Medium Weight Shock and Vibration Test Report
on
3” x 1 1/2” x 6” 15 HP Pump
for
Sims Pump Valve Company
Hoboken, NJ

NU LABORATORIES, INC.
312 Old Allerton Road, Annandale, NJ
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26 October 2005

Prepared By	Checked By	Approved By
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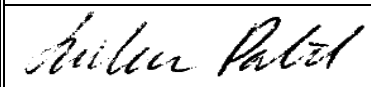	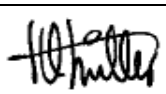	
October 27, 2005	October 27, 2005	October 27, 2005

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1. PURPOSE OF TEST

The purpose of this test was to demonstrate that the 3" x 1 1/2" x 6" 15HP Pump, herein referred to as the "Pump," complied with the requirements of MIL-S-901D for a Grade A, Class I, Type A, nine (9) blow medium weight shock test and the requirements of MIL-STD-167-1 when subjected to vibration through the frequency range of 4 Hz through 50 Hz in each of the three (3) major axes.

2. MANUFACTURER

Sims Pump Valve Company
1314 Park Avenue
Hoboken, NJ 07030

3. MANUFACTURER'S TYPE OR MODEL NO.

3" x 1 1/2" x 6" 15HP Pump

4. SPECIFICATIONS

4.1 MILITARY

MIL-S-901D (NAVY) Military Specification, Shock Tests, H.I. (High Impact); Shipboard Machinery, Equipment and Systems, Requirements for, dated 17 March 1989.

MIL-STD-167-1 (SHIPS) Military Standards Mechanical Vibrations of Shipboard Equipment, 19 June 1987

4.2 SIMS PUMP VALVE COMPANY

Purchase Order Number: 4124

5. NUMBER OF ITEMS TESTED

One (1)

6. SECURITY CLASSIFICATION OF ITEMS

Unclassified

7. DATE TESTING COMPLETED

17 October 2005

8. TEST CONDUCTED BY

NU Laboratories, Inc.
312 Old Allerton Road
Annandale, NJ 08801
(NAVY Certified Shock Test Facility by NAVSEAINST 9491.1C)

9. TEST WITNESSES

Vladimir Spektor, Sims Pump representative– shock only.
John Kozel, Sims Pump representative– shock only.
Eric Burachinsky, Sims Pump representative– shock only.
Robert Coseano, NSWCCD representative—shock only.

10. DISPOSITION OF TEST ITEMS

The Pump was returned to Sims Pump Company.

11. ABSTRACT

The Pump was subjected to a total of nine (9) medium weight shock blows in accordance with the referenced test specifications. Visual inspections, performed after each shock blow, revealed no obvious physical damage, loss in pressure, or leakage. Refer to Section 12 for details.

The Pump was subjected to vibration through the frequency range of 4 Hz to 50 Hz in each of the three (3) major axes. Visual inspections, performed after each, major axis of vibration, revealed no obvious physical damage, loss in pressure, or leakage. Refer to Section 13 for details.

12. MEDIUM WEIGHT SHOCK TEST DESCRIPTION

12.1 ACCEPTANCE CRITERIA

The Pump shall be considered to have failed the shock test if any portion of the equipment comes adrift or otherwise becomes a hazard to personnel, or equipment is not able to perform its Grade A specified function due to performance degradation in accordance with MIL-S-901D Section 3.1.10.1.

12.2 TEST SETUP

Upon receipt a visual inspection performed on the Pump revealed no obvious physical damage or discrepancy.

The Pump was weighed using a portable platform scale and the weight was recorded in the test log. The weight of the Pump was found to be 452 pounds.

The Pump was attached to a 48″ x 48″ x 1 ½” steel plate using four (4) 7/8”-8 Grade 5 bolts torqued to 400 lbs-ft. The entire assembly was then secured to fixture Figure 13 of MIL-S-901D on the medium weight shock machine orientated in the first major axis of test. A 54 pound dummy mass was attached to the suction side of the Pump using six (6) 1/2”-13 B7 threaded rod, nuts and washers torqued to 45 lbs-ft. A 18.5 pound dummy mass was attached to the discharge side of the Pump using six (6) 1/2”-13 B7 threaded rod,, washers, and nuts torqued to 45 lbs-ft. The total weight on the anvil table was found to be 2,091.5 pounds. Refer to Table 1 for the medium weight shock test weights and Figure 1 for photographs of the test setup.

Table 1: Medium Weight Shock Test Weights

Pump	**452 lbs.**
48″ x 48″ x 1 ½” Steel Plate	**970 lbs.**
Dummy Mass - Suction	**54 lbs.**
Dummy Mass - Discharge	**18.5 lbs.**
Mounting Bolts	**3 lbs.**
Two (2) Half Rails	**166 lbs.**
Eight (8) ½ Rail Shoes	**32 lbs.**
Four (4) T-Blocks	**16 lbs.**
Figure 13	**380 lbs.**
Figure 16	**1,470 lbs.**

12.3 TEST CONDITIONS

Throughout the shock test the Pump was monitored for any leaks or loss in pressure

Observations were made by Sims Pump, NSWC, and NU Laboratories, Inc. representatives.

During blows marked as "**CONDITION A**" the Pump was flooded with water, energized with 440 VAC, three (3) phase, 60 Hz power and operating with the discharge pressure adjusted to 56 psig.

During blows marked as "**CONDITION B**" the Pump flooded with water, and de-energized.

12.4 BLOW #1 - "CONDITION A"

12.4.1 Conditions: 1.25' hammer height, Group #I, 3.0" anvil table travel, Figure 13 of the referenced specifications.
12.4.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.
12.4.3 Action: Testing was continued.

12.5 BLOW #2 - "CONDITION B"

12.5.1 Conditions 2.25' hammer height, Group #II, 3.0" anvil table travel, Figure 13 of the referenced specifications.
12.5.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.
12.5.3 Action: Testing was continued

12.6 BLOW #3 - "CONDITION A"

12.6.1 Conditions: 2.25' hammer height, Group #III, 1.5" anvil table travel, Figure 13 of the referenced specifications.
12.6.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.
12.6.3 Action: Testing was continued.

The entire assembly was then removed from fixture Figure 13 of MIL-S-901D, and reattached to fixture Figure 16 of MIL-S-901D of the referenced specifications, orientated with the side of the Pump facing down. The total weight on the anvil table was found to be 3,181.5 pounds. Refer to Figure 1 for a photograph of the test setup and Table 1 for a breakdown of the test weights.

12.7 BLOW #4 - "CONDITION A"

12.7.1 Conditions: 1.5' hammer height, Group #I, 3.0" anvil table travel, Figure 16 of the referenced specifications.
12.7.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.
12.7.3 Action: Testing was continued.

12.8 BLOW #5 - "CONDITION B"

12.8.1 Conditions: 2.5' hammer height, Group #II, 3.0" anvil table travel, Figure 16 of the referenced specifications.
12.8.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.
12.8.3 Action: Testing was continued.

12.9 BLOW #6 - "CONDITION A"

12.9.1 Conditions: 2.5' hammer height, Group #III, 1.5″ anvil table travel, Figure 16 of the referenced specifications.
12.9.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.
12.9.3 Action: Testing was completed.

The entire assembly was removed from fixture Figure 16 of MIL-S-901D, rotated 90° and reattached to MIL-S-901D Figure 16 with the suction side of the Pump facing down; see Figure 1. The total weight on the anvil table remained at 3,181.5 pounds.

12.10 BLOW #7 - "CONDITION A"

12.10.1 Conditions: 1.5' hammer height, Group #I, 3.0" anvil table travel, Figure 16 of the referenced specifications.
12.10.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.
12.10.3 Action: Testing was continued.

12.11 BLOW #8 - "CONDITION B"

12.11.1 Conditions: 2.5' hammer height, Group #II, 3.0" anvil table travel, Figure 16 of the referenced specifications.
12.11.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.
12.11.3 Action: Testing was continued

12.12 BLOW #9 - "CONDITION A"

12.12.1 Conditions: 2.5' hammer height, Group #III, 1.5" anvil table travel, Figure 16 of the referenced specifications.
12.12.2 Observations: A post-blow visual inspection revealed no obvious physical damage. No leakage or loss in pressure was reported.
12.12.3 Action: Testing was continued.

Refer to the Factory Test Records, Figures 2, and the Shock Acceptance Form, Figure 3, for additional information.

13. VIBRATION TEST DESCRIPTION

13.1 TEST SETUP

Upon completion of the shock test the Pump assembly was removed from Figure 16 of MIL-S-901D and attached to the vibration machine. Refer to Figure 4 for the photographs of the test setups.

An accelerometer was attached to the Pump, orientated in the direction of vibration, to aid in the detection of response prominences.

13.2 TEST CONDITIONS

The Pump was subjected to vibration in each of the three (3) major axes in "**CONDITION A**"; the Pump was flooded with water, energized with 440 VAC, three (3) phase, 60 Hz power and operating with the discharge pressure adjusted to 56 psig.

13.3 FIRST MAJOR AXIS OF VIBRATION (FRONT TO BACK AXIS)

13.3.1 Exploratory Vibration

The Pump, was vibrated from 4 Hz through 50 Hz with a vibration input of 0.020 ± 0.004 inches (double amplitude) to determine response prominences and from 34 Hz through 50 Hz with a vibration input of 0.006 + 0.000/-0.002 (double amplitude) to determine response prominences. . The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for approximately 15 seconds. No response prominences were noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

13.3.2 Variable Frequency Vibration

The Pump was vibrated from 4 Hz to 50 Hz with input amplitudes as shown in Table 2. The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for a period of five (5) minutes. No obvious physical damage, leakage or loss in pressure was noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

Table 2: Variable Frequency Test Amplitudes

FREQUENCY (Hz)	INPUT INCHES (DOUBLE AMPLITUDE)
4 – 15 Hz	0.060 ± 0.012
16 – 25 Hz	0.040 ± 0.008
26 – 33 Hz	0.020 ± 0.004
34 – 40 Hz	0.010 ± 0.002
41 – 50 Hz	0.006 + 0.000 -0.002

13.3.3 Endurance Vibration

Since no response prominences were noted the endurance vibration was performed at the specified upper frequency of 50 Hz for a period of two (2) hours. Upon the completion of the two (2) hour dwell an inspection was performed which revealed no obvious physical damage, leakage or loss in pressure.

The frequency, table input vibration levels, accelerometer output vibration levels and the duration of dwell were recorded on the Vibration Test Data Sheets.

13.4 SECOND MAJOR AXIS OF VIBRATION (VERTICAL AXIS)

13.4.1 Exploratory Vibration

The Pump was vibrated from 4 Hz through 33 Hz with a vibration input of 0.020 ± 0.004 inches (double amplitude) to determine response prominences and from 34 Hz through 50 Hz with a vibration input of 0.006 + 0.000/-0.002 (double amplitude) to determine response prominences. . The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for approximately 15 seconds. No response prominences were noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

13.4.2 Variable Frequency Vibration

The Pump was vibrated from 4 Hz to 50 Hz with input amplitudes as shown in Table 2. The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for a period of five (5) minutes. No obvious physical damage, leakage or loss in pressure was noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

13.4.3 Endurance Vibration

Since no response prominences were noted the endurance vibration was performed at the specified upper frequency of 50 Hz for a period of two (2) hours. Upon the completion of the two (2) hour dwell an inspection was performed which revealed no obvious physical damage, leakage or loss in pressure.

The frequency, table input vibration levels, accelerometer output vibration levels and the duration of dwell were recorded on the Vibration Test Data Sheets.

13.5 THIRD MAJOR AXIS OF VIBRATION (SIDE TO SIDE AXIS)

13.5.1 Exploratory Vibration

The Pump was vibrated from 4 Hz through 33 Hz with a vibration input of 0.020 ± 0.004 inches (double amplitude) to determine response prominences and from 34 Hz through 50 Hz with a vibration input of 0.006 + 0.000/-0.002 (double amplitude) to determine response prominences. . The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for approximately 15 seconds. No response prominences were noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

13.5.2 Variable Frequency Vibration

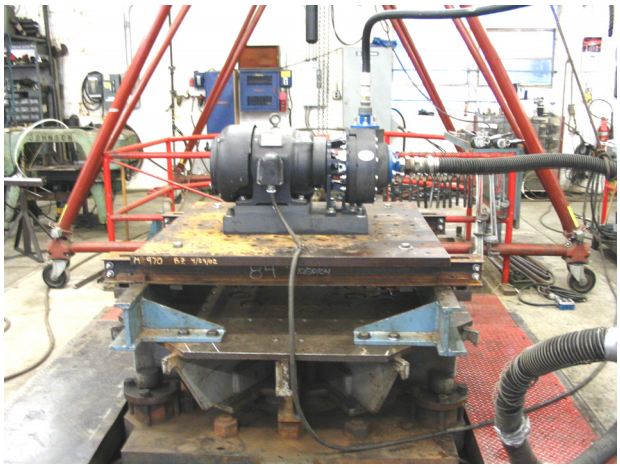
The Pump was vibrated from 4 Hz to 50 Hz with input amplitudes as shown in Table 2. The change in frequency was made in discrete intervals of 1 Hz and the vibration was maintained at each frequency for a period of five (5) minutes. No obvious physical damage, leakage or loss in pressure was noted.

The table input vibration levels and the accelerometer output vibration levels at each frequency were recorded on the Vibration Test Data Sheets.

13.5.3 Endurance Vibration

Since no response prominences were noted the endurance vibration was performed at the specified upper frequency of 50 Hz for a period of two (2) hours. Upon the completion of the two (2) hour dwell an inspection was performed which revealed no obvious physical damage, leakage or loss in pressure.

The frequency, table input vibration levels, accelerometer output vibration levels and the duration of dwell were recorded on the Vibration Test Data Sheets. Refer to the Vibration Test Data Sheets, Figures 5 through 10, for additional information.
Upon completion of the vibration test visual inspection performed revealed no obvious physical damage or discrepancy.



Vertical Axis

Pump Shaft Perpendicular to Incline Axis

Pump Shaft Parallel to Incline

Shock Test Setup Photographs
Figure 1

FACTORY TEST RECORD: CLASS HI SHOCK

FACTORY TEST RECORD: CLASS HI SHOCK			DATE 25 October 2005	TEST # 10405.1
1. ITEM NAME OF EQUIPMENT SHOCK-TESTED 3" x 1 ½" x 6" 15HP Pump		2. RATING (KW, VOLTS, GPM, CFM, ETC.)		
3. MAJOR PARTS				
PUMP, ETC.	TESTED FOR Sims Pump Valve Company, Inc.	ADDRESS 1314 Park Avenue Hoboken, NJ 07030	GOV DWG NO	IDENTIFYING #
MOTOR, ETC.	MANUFACTURER	ADDRESS	GOV DWG NO	IDENTIFYING #
STARTER, ETC.	MANUFACTURER	ADDRESS	GOV DWG NO	IDENTIFYING #
4. CONTRACT NO.	CONTRACTOR	ADDRESS		

5. TYPE OF SHOCK TEST ☒ ASSEMBLY ☐ SUB-ASSEMBLY ☐ PART

6. TOTAL WEIGHT OF ASSEMBLY TESTED 452 lbs.	WEIGHT OF INDIVIDUAL MAJOR PARTS LBS.	MOTOR LBS.	STARTER LBS.
7. WEIGHT CLASSIFICATION OF ITEM ☐ LIGHT ☒ MEDIUM	8. APPLICABLE MOUNTING FIGURE IN SPECIFICATION MIL-S-901 ☐ FIX 4A, FIG 5 ☐ FIX 4C, FIG 8 ☒ FIG 13 ☒ FIG 16 ☐ FIG 10-2 ☐ OTHER		

9. FOR LIGHTWEIGHT ITEMS

FIRST CONDITION				SECOND CONDITION			
BLOW	DROP	AXIS	DAMAGE INCURRED	BLOW	DROP	AXIS	DAMAGE INCURRED

ITEMS SUBJECT TO ABOVE TWO CONDITIONS WERE SAME ☐ DIFFERENT☐

REMARKS

10. FOR MEDIUM-WEIGHT ITEMS

Fig. 13 / Fig. 16,				Fig. 16,			
BLOWS	GRP #	HAMMER DROP	DAMAGE INCURRED	BLOWS	GRP #	HAMMER DROP	DAMAGE INCURRED
1	I	1.25	No damage noted	7	I	1.5'	No damage noted
2	II	2.25'	No damage noted	8	II	2.5'	No damage noted
3	III	2.25'	No damage noted	9	III	2.5'	No damage noted
4	I	1.5'	No damage noted				
5	II	2.5'	No damage noted				
6	III	2.5'	No damage noted				

TOTAL WEIGHT ON ANVIL TABLE Figure 13- 2,091.5, Figure 16- 3,181.5 lbs	REMARKS	
TEST LABORATORY NU Laboratories, Inc.	ADDRESS 312 Old Allerton Road, Annandale, NJ 08801	TEST ENGINEER

Factory Test Record
Figure 2

MIL-S-901D: SHOCK ACCEPTANCE FORM

1. The item identified below has met the requirements of Military Specification MIL-S-901, based upon:
   - ☒ Shock testing of the item identified below
   - ❑ Previous shock testing of an item similar to the item identified below (shock test extension)
   - ❑ Previous shock testing of an item identical to the item identified below (shock test extension)
2. Item (Nomenclature) Pump
3. Item (Description) 3" x 1 1/2" x 6 15HP Pump
4. Tested For Sims Pump Company
5. Model N/A 6. Size/Capacity _____
7. Serial Number N/A 8. Revision and Date -
9. Military Specification MIL-S-901D
10. Ship _____ 11. Service _____
12. Contract No. _____
13. Shock Test Facility NU Laboratories, Inc.
14. Report No. 10405.1
15. Previous Shock test approval reference (if this form conveys shock test Extension approval) _____

16.	Test Category	☐ Lightweight	☒ Medium weight	☐ Heavyweight	
17.	Shock Grade	☒ A	☐ B		
18.	Equipment Class	☒ I	☐ II	☐ III	
19.	Shock Test Type	☒ A	☐ B	☐ C	
20.	Mounting Location	☒ Deck	☐ Hull	☐ Shell	☐ Wetted-Surface

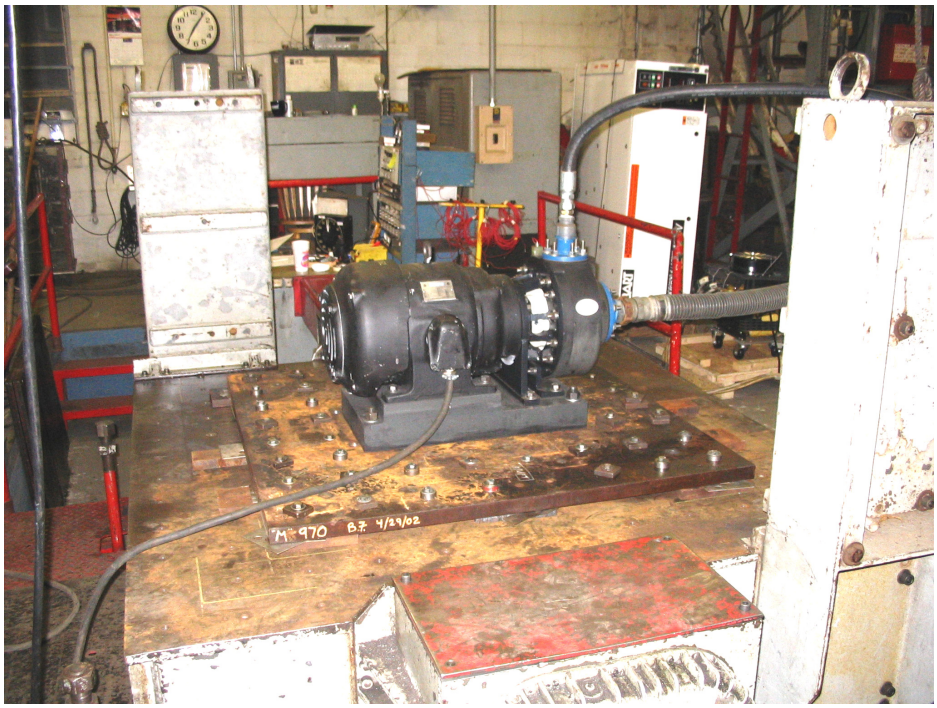
21. Shipboard mounting plane represented during shock test:

☒ Base	☐ Front or Face	☐ Back
☐ Top	☐ Combination	☐ Other Flanged Ends

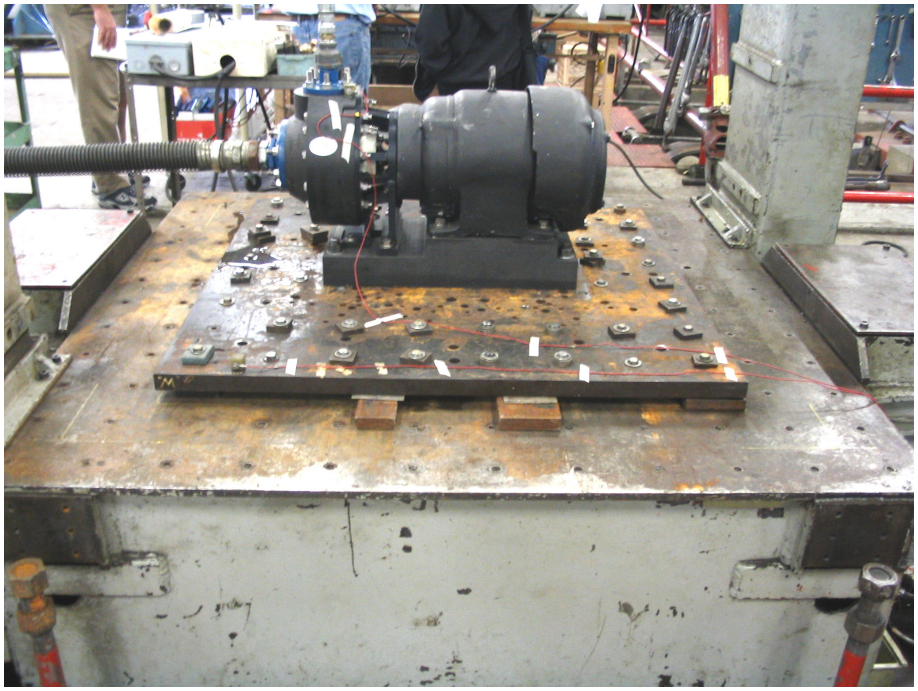
22. Mounting orientation of item relative to ship's fore-and-aft axis (for medium weight and heavyweight test items only): Unrestricted
23. Approval Limitations: _____
24. Approved. _____

Authorized Signature	Approval Activity	Date
		25 October 2005

Shock Acceptance Form
Figure 3



Vertical and Front to Back Axes



Side to Side Axis

Vibration Test Setup
Figure 4

Hz	EXPLORATORY INPUT	EXPLORATORY CH. 1	EXPLORATORY CH. 2	VARIABLE FREQUENCY INPUT	VARIABLE FREQUENCY CH. 1	VARIABLE FREQUENCY CH. 2
4	.024	.024		.063	.064	
5	.024	.024		.063	.064	
6	.023	.023		.062	.063	
7	.023	.022		.062	.063	
8	.022	.022		.061	.062	
9	.022	.022		.061	.062	
10	.021	.022		.061	.061	
11	.021	.021		.061	.061	
12	.021	.021		.061	.061	
13	.021	.021		.061	.061	
14	.021	.021		.060	.060	
15	.021	.021		.060	.060	
16	.021	.020		.044	.043	
17	.021	.020		.044	.043	
18	.021	.020		.044	.043	
19	.020	.020		.044	.042	
20	.020	.020		.043	.042	
21	.020	.020		.043	.042	
22	.020	.019		.043	.042	
23	.020	.019		.043	.042	
24	.020	.019		.043	.041	
25	.020	.019		.043	.041	
26	.020	.019		.022	.022	
27	.020	.019		.022	.022	
28	.019	.019		.022	.022	
29	.019	.019		.022	.022	
30	.019	.019		.022	.022	
31	.019	.019		.022	.022	
32	.020	.019		.022	.022	
33	.021	.019		.022	.022	
34	.006	.005		.011	.011	
35	.006	.005		.011	.011	
36	.006	.005		.011	.011	
37	.006	.005		.011	.011	
38	.006	.005		.011	.011	
39	.006	.005		.011	.011	
40	.006	.005		.011	.011	
41	.006	.005		.006	.005	
42	.006	.005		.006	.005	
43	.006	.005		.006	.005	
44	.006	.005		.006	.005	
45	.006	.005		.006	.005	
46	.006	.005		.006	.005	
47	.006	.005		.006	.005	
48	.006	.005		.006	.005	
49	.006	.005		.006	.005	
50	.006	.005		.006	.005	

RES. _____ Hz

VIBRATION TEST DATA SHEET

JOB NO. 10405

DATE 10/15/05

AXIS Front to Back

NU LABORATORIES, INC.

312 Old Allerton Rd. Annandale, NJ 08801
908-713-9300

NOTE: RECORDED DATA IS DOUBLE AMPLITUDE (INCHES)

ENDURANCE TEST

Hz	INPUT	DURATION
50	.006	7 Hours

• TEST SPECIMEN • NOMENCLATURE

3 x 1½ x 6 Pump

SERIAL NO.

MANUFACTURER

Sims Inc.

ACCELEROMETER LOCATIONS

CH. 1 Top of Pump

CH. 2

REMARKS

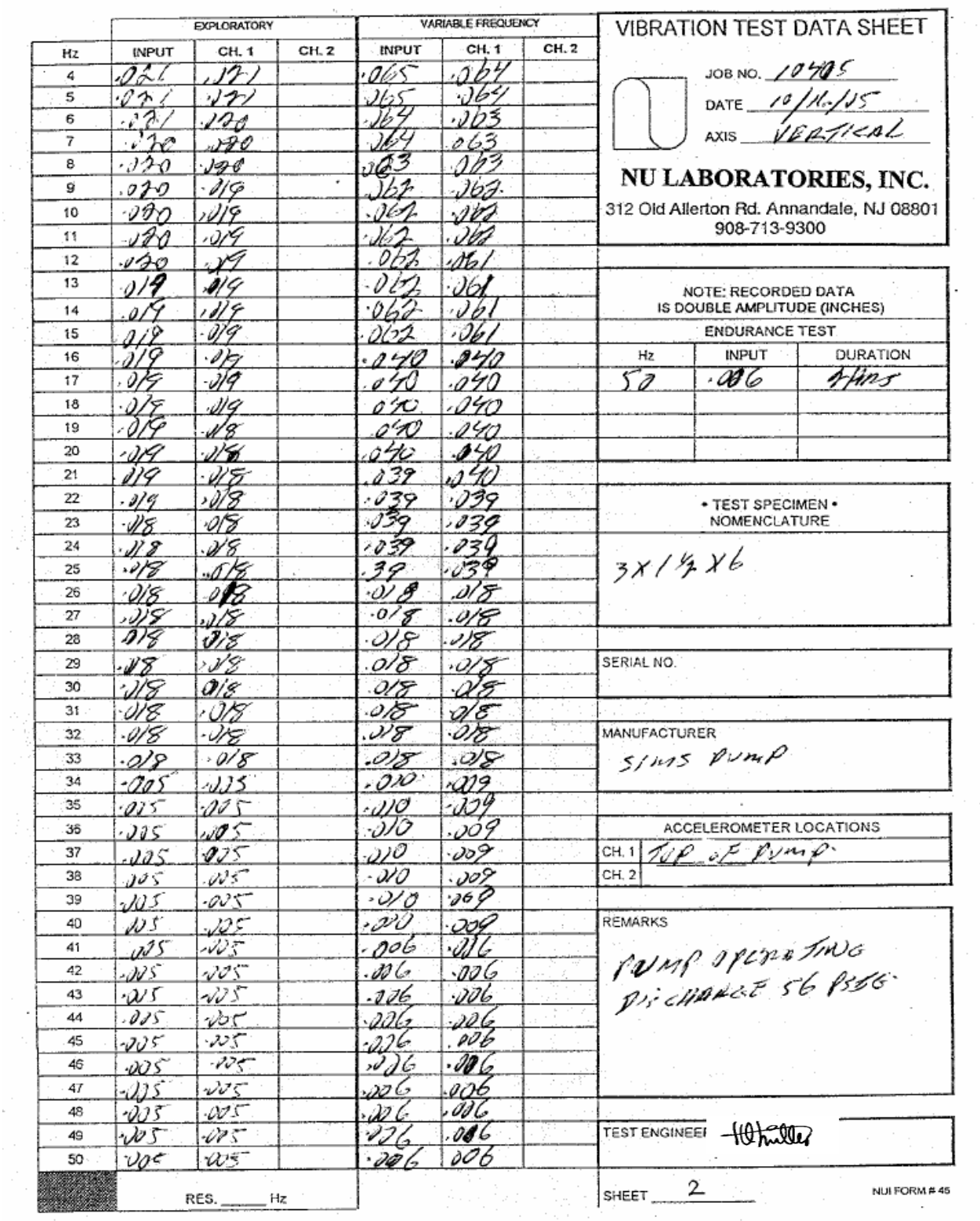
Pump operating 7 hours
Discharge 56 psig.

TEST ENGINEER

SHEET 1

NUI FORM # 45

Vibration Test Data Sheet
Figure 5



Hz	EXPLORATORY INPUT	EXPLORATORY CH. 1	EXPLORATORY CH. 2	VARIABLE FREQUENCY INPUT	VARIABLE FREQUENCY CH. 1	VARIABLE FREQUENCY CH. 2
4	.021	.021		.065	.064	
5	.021	.021		.065	.064	
6	.021	.020		.064	.063	
7	.020	.020		.064	.063	
8	.020	.020		.063	.063	
9	.020	.019		.062	.062	
10	.020	.019		.061	.062	
11	.020	.019		.062	.062	
12	.020	.019		.062	.061	
13	.019	.019		.062	.061	
14	.019	.019		.062	.061	
15	.018	.019		.062	.061	
16	.019	.019		.040	.040	
17	.019	.019		.040	.040	
18	.019	.019		.040	.040	
19	.019	.018		.040	.040	
20	.019	.018		.040	.040	
21	.019	.018		.039	.040	
22	.019	.018		.039	.039	
23	.018	.018		.039	.039	
24	.018	.018		.039	.039	
25	.018	.018		.039	.039	
26	.018	.018		.018	.018	
27	.018	.018		.018	.018	
28	.018	.018		.018	.018	
29	.018	.018		.018	.018	
30	.018	.018		.018	.018	
31	.018	.018		.018	.018	
32	.018	.018		.018	.018	
33	.018	.018		.018	.018	
34	.005	.005		.010	.009	
35	.005	.005		.010	.009	
36	.005	.005		.010	.009	
37	.005	.005		.010	.009	
38	.005	.005		.010	.009	
39	.005	.005		.010	.009	
40	.005	.005		.010	.009	
41	.005	.005		.006	.006	
42	.005	.005		.006	.006	
43	.005	.005		.006	.006	
44	.005	.005		.006	.006	
45	.005	.005		.006	.006	
46	.005	.005		.006	.006	
47	.005	.005		.006	.006	
48	.005	.005		.006	.006	
49	.005	.005		.006	.006	
50	.005	.005		.006	.006	

RES. _____ Hz

VIBRATION TEST DATA SHEET

JOB NO. 10405

DATE 10/16/05

AXIS VERTICAL

NU LABORATORIES, INC.
312 Old Allerton Rd. Annandale, NJ 08801
908-713-9300

NOTE: RECORDED DATA IS DOUBLE AMPLITUDE (INCHES)

ENDURANCE TEST

Hz	INPUT	DURATION
50	.006	4 Hrs

• TEST SPECIMEN • NOMENCLATURE

3 X 1 ½ X 6

SERIAL NO.

MANUFACTURER

SIMS PUMP

ACCELEROMETER LOCATIONS

CH. 1 TOP OF PUMP

CH. 2

REMARKS

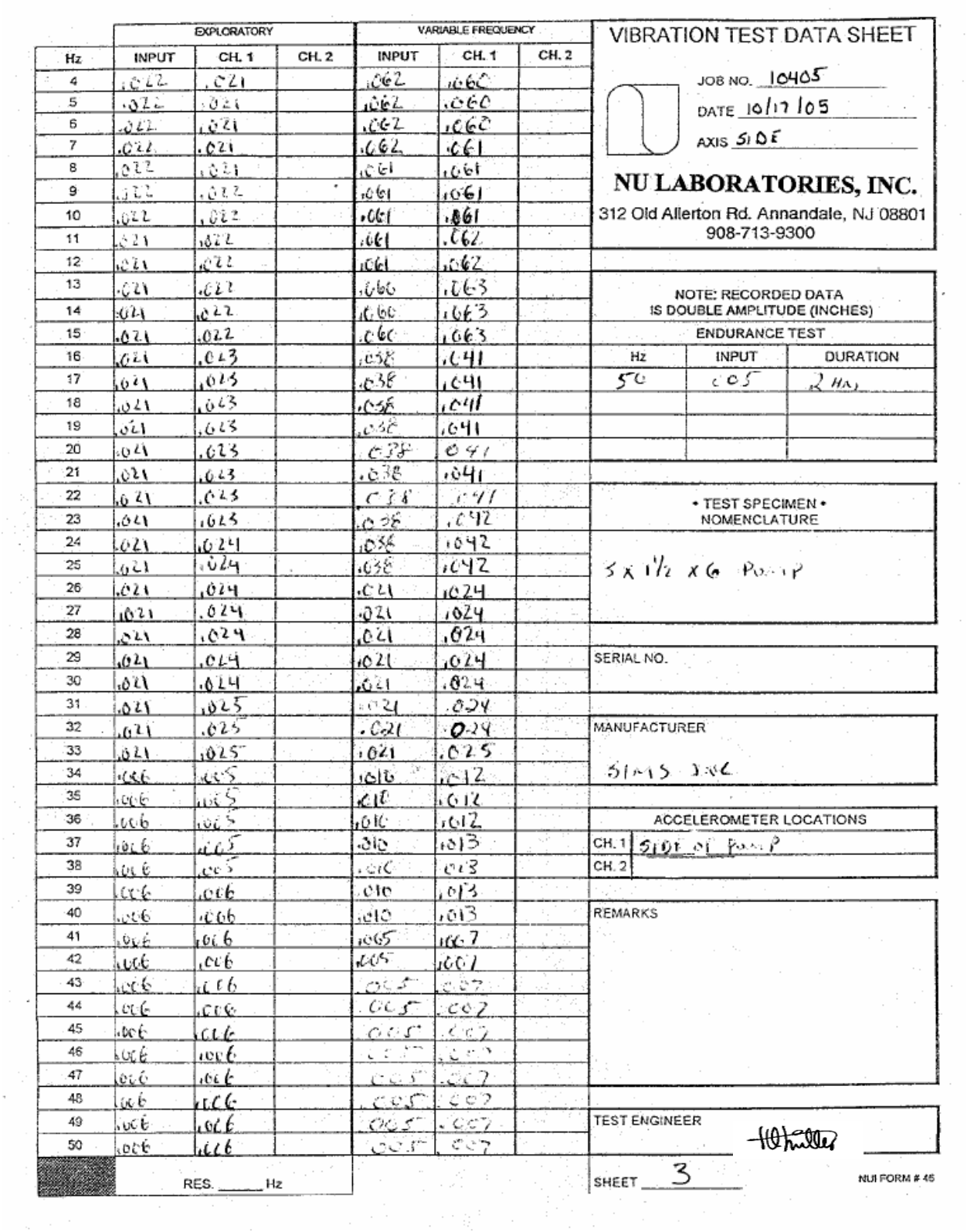
PUMP OPERATING
DISCHARGE 56 PSIG

TEST ENGINEER H Mueller

SHEET 2

NUI FORM # 45

Vibration Test Data Sheet
Figure 6



Hz	EXPLORATORY INPUT	EXPLORATORY CH. 1	EXPLORATORY CH. 2	VARIABLE FREQUENCY INPUT	VARIABLE FREQUENCY CH. 1	VARIABLE FREQUENCY CH. 2
4	.022	.021		.062	.060	
5	.022	.021		.062	.060	
6	.022	.021		.062	.060	
7	.022	.021		.062	.061	
8	.022	.021		.061	.061	
9	.022	.022		.061	.061	
10	.022	.022		.061	.061	
11	.021	.022		.061	.062	
12	.021	.022		.061	.062	
13	.021	.022		.060	.063	
14	.021	.022		.060	.063	
15	.021	.022		.060	.063	
16	.021	.023		.038	.041	
17	.021	.023		.038	.041	
18	.021	.023		.038	.041	
19	.021	.023		.038	.041	
20	.021	.023		.038	.041	
21	.021	.023		.038	.041	
22	.021	.023		.038	.041	
23	.021	.023		.038	.042	
24	.021	.024		.038	.042	
25	.021	.024		.038	.042	
26	.021	.024		.021	.024	
27	.021	.024		.021	.024	
28	.021	.024		.021	.024	
29	.021	.024		.021	.024	
30	.021	.024		.021	.024	
31	.021	.025		.021	.024	
32	.021	.025		.021	.024	
33	.021	.025		.021	.025	
34	.006	.005		.010	.012	
35	.006	.005		.010	.012	
36	.006	.005		.010	.012	
37	.006	.005		.010	.013	
38	.006	.005		.010	.013	
39	.006	.006		.010	.013	
40	.006	.006		.010	.013	
41	.006	.006		.005	.007	
42	.006	.006		.005	.007	
43	.006	.006		.005	.007	
44	.006	.006		.005	.007	
45	.006	.006		.005	.007	
46	.006	.006		.005	.007	
47	.006	.006		.005	.007	
48	.006	.006		.005	.007	
49	.006	.006		.005	.007	
50	.006	.006		.005	.007	

RES. _____ Hz

VIBRATION TEST DATA SHEET

JOB NO. 10405

DATE 10/17/05

AXIS SIDE

NU LABORATORIES, INC.

312 Old Allerton Rd. Annandale, NJ 08801
908-713-9300

NOTE: RECORDED DATA IS DOUBLE AMPLITUDE (INCHES)

ENDURANCE TEST

Hz	INPUT	DURATION
50	.05	2 HRS

• TEST SPECIMEN • NOMENCLATURE

5 x 1½ x 6 Pump

SERIAL NO.

MANUFACTURER

SIMS DEV.

ACCELEROMETER LOCATIONS

CH. 1: SIDE OF PUMP

CH. 2:

REMARKS

TEST ENGINEER

SHEET 3

NUI FORM # 45

Vibration Test Data Sheet
Figure 7

LIST OF APPARATUS

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DATE	DUE DATE
Platform Scale	Fairbanks Morse	1124A	G-511379	9/21/05	9/21/06
Torque Wrench	Central Tools	96355	794037102	9/06/05	9/06/06
Accelerometer	Endevco	2221D	EY61	9/21/05	9/21/06
Pressure Gauge	Helicoid	0-1000-5	22869E	8/19/05	8/19/06
Accelerometer	Endevco	2221D	EY62	1/17/05	1/17/06
Medium Weight Shock Machine	New England Trawler	10-T-3351-C	N/A	Functional	
Torque Wrench	CDI	752MFRMH	1002602828	12/08/04	12/08/05
Vibration Machine	L.A.B.	RVH-72-5000	51401	Functional	
Charge Amplifer	Tri Tek	203M	210	8/16/05	8/16/06
Charge Amplifer	Tri Tek	203M	211	3/21/05	3/21/06
1 Hour Timer	Gra-Labs	300	300-87061543	3/21/05	3/21/06
Frequency Counter	Fluke	87	48001437	12/6/04	12/6/05

All calibrations are traceable to the National Institute of Standards and Technology. Procedures satisfy the requirements set forth in MIL-STD-45662 or ANSI/NCSL Z540-1. Calibration records are on file at NU Laboratories, Inc.

All weights and scales are traceable to the State of NJ Office of Weights and Measures (NJSA 51:1-61; 75; NJAC 13:47E-1.2)