NTS Labs LLC Test Report for Environmental/Dynamics Testing of the ExpressVote® Universal Voting System Hardware 3.0

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Revision History

Rev.	Description	Issue Date
0	Initial Release	09/05/2023
1	Corrected test dates, item name, and results	10/06/2023
2	Revised item name on cover page and in Table 3.0-1	10/11/2023

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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: See Table 5.0-1
- Pro V&V, Inc Purchase Order(s) 2023-011 dated 04/24/2023.
- NTS Labs LLC Quote(s) OP0638253-0 dated 04/21/2023.
- 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	ExpressVote® Universal Voting System Hardware 3.0	ExpressVote3	EV032334P003
2	1	ExpressVote® Universal Voting System Hardware 3.0	ExpressVote3	EV032334P030
3	1	ExpressVote® Universal Voting System Hardware 3.0	ExpressVote3	EV032334P026
4	1	ExpressVote® Universal Voting System Hardware 3.0	ExpressVote3	EV032334P016
5	1	ExpressVote® Universal Voting System Hardware 3.0	ExpressVote3	EV032334P029

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 Temp	MIL-810H Method 502.7	Longmont	08/08/2023 - 08/09/2023	ExpressVote3	EV032334P003	Passed
5.2	High Temp	MIL-810H Method 501.7	Longmont	08/09/2023 - 08/10/2023	ExpressVote3	EV032334P003	Passed
5.3	Bench Handling	MIL-STD-810H Method 516.8, Procedure VI	Longmont	08/15/2023	ExpressVote3	EV032334P003	Passed
5.4	Transportation Vibration	MIL-STD-810H	Longmont	08/15/2023 - 08/16/2023	ExpressVote3	EV032334P003	Passed
5.5	Continuous Operation	MIL-STD-810H, Methods 501.7 and 502.7, Procedure II	Longmont	08/28/2023- 09/01/2023	ExpressVote3	EV032334P026, EV032334P016, EV032334P029	Passed
5.6	Settling Dust	MIL-STD-810H Method 510.7/IEC 60068-2-68	Longmont	085/16/2023- 08/17/2023	ExpressVote3	EV032334P030	Passed
5.7	Dripping Rain	MIL-STD_810H Method 506.6 Procedure III	Longmont	08/17/2023	ExpressVote3	EV032334P030	Passed

5.1 Low Temp

5.1.1 Test Procedure

The ExpressVote 3 was tested in accordance with MIL-810H Method 502.7.

5.1.2 Test Result

The EUT passed all defined requirements.

5.1.3 Test Datasheets

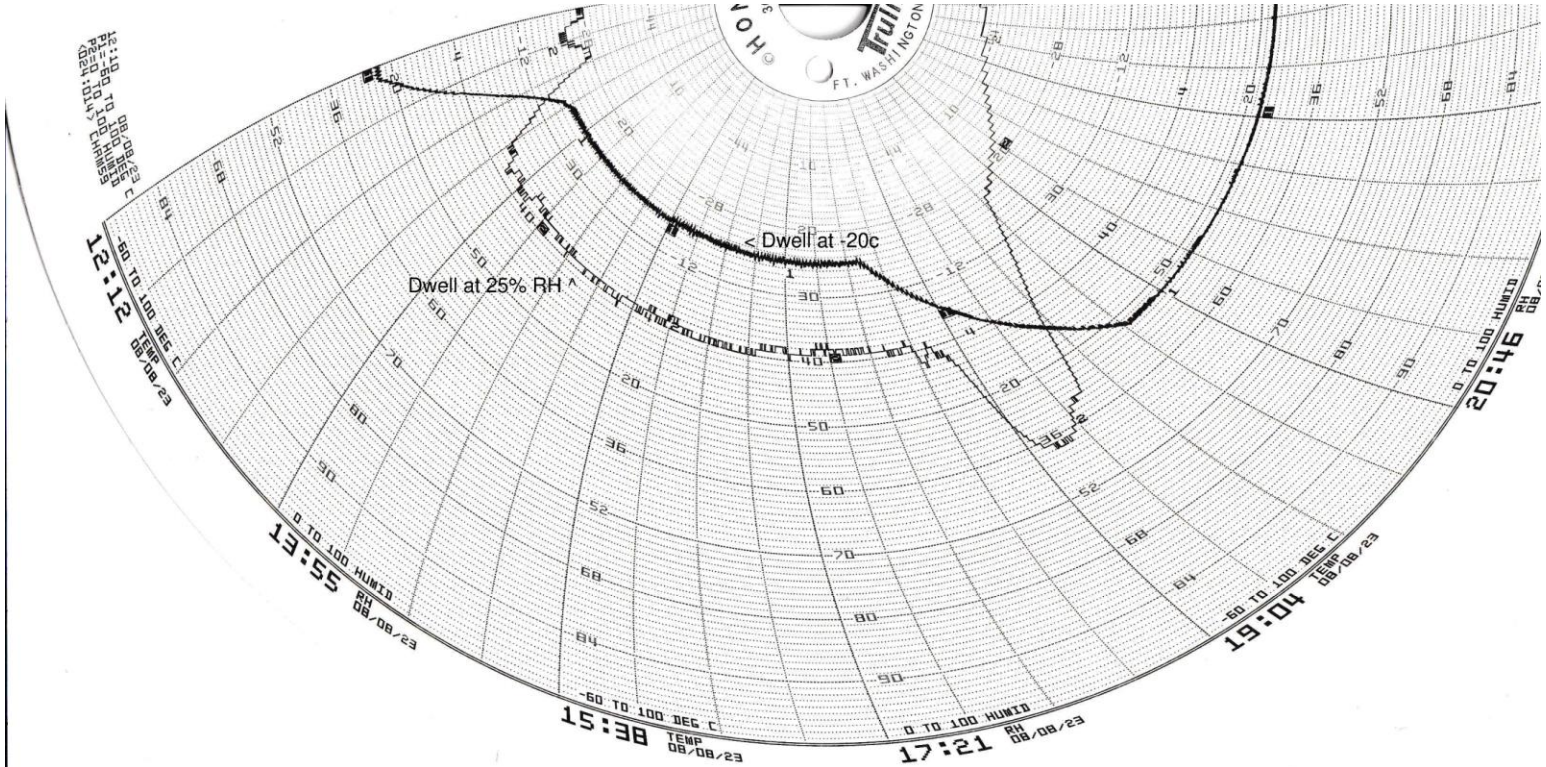
Test Log			
MJO No: PR171950-00	**Customer: Pro V&V**	**Test Specification: MIL-810H Method 502.7**	**Low Temperature & Humidity Test**

Date	Time	Log Entry	Tech
8/8/2023	9:15	**No visible evidence of damage before testing.**	CS
8/8/23	09:30	Customer performed pre-test on UUT and installed into chamber – No issues found	CS
8/8/23	12:21	Start the following test profile	CS
		Ramp to +23c	
		Ramp to -20c & 25% RH	
		Dwell at -20c & 25% RH for 4hrs	
		Ramp to +23c	
8/9/23	08:30	Customer performed posttest test on UUT – No issues found	CS
8/9/23	08:45	Test complete	CS
		Note: All test pass or fail determinations decided by Pro V&V Inc.	

5.1.4 Test Photographs

Low _Temperature & Humidity_-20c & 25%_RH_Test

5.1.5 Test Data



PR171950-00_Pro_V&V_Low_Temperature & Humidity_Test_-20c & 25% RH_Chart_Data

5.1.6 Test Equipment List

Table 5.1-1: Low Temp Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC061559	Chamber (Temperature/Humidity)	StorageTek	Large Walk In	09/02/2022	09/02/2023
WC061560	Controller (Temperature)	Watlow	F4	09/02/2022	09/02/2023
WC061561	Recorder (Chart)	Honeywell	DR45AT	09/02/2022	09/02/2023

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.2 High Temp

5.2.1 Test Procedure

The ExpressVote 3 was tested in accordance with MIL-810H Method 501.7.

5.2.2 Test Result

The EUT passed all defined requirements after the test was completed.

5.2.3 Test Datasheets

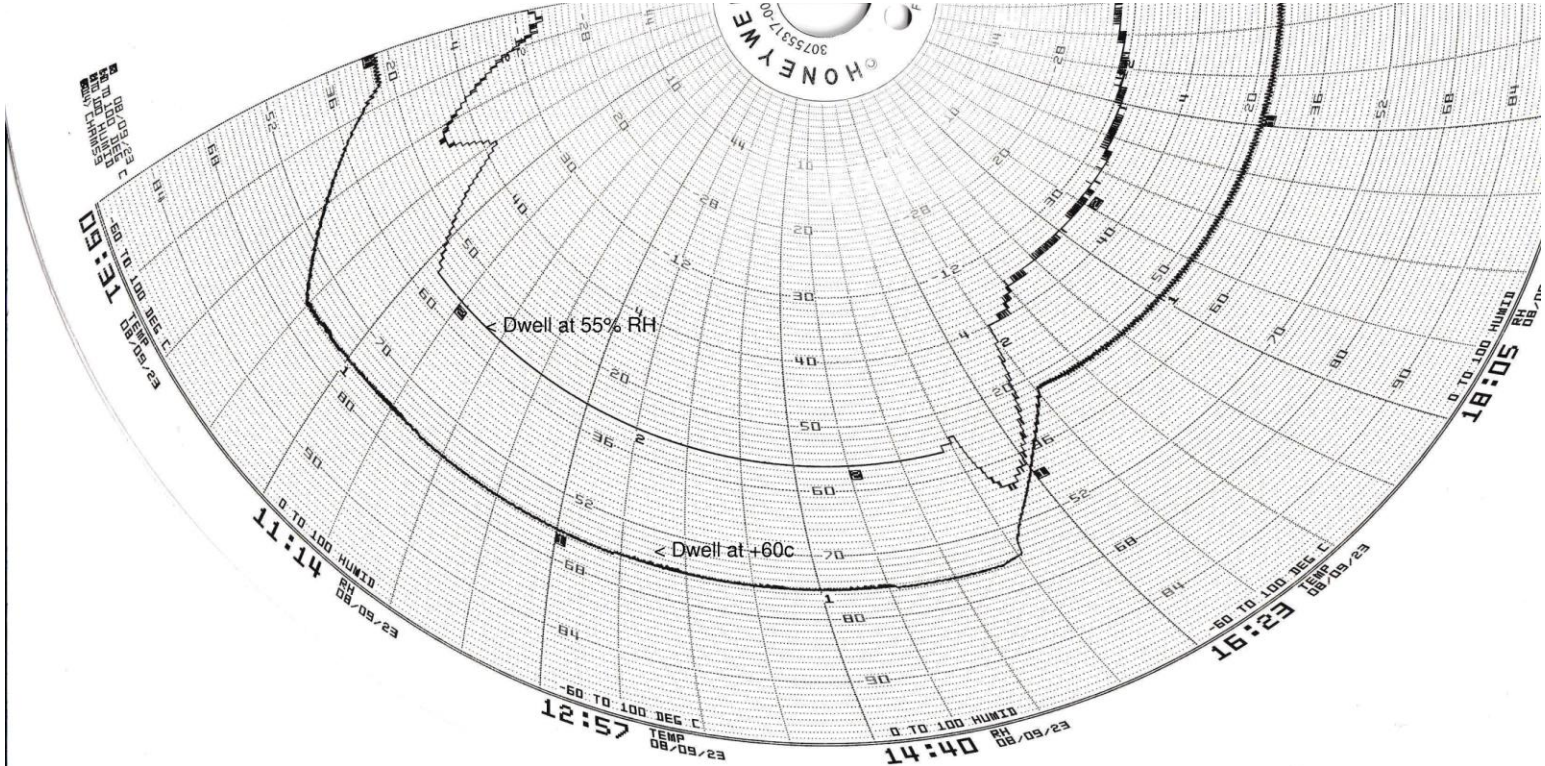
Test Log			
MJO No: PR171950-00	**Customer: Pro V&V**	**Test Specification: MIL-810H Method 501.7**	**High Temperature & Humidity Test**

Date	Time	Log Entry	Tech
8/9/2023	8:15	**No visible evidence of damage before testing.**	CS
8/9/23	08:30	Customer performed pre-test on UUT and installed into chamber – No issues found	CS
8/9/23	10:08	Start the following test profile	CS
		Ramp to +23c	
		Ramp to +60c & 55% RH	
		Dwell at +60 & 55% RH for 4hrs	
		Ramp to +23c	
8/10/23	15:15	Customer performed posttest test on UUT – No issues found	CS
8/10/23	15:30	Test complete	CS
		Note: All test pass or fail determinations decided by Pro V&V Inc.	

5.2.4 Test Photographs

High _Temperature & Humidity_+60c & 55%_RH_Test

5.2.5 Test Data



PR171950-00_Pro_V&V_High_Temperature & Humidity_Test_+60c & 55% RH_Chart_Data

5.2.6 Test Equipment List

Table 5.2-1: High Temp Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC061559	Chamber (Temperature/Humidity)	StorageTek	Large Walk In	09/02/2022	09/02/2023
WC061560	Controller (Temperature)	Watlow	F4	09/02/2022	09/02/2023
WC061561	Recorder (Chart)	Honeywell	DR45AT	09/02/2022	09/02/2023

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.3 Bench Handling

5.3.1 Test Procedure

The ExpressVote 3 was tested in accordance with MIL-STD-810H Method 516.8, Procedure VI.

5.3.2 Test Result

The EUT passed all defined requirements after the test was completed.

5.3.3 Test Datasheets

Test Log				
MJO No: PR171950-00		**Customer: Pro V&V**	**Test Specification: MIL-STD-810H Method 516.8, Procedure VI**	**Bench Handling Test**
Date	Time	Log Entry		Tech
8/15/2023	12:15	**No visible evidence of damage before testing.**		CS
8/15/23	12:24	Start 6 drops per edge of UUT from 4 inches		CS
8/15/23	12:27	Total of 24 drops from 4 inches for UUT complete		CS
8/15/23	12:30	Test Complete and customer performed posttest and visual inspection - No issues found		CS
		Note: All test pass or fail determinations decided by Pro V&V Inc.		

5.3.4 Test Photographs

Bench Handling_01

Bench Handling_02

Bench Handling_03

Bench Handling_04

5.3.5 Test Equipment List

Table 5.3-1: Bench Handling Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC078513	Measurement Tools (Rule)	StorageTek	4 Inch Block	NCR	NCR

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.4 Transportation Vibration

5.4.1 Test Procedure

The ExpressVote 3 was tested in accordance with MIL-STD-810H.

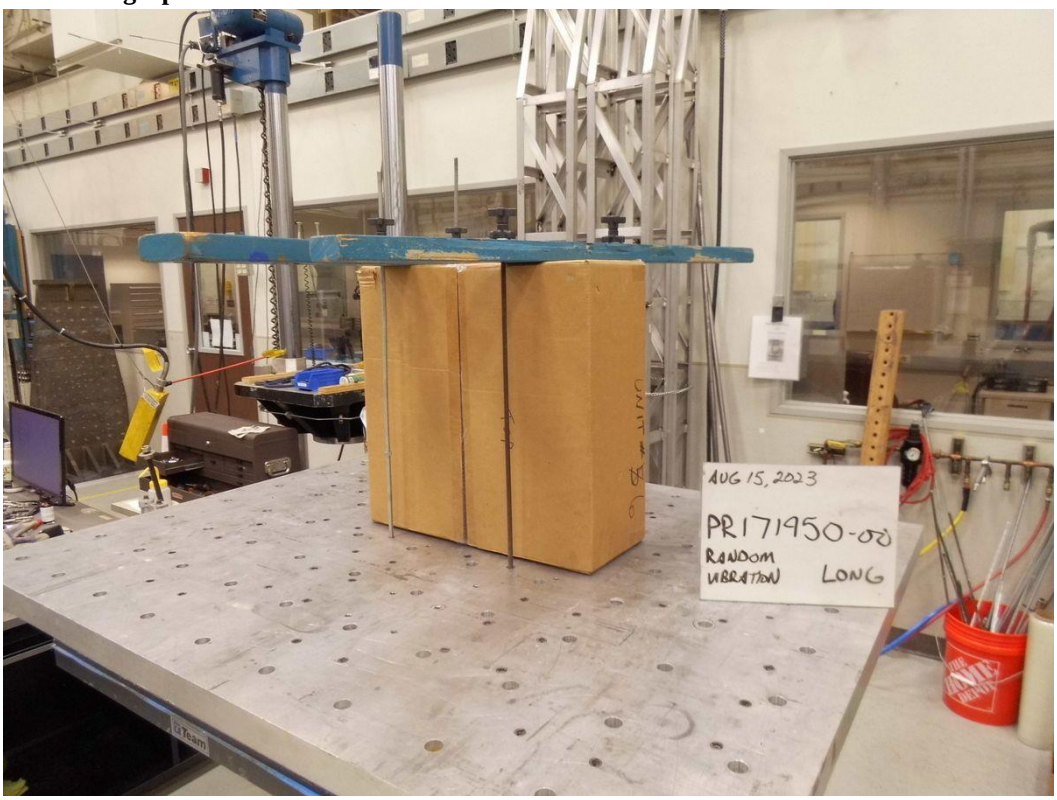
5.4.2 Test Result

The EUT passed all defined requirements after the test was completed.

5.4.3 Test Datasheets

Start Date: 8/15/23		End Date: 8/16/23				Project No: PR171950-00	
Test Engineer: Michael Nash					Customer Witness: n/a	Temp: 66° Humidity: 46%	
Date	**Time**	**Axis**	**Plot No.**	**Serial No.**	**Remarks**		**Initials**
8/15/23		Vertical		EV032334P003	Setup UUT to Shaker HYD06 in Vertical Axis		MN
	1400		Run 1		Run 1.08 Grms random vibration on the UUT for 60 min		MN
		Long			Setup UUT to Shaker HYD06 in Longitudinal Axis		MN
	1505		Run 2		Run 0.76 Grms random vibration on the UUT for 60 min		MN
8/16/2023		Trans			Setup UUT to Shaker HYD06 in Transverse Axis		MN
	646		Run 3		Run 0.21 Grms random vibration on the UUT for 60 min		MN
					Test complete, no damage noted		MN

5.4.4 Test Photographs



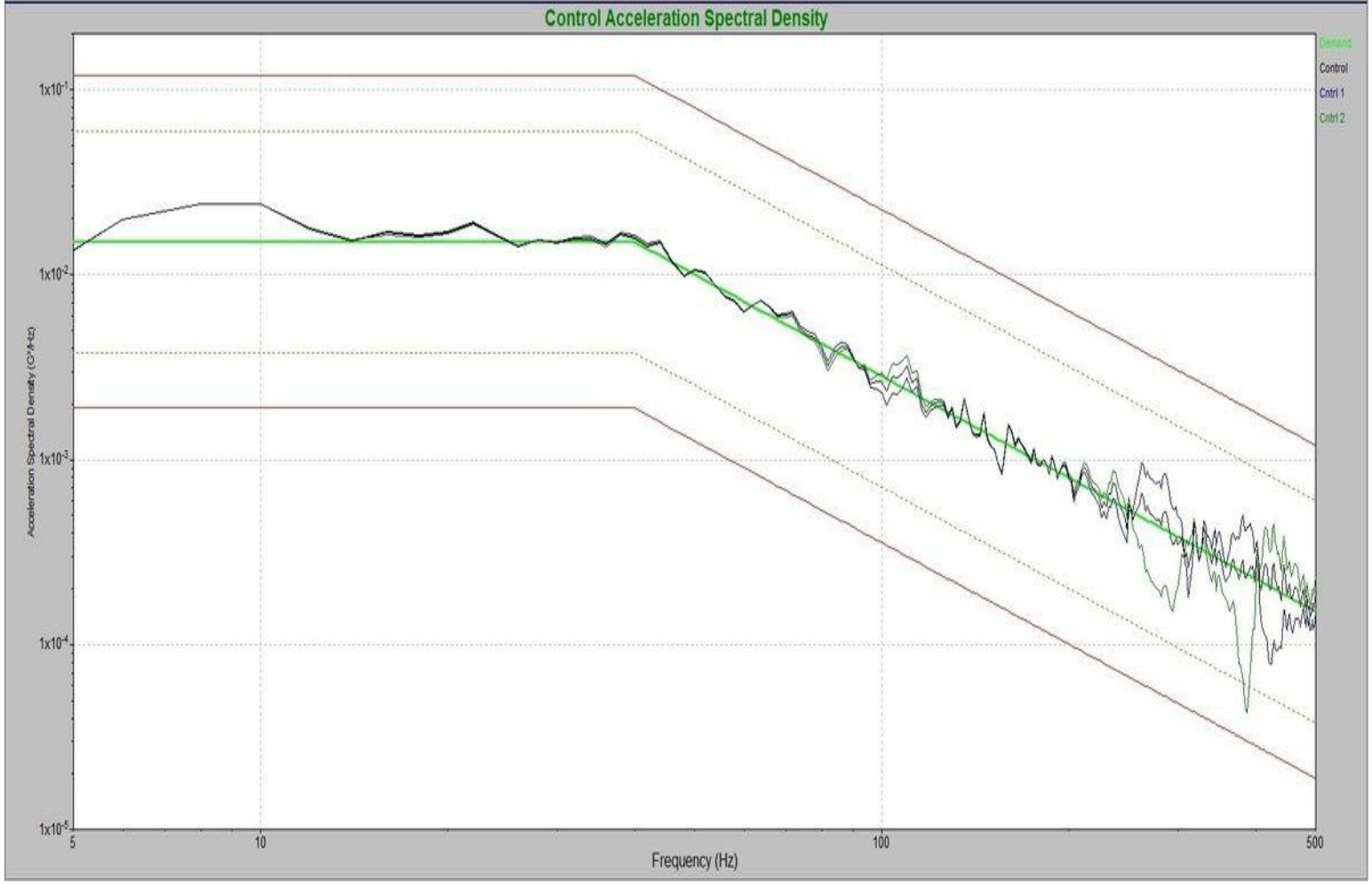
Vibration Longitudinal

Vibration Transverse

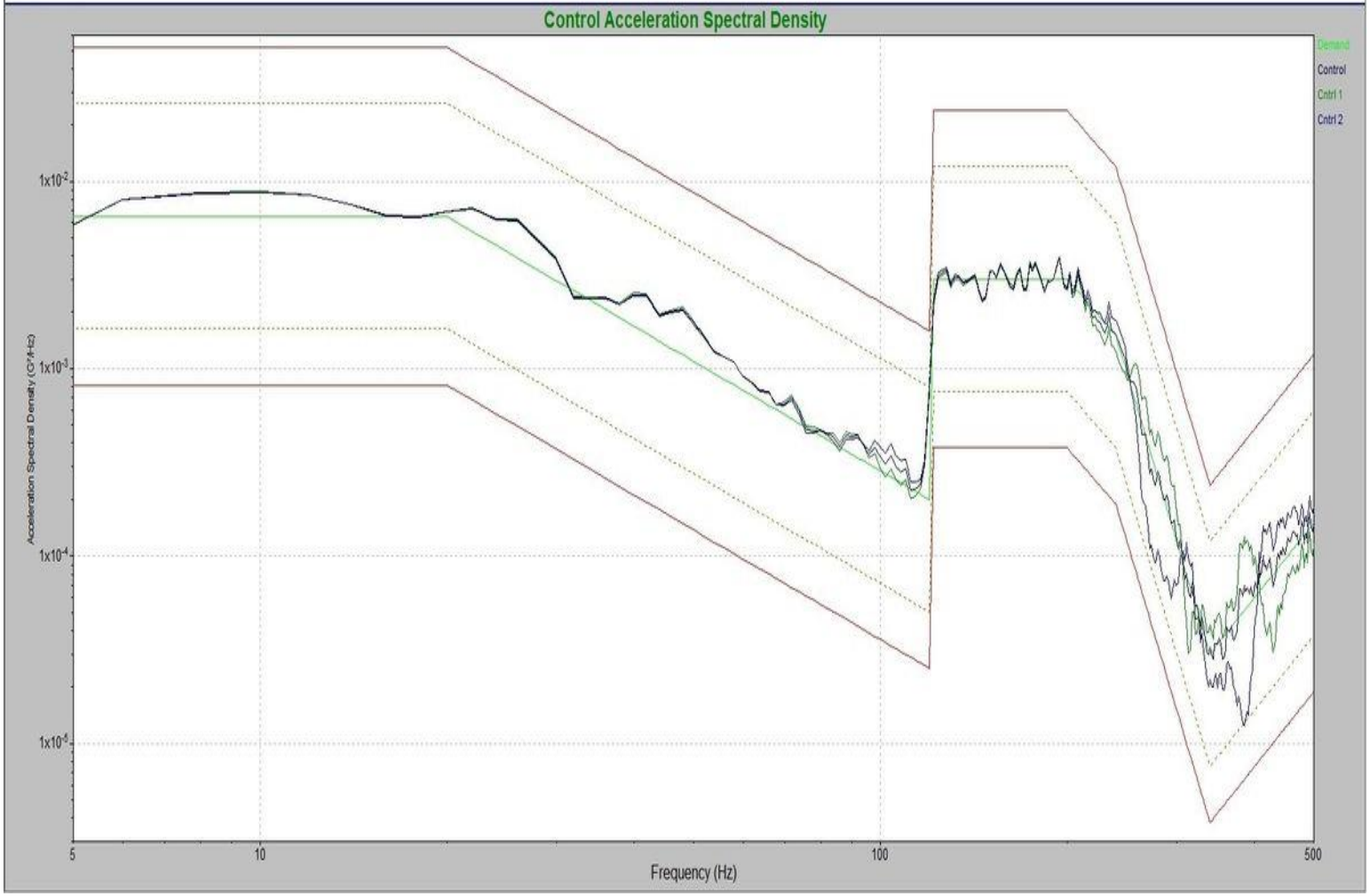
Vibration Vertical

5.4.5 Test Data

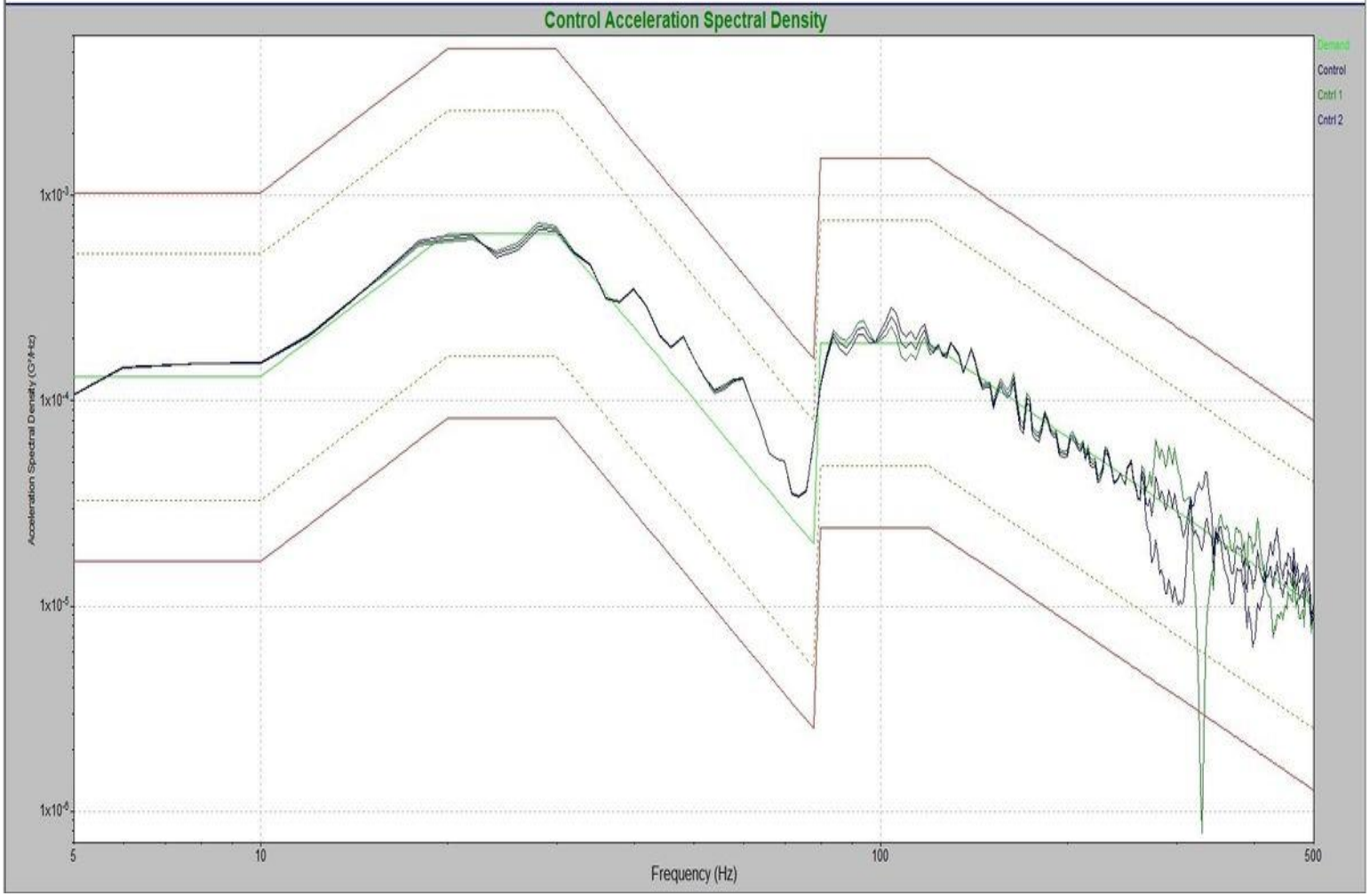
NTS Longmont, CO	Level Time: 1:00:00	Demand: 1.092 G RMS	Pro V&V
Job# PR171950-00	Run 1	Control: 1.129 G RMS	UUT: ExpressVote3
Aug 15, 2023 14:00:04		Test axis: Vertical	S/N: EV032334P003



NTS Longmont, CO	Level Time: 1:00:00	Demand: 0.77 G RMS	Pro V&V
Job# PR171950-00	Total Time: 1:00:13	Control: 0.8045 G RMS	UUT: ExpressVote3
Aug 15, 2023 15:05:32	Run 2	Test axis: Longitudinal	S/N: EV032334P003



NTS Longmont, CO	Level Time: 1:00:00	Demand: 0.2057 G RMS	Pro V&V
Job# PR171950-00	Total Time: 1:00:17	Control: 0.2113 G RMS	UUT: ExpressVote3
Aug 16, 2023 06:46:00	Run 3	Test axis: Z	S/N: EV032334P003



5.4.6 Test Equipment List

Table 5.4-1: Transportation Vibration Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC061429	Shaker (Hydraulic)	Team Corporation	80/10.5	NCR	NCR
WC059871	Accelerometer (Seismic)	PCB Piezotronics	352C34	11/08/2022	11/08/2023
WC059872	Accelerometer (Seismic)	PCB Piezotronics	352C34	11/08/2022	11/08/2023
WC059875	Computer (Vibration Controller)	Vibration Research	VR9500	05/02/2023	05/01/2024
WC070466	Meter (Hygrometer)	Fluke	971	06/14/2023	06/14/2024

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.5 Continuous Operation

5.5.1 Test Procedure

The ExpressVote 3 was tested in accordance with MIL-STD-810H, Methods 501.7 and 502.7, Procedure II.

5.5.2 Test Result

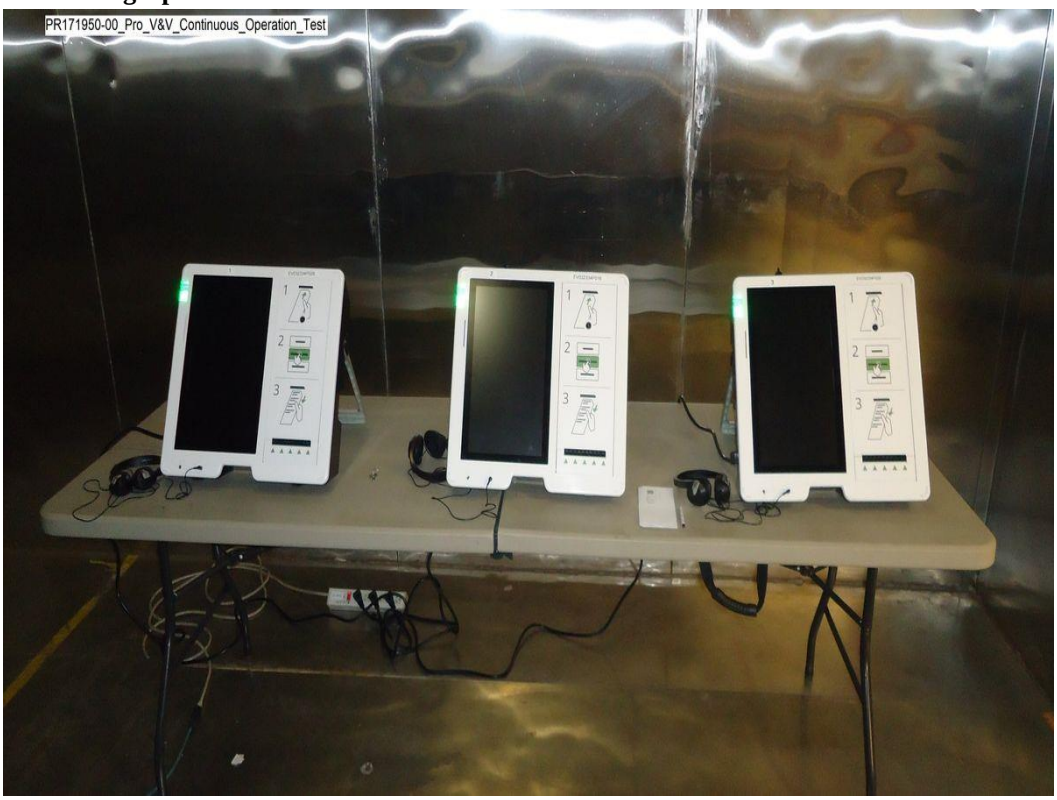
The EUT passed all defined requirements after the test was completed.

5.5.3 Test Datasheets

Test Log			
MJO No: PR171950-00	**Customer: Pro V&V**	**Test Specification: MIL-STD-810H, Methods 501.7 and 502.7, Procedure II**	**Continuous Operation – Varied Environmental Conditions Test**

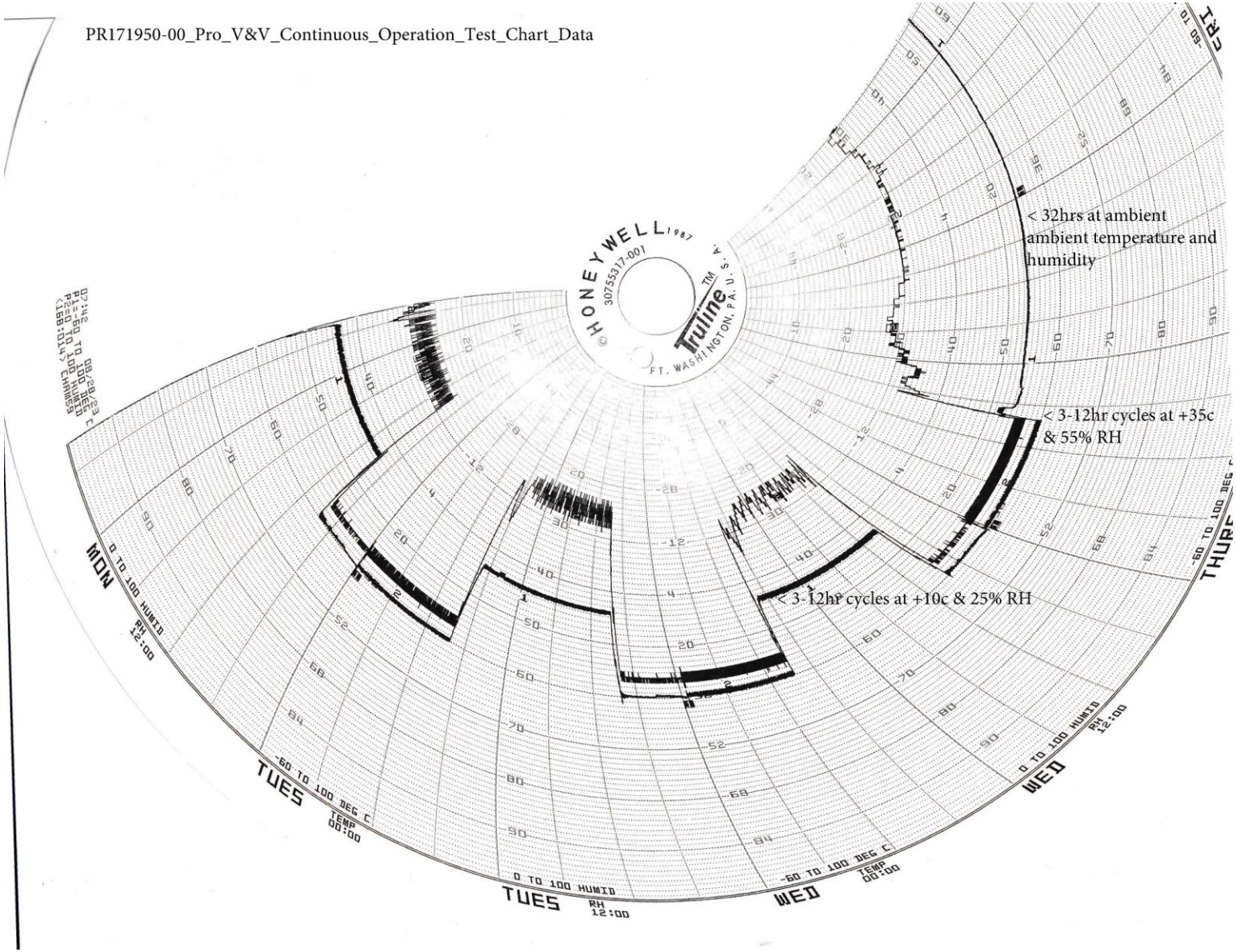
Date	Time	Log Entry	Tech
8/25/2023	8:45	**No visible evidence of damage before testing.**	CS
8/25/23	09:00	Customer installed UUT's into chamber – Performed visual inspection – No issues found	CS
8/28/23	08:00	Ramp chamber to +10c & 25% RH & dwell for 12 hours	CS
8/28/23	20:00	Ramp chamber to +35c & 55% RH & dwell for 12 hours	KM
8/29/23	08:00	Ramp chamber to +10c & 25% RH & dwell for 12 hours	CS
8/29/23	20:00	Ramp chamber to +35c & 55% RH & dwell for 12 hours	KM
8/30/23	08:00	Ramp chamber to +10c & 25% RH & dwell for 12 hours	CS
8/30/23	20:00	Ramp chamber to +35c & 55% RH & dwell for 12 hours	KM
8/31/23	08:00	Ramp chamber to +23c ambient temperature and humidity	CS
8/31/23	08:00	Temperature and humidity variation portion of test has completed	CS
8/31/23	08:00	Test will continue to run at +23c ambient for another 32 hours	CS
9/1/23	16:30	All Testing complete for a total of 104 hours	KM
		Note: All test pass or fail determinations decided by Pro V&V Inc.	

5.5.4 Test Photographs



Continuous _Operation _Test

5.5.5 Test Data



5.5.6 Test Equipment List

Table 5.5-1: Continuous Operation Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC061559	Chamber (Temperature/Humidity)	StorageTek	Large Walk In	09/02/2022	09/02/2023
WC061560	Controller (Temperature)	Watlow	F4	09/02/2022	09/02/2023
WC061561	Recorder (Chart)	Honeywell	DR45AT	09/02/2022	09/02/2023

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.6 Settling Dust

5.6.1 Test Procedure

The ExpressVote 3 was tested in accordance with MIL-STD-810H Method 510.7/IEC 60068-2-68.

5.6.2 Test Result

The EUT passed all defined requirements after the test was completed.

5.6.3 Test Datasheets

Test Log			
MJO No: PR171950-00	**Customer: Pro V&V**	**Test Specification: MIL-STD-810H Method 510.7/IEC 60068-2-68**	**Dust Test**

Date	Time	Log Entry	Tech
8/16/2023	8:15	**No visible evidence of damage before testing.**	CS
8/16/23	08:30	Customer performed functional pretest on UUT – No issues found	CS
8/16/23	09:30	Installed UUT into chamber	CS
8/16/23	09:35	Start the following Dust Test profile	CS
		Installed dust for 1 minute	
		Let dust settle for 1 hour	
		Repeat steps above for a total of 8 cycles	
8/17/23	08:15	Customer performed post inspection and functional test of UUT – No issues found	CS
8/17/23	08:30	Test complete	CS
		Note: All test pass or fail determinations decided by Pro V&V Inc.	

5.6.4 Test Photographs

Dust_ Pre-test

Dust _Post Test

5.6.5 Test Equipment List

Table 5.6-1: Settling Dust Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC080871	Chamber (Dust, Settling)	Thermotron	D27	NCR	NCR

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

5.7 Dripping Rain

5.7.1 Test Procedure

The ExpressVote 3 was tested in accordance with MIL-STD_810H Method 506.6 Procedure III.

5.7.2 Test Result

The EUT passed all defined requirements after the test was completed.

5.7.3 Test Datasheets

Test Log			
MJO No: PR171950-00	**Customer: Pro V&V**	**Test Specification: MIL-STD_810H Method 506.6 Procedure III**	**Dripping Rain Test**

Date	Time	Log Entry	Tech
8/17/2023	8:30	**No visible evidence of damage before testing.**	CS
8/17/23	08:45	Customer performed functional pretest and visual inspection – No issues found	CS
8/17/23	09:44	Install UUT under Chamber 118. UUT will be exposed to dripping rain with a distance of 1 meter (3 feet) from upper surface for 15 minutes	CS
8/17/23	09:45	Start drip test	CS
8/17/23	10:00	Drip test complete	CS
8/17/23	10:03	Customer performed post-test inspection and functional test on UUT – No issues found	CS
		Note: All test pass or fail determinations decided by Pro V&V Inc.	

5.7.4 Test Photographs

Dripping_ Rain_ Test

Dripping _Rain _Test

Dripping _Rain _Test

5.7.5 Test Equipment List

Table 5.7-1: Dripping Rain Test Equipment List

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC061710	Machine (Rain)	StorageTek	Rain Drip	NCR	NCR

Calibration Abbreviations
CAL: Calibration
NCR: No Calibration Required

End of Test Report