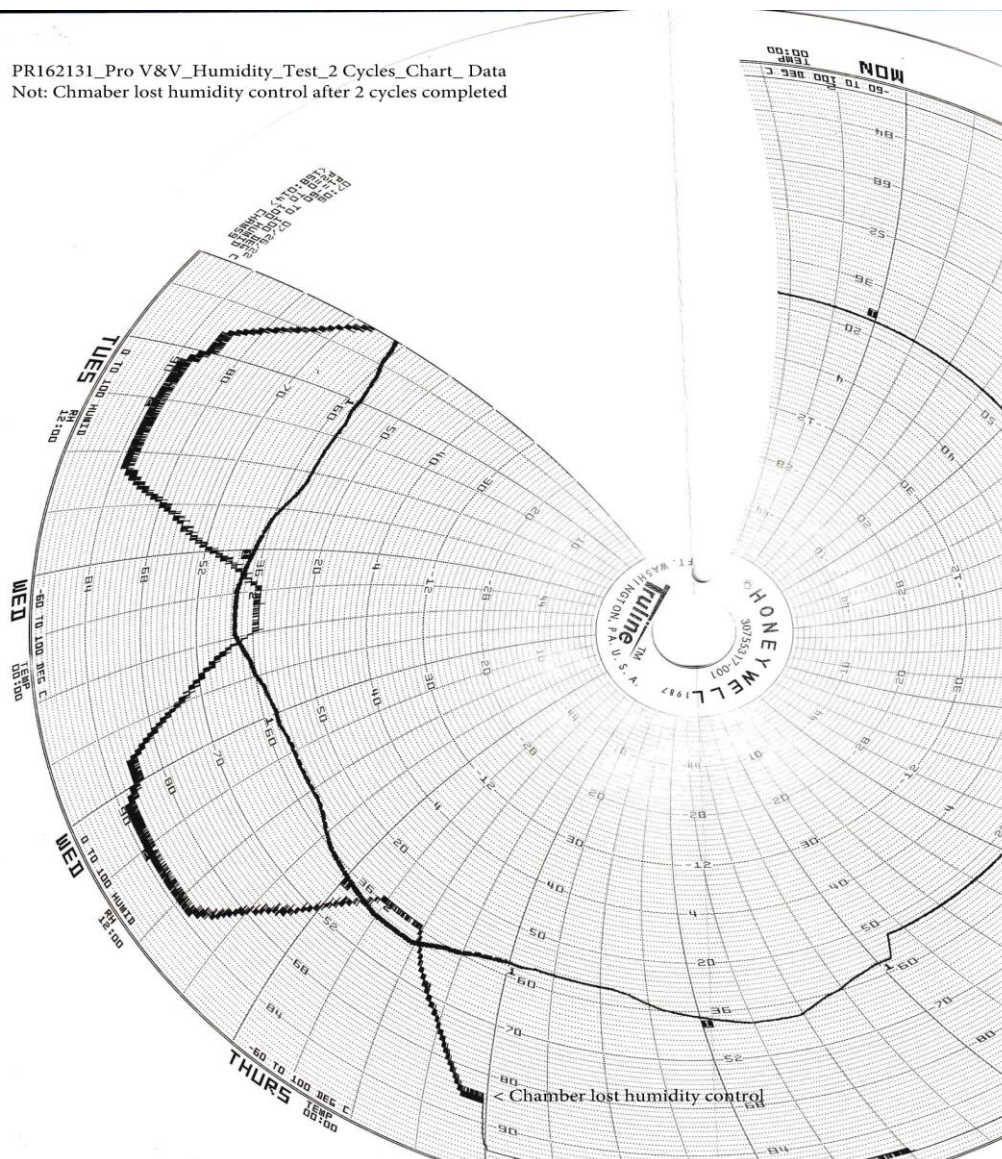
Temperature & Humidity Test (2)

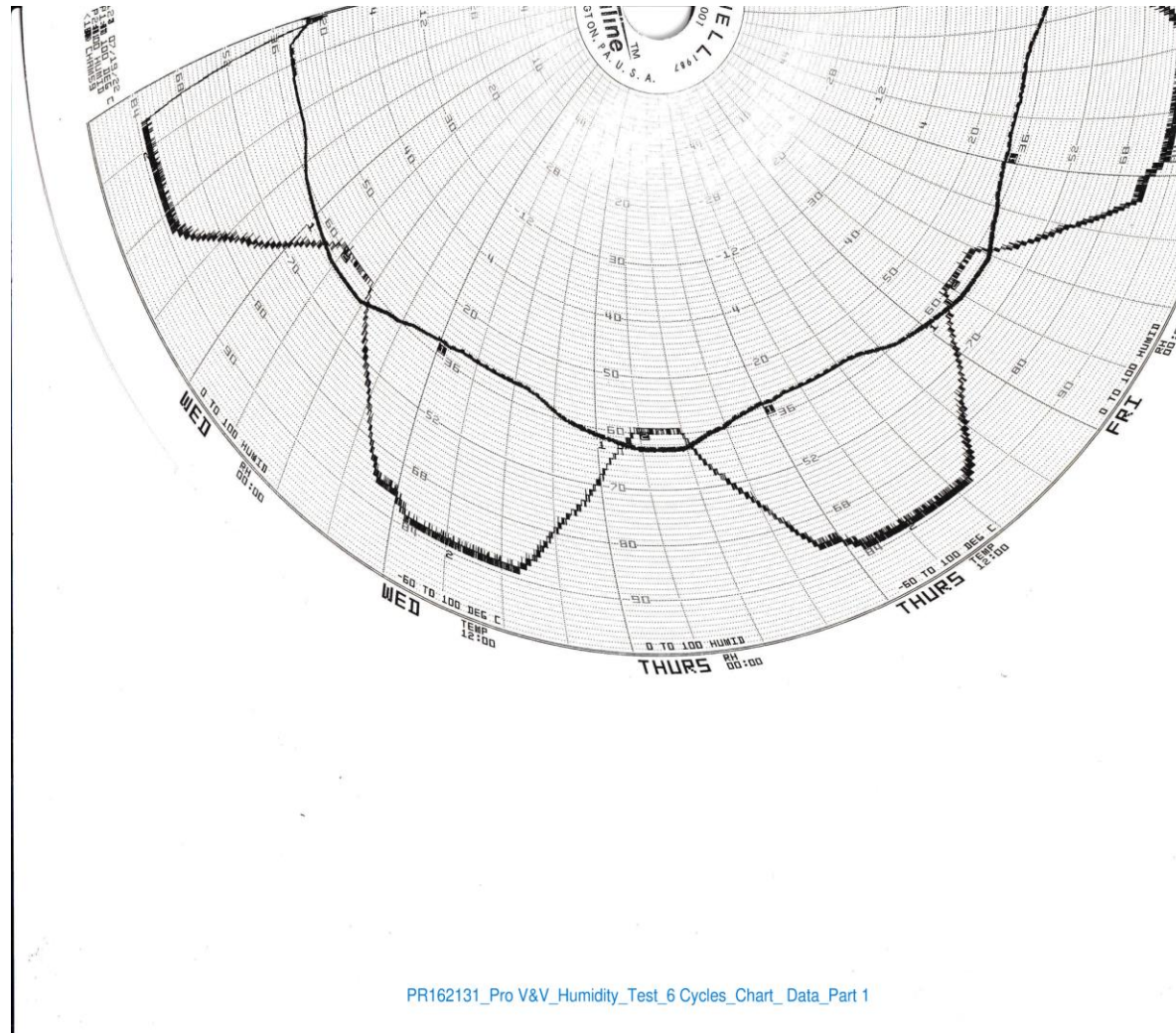


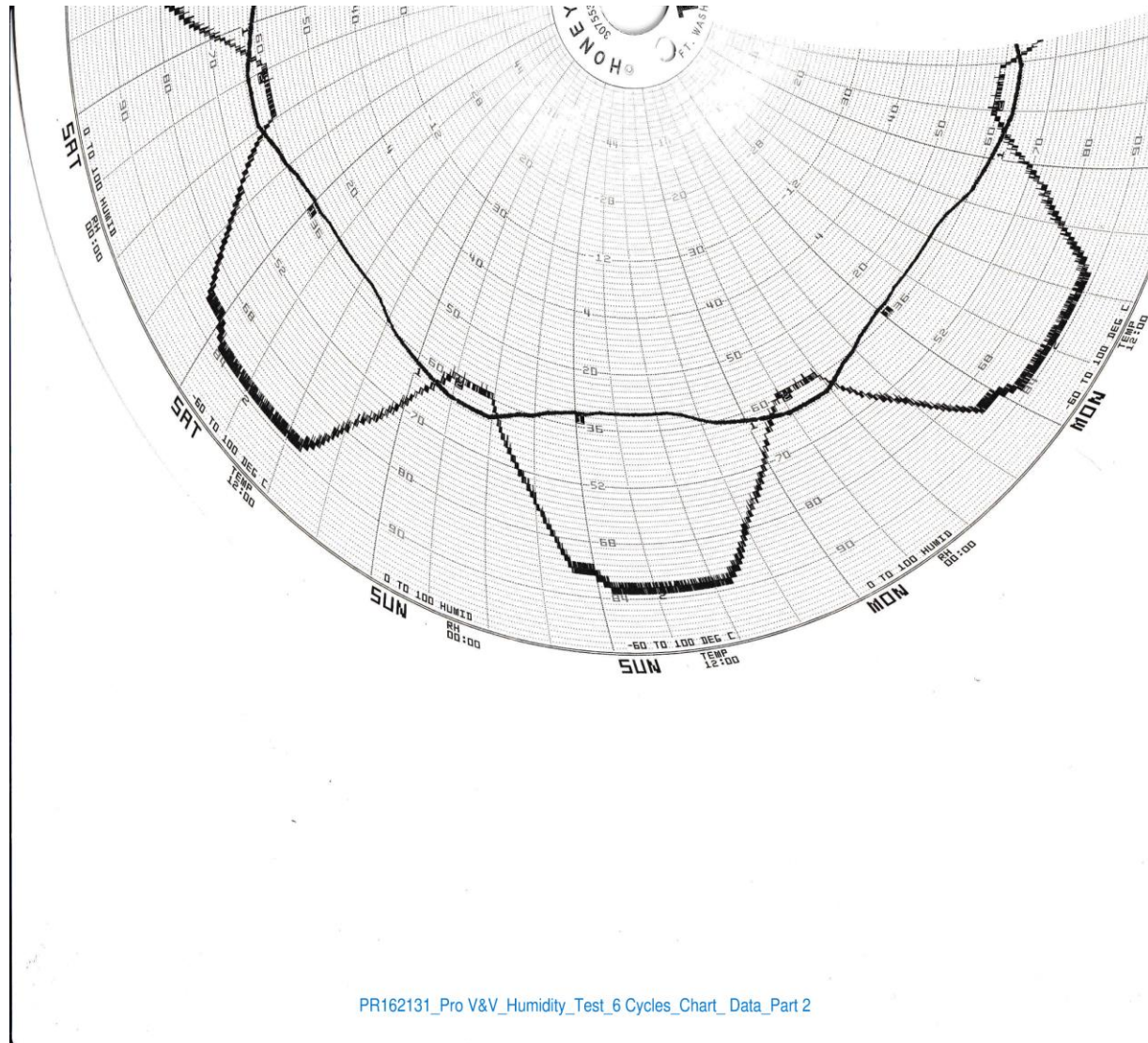
Temperature & Humidity Test Final 2 Cycles

5.3.6 Test Data

PR162131_Pro V&V_Humidity_Test_2 Cycles_Chart_Data
Not: Chmaber lost humidity control after 2 cycles completed











5.3.7 Test Equipment List

Table 5.3-1: Humidity Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC061559	Chamber (Temperature/Humidity)	StorageTek	Large Walk In	09/29/2021	09/29/2022
WC061560	Controller (Temperature)	Watlow	F4	09/29/2021	09/29/2022
WC061561	Recorder (Chart)	Honeywell	DR45AT	09/29/2021	09/29/2022

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required



5.4 Temperature/Power Variation

5.4.1 Test Procedure

MIL-STD-810D Method 502.2 & 501.2

5.4.2 Test Result

No issues found. Customer determination.

5.4.3 Test Datasheets

Test Log			
MJO: PR162131		Customer: Pro V&V	Test Spec: MIL-STD-810D Method 502.2 & 501.2
Temperature Power Variation Test			
Date	Time	Log Entry	Tech
8/8/2022	730	No visible evidence of damage before testing.	CS
8/8/22	0800	Set VAC to 117vIts & ramp to +10c	CS
8/8/22	0815	Start dwell at 117vIts & +10c for 4hrs	CS
8/8/22	1215	Lower VAC to 105vIts & dwell for 4hrs	CS
8/8/22	1615	Raise VAC to 129vIts & dwell for 4hrs	CS
8/8/22	2015	Lower VAC to 117vIts & Raise temperature to +35c & dwell for 4hrs	KM
8/9/22	0015	Lower VAC to 105vIts & dwell for 4hrs	KM
8/9/22	0415	Raise VAC to 129vIts & dwell for 4hrs	KM
8/9/22	0815	Lower VAC to 117vIts & Lower temperature to +10c & dwell for 4hrs	CS
8/9/22	1215	Lower VAC to 105vIts & dwell for 4hrs	CS
8/9/22	1615	Raise VAC to 129vIts & dwell for 4hrs	CS
8/9/22	2015	Lower VAC to 117vIts & Raise temperature to +35c & dwell for 4hrs	KM
8/10/22	0015	Lower VAC to 105vIts & dwell for 4hrs	KM
8/10/22	0415	Raise VAC to 129vIts & dwell for 4hrs	KM
8/10/22	0815	Lower VAC to 117vIts & ramp to +23c ambient	CS
8/10/22	0815	Temperature and power variation portion of test has completed	CS
8/10/22	0815	Test will continue to run at +23c ambient for another 16hrs	CS
8/10/22	2330	All Testing complete for a total of 64hrs	KM
		Note: All test pass or fail determinations decided by Pro V&V Inc.	

5.4.4 Test Photographs

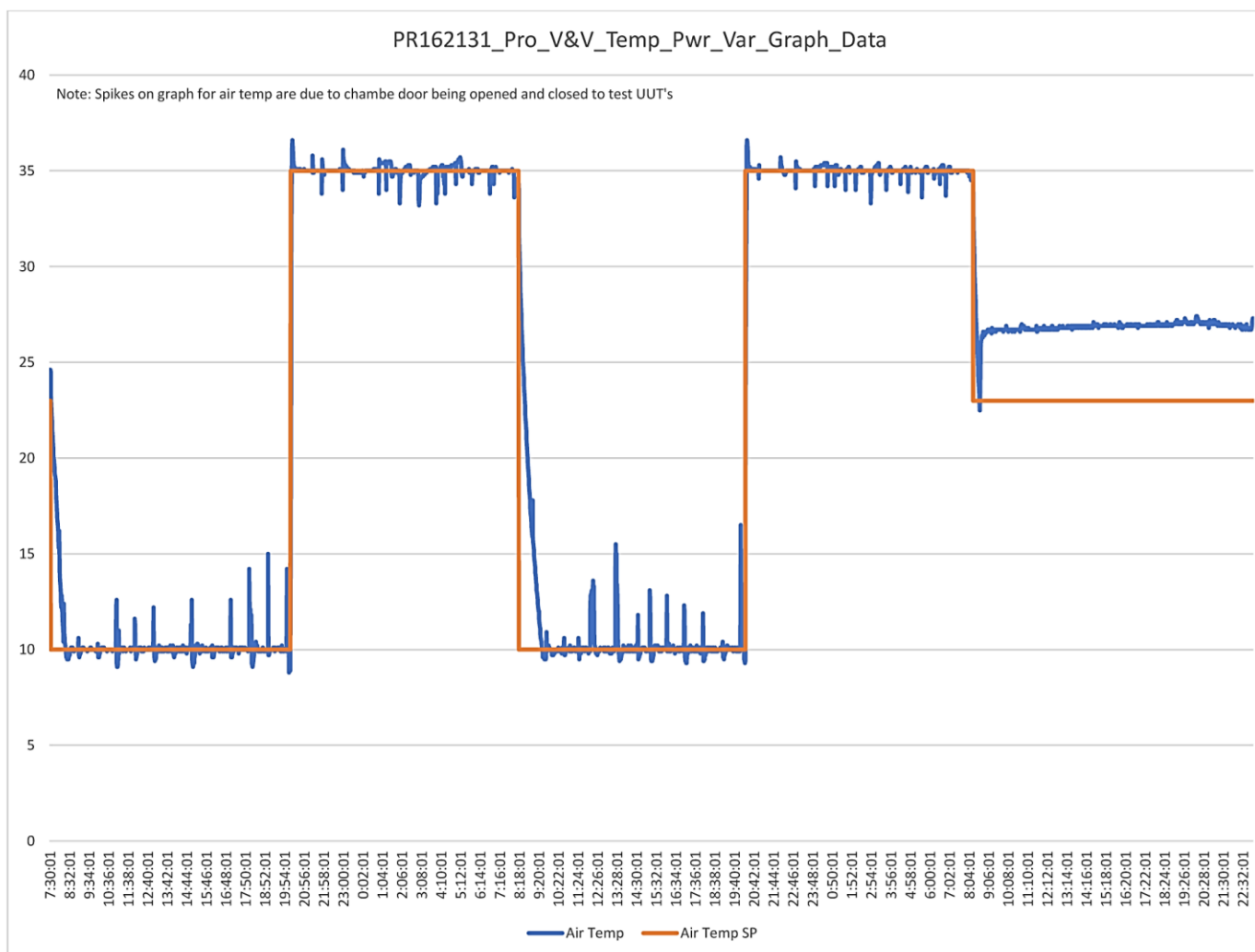


Temperature Power Variation Test (1)



Temperature Power Variation Test (2)

5.4.5 Test Data





5.4.6 Test Equipment List

Table 5.4-1: Temperature/Power Variation Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC061603	Chamber (Temperature/Humidity)	Thermotron	WS-1372-CH-(5) 25-25	09/29/2021	09/29/2022
WC061604	Controller (Temperature)	Thermotron	8800	09/29/2021	09/29/2022

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required



5.5 Bench Handling

5.5.1 Test Procedure MIL-STD-810D

5.5.2 Test Result

No visual damage was noted as a result of the test.

5.5.3 Test Datasheets

Start Date: 8/3/22		End Date: 8/3/22		Project No: PR162131		
Test Engineer: Michael Nash			Customer Witness: n/a		Temp: 67° Humidity: 56%	
Date	Time	Axis	Plot No.	Serial No.	Remarks	Initials
8/3/22				4610001011	Setup for Bench Handling	MN
	1410		Drop 1		With bottom front edge down, raise opposite side 4 in and drop onto workbench	MN
	1411		Drop 2		With bottom left edge down, raise opposite side 4 in and drop onto workbench	MN
	1412		Drop 3		With bottom rear edge down, raise opposite side 4 in and drop onto workbench	MN
	1413		Drop 4		With bottom right edge down, raise opposite side 4 in and drop onto workbench	MN
	1414		Drop 5		With top front edge down, raise opposite side 4 in and drop onto workbench	MN
	1415		Drop 6		With top left edge down, raise opposite side 4 in and drop onto workbench	MN
	1416		Drop 7		With top rear edge down, raise opposite side 4 in and drop onto workbench	MN
	1417		Drop 8		With top right edge down, raise opposite side 4 in and drop onto workbench	MN
	1418		Drop 9		With left front edge down, raise opposite side 4 in and drop onto workbench	MN
	1419		Drop 10		With left rear edge down, raise opposite side 4 in and drop onto workbench	MN
	1420		Drop 11		With right front edge down, raise opposite side 4 in and drop onto workbench	MN
	1421		Drop 12		With right rear edge down, raise opposite side 4 in and drop onto workbench	MN
					Testing complete, no damage noted	MN

5.5.4 Test Photographs



Drop 1



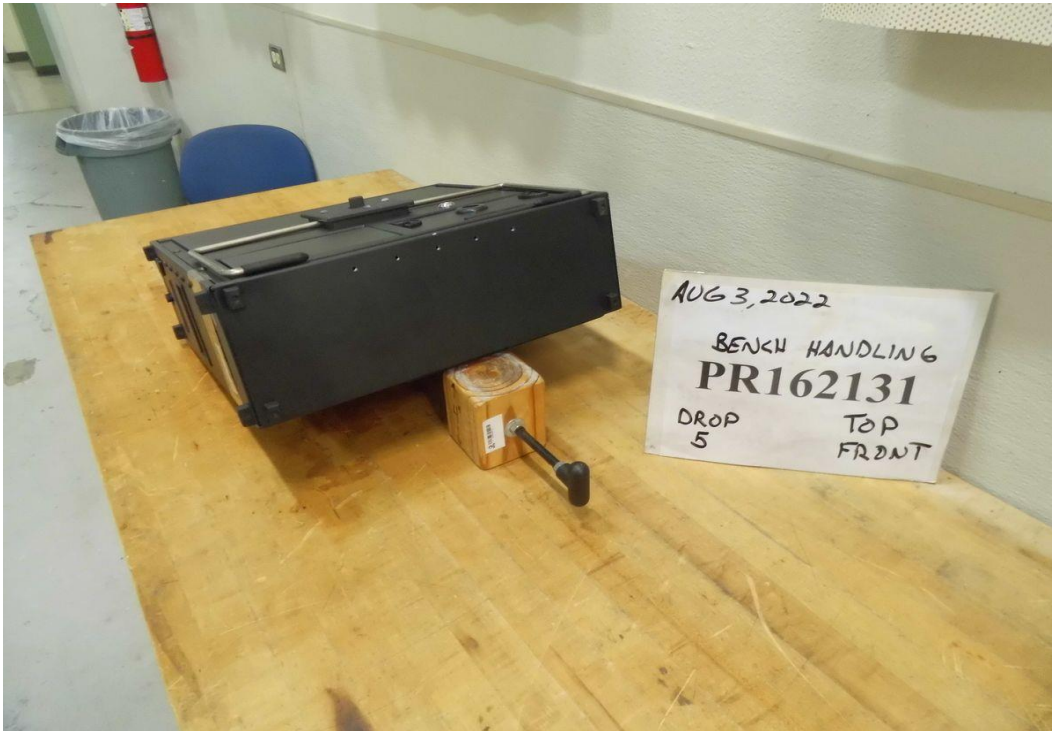
Drop 2



Drop 3



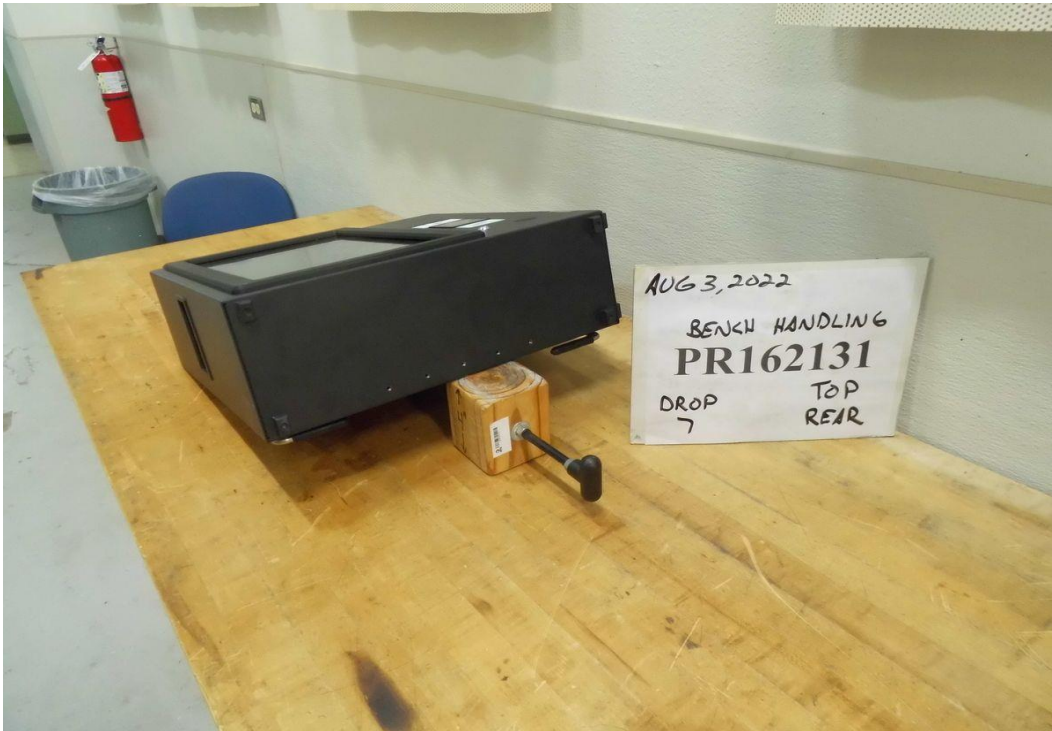
Drop 4



Drop 5



Drop 6



Drop 7



Drop 8



Drop 9



Drop 10



Drop 11



Drop 12



5.5.5 Test Equipment List

Table 5.5-1: Bench Handling Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC070466	Meter (Hygrometer)	Fluke	971	05/23/2022	05/23/2023
WC078485	Measurement Tools (Ruler)	Starrett	C604R	NCR	NCR

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required



5.6 Transportation Vibration

5.6.1 Test Procedure

MIL-STD-810D

5.6.2 Test Result

No visual damage was noted as a result of the test.

5.6.3 Test Datasheets

Start Date: 8/3/22		End Date: 8/3/22		Project No: PR162131		
Test Engineer: Michael Nash			Customer Witness: n/a		Temp: 67°	Humidity: 56%
Date	Time	Axis	Plot No.	Serial No.	Remarks	Initials
8/3/22		Z		ClearMark 1 & 2	Setup UUT's on shaker HYD06 in the Vertical Axis	MN
	1035		Run 1		Run 1.04 gRMS common carrier random vibration for 60 min	MN
					Testing complete, no damage noted	MN

5.6.4 Test Photographs



Random Vibe

5.6.5 Test Data



**5.6.6 Test Equipment List****Table 5.6-1: Transportation Vibration Test Equipment List**

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC061429	Shaker (Hydraulic)	Team Corporation	80/10.5	NCR	NCR
WC059862	Accelerometer (Seismic)	PCB Piezotronics	307A21	10/11/2021	10/11/2022
WC061706	Computer (Vibration Controller)	Vibration Research	VR9500	05/03/2022	05/03/2023
WC070244	Accelerometer (Vibration)	PCB Piezotronics	353B32	11/22/2021	11/22/2022
WC070466	Meter (Hygrometer)	Fluke	971	05/23/2022	05/23/2023

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required



End of Test Report