

National Technical Systems Test Report for Environmental Testing of the FVS

Prepared For

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Prepared By

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A handwritten signature in black ink, appearing to read "Gagne", written over a horizontal line.

Greg Gagne
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A handwritten signature in black ink, appearing to read "Robert Polverari", written over a horizontal line.

Robert Polverari
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Revision History

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1.0 Introduction

This document presents the test procedures used and the results obtained during the performance of an Environmental 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.

- Pro V&V, Inc. Purchase Order(s) 2020-005,2020-007,2021-002, dated 07/02/2020,10/21/2020,02/11/2021
- National Technical Systems (NTS) Quote(s) OP0554066, dated 06/17/2020
- NTS Corporate Quality Policy Manual, Revision 9, dated 9/20/2018
- ISO/IEC 17025:2017(E) *General Requirements for the Competence of Testing and Calibration Laboratories*, dated 11/1/2017
- Test Specification: MIL-STD-810D

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. Details below:

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

Item	Qty.	Name/Description	Part Number	Serial Number
1	1	FVS	FVS	FVS-VST 100100

3.1 Security Classification

Non-classified

4.0 General Test Requirements

4.1 Test Equipment

NTS-provided equipment is calibrated according to ISO/IEC 17025:2017(E) and calibration is traceable to the National Institute of Standards and Technology (NIST). Calibration records are maintained on file at NTS.

4.2 Notice of Deviation

In accordance with NTS' quality procedures, when the EUT is observed to exceed or display susceptibility, a Notice of Deviation (NOD) document is generated by the technician performing the test. This NOD documents the requirement, how the EUT deviated from the requirement, and allows room for resolution of the deviation.

This document is reviewed and approved by the NTS Program Manager or Engineer and the NTS Quality Assurance Representative, and then forwarded to the customer contact. Once mitigated (or passed over), the steps taken to correct the deviation (or simply instruction from the customer to continue testing) are recorded in the NOD and a copy of the NOD is integrated into the body of the report, in the appropriate location.



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	Longmont	09/21/2020 - 09/22/2020	FVS	FVS-VST 100100	None
5.2	High Temperature	MIL-STD-810D	Longmont	09/22/2020 - 09/23/2020	FVS	FVS-VST 100100	None
5.3	Humidity	MIL-STD-810D	Longmont	09/08/2020 - 09/21/2020	FVS	FVS-VST 100100	None
5.4	Bench Handling	MIL-STD-810D	Longmont	09/23/2020 - 09/23/2020	FVS	FVS-VST 100100	None
5.5	Transportation Vi- bration	MIL-STD-810D	Longmont	09/24/2020 - 09/24/2020	FVS	FVS-VST 100100	None

*The decision rule used to state compliance is in accordance with the test specification used for testing. Unless otherwise noted, testing was performed in accordance with the latest published version of test specification at time of test.

5.1 Low Temperature

5.1.1 Test Result

N/A

5.1.2 Test Procedure

See below.

5.1.3 Test Datasheets

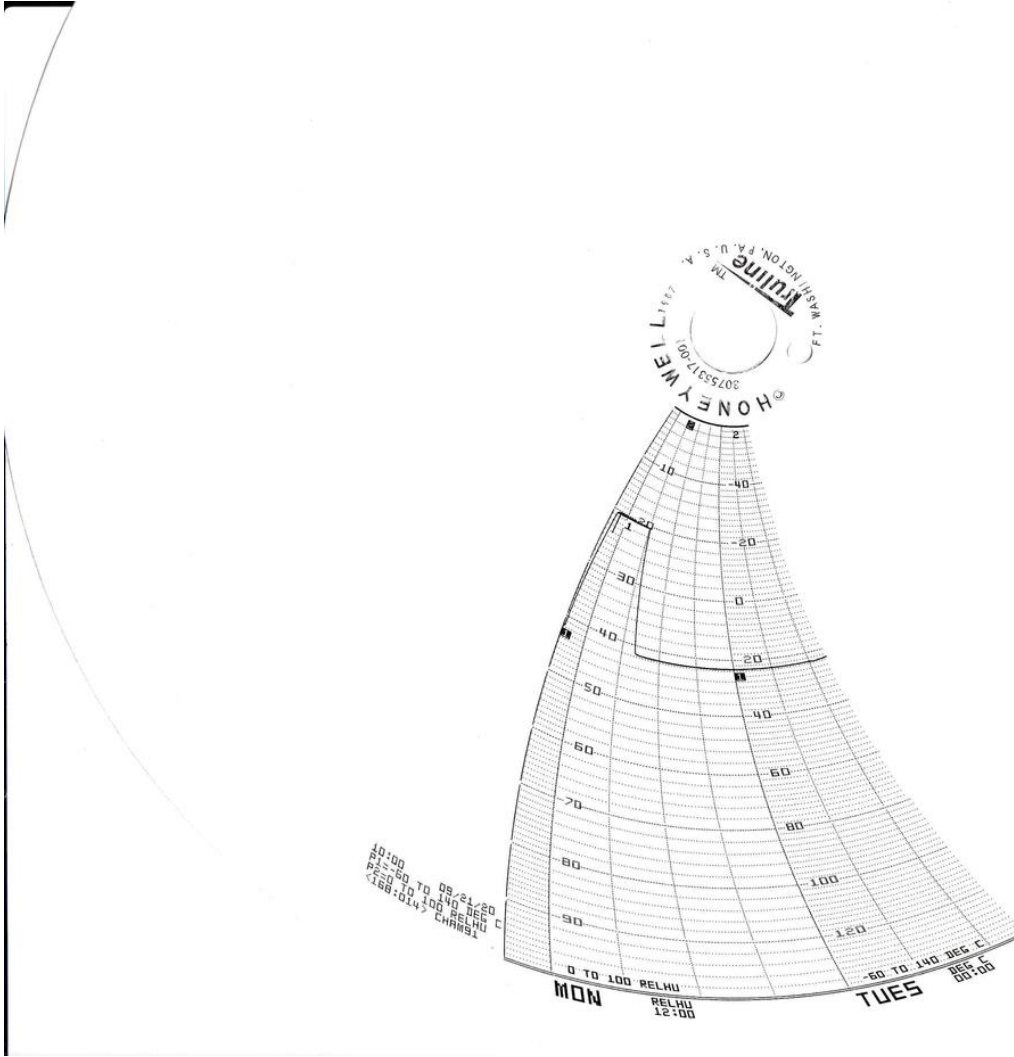
Start Date: 09/21/20		End Date: 09/22/20	MJO No: PR121029
Customer: Pro V&V		Test Performed: Cold Temperature Test	Test By: KM
Part Name: FVS		Serial No: FVS-VST 100100	Customer Witness: N/A
Page 1 of 1		Test Specification: MIL-STD_810D	Temp: -20c Humidity: N/A
Date	Time	Remarks	Initials
09/21/20	11:00	Start the following test profile	KM
		Ramp to +23c	
		Ramp to -20c	
		Dwell at -20 for 4hrs	
		Ramp to +23c	
		Customer inspected UUT and performed post-test functional test on UUT	
09/22/20	09:00	Test complete	KM
		Note: All test pass or fail determinations decided by Pro V&V Inc.	

5.1.4 Test Photographs



Pro V&V Job Number	01-01-UHI-06
Manufacturer	Unisyn
System Name	OVS 2.2
Equipment	FVS
Serial Number(s)	FVS-VST 100100
Date	9-8-2020
Test	Humidity

5.1.5 Test Data



Ch 91_-20c_Graph_Data



5.1.6 Test Equipment List

Table 5.1-1: Low Temperature Test Equipment List

ID Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
WC061722	N/A	N/A	N/A	Chamber 91	NCR	NCR
WC061723	Envirotronics	System +	N/A	Controller	02/11/20	02/11/21
WC061724	Honeywell	N/A	N/A	Chart Recorder	02/11/20	02/11/21

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

5.2 High Temperature

5.2.1 Test Result

N/A

5.2.2 Test Procedure

See below.

5.2.3 Test Datasheets

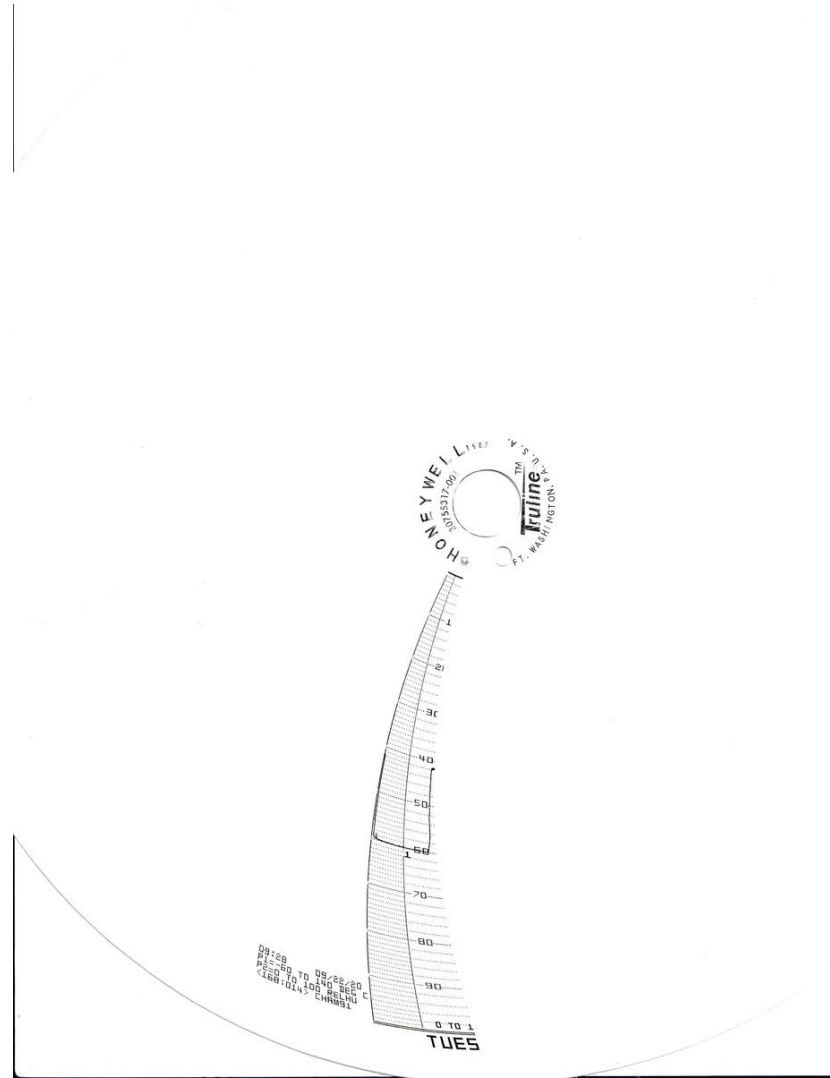
Start Date: 09/22/20		End Date: 09/23/20	MJO No: PR121029
Customer: Pro V&V		Test Performed: High Temperature Test	Test By: KM
Part Name: FVS		Serial No: FVS-VST 100100	Customer Witness: N/A
Page 1 of 1		Test Specification: MIL-STD_810D	Temp: +60c Humidity: N/A
Date	Time	Remarks	Initials
09/22/20	09:50	Start the following test profile	KM
		Ramp to +23c	
		Ramp to +60c	
		Dwell at +60 for 4hrs	
		Ramp to +23c	
		Customer inspected UUT and performed post-test functional test on UUT	
09/23/20	09:00	Test complete	KM
		Note: All test pass or fail determinations decided by Pro V&V Inc.	

5.2.4 Test Photographs



Pro V&V Job Number	01-01-UHI-06
Manufacturer	Unisyn
System Name	OVS 2.2
Equipment	FVS
Serial Number(s)	FVS-VST 100100
Date	9-8-2020
Test	Humidity

5.2.5 Test Data



Ch 91_+60c_Graph_Data



5.2.6 Test Equipment List

Table 5.2-1: High Temperature Test Equipment List

Asset Number	Mfct	Description	M/N	S/N	Range	Start Date	End Date	Last Cal	Cal Interval (Months)	Cal Due	Notes
WC061430	Team Corporation	Horizontal Electro Hydraulic Shaker, HYD 05	188-48-16	494		09/08/2020	09/30/2020		12	NCR	
WC061603	Thermotron	Temp/Hum, Drive-in, CH 42	WS-1372-CH-(5) 25-25	23-9941		09/08/2020	09/30/2020	10/05/2020	12	10/05/2021	

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

5.3 Humidity

5.3.1 Test Result

N/A

5.3.2 Test Procedure

See below.

5.3.3 Test Datasheets

Start Date: 09/08/20		End Date: 09/21/20		MJO No: PR121029	
Customer: Pro V&V		Test Performed: 10 Day Temperature/Humidity Test		Test By: KM	
Part Name: FVS		Serial No: FVS-VST 100100		Customer Witness: N/A	
Page 1 of 1		Test Specification: MIL-STD_810D		Temp: +31c to +41c Humidity: 59% RH to 88% RH	
Date	Time	Remarks	Initials		
09/08/20	11:15	Customer performed pre-test functional test on UUT	KM		
09/08/20	11:30	Install UUT in chamber	KM		
09/08/20	12:00	Start test profile mil-810 hot hum 10 day test			
09/18/20	12:30	Test has completed mil-810 hot hum 10 day test	KM		
09/18/20	12:31	Chamber at +23c ambient	KM		
09/18/20	14:00	Open chambers doors	KM		
09/21/20	09:00	Customer inspected UUT and performed post-test functional test on UUT	KM		
09/21/20	10:00	Test complete	KM		
		Note: All test pass or fail determinations decided by Pro V&V Inc.			

5.3.4 Test Photographs

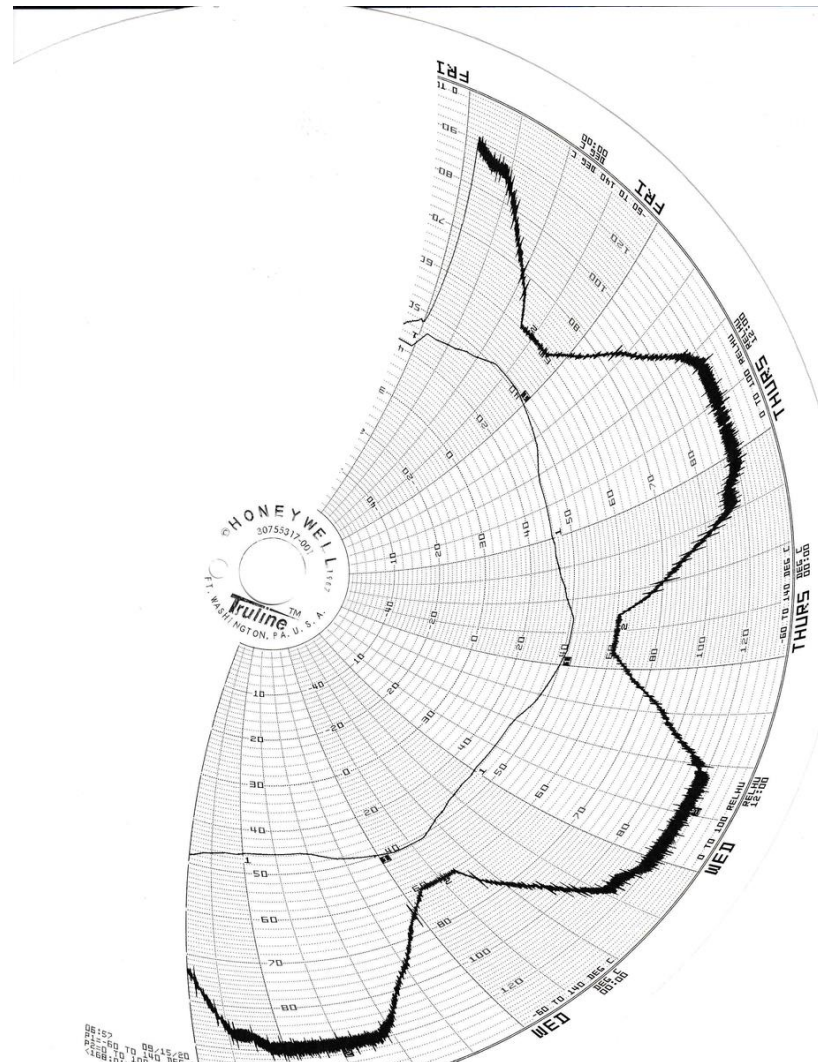


PLEASE DO NOT DOUBLE STACK
FRAGILE

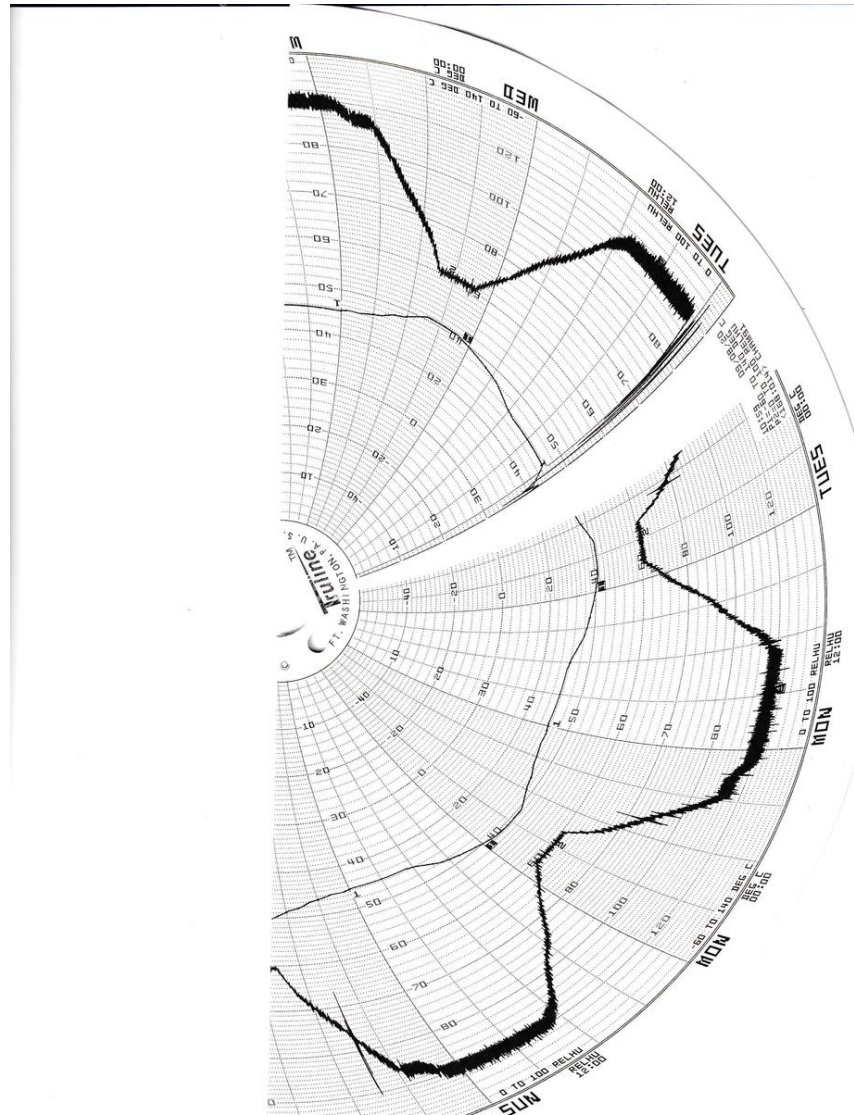
Pro V&V Job Number	01-01-UNI-06
Manufacturer	Unisyn
System Name	OVS 2.2
Equipment	FVS
Serial Number(s)	FVS-VST 100100
Date	9-8-2020
Test	Humidity

PRO V&V

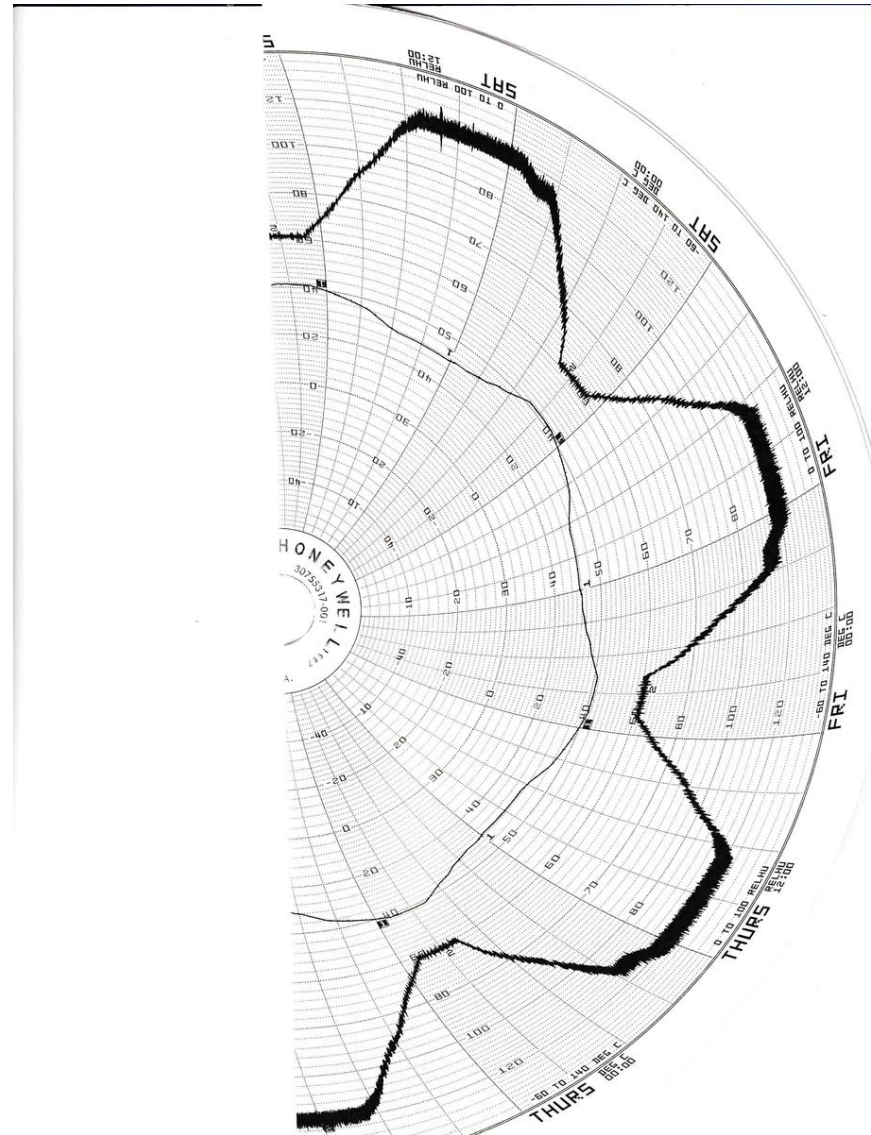
5.3.5 Test Data



3_Cycles_Graph_Data



7_Cycles_Graph_Data_Page_1



7_Cycles_Graph_Data_Page_2



5.3.6 Test Equipment List

Table 5.3-1: Humidity Test Equipment List

Asset Number	Mfct	Description	M/N	S/N	Range	Start Date	End Date	Last Cal	Cal Interval (Months)	Cal Due	Notes
WC061430	Team Corporation	Horizontal Electro Hydraulic Shaker, HYD 05	188-48-16	494		09/08/2020	09/30/2020		12	NCR	
WC061722	Envirotronics	Temp/Hum chamber, CH 91	EH64-2-5	08963401		09/08/2020	09/30/2020	02/11/2020	12	03/11/2021	
WC061723	Envirotronics	System Plus	386T	15240796		09/08/2020	09/30/2020	02/11/2020	12	03/11/2021	
WC061724	Honeywell	Chart Recorder	DR4500	0220Y25506320002		09/08/2020	09/30/2020	02/11/2020	12	03/11/2021	

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required

5.4 Bench Handling

5.4.1 Test Result

N/A

5.4.2 Test Datasheets

Start Date: 09/23/20		End Date: 09/23/20	MJO No: PR121029
Customer: Pro V&V		Test Performed: Bench Test	Test By: KM
Part Name: FVS		Serial No: FVS-VST 100100	Customer Witness: N/A
Page 1 of 1		Test Specification: MIL-STD_810D	Temp: N/A Humidity: N/A
Date	Time	Remarks	Initials
09/23/20	10:00	Start 6 drops per corner of UUT from 4 inches	KM
09/23/20	11:00	Total of 24 drops from 4 inches for UUT complete	KM
09/23/20	11:30	Test Complete and customer performed posttest	KM
		Note: All test pass or fail determinations decided by Pro V&V Inc.	

5.4.3 Test Photographs





5.4.4 Test Equipment List

Table 5.4-1: Bench Handling Test Equipment List

Asset Number	Mfct	Description	M/N	S/N	Range	Start Date	End Date	Last Cal	Cal Interval (Months)	Cal Due	Notes
WC061430	Team Corporation	Horizontal Electro Hydraulic Shaker, HYD 05	188-48-16	494		09/08/2020	09/30/2020		12	NCR	
WC061603	Thermotron	Temp/Hum, Drive-in, CH 42	WS-1372-CH-(5) 25-25	23-9941		09/08/2020	09/30/2020	10/05/2020	12	10/05/2021	

Calibration Abbreviations

CAL: Calibration
NCR: No Calibration Required



5.5 Transportation Vibration

5.5.1 Test Result

N/A

5.5.2 Test Procedure

See below.

5.5.3 Test Datasheets

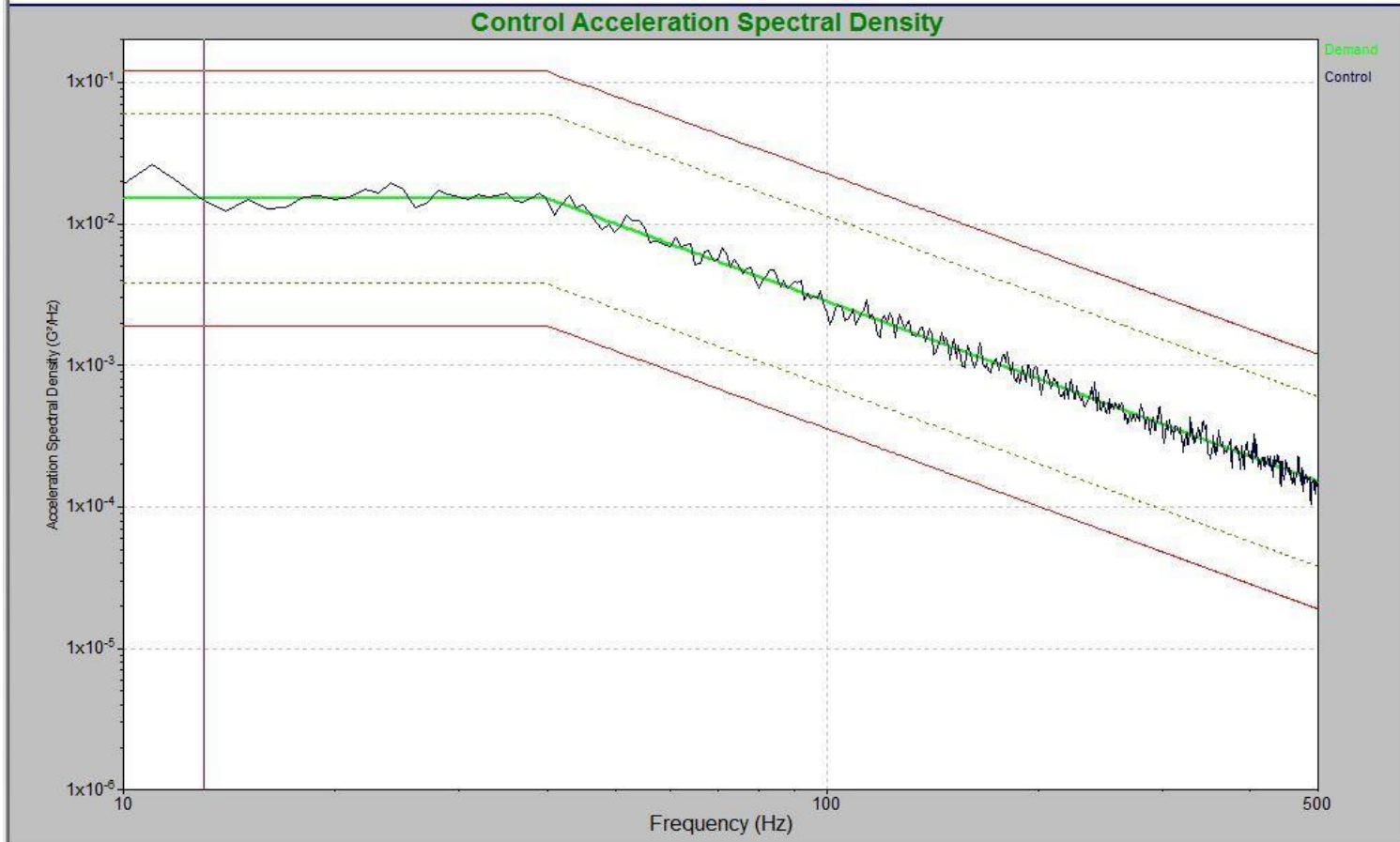
Start Date: 9-24-20		End Date: 9-24-20		MJO No: PR121029		
Customer: Pro V&V		Test Performed: Random Vibration		Test Engineer: G. Mathews		
Part Name: Boxed sample		Serial numbers:		Customer Witness: n/a		
Page of		Test Specification: Customer SOW & MIL-STD-810D		Temp: 67° Humidity: 45%		
Date	Time	Axis	Plot No.	Serial No.	Remarks	Initials
9-24-20	0857	Vertical			Setup UUT on shaker HYD06 in the Vertical-Axis	GM
			Run 1		Run 1.04 gRMS random vibration profile on the UUT in the Vertical-Axis	GM
	1003	Longitudinal			Setup UUT on shaker HYD06 in the Transverse - Axis	GM
			Run 2		Run 0.74 gRMS random vibration profile on the UUT in the Transverse-Axis	GM
	1108	Transverse			Setup UUT on shaker HYD06 in the Longitudinal - Axis	GM
			Run 3		Run 0.2 gRMS random vibration profile on the UUT in the Longitudinal-Axis	GM
					Testing complete	GM

5.5.4 Test Photographs



5.5.5 Test Data

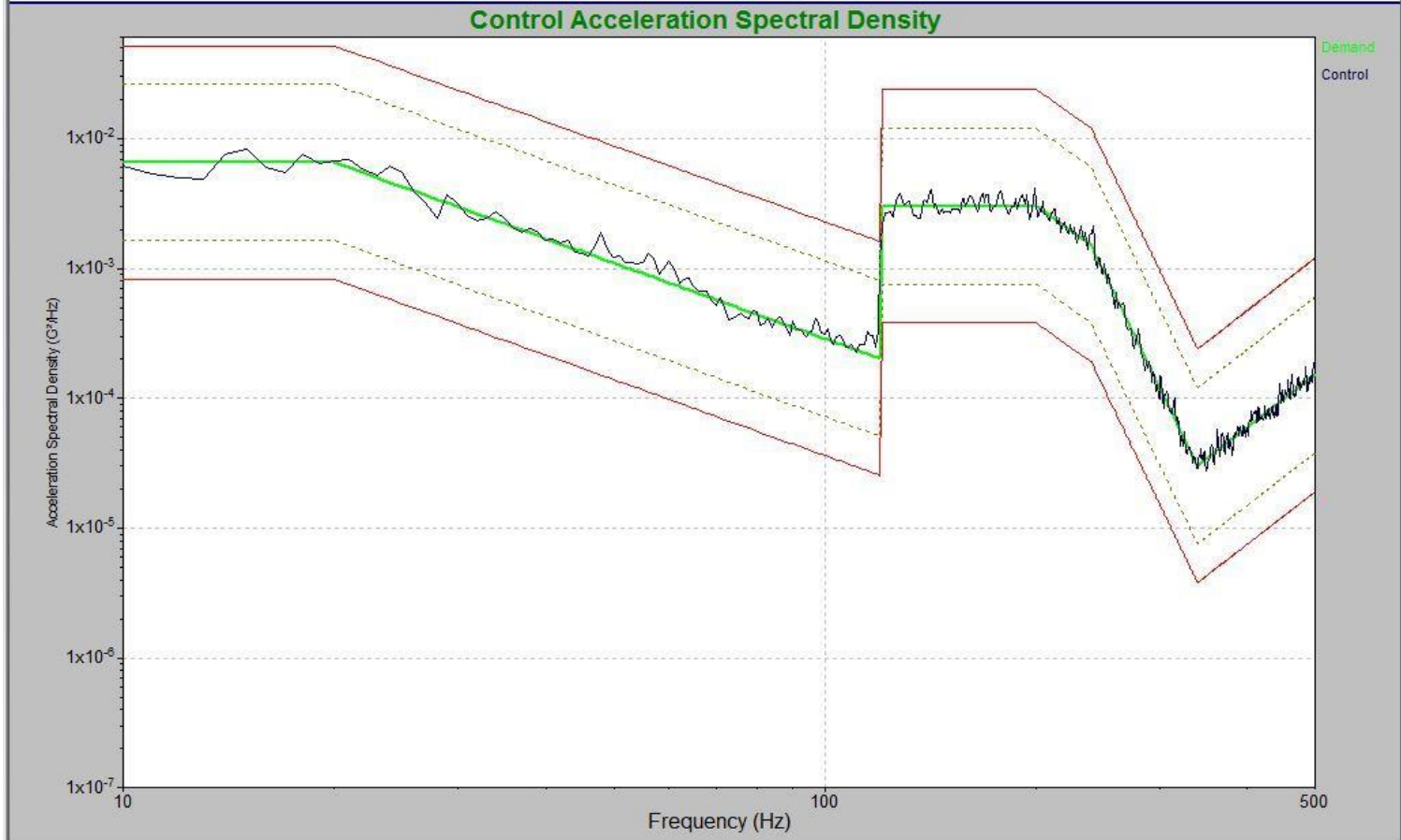
NTS Longmont, CO	Level Time: 1:00:00	Demand: 1.047 G RMS	Pro V&V
Job#: PR121029 and PR120980	Total Time: 1:00:10	Control: 1.068 G RMS	UUT: Boxed samples
Sep 24, 2020 08:57:04	Run 1	Test axis: Vertical	SN:



Run 1



NTS Longmont, CO	Level Time: 1:00:00	Demand: 0.7428 G RMS	Pro V&V
Job#: PR121029 and PR120980	Total Time: 1:00:10	Control: 0.7555 G RMS	UUT: Boxed samples
Sep 24, 2020 10:03:03	Run 2	Test axis: Longitudinal	SN:



Run 2

NTS Longmont, CO

Level Time: 1:00:00

Demand: 0.2038 G RMS

Pro V&V

Job#: PR121029 and PR120980

Total Time: 1:00:08

Control: 0.203 G RMS

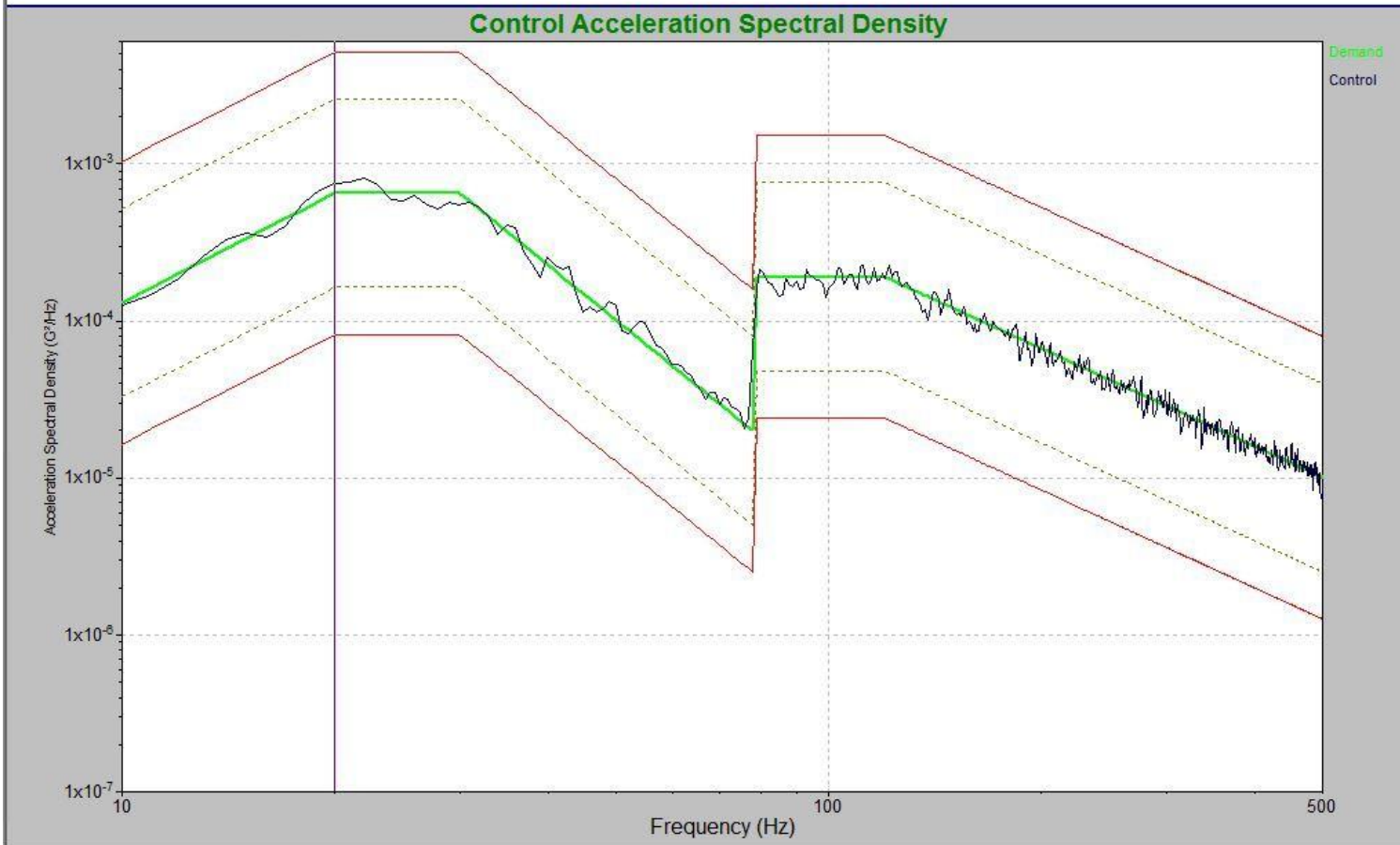
UUT: Boxed samples

Sep 24, 2020 11:08:38

Run 3

Test axis: Transverse

SN:



Run 3



5.5.6 Test Equipment List

Table 5.5-1: Transportation Vibration Test Equipment List

ID Number	WC Number	Manufacturer	Model #	Serial #	Description	Cal Date	Cal Due
1750	WC061429	Team	80/10.5	544	Shaker System HYD06	N/A	
1676	WC061504	PCB	353B34	82374	Accelerometer	4/14/2020	4/30/2021
1698	WC070242	PCB	353B34	LW204222	Accelerometer	10/4/2019	10/4/2020
1872	WC059875	Vibration Research	VR9500	95268B57	Vibration Controller	6/4/2020	6/4/2021
1766	WC070466	Fluke	971	3623064	Temp/Humidity Meter	4/15/2020	4/15/2021

Calibration Abbreviations

CAL: Calibration

NCR: No Calibration Required



End of Report