Medium Weight Shock and Vibration Test Report
on
4” x 4” x 9”, 20 HP Pump
for
Sims Pump Valve Company
Hoboken, NJ

NU LABORATORIES, INC.
312 Old Allerton Road, Annandale, NJ
(908) 713-9300
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10 January 2008

Prepared By	Checked By	Approved By
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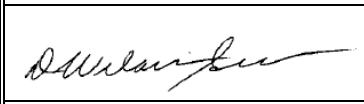	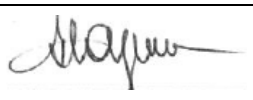	
10 January 2008	10 January 2008	10 January 2008

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1. PURPOSE OF TEST

The purpose of this test was to demonstrate that the 4" x 4" x 9", 20 HP Pump attached to the composite base, hereinafter 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 with 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, Inc.
1314 Park Avenue
Hoboken, NJ 07030

3. MANUFACTURER'S TYPE OR MODEL NO.

4" x 4" x 9", 20 HP Pump
Composite Base: N16695-9A20-03
Serial No.: —1

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, dated 19 June 1987

4.2 SIMS PUMP VALVE COMPANY, INC.

Purchase Order Number: 6696

5. NUMBER OF ITEMS TESTED

One (1)

6. SECURITY CLASSIFICATION OF ITEMS

Unclassified

7. DATE TESTING COMPLETED

14 December 2007

8. TEST CONDUCTED BY

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

9. TEST WITNESSES

Vladimir Spektor, Sims Pump representative
Robert Coseano, NSWCCD representative

10. DISPOSITION OF TEST ITEM

The Pump was returned to Sims Pump Company, Inc.

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 771 pounds.

The Pump was attached to a 40″ x 55″ x 1½” steel plate using eight (8) 7/8”-8 Grade 5 bolts torqued to 150 lbs-ft. The entire assembly was then secured to fixture Figure 13 of MIL-S-901D on the medium weight shock machine, oriented in the first major axis of test. An 11 pound dummy mass was attached to the suction side of the Pump using eight (8) 5/8”-11 studs torqued to 80 lbs-ft. A 10 pound dummy mass was attached to the discharge side of the Pump using eight (8) 5/8”-11 bolts torqued to 80 lbs-ft. The total weight on the anvil table was 2473.5 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	**771 lbs.**
40″ x 55″ x 1½”Steel Plate	**938 lbs.**
Dummy Mass - Suction	**11 lbs.**
Dummy Mass - Discharge	**10 lbs.**
Mounting Bolts	**7 lbs.**
90° 4” Pipe	**10 lbs.**
Three (3) Half Rails	**249 lbs.**
Twelve (12) Half Rail Shoes	**48 lbs.**
Nine (9) T-Blocks	**36 lbs.**
Nine (9) Spacers	**13.5 lbs.**
Figure 13	**380 lbs.**
Figure 16	**1470 lbs.**
Total Weight Fixture Figure 13	**2473.5 lbs.**
Total Weight Fixture Figure 16	**3563.5 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, NAVICP, 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 30 psig.

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

12.4 BLOW #1 - CONDITION A

12.4.1 Conditions: Vertical Axis, 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: Vertical Axis, 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: Vertical Axis, 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 removed from fixture Figure 13 of MIL-S-901D, and reattached to fixture Figure 16 of MIL-S-901D of the referenced specifications, oriented with the side of the Pump facing down. The total weight on the anvil table was 3563.5 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: 30° Side Down, 1.75’ 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: 30° Side Down, 2.75' 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: 30° Side Down, 2.75' 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 continued.

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 Pump facing down. Refer to Figure 1. The total weight on the anvil table remained at 3563.5 pounds.

12.10 BLOW #7 - CONDITION A

12.10.1 Conditions: 30° Front Down, 1.75' 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: 30° Front Down, 2.75' 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: 30° Front Down, 2.75' 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 Record, Figure 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 photographs of the test setups.

One (1) accelerometer was attached to the plate and one (1) accelerometer was attached to the Pump, oriented 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 30 psig.

13.3 FIRST MAJOR AXIS OF VIBRATION (FRONT TO BACK)

13.3.1 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 Sheet, Figure 5.

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, Figure 5.

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

The endurance vibration was performed at the frequency of 50 Hz for a period of two (2) hours. Upon the completion of the two (2) hour dwell an external visual inspection revealed no obvious physical damage, leakage or loss in pressure.

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 Sheet, Figure 6.

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 Sheet, Figure 6.

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 external visual inspection revealed no obvious physical damage, leakage or loss in pressure.

13.5 THIRD MAJOR AXIS OF VIBRATION (SIDE TO SIDE)

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 Sheet, Figure 7.

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 Sheet, Figure 7.

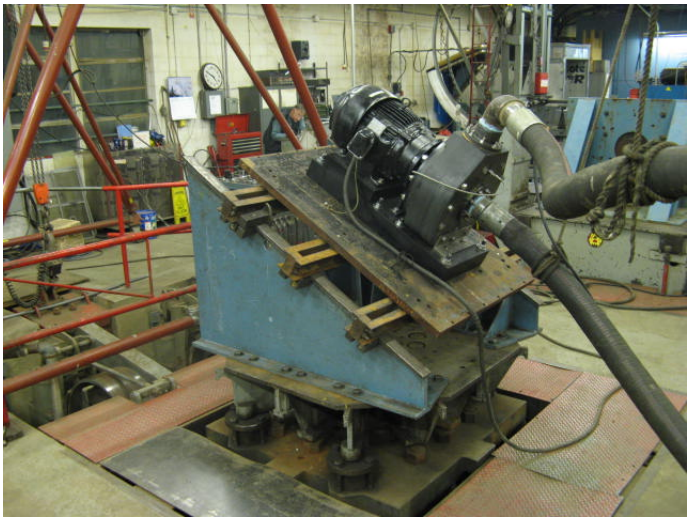
13.5.3 Endurance Vibration

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 external visual inspection revealed no obvious physical damage, leakage or loss in pressure.

Refer to the Vibration Test Data Sheets, Figures 5 through 7, for additional information.

Vertical Axis

30° Side Down



30° Pump Down

Shock Test Setup Photographs
Figure 1

FACTORY TEST RECORD: CLASS HI SHOCK

FACTORY TEST RECORD: CLASS HI SHOCK	DATE 14 December 2007	TEST # 10858.1
1. ITEM NAME OF EQUIPMENT SHOCK-TESTED 4" x 4" x 9", 20 HP Pump attached to composite base	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 771 lbs.	WEIGHT OF INDIVIDUAL MAJOR PARTS	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			
BLOWS	GRP #	HAMMER DROP	DAMAGE INCURRED	BLOWS	GRP #	HAMMER DROP	DAMAGE INCURRED
1	I	1.25'	No damage noted	4	I	1.75'	No damage noted
2	II	2.25'	No damage noted	5	II	2.75'	No damage noted
3	III	2.25'	No damage noted	6	III	2.75'	No damage noted
				7	I	1.75'	No damage noted
				8	II	2.75'	No damage noted
				9	III	2.755'	No damage noted

TOTAL WEIGHT ON ANVIL TABLE Fig 13 -2473.5 lbs., Fig 16 – 3563.5 lbs.	REMARKS	
TEST LABORATORY NU Laboratories, Inc.	ADDRESS 312 Old Allerton Road, Annandale, NJ 08801	TEST ENGINEER [signature]

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) 4" x 4" x 9", 20 HP Pump attached to composite base
4. Tested For Sims Pump Valve Company, Inc.
5. M/N NS16695-9A20 6. Size/Capacity 600 gpm
7. Serial Number —1 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. 10858.1
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 ____

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. _____

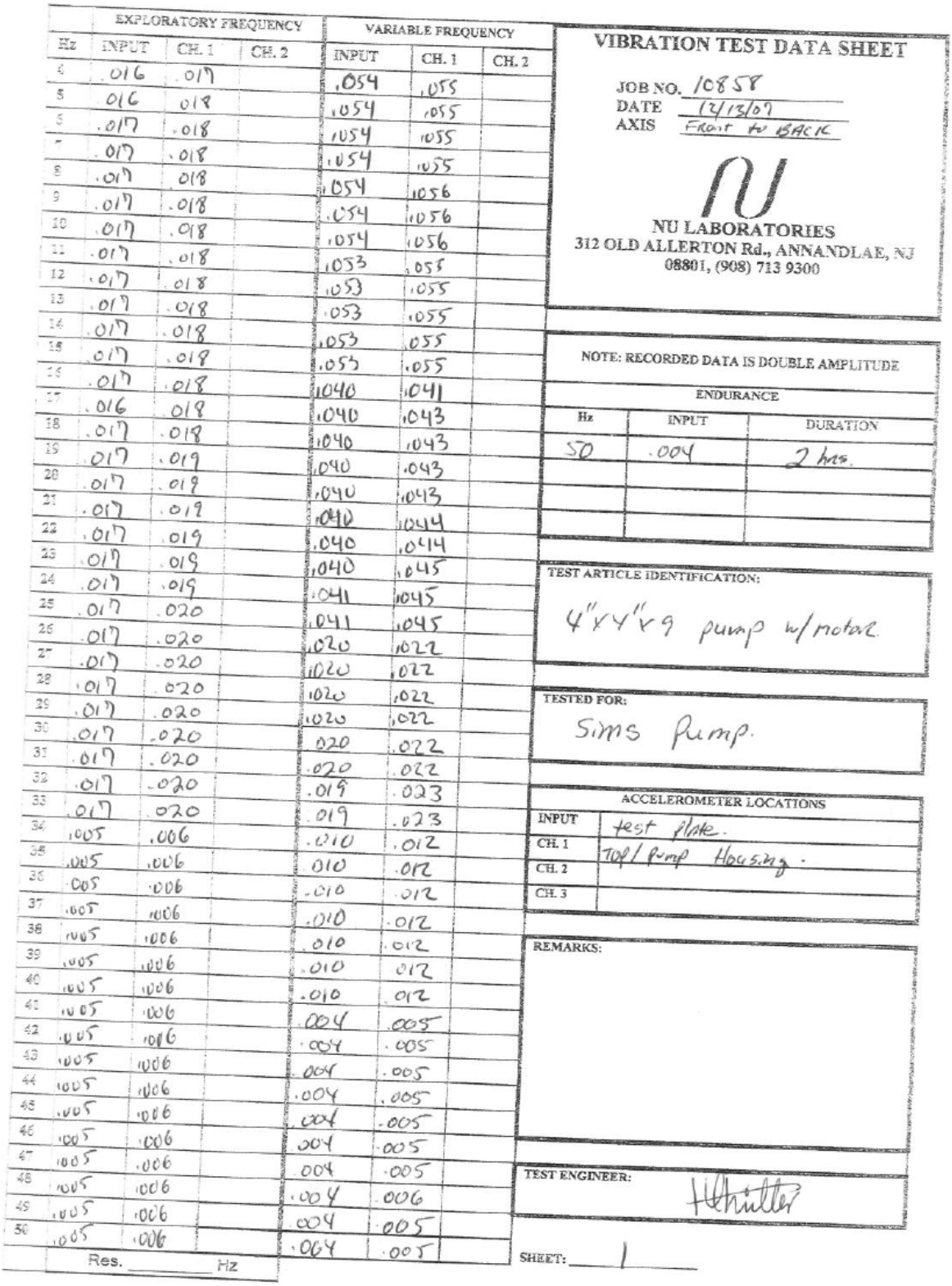
Authorized Signature	Approval Activity	Date
		14 December 2007

Shock Acceptance Form
Figure 3

Front to Back and Vertical Axes

Side to Side Axis

Vibration Test Setup
Figure 4



Hz	EXPLORATORY FREQUENCY INPUT	CH. 1	CH. 2	VARIABLE FREQUENCY INPUT	CH. 1	CH. 2
4	.016	.017		.054	.055	
5	.016	.018		.054	.055	
6	.017	.018		.054	.055	
7	.017	.018		.054	.055	
8	.017	.018		.054	.056	
9	.017	.018		.054	.056	
10	.017	.018		.054	.056	
11	.017	.018		.053	.055	
12	.017	.018		.053	.055	
13	.017	.018		.053	.055	
14	.017	.018		.053	.055	
15	.017	.018		.053	.055	
16	.017	.018		.040	.041	
17	.016	.018		.040	.043	
18	.017	.018		.040	.043	
19	.017	.019		.040	.043	
20	.017	.019		.040	.043	
21	.017	.019		.040	.044	
22	.017	.019		.040	.044	
23	.017	.019		.040	.045	
24	.017	.019		.041	.045	
25	.017	.020		.041	.045	
26	.017	.020		.020	.022	
27	.017	.020		.020	.022	
28	.017	.020		.020	.022	
29	.017	.020		.020	.022	
30	.017	.020		.020	.022	
31	.017	.020		.020	.022	
32	.017	.020		.019	.023	
33	.017	.020		.019	.023	
34	.005	.006		.010	.012	
35	.005	.006		.010	.012	
36	.005	.006		.010	.012	
37	.005	.006		.010	.012	
38	.005	.006		.010	.012	
39	.005	.006		.010	.012	
40	.005	.006		.010	.012	
41	.005	.006		.004	.005	
42	.005	.006		.004	.005	
43	.005	.006		.004	.005	
44	.005	.006		.004	.005	
45	.005	.006		.004	.005	
46	.005	.006		.004	.005	
47	.005	.006		.004	.005	
48	.005	.006		.004	.006	
49	.005	.006		.004	.005	
50	.005	.006		.004	.005	

Res. _____ Hz

VIBRATION TEST DATA SHEET

JOB NO. 10858
DATE 12/13/07
AXIS Front to BACK

NU LABORATORIES
312 OLD ALLERTON Rd., ANNANDLAE, NJ
08801, (908) 713 9300

NOTE: RECORDED DATA IS DOUBLE AMPLITUDE

ENDURANCE

Hz	INPUT	DURATION
50	.004	2 hrs.

TEST ARTICLE IDENTIFICATION:
4"x4"x9 pump w/motor

TESTED FOR:
Sims Pump.

ACCELEROMETER LOCATIONS

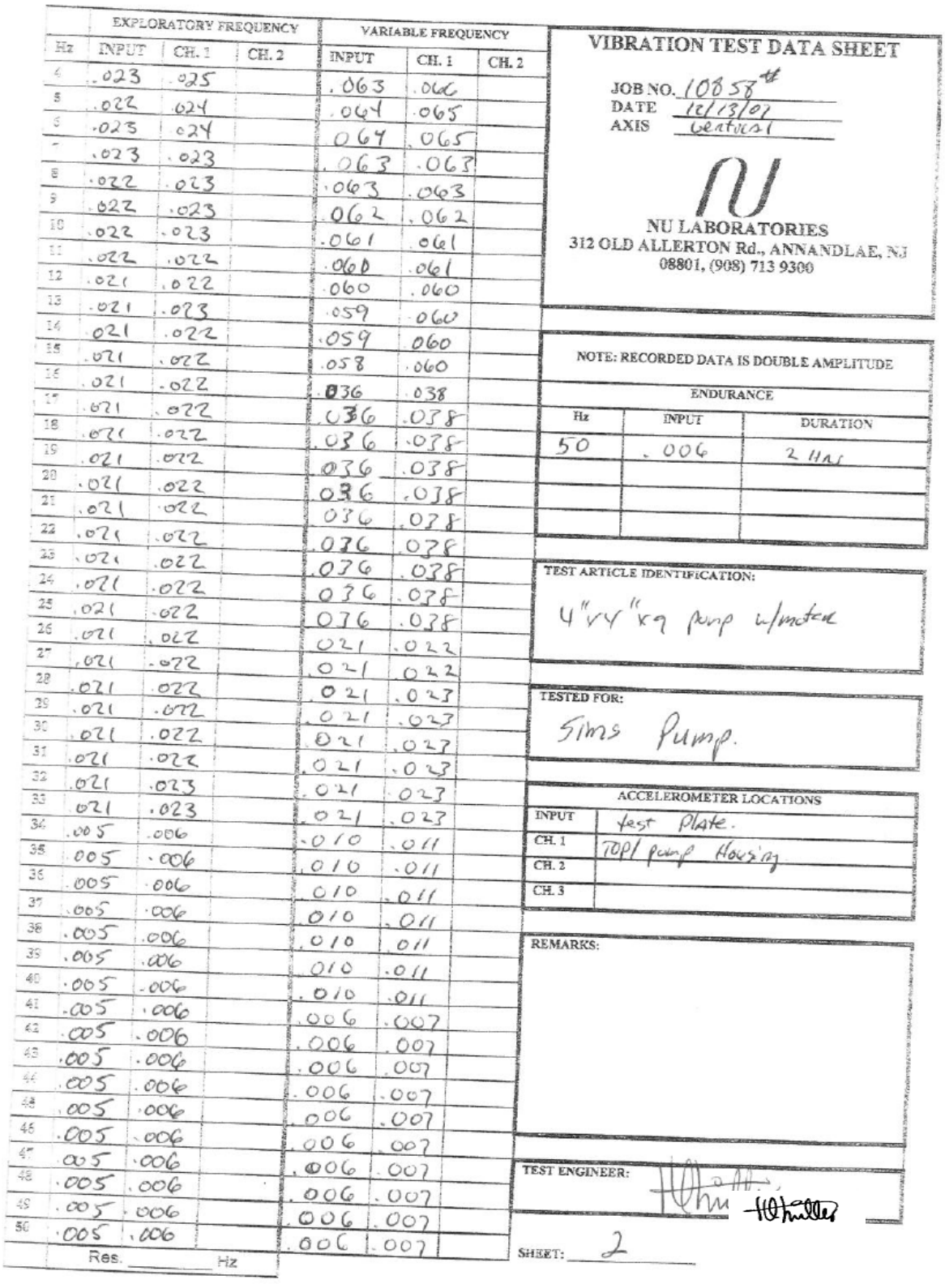
INPUT	test plate.
CH. 1	Top/Pump Housing.
CH. 2	
CH. 3	

REMARKS:

TEST ENGINEER: HChristler

SHEET: 1

Vibration Test Data Sheet
Figure 5



Hz	EXPLORATORY FREQUENCY INPUT	CH. 1	CH. 2	VARIABLE FREQUENCY INPUT	CH. 1	CH. 2
4	.023	.025		.063	.066	
5	.022	.024		.064	.065	
6	.023	.024		064	.065	
7	.023	.023		.063	.063	
8	.022	.023		.063	.063	
9	.022	.023		.062	.062	
10	.022	.023		.061	.061	
11	.022	.022		.060	.061	
12	.021	.022		.060	.060	
13	.021	.023		.059	.060	
14	.021	.022		.059	060	
15	.021	.022		.058	.060	
16	.021	.022		036	038	
17	.021	.022		.036	.038	
18	.021	.022		036	.038	
19	.021	.022		036	.038	
20	.021	.022		036	.038	
21	.021	.022		036	.038	
22	.021	.022		.036	.038	
23	.021	.022		.036	.038	
24	.021	.022		036	.038	
25	.021	.022		036	.038	
26	.021	.022		021	.022	
27	.021	.022		.021	022	
28	.021	.022		.021	.023	
29	.021	.022		.021	.023	
30	.021	.022		021	.023	
31	.021	.022		.021	.023	
32	.021	.023		.021	.023	
33	021	.023		.021	.023	
34	.005	.006		.010	.011	
35	.005	.006		.010	.011	
36	.005	.006		010	.011	
37	.005	.006		010	.011	
38	.005	.006		.010	.011	
39	.005	.006		010	.011	
40	.005	.006		.010	.011	
41	.005	.006		.006	.007	
42	.005	.006		.006	.007	
43	.005	.006		.006	.007	
44	.005	.006		.006	.007	
45	.005	.006		006	.007	
46	.005	.006		006	.007	
47	005	.006		.006	.007	
48	.005	.006		.006	.007	
49	.005	.006		.006	.007	
50	.005	.006		.006	.007	

Res. _____ Hz

VIBRATION TEST DATA SHEET

JOB NO. 10858 rt
DATE 12/13/01
AXIS Vertical

NU LABORATORIES
312 OLD ALLERTON Rd., ANNANDLAE, NJ
08801, (908) 713 9300

NOTE: RECORDED DATA IS DOUBLE AMPLITUDE

ENDURANCE

Hz	INPUT	DURATION
50	.006	2 Hrs

TEST ARTICLE IDENTIFICATION:
4"x4"x9 pump w/motor

TESTED FOR:
Sims Pump.

ACCELEROMETER LOCATIONS

INPUT	test Plate.
CH. 1	Top/ pump Housing
CH. 2	
CH. 3	

REMARKS:

TEST ENGINEER:

SHEET: 2

Vibration Test Data Sheet
Figure 6

	EXPLORATORY FREQUENCY			VARIABLE FREQUENCY		
Hz	INPUT	CH. 1	CH. 2	INPUT	CH. 1	CH. 2
4	.019	.019		.053	.053	
5	.019	.019		.054	.054	
6	.019	.019		.056	.055	
7	.020	.020		.057	.056	
8	.020	.020		.058	.057	
9	.020	.020		.058	.058	
10	.020	.020		.058	.058	
11	.020	.020		.058	.059	
12	.020	.021		.057	.059	
13	.020	.021		.057	.059	
14	.019	.021		.057	.060	
15	.019	.021		.057	.060	
16	.019	.021		.039	.042	
17	.019	.021		.039	.042	
18	.019	.021		.039	.043	
19	.019	.021		.039	.043	
20	.019	.022		.039	.043	
21	.019	.022		.039	.044	
22	.019	.022		.039	.044	
23	.019	.022		.039	.044	
24	.019	.022		.039	.045	
25	.019	.022		.039	.045	
26	.019	.022		.022	.025	
27	.019	.023		.022	.025	
28	.019	.023		.022	.026	
29	.019	.023		.022	.026	
30	.019	.023		.022	.026	
31	.019	.024		.021	.027	
32	.019	.024		.021	.027	
33	.019	.024		.021	.027	
34	.004	.006		.010	.014	
35	.004	.006		.010	.014	
36	.004	.006		.010	.014	
37	.004	.006		.010	.014	
38	.004	.006		.010	.014	
39	.004	.006		.010	.014	
40	.004	.006		.010	.015	
41	.004	.006		.006	.009	
42	.004	.007		.006	.009	
43	.004	.007		.006	.009	
44	.004	.007		.006	.009	
45	.004	.007		.006	.009	
46	.004	.007		.006	.010	
47	.004	.007		.006	.010	
48	.004	.007		.006	.010	
49	.004	.007		.006	.011	
50	.004	.008		.006	.011	
	Res. _____ Hz					

VIBRATION TEST DATA SHEET

JOB NO. 10858
DATE 12/14/07
AXIS 510C TO 510C

NU LABORATORIES
312 OLD ALLERTON Rd., ANNANDLAE, NJ
08801, (908) 713 9300

NOTE: RECORDED DATA IS DOUBLE AMPLITUDE

ENDURANCE

Hz	INPUT	DURATION
50	.006	2 HRS

TEST ARTICLE IDENTIFICATION:

4"x4"x9 PUMP W/MOTOR

TESTED FOR:

SIMS PUMP

ACCELEROMETER LOCATIONS

INPUT	TEST PLATE
CH. 1	TOP / PUMP HOUSING
CH. 2	
CH. 3	

REMARKS:

TEST ENGINEER: H Shutter

SHEET: 3

Vibration Test Data Sheet
Figure 7

LIST OF APPARATUS

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL DATE	DUE DATE
Medium Weight Shock Machine	New England Trawler	10-T-3351-C	N/A	Functional	
Platform Scale	Fairbanks Morse	1124A	G511379	10/10/07	10/10/08
Digital Scale	Industrial Commercial	TI-500SSB-5K	5D1901100001E	10/10/07	10/10/08
Balance Scale	Ohaus	1225	EL330	10/10/07	10/10/08
Torque Wrench	Snap-On	TED50 FUA	1024	05/29/07	05/29/08
Torque Wrench	CDI	2503MFRMH	0499200127	03/22/07	03/22/08
Torque Wrench	Armstrong	64-301	L-5	09/10/07	09/10/08
Torque Wrench	CDI	752MFRMH	1002602828	01/24/07	01/24/08
Pressure Gauge	Wekssler	GP2-16-3	1003	10/29/07	10/29/08
Vibration Machine	LAB	72-5000	51401	Functional	
1 Hour Timer	GraLab	300	300-87061543	05/29/07	05/29/08
Multimeter	Fluke	83	57511058	05/29/07	05/29/08
Charge Amplifier	Trig Tek	203M	733	03/07/07	03/07/08
Charge Amplifier	Trig Tek	203M	223	05/16/07	05/16/08
Accelerometer	Endevco	2221D	EY61	11/02/07	11/02/08
Accelerometer	Endevco	2221D	EY62	03/05/07	03/05/08

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)