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Page 1 of 7

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* * * * *

**This document was reviewed following the
procedures described in WHC-CM-3-4 and is:**

APPROVED FOR PUBLIC RELEASE

* * * * *

WHC Information Release Administration Specialist:

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7. Abstract

This Acceptance Test Procedure is for the 241-SY-101/241-C-106 Shot Loading System. The procedure will test the components of the Shot Loading System and its capability of adequately loading shot into the annular space of the Container.

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9. Impact Level **SQ**

10. RELEASE STAMP

ACCEPTANCE TEST PROCEDURE

241-SY-101/241-C-106

SHOT LOADING SYSTEM

Prepared by

TWRS Engineering Support Services

Westinghouse Hanford Company
Hanford Operations and Engineering Contractor

for the
U.S. Department of Energy
Richland Operations

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1.0 INSTRUCTION SECTION

1.1 PURPOSE/SCOPE

The purpose of this test procedure is to provide a means of testing the Shot Loading System (SLS). The test will verify that the system is capable of performing its intended function of properly filling the annular spaces of the Container with shielding shot. The loaded shot will provide shielding as required for transporting and storage of a contaminated pump after removal from the tank. This test serves as verification that the SLS is acceptable for use in the pump removal operations for Tanks 241-SY-101, 241-C-106 and 241-AY-102. The pump removal operation for these three tanks will be performed by two different organizations with different equipment, but the Shot Loading System will be compatible between the two operations.

The test will be performed with the Shot Loading Platform (SLP), the Shot Loading Trainer (SLT), which is a mock section of the Container, with vibrator equipment attached, the Drum Handler, and the Shot Bucket. The test will determine that all components of the Shot Loading System interface properly. The test will also determine if shot can be loaded sufficiently to provide the required shielding for transporting and storing the Container.

For the actual pump removal, lead shot and/or steel shot will be loaded into the Container's annular spaces, depending on shielding requirements for the different sections of the Container determined after the pump is loaded. If radiation levels are measured to be below the required maximum for storage at any section of the Container, no shot will be loaded into that section's corresponding annular space. The resulting weight of shot that can be loaded into the SLT by this testing will be evaluated for determining the shielding capability of shot loading. For acceptance test purposes, only steel shot will be used due to the hazardous material classification of lead.

The scope of the test encompasses six separate tests. The first test procedure will verify that all of the components of the Shot Loading Platform interface properly. The second test procedure will test the Drum Handler. The third test procedure will check the interface between the shot loading system and the trailer-mounted Container. The fourth test procedure will test the installation and operation of the vibrators on the SLT. The fifth test procedure will determine the weight of shot that can be loaded into the Container with no vibration of the Container. The sixth test procedure will include operating the vibrators during the shot loading operation to determine the weight of shot that can be loaded while the Container is being vibrated. The seventh test will determine the weight of additional shot that can be loaded when the SLT is vibrated only after loading shot. Following each shot loading operation, the resulting shot distribution will be observed and evaluated.

1.2 REFERENCES

- DOE 1992, *Hanford Site Hoisting and Rigging Manual*, DOE.RL.92.36, U.S. Department of Energy Field Office, Richland, WA.

1.3 RESPONSIBILITIES

1.3.1 Cognizant Manager

- Responsible for overall control of the Equipment Removal System (ERS), including the testing of the SLS.
- Assigns responsibilities related to the ERS, which includes the SLS.

1.3.2 Cognizant Engineer

- Identifies and specifies requirements for the ERS.
- Approves the Acceptance Test Procedure and test criteria changes.
- Provides technical expertise during testing of the SLS.
- Approves acceptability of test activities and results.
- Assigns SLS related responsibilities.
- Responsible for preparing the Acceptance Test Procedure and the Acceptance Test Report.
- Identifies and provides equipment and facilities for SLS testing.
- Provides technical expertise during the testing of the SLS.

1.3.3 Test Director

- Directs the ICF-KH in the set-up for the ATP test and leads ICF-KH in the procedure of the Acceptance Test.
- Witnesses and signs off on the ATP verification steps.
- Reviews and approves ATP exceptions.
- Reviews and approves ATP procedure revisions.
- Responsible for personnel safety during performance of the test.

1.3.4 Quality Assurance

- Monitors testing activities and data recording.
- Assists in maintenance and control of test records.
- Approves Acceptance Criteria changes.

1.3.5 Safety Engineering

- Reviews the test procedure and specifications for safety conformance.
- Provides test facility inspection and support as needed to conduct testing within the safety standards of WHC.

1.3.6 ICF-KH Construction Manager

- Assigns personnel to perform the SLS testing.
- Responsible for training of personnel that will be performing the test.

1.3.7 ICF-KH Construction Forces

- Responsible for transporting equipment to the test facility.
- Responsible for equipment set-up and instrument calibration, if necessary.
- Responsible for performing the SLS test.

1.4 SYSTEM DESCRIPTION

The Shot Loading System is one major component of the Equipment Removal System, which is designed to remove, contain and store a pump that will require removal from a waste storage tank. The Shot Loading System is designed to fill the annular spaces in the Container with lead or steel shot for shielding. The Shot Loading System consists of the Shot Loading Platform, a Shot Bucket, a Drum Handler, a set of shot funnels, and pneumatic vibrator equipment. Other associated equipment to support the shot loading operation include an air compressor for driving the vibrators, a fork lift for handling bulk shot with the Drum Handler, and a mobile crane for assembling the SLP, moving the SLT, and hoisting the Shot Bucket.

1.5 TEST CONDITIONS AND EQUIPMENT REQUIRED

The test will be performed at the Cold Test Facility (CTF) in the 200 Area. All equipment for the test will be located at the CTF. The conditions for the test must, as closely as practical, simulate the conditions of an actual shot loading operation for the Container on the Hydraulic Trailer. The Shot Loading Trainer has been designed to simulate a section of the Container for Project W-320 (C-106 and AY-102) in diameter and in height above grade. For acceptance test purposes, the diameter and height of the trainer will adequately simulate SY-101 also.

The test procedures will test all components of the Shot Loading System and how they interface. The test will be performed by locating the SLT at the test site at the CTF. The SLT will be placed under the SLP to align the Shot Funnel with the platform opening. The shot specified for this test is 2.03mm - 3.30mm (0.08"-0.13") diameter cast steel shot. The shot loading will be performed in three separate tests to the extent that the SLT will receive no additional shot. The resulting weight of shot loaded will then be determined to evaluate for possible voids in the annular space. A visual inspection through observation ports in the SLT will also be done after each shot loading operation to determine if any areas in the annular space are void of shot. Each shot loading test will include filling two separate annular spaces. The weight of the shot loaded shall be recorded separately for each annular space.

The first shot loading test will be performed without operating the vibrators. This test shall be performed three times to determine the repeatability of the weight of shot that will load into the SLT annular space. If the resulting weight from the three test performances varies by more than 5% from lowest to highest weights, the test shall be repeated until the Test Director judges the results to be satisfactorily consistent.

The second shot loading test will be performed with the 2 vibrators operating together to agitate the SLT during a shot loading operation to determine the capability of loading additional shot. This second test will also be performed a minimum of three times for determining the consistency of resulting weights.

The third shot loading test will be performed by first loading the shot without vibration and then operating the vibrators to further settle the shot and determine the additional weight of shot that can be loaded. The third test will also be performed a minimum of three times to determine repeatability of results.

The vibrators specified for this testing have been sized for the Shot Loading Trainer to provide the same force-to-weight ratio as the larger vibrators planned for the Container/Strongback/Hydraulic Trailer for SY-101. The vibrators for C-106 and AY-102 will be sized based on test results. The test vibrators have adjustable unbalance and speed to vary the vibration force exerted on the SLT. If test results require, the vibrators may be adjusted

between tests to achieve improved test results. The final vibrator sizing for the actual Container/Strongback/Trailer will be based on test results.

Execution of the Acceptance Test Procedure will significantly complement and introduce training for the Shot Loading System by allowing crafts personnel and supervisors to perform simulated shot loading operations. To document names and respective functions of personnel who participate in performing the test, a record is provided in Appendix B to be completed before completing the test. Although there are no radiological hazards in the CTF, the personnel requirements for participating in the ATP are equal to the requirements necessary for working in the actual tank farm.

Useful volumes and weights for the SLT and shot are provided here for test result evaluation:

Shot Loading Trainer:

7" Long Annular Space: Volume = 28.9 liters (7.64 gallons)
= 28,900 cc (1,764 cu. in.)

48" Long Annular Space: Volume = 198 liters (52.4 gallons)
= 198,000 cc (12,100 cu. in.)

Many factors will affect the actual amount of shot that will load into the SLT. Factors include shot density, shot size variance, shot surface finish, and the ability of the shot to flow into the annular space. Therefore, the weight of shot anticipated to be loaded can only be approximated. Assuming an anticipated shot loading density of 4.15 grams/cc (0.150 lbm/cu. in.), which is based on the shot manufactured to the SAE J827 specification, the following weights of steel shot are expected to be loaded into the SLT, assuming no voids exist:

7" Long Annular Space: Shot Weight = 120 kg (265 lbm)

48" Long Annular Space: Shot Weight = 821 kg (1,821 lbm)

The following equipment is required for this test of the Shot Loading System:

- The Shot Loading Trainer (SLT), which is a short mock section of the Container mounted on a stand assembly, fabricated for testing and training purposes. Refer to Drawing No. H-2-83742 SHOT LOADING TRAINER in Appendix C.

- The Shot Loading Platform (SLP) for access to operate the Shot Loading System with the SLT. Refer to Drawing No. H-2-83738 SHOT LOADING PLATFORM in Appendix C. The main components of the SLP are as follows:
 - Platform assembly
 - Top plate
 - Side plate
 - Safety railings
 - Shot Hopper - See Drawing No. 94-10 SPECIAL 10 CU. FT. LEAD "BB" HOPPER WESTINGHOUSE HANFORD in Appendix C
 - Center shielding assembly
- Scaffolding to access the SLP ladder.
- The portable air compressor for driving the pneumatic vibrators. The minimum capacity required is 0.0708 m³/s (150 CFM) at 862 kPa (125 psi).
- 2 pneumatic vibrators for mounting on each side of the SLT. The vibrators to be used are:

Manufacturer: Global Manufacturing, Inc.
Model: C3-6A-4AC

The vibrators' manufacturer's information is included in Appendix C (Global Manufacturing, Inc. GLOBAL DESIGN SERIES PNEUMATIC VIBRATORS). The vibrators must be equipped with the following combination filter/regulator/lubricator unit (FRL unit) furnished by the vibrator manufacturer:

Manufacturer: Norgren
Model: F/R-L Lubro-Control Unit

Also, hoses, fittings, and connectors between the air supply, FRL unit and vibrators will be required.

- 2 Shot Funnels for installing on the shot fill ports on the SLT.
- The Shot Bucket for lifting the shot to the platform. The drawing for the Shot Bucket is included in Appendix C (Drawing No. 94-9 "SPECIAL 10 CU. FT. BUCKET FOR WESTINGHOUSE HANFORD").
- The forklift truck recommended for this test is a Wiggins 6000 Lb. capacity fork truck.

- The Drum Handler for dumping shot from the barrels into the Shot Bucket. The Drum Handler is a Valley Craft Model 6139 Versa-Grip Dual Function Drum Handler. The manufacturer's information is included in Appendix C.
- The mobile crane recommended for this test is a Loraine LRT 330. It will be used to assemble the SLP and move the SLT. The crane will also be used for lifting the loaded Shot Bucket from the ground to dump shot into the Shot Hopper on the SLP.
- 1360 kg (3000 lbs) of bulk steel shot. The shot must be cast steel with a diameter range of 2.03 mm to 3.3 mm (0.08" to 0.13").
- Catch receptacle for dumping the shot from the SLT. The catch receptacle is a 55 gallon drum. It will be handled with the Drum Handler on the forklift truck.
- Measuring tape or ruler of at least 0.914 meters (3 feet) in length.
- The Hydraulic Trailer with the Container mounted for testing the interface with the Shot Loading Platform. A tractor will also be required to move the trailer. This equipment is required for both C-106 and SY-101.
- Vacuum machine for removing excess shot from Shot Funnels.
- A shop knife or other suitable cutting tool, for cutting the elephant trunk on the Shot Hopper.
- A set of 8 wheel chocks made from 4" X 4" wooden blocks, 16" long, cut at 45° angles.
- Three 2-way radios for communications during the trailer maneuvering under the SLP.
- The following tools will be required for assembly and installation of equipment:

Socket wrenches: 1/2" and 3/4" drive

Sockets and box end wrenches of the following sizes: 7/8"

1-1/8"

1-1/4"

1-7/16"

- The following rigging materials are recommended for assembling the SLP:
 - For the SLP ladder side plate:
9/16" dia. 2-way 10 ft. long slings
 - For the SLP frame:
1/2" dia. 4-way 10 ft. long slings
 - For the SLP floor plate:
1/2" dia. 4-way 10 ft. long slings
- Measuring & Testing Equipment (M & TE):

The following M & TE is required for the test. Calibration verification will be required prior to using equipment in the test. If the equipment's calibration is not verifiable, the equipment shall be calibrated prior to use in the test.

- Weigh scales for measuring the weight of shot. The range of the scales must be 0 - 2268 kg (0 - 5000 lbs). Verify that the calibration expiration date has not expired. If the accuracy of the 0-5000 lb. scales is not within ± 2.3 kg (5 lb.) down to 0 kg, an additional scale with a lower range is required. The range of the smaller scale should be minimum 0 - 680 kg (0 - 1500 lb.).
- A pressure gauge, 0 - 6.875 bars (0-100 psi), for measuring the inlet air pressure to the vibrator air motors.
- Torque Wrenches of 1/2" and 3/4" drives with a range of 0 - 300 ft-lbs minimum with a minimum accuracy of $\pm 10\%$.

1.6 ACCEPTANCE TEST

The following tests are to be performed per the following sequence of step-by-step instructions:

1.6.1 Shot Loading Platform Test Procedure

When erected, the platform assembly will have an adjustable platform height to accommodate different sized trailers and containers. The components of the platform are bolted together for easy removal and cleaning. All hoisting and rigging shall comply with the DOE 1992, *Hanford Site Hoisting and Rigging Manual*, DOE.RL.92.36. The shot loading platform shall be erected per Drawing No. H-2-83738 Rev. 0 (in Appendix C) in the following manner:

- 1.6.1.1 With the four legs in place, raise the unit as a whole and check the legs and bolt connections at each setting. The minimum recommended rigging is 1/2" dia. 4-way 10 ft. long slings (90° sling angles provides 6.2 ton safe working load limit; 60° sling angles provides 7.6 ton safe working load limit). The shackle size shall be 3/4" dia. minimum (4.75 ton safe working load limit per shackle).
- 1.6.1.2 After the platform is set at the maximum 16' height, lift the 2" ladder side plate and position the plate on the platform assembly such that the attachment holes are aligned. The minimum recommended rigging is 9/16" dia. 2-way 10 ft. long slings at 60° sling angles (provides 4.8 ton safe working load limit). The shackle size shall be 3/4" dia. minimum (4.75 ton safe working load limit per shackle).
- 1.6.1.3 Bolt the ladder side plate to the platform assembly. The boltheads and nuts require a 1-7/16" socket and wrench size. Torque the bolts to 96 ft-lbs ± 4 ft-lbs.

Torque Wrench Serial Number _____
 Calibration Due Date _____
 Calibration Verified by _____ (initials/date).

- 1.6.1.4 Hoist the 2" top plate and set it on top of the platform using the guide angles. Ensure that the plate is correctly oriented on the platform per drawing H-2-83738 sheet 3 (included in Appendix C). The minimum recommended rigging is 1/2" dia. 4-way 10 ft. long slings (90° sling angles provides 6.2 ton safe working load limit; 60° sling angles provides 7.6 ton safe working load limit). The shackle size shall be 3/4" dia. minimum (4.75 ton safe working load limit per shackle).
- 1.6.1.5 Assemble the safety railings on the platform, starting with the ladder side and working in a clockwise rotation. Personnel on the platform shall use safety harnesses for fall protection until the railings are installed. Check that the gate seats against the railing and rotates to an open position.
- 1.6.1.6 Lift and place the 2" center shielding assembly on the top 2" plate. Bolt the shielding assembly to the top plate. The boltheads require a 7/8" socket. Torque the bolts to 48 ft-lbs ± 2 ft-lbs.
- 1.6.1.7 Lift and place the Shot Hopper on the platform and install the mounting bolts. The boltheads require a 7/8" socket. Torque the bolts to 48 ft-lbs ± 2 ft-lbs.

Testing as directed by this procedure section has been completed. Exceptions, if any, are listed in Section 3.0 of this document.

Test Director: _____ Date: _____

QA Representative: _____ Date: _____

1.6.2 Drum Handler Test

1.6.2.1 Check the drum handler's battery power level gauge and, if required, charge the battery.

1.6.2.2 Record the forklift truck's equipment number.

Forklift Truck Equipment No. _____

1.6.2.3 Insert the forks of the lift truck into the fork tubes of the drum grip.

1.6.2.4 Attach the safety chain around the carriage of the lift truck.

1.6.2.5 Secure the control module magnetically to a metal surface near the driver's seat of the lift truck.

1.6.2.6 Advance the lift truck until the jaws of the drum grip center around a drum full of shot.

1.6.2.7 Grip the drum just below the bottom ring with the safety arm hooked over the top edge of the drum.

NOTE: As a safety precaution, the control module is wired so that only one function can be performed at one time. The clamping function requires the use of two separate switches to guard against opening the jaws accidentally.

1.6.2.8 Activate the clamping pressure using the hand control module. Do not activate the drum grip control while the lift truck is in motion.

1.6.2.9 Raise the drum grip with the fork truck. Move the fork truck and position the drum over the Shot Bucket.

1.6.2.10 Dump the drum's entire contents of shot into the Shot Bucket. This is to be performed by slowly rotating the drum. Watch for drum distortion as the shot is being dumped.

NOTE: Dumping capacity is limited by the strength and rigidity of the drum being dumped. Open top drums must be capable of retaining their cylindrical shape while dumping.

- 1.6.2.11 Verify that the Drum Handler provides adequate angle on the drum to completely empty the shot from the drum.

Verified by _____ (initials/date)

- 1.6.2.12 After completion of this test, lift the Shot Bucket and dump the shot into its drum.

Testing as directed by this procedure section has been completed. Exceptions, if any, are listed in Section 3.0 of this document.

Test Director: _____ Date: _____

QA Representative: _____ Date: _____

1.6.3 Trailer/Container to Shot Loading Platform Interface Test

- 1.6.3.1 Install 3 Shot Funnels, on the front, middle, and rear fill ports on the Container that is mounted on the Hydraulic Trailer.

- 1.6.3.2 Adjust the height of the SLP such that the bottom of the floor plate is $30.5 \text{ cm} \pm 15.2 \text{ cm}$ ($12" \pm 6"$) above the top of the Funnels on the Container.

- 1.6.3.3 Move the Hydraulic Trailer under the SLP. Communication by two-way radio should be maintained between the truck driver, the spotter, and the operator on the SLP. Verify that no interferences exist between the SLP and the Container and Hydraulic Trailer.

Verified by _____ (initials/date)

- 1.6.3.4 Determine the best length for the elephant trunk by its position in the funnel and mark the trunk at that length. Cut the trunk at the mark with the shop knife. Proper interface is with the bottom of the elephant trunk $15.2 \text{ cm} \pm 7.6 \text{ cm}$ ($6" \pm 3"$) below the top of the funnel (inside the funnel).

- 1.6.3.5 As the trailer is moved to align each Funnel with the SLP, it will be necessary to lift the chute on the Shot Hopper to allow the elephant trunk to clear the top of the Funnel. Verify that no interferences occur with aligning all 3 Funnels on the Container with the SLP.

Verified by _____ (initials/date)

- 1.6.3.6 Verify that the elephant trunk properly interfaces with all three funnels. Proper interface is with the bottom of the elephant trunk

15.2 cm $\pm$ 7.6 cm (6" $\pm$ 3") below the top of the funnel (inside the funnel).

Verified by _____ (initials/date)

- 1.6.3.6 Unbolt the Shot Hopper and center shielding assembly from the SLP top plate and remove them from the SLP.
- 1.6.3.7 Move the trailer to align each funnel with the opening in the SLP top plate. Unscrew each funnel and install the port plugs. Verify that removal of funnels and installation of plugs can be accomplished through the platform opening.

Verified by _____ (initials/date)

- 1.6.3.8 Mark the SLP legs for future determination of leg height position for the respective Container/trailer. Mark the elephant trunk to indicate use for the respective Container/trailer.

Testing for the C-106 Container/Trailer to Shot Loading Platform Interface, as directed by this procedure section, has been completed. Exceptions, if any, are listed in Section 3.0 of this document.

Test Director: _____ Date: _____

QA Representative: _____ Date: _____

Testing for the SY-101 Container/Trailer to Shot Loading Platform Interface, as directed by this procedure section, has been completed. Exceptions, if any, are listed in Section 3.0 of this document.

Test Director: _____ Date: _____

QA Representative: _____ Date: _____

1.6.4 Vibrator Test Procedure

- 1.6.4.1 Verify that the unbalance setting on the vibrators is set at 0.34 N-m (3.0 lb-in). Refer to INSTRUCTIONS FOR ADJUSTING THE WEIGHTS OF THE C3 VIBRATOR in the Global Manufacturing, Inc. GLOBAL DESIGN SERIES PNEUMATIC VIBRATORS in Appendix C.

Verified by _____ (initials/date)

- 1.6.4.2 Mount the 2 vibrators on each side of the SLT using 3/4-10UNC Grade 8 Plated Bolts, 88.9 mm (3½") long per Drawing No. H-2-83742 SHOT LOADING TRAINER. The boltheads require a 1-1/8" socket. Torque the mounting bolts to 382 N-m ± 15 N-m (282 ft-lb ± 10 ft-lbs). Verify the specified bolting and torque.

Torque Wrench Serial Number _____
 Calibration Due Date _____
 Bolting and torque verified by _____ (initials/date)

- 1.6.4.3 As a safety precaution, attach a sling or chain from each vibrator handle to the tie-down hole on the SLT.

- 1.6.4.4 Secure the SLT by connecting cables at each of the four corners of the SLT to the SLP legs.

- 1.6.4.5 Install a ½"-14 NPT pipe nipple on the vibrators' air inlet ports. The inlet port is the upper port on the vibrator air motor.

- 1.6.4.6 Install the pressure gauge on the filter/regulator/lubricator unit (FRL unit). Verify that the calibration on the pressure gauge is current.

Pressure Gauge Serial Number _____
 Calibration Due Date _____
 Verified by _____ (initials/date)

- 1.6.4.7 Install a 3/4" tee fitting downstream of the FRL unit. Install equal lengths of 3/4" (or larger) diameter flexible hose between the vibrators and the tee at the FRL unit.

- 1.6.4.8 Verify that the lubricator reservoir on the FRL unit has been filled with lubrication oil per the vibrator manufacturer's specifications. Refer to the Global Manufacturing, Inc. GLOBAL DESIGN SERIES PNEUMATIC VIBRATORS in Appendix C.

Verified by _____ (initials/date)

- 1.6.4.9 Support the FRL unit on the SLP or other suitable support and allow some slack in the hose to prevent transmitting vibrator forces to the FRL unit. The FRL unit should be mounted at or above the level of the vibrator to provide lubrication to the vibrator's air motor.

- 1.6.4.10 Install the exhaust filter on the vibrator motor outlet port. The outlet port is the port on the air motor directly below the inlet port. Install the exhaust muffler on the outlet of the filter.

- 1.6.4.11 Connect the air compressor to the FRL unit with a 1" or larger diameter hose. Check that the air supply valve at the inlet to the FRL unit is closed.

1.6.4.12 Start the air compressor.

1.6.4.13 Clear all personnel from the immediate area of the SLT. All personnel in the area shall wear hearing protection as required during vibrator operation.

1.6.4.14 Open the air supply valve to start the vibrators. Adjust the pressure regulator on the FRL unit to provide an air inlet pressure to the vibrator air motor of $2.80 \text{ bars} \pm 0.14 \text{ bars}$ ($40 \text{ psi} \pm 2 \text{ psi}$) as indicated on the gauge on the FRL unit with the air supply valves fully open. Verify that the inlet pressure to the vibrator motors is in the specified range.

Verified by _____ (initials/date)

1.6.4.15 Verify that the lubricator is dripping oil in the sight glass at the manufacturer's drip rate of 10 to 12 drops per minute as indicated in the Global Manufacturing, Inc. GLOBAL DESIGN SERIES PNEUMATIC VIBRATORS in Appendix C.

Verified by _____ (initials/date)

1.6.4.16 Run the vibrators for 5 minutes at $2.80 \text{ bars} \pm 0.14 \text{ bars}$ ($40 \text{ psi} \pm 2 \text{ psi}$).

1.6.4.17 Increase the operating pressure on the pressure regulator to $4.14 \text{ bars} \pm 0.14 \text{ bars}$ ($60 \text{ psi} \pm 2 \text{ psi}$) and operate at this pressure for 5 minutes. Verify that the inlet pressure to the vibrator motors is in the specified range.

Verified by _____ (initials/date)

1.6.4.18 Shut off the vibrators by closing the air supply valve.

Testing as directed by this procedure section has been completed. Exceptions, if any, are listed in Section 3.0 of this document.

Test Director: _____ Date: _____

QA Representative: _____ Date: _____

1.6.5 Shot Loading Test Procedure - No Vibration

As a general rule for all of the shot loading tests, extreme care must be exercised to maintain control of shot handling. The measurement of shot weights is critical to the validity of this test. Therefore spillage of shot during handling between components of the test equipment is unacceptable for providing credible test results. The test must also demonstrate that shot is contained for environmental purposes when lead shot is used in the future. If any shot is spilled during the test due to equipment design or method of use, it should be noted as an exception in the record copy of the ATP.

17.8 cm (7") Long SLT Section - No Vibration

1.6.5.1 Install the Shot Funnels in the 2 fill ports on the SLT. Leave the plugs in the observation ports on the 122 cm (48") section of the SLT.

1.6.5.2 Check the tire pressure on all 8 tires on the SLT. Tire pressure is to be 50 psi $\pm$ 3 psi.

1.6.5.3 Verify that the trap doors on the bottom of the SLT are closed and locked with the locking pins and hairpin cotter pins installed.

Verified by _____ (initials/date)

1.6.5.4 Locate the SLT under the SLP such that the elephant trunk on the Shot Hopper is directly above the Shot Funnel on the 17.8 cm (7") section of the SLT.

1.6.5.5 Adjust the telescoping legs on the SLP to set the height of the bottom of the floor plate 30.4 cm $\pm$ 15.2 cm (12" $\pm$ 6") above the top of the Shot Funnel.

1.6.5.6 Check that the gate lever on the Shot Bucket operates properly to open and close the gate.

1.6.5.7 Verify the calibration on the scales.

Scale Serial Number _____
Calibration Due Date _____
Verified By _____ (Initials/Date)

- 1.6.5.8 Place the Shot Bucket on the scales and record the empty weight of the Shot Bucket.

Measured Weight of Empty Shot Bucket _____

- 1.6.5.9 Place the vacuum machine on the scales and record the empty weight of the vacuum machine.

Measured Weight of Empty Vacuum Machine _____

- 1.6.5.10 Place the empty catch drum on the scales and record the empty weight of the catch drum.

Measured Weight of Empty Catch Drum _____

- 1.6.5.11 Place the Shot Bucket on the scales and load $136 \text{ kg} \pm 4.5 \text{ kg}$ (300 pounds ± 10 pounds) of shot (approximately 9 gallons) into the bucket using the Drum Handler on the forklift. Record the actual weight of the shot in the bucket by subtracting the weight of the empty shot bucket.

Weight of Shot Bucket with shot	_____
- Weight of empty Shot Bucket	_____
= Weight of Shot in Bucket	_____

- 1.6.5.12 Hoist the Shot Bucket with the crane and dump the entire amount of shot into the Shot Hopper. Verify that the gate on the Shot Bucket closes to completely shut off flow of the shot.

Verified by _____ (initials/date)

- 1.6.5.13 Verify visually that the bottom of the hopper's elephant trunk is inside the Funnel.

Verified by _____ (initials/date)

- 1.6.5.14 Open the gate on the Shot Hopper and allow shot to flow into the SLT until the annular space is full.

- 1.6.5.15 Verify that the gate on the shot hopper completely shuts off flow of the shot.

Verified by _____ (initials/date)

- 1.6.5.16 Use the vacuum machine to remove excess shot that remains in the Funnel and in the Shot Hopper's chute.

- 1.6.5.17 Place the vacuum machine on the scales. Determine the weight of the shot in the vacuum machine by subtracting the empty weight of the vacuum machine.

Weight of Vacuum Machine with shot	_____
- <u>Weight of empty Vacuum Machine</u>	_____
= Weight of shot in Vacuum Machine	_____

- 1.6.5.18 Move the SLT out from under the SLP to enable unloading the shot.

- 1.6.5.19 Place the empty catch drum mounted on the Drum Handler under the SLT. Raise the drum to locate it 30 cm $\pm$ 15 cm (12" $\pm$ 6") below the small trap door on the bottom of the SLT.

- 1.6.5.20 Check that the catch drum is aligned under the small trap door on the bottom of the SLT. Open the trap door on the bottom of the SLT and unload the shot from the SLT into the catch drum.

- 1.6.5.21 Place the catch drum on the scales and determine the weight of the shot unloaded from the SLT by subtracting the weight of the empty drum.

Weight of Catch Drum with shot	_____
- <u>Weight of Empty Catch Drum</u>	_____
= Weight of shot unloaded from SLT	_____

- 1.6.5.22 Dump the shot from the catch drum into a shot drum.

- 1.6.5.23 Place the empty catch drum under the elephant trunk. Dump the remaining shot in the Shot Hopper into the catch drum.

- 1.6.5.24 Place the catch drum on the scales and determine the weight of the shot remaining in the Shot Hopper by subtracting the weight of the empty catch drum.

Weight of catch drum with shot	_____
- <u>Weight of empty catch drum</u>	_____
= Weight of shot remaining in Shot Hopper	_____

- 1.6.5.25 Determine the weight of shot that the annular space held as follows:

Weight of shot loaded into Shot Bucket	_____
Subtract Weight of shot remaining in Shot Hopper	- _____
<u>Subtract Weight of shot in Vacuum Machine</u>	- _____

Weight of shot in Annular Space is..... = _____

- 1.6.5.26 Compare the weight of shot in the annular space determined in the last step to the weight of shot unloaded from the SLT, as determined in step 1.6.5.21. If the weights differ by more than 2.3 kg (5 pounds), check the annular space for shot remaining inside or for other causes of the difference in weight. Record the weight of shot on the appropriate data sheet in Section 2.0 of this document.
- 1.6.5.27 Close the trap door on the bottom of the SLT and lock the door with the locking pins and hairpin cotter pins.

Testing as directed by this procedure section has been completed. Exceptions, if any, are listed in Section 3.0 of this document.

Test Director: _____ Date: _____

QA Representative: _____ Date: _____

122 cm (48") Long SLT Section - No Vibration

- 1.6.5.28 Move the SLT to align the Funnel on the 122 cm (48") SLT section with the elephant trunk. Check that the funnel is installed on the center port of the section, not on an observation port.
- 1.6.5.29 Place the Shot Bucket on the scales and load 907 kg $\pm$ 23 kg (2000 pounds $\pm$ 50 pounds) of shot (approximately 57 gallons) into the bucket using the Drum Handler on the forklift. Record the actual weight of the shot in the bucket by subtracting the weight of the empty shot bucket.

Weight of Shot Bucket with shot	_____
- Weight of empty Shot Bucket	_____
= Weight of Shot in Bucket	_____

- 1.6.5.30 Hoist the Shot Bucket and dump the entire amount of shot into the Shot Hopper.
- 1.6.5.31 Verify that the bottom of the hopper's elephant trunk is inside the Funnel.

Verified by _____ (initials/date)

- 1.6.5.32 Carefully open the gate on the Shot Hopper and allow shot to flow into the SLT until the annular space is full.
- 1.6.5.33 Use the vacuum machine to remove excess shot that remains in the Funnel and in the Shot Hopper's chute.

- 1.6.5.34 Place the vacuum machine on the scales. Determine the weight of the shot in the vacuum machine by subtracting the empty weight of the vacuum machine.

Weight of Vacuum Machine with shot _____
 - Weight of empty Vacuum Machine _____
 = Weight of shot in Vacuum Machine _____

- 1.6.5.35 Following filling the 1.22 m (48") section, move the SLT to align the observations ports with the opening in the SLP. Remove the plugs from the observation ports on both ends of the 1.22 m (48") section of the SLT. Measure and record the level of the shot in the annular space below each of the observation ports. Replace the plugs in the observation ports.

Level of shot below left port _____

Level of shot below right port _____

- 1.6.5.36 Move the SLT out from under the SLP and place the empty catch drum mounted on the Drum Handler under the SLT. Raise the drum to locate it $30 \text{ cm} \pm 15 \text{ cm}$ ($12" \pm 6"$) below the large trap door on the bottom of the SLT.

- 1.6.5.37 Check that the catch drum is aligned under the large trap door on the bottom of the SLT. Open the trap door on the bottom of the SLT and unload the shot from the SLT into the catch drum.

- 1.6.5.38 Place the catch drum on the scales and determine the weight of the shot unloaded from the SLT by subtracting the weight of the empty drum.

Weight of Catch Drum with shot _____
 - Weight of empty Catch Drum _____
 = Weight of shot unloaded from SLT _____

- 1.6.5.39 Dump the shot from the catch drum into a shot drum.

- 1.6.5.40 Place the catch drum under the elephant trunk. Dump the remaining shot in the Shot Hopper into the catch drum.

- 1.6.5.41 Place the catch drum on the scales and determine the weight of the shot remaining in the Shot Hopper by subtracting the weight of the empty catch drum.

Weight of catch drum with shot _____
 - Weight of empty catch drum _____
 = Weight of shot remaining in Shot Hopper _____

1.6.5.42 Determine the weight of shot that the annular space held as follows:

Weight of shot loaded into Shot Bucket _____
 Subtract Weight of shot remaining in Shot Hopper - _____
Subtract Weight of shot in Vacuum Machine - _____

Weight of shot in Annular Space is..... = _____

1.6.5.43 Compare the weight of shot in the annular space determined in the last step to the weight of shot unloaded from the SLT as determined in step 1.6.5.38. If the weights differ by more than 4.5 kg (10 pounds), check the annular space for shot remaining inside or for other causes of the difference in weight. Record the weight of shot on the appropriate data sheet in Section 2.0 of this document.

1.6.5.44 Close the trap door on the bottom of the SLT and lock the door with the locking pins and hairpin cotter pins.

Testing as directed by this procedure section has been completed. Exceptions, if any, are listed in Section 3.0 of this document.

Test Director: _____ Date: _____

QA Representative: _____ Date: _____

1.6.6 Shot Loading Test Procedure - Vibrators in Use

122 cm (48") Long SLT Section - Vibrators in Use

1.6.6.1 Move the SLT to align the Funnel on the 122 cm (48") SLT section with the elephant trunk. Secure the SLT by connecting cables or chains at each of the four corners of the SLT to fixed tie points or to the legs of the SLP. Place the wheel chocks on both sides of each wheel assembly on the SLT.

1.6.6.2 Place the Shot Bucket on the scales and load 907 kg $\pm$ 23 kg (2000 pounds $\pm$ 50 pounds) of shot (approximately 57 gallons) into the bucket using the Drum Handler on the forklift. Record the actual weight of the shot in the bucket by subtracting the weight of the empty shot bucket.

Weight of Shot Bucket with shot _____
 - Weight of empty Shot Bucket _____
 = Weight of Shot in Bucket _____

- 1.6.6.3 Hoist the Shot Bucket and dump the entire amount of shot into the Shot Hopper.
- 1.6.6.4 Verify that the bottom of the hopper's elephant trunk is inside the Funnel.

Verified by _____ (initials/date)

- 1.6.6.5 Clear all personnel from the immediate area of the SLT. All personnel in the area are to use hearing protection as required during vibrator operation. Start the vibrators on the SLT. Verify that the gauge on the FRL unit is reading 2.80 bars $\pm$ 0.14 bars (40 psi $\pm$ 2 psi). Adjust the FRL unit pressure regulator, if necessary, to provide 2.80 bars $\pm$ 0.14 bars (40 psi $\pm$ 2 psi).

Pressure Verified by _____ (initials/date)

- 1.6.6.6 Carefully open the gate on the Shot Hopper and allow shot to flow into the SLT until the annular space is full.
- 1.6.6.7 Shut down the vibrators by closing the air supply valve.
- 1.6.6.8 Use the vacuum machine to remove excess shot that remains in the Funnel and in the Shot Hopper's chute.
- 1.6.6.9 Place the vacuum machine on the scales. Determine the weight of the shot in the vacuum machine by subtracting the empty weight of the vacuum machine.

Weight of Vacuum Machine with shot	_____
- Weight of empty Vacuum Machine	_____
= Weight of shot in Vacuum Machine	_____

- 1.6.6.10 Following filling the 1.22 m (48") section, move the SLT to align the observations ports with the opening in the SLP. Remove the plugs from the observation ports on both ends of the 1.22 m (48") section of the SLT. Measure and record the level of the shot in the annular space below each of the observation ports. Replace the plugs in the observation ports.

Level of shot below left port _____

Level of shot below right port _____

- 1.6.6.11 Move the SLT out from under the SLP and place the empty catch drum mounted on the Drum Handler under the SLT. Raise the drum to locate it 30 cm $\pm$ 15 cm (12" $\pm$ 6") below the large trap door on the bottom of the SLT.

1.6.6.12 Check that the catch drum is aligned under the large trap door on the bottom of the SLT. Open the trap door on the bottom of the SLT and unload the shot from the SLT into the catch drum.

1.6.6.13 Place the catch drum on the scales and determine the weight of the shot unloaded from the SLT by subtracting the weight of the empty drum.

Weight of Catch Drum with shot	_____
- <u>Weight of empty Catch Drum</u>	_____
= Weight of shot unloaded from SLT	_____

1.6.6.14 Dump the shot from the catch drum into a shot drum.

1.6.6.15 Place the catch drum under the elephant trunk. Dump the remaining shot in the Shot Hopper into the catch drum.

1.6.6.16 Place the catch drum on the scales and determine the weight of the shot remaining in the Shot Hopper by subtracting the weight of the empty catch drum.

Weight of catch drum with shot	_____
- <u>Weight of empty catch drum</u>	_____
= Weight of shot remaining in Shot Hopper	_____

1.6.6.17 Determine the weight of shot that the annular space held as follows:

Weight of shot loaded into Shot Bucket	_____
Subtract Weight of shot remaining in Shot Hopper	- _____
<u>Subtract Weight of shot in Vacuum Machine</u>	- _____

Weight of shot in Annular Space is..... = _____

1.6.6.18 Compare the weight of shot in the annular space determined in the last step to the weight of shot unloaded from the SLT as determined in step 1.6.6.13. If the weights differ by more than 4.5 kg (10 pounds), check the annular space for shot remaining inside or for other causes of the difference in weight. Record the weight of shot on the appropriate data sheet in Section 2.0 of this document.

1.6.6.19 Close the trap door on the bottom of the SLT and lock the door with the locking pins and hairpin cotter pins.

Testing as directed by this procedure section has been completed. Exceptions, if any, are listed in Section 3.0 of this document.

Test Director: _____ Date: _____

QA Representative: _____ Date: _____

17.8 cm (7") Long SLT Section - Vibrators In Use

1.6.6.20 Move the SLT to align the Funnel on the 17.8 cm (7") long SLT section with the elephant trunk. Secure the SLT by connecting cables or chains at each of the four corners of the SLT to fixed tie points or to the legs of the SLP. Place the wheel chocks on both sides of each wheel assembly on the SLT.

1.6.6.21 Place the Shot Bucket on the scales and load $136 \text{ kg} \pm 4.5 \text{ kg}$ (300 pounds ± 10 pounds) of shot (approximately 9 gallons) into the bucket using the Drum Handler on the forklift. Record the actual weight of the shot in the bucket by subtracting the weight of the empty shot bucket.

Weight of Shot Bucket with shot	_____
- Weight of empty Shot Bucket	_____
= Weight of Shot in Bucket	_____

1.6.6.22 Hoist the Shot Bucket and dump the entire amount of shot into the Shot Hopper.

1.6.6.23 Verify visually that the bottom of the hopper's elephant trunk is inside the Funnel.

Verified by _____ (initials/date)

1.6.6.24 Clear all personnel from the immediate area of the SLT. All personnel in the area are to use hearing protection as required during vibrator operation. Start the vibrators on the SLT. Verify that the gauge on the FRL unit is reading $2.80 \text{ bars} \pm 0.14 \text{ bars}$ (40 psi ± 2 psi). Adjust the FRL unit pressure regulator, if necessary, to provide $2.80 \text{ bars} \pm 0.14 \text{ bars}$ (40 psi ± 2 psi).

Pressure Verified by _____ (initials/date)

1.6.6.25 Open the gate on the Shot Hopper and allow shot to flow into the SLT until the annular space is full.

1.6.6.26 Shut down the vibrators by closing the air supply valve.

1.6.6.27 Use the vacuum machine to remove excess shot that remains in the Funnel and in the Shot Hopper's chute.

- 1.6.6.28 Place the vacuum machine on the scales. Determine the weight of the shot in the vacuum machine by subtracting the empty weight of the vacuum machine.

Weight of Vacuum Machine with shot	_____
- <u>Weight of empty Vacuum Machine</u>	_____
= Weight of shot in Vacuum Machine	_____

- 1.6.6.29 Move the SLT out from under the SLP and place the empty catch drum mounted on the Drum Handler under the SLT. Raise the drum to locate it 30 cm $\pm$ 15 cm (12" $\pm$ 6") below the small trap door on the bottom of the SLT.

- 1.6.6.30 Check that the catch drum is aligned under the small trap door on the bottom of the SLT. Open the trap door on the bottom of the SLT and unload the shot from the SLT into the catch drum.

- 1.6.6.31 Place the catch drum on the scales and determine the weight of the shot unloaded from the SLT by subtracting the weight of the empty drum.

Weight of Catch Drum with shot	_____
- <u>Weight of empty Catch Drum</u>	_____
= Weight of shot unloaded from SLT	_____

- 1.6.6.32 Dump the shot from the catch drum into a shot drum.

- 1.6.6.33 Place the catch drum under the elephant trunk. Dump the remaining shot in the Shot Hopper into the catch drum.

- 1.6.6.34 Place the catch drum on the scales and determine the weight of the shot remaining in the Shot Hopper by subtracting the weight of the empty catch drum.

Weight of catch drum with shot	_____
- <u>Weight of empty catch drum</u>	_____
= Weight of shot remaining in Shot Hopper	_____

- 1.6.6.35 Determine the weight of shot that the annular space held as follows:

Weight of shot loaded into Shot Bucket	_____
Subtract Weight of shot remaining in Shot Hopper	- _____
<u>Subtract Weight of shot in Vacuum Machine</u>	- _____

Weight of shot in Annular Space is..... = _____

- 1.6.6.36 Compare the weight of shot in the annular space determined in the last step to the weight of shot unloaded from the SLT as determined in step 1.6.6.31. If the weights differ by more than 4.5 kg (10 pounds), check the annular space for shot remaining inside or for other causes of the difference in weight. Record the weight of shot on the appropriate data sheet in Section 2.0 of this document.
- 1.6.6.37 Close the trap door on the bottom of the SLT and lock the door with the locking pins and hairpin cotter pins.
- 1.6.6.38 Based on test results, an evaluation must be made at this time whether the shot is being effectively loaded into the annular spaces of the SLT without leaving significant voids. An evaluation should also be made of how the operation of the vibrators increased the amount of shot loaded and reduced voids. If the results of the evaluation warrant further testing, the vibration forces may be changed on the vibrators in two ways. The unbalance setting can be adjusted. Increasing the unbalance setting increases the forces exerted. Also the pressure regulator on the FRL unit can be adjusted to change the running speed of the vibrator. Increasing the pressure increases the running speed which increases the vibrator forces. The maximum pressure that the vibrators should be operated at is 50 psi for the shot loading tests. If required, both unbalance and running speed can be adjusted to achieve desired test results. When additional testing is performed, record the unbalance setting and operating pressure for the vibrators for that test.
- 1.6.6.39 After the shot loading operations have been completed, remove the Funnels from the SLT. Install the threaded plugs and tighten snugly.
- 1.6.6.40 Inspect the area below the SLT and collect any spilled shot.

Testing as directed by this procedure section has been completed. Exceptions, if any, are listed in Section 3.0 of this document.

Test Director: _____ Date: _____

QA Representative: _____ Date: _____

1.6.7 Shot Loading Test Procedure - Vibrators in Use After Loading

122 cm (48") Long SLT Section

- 1.6.7.1 Move the SLT to align the Funnel on the 17.8 cm (7") long SLT section with the elephant trunk. Secure the SLT by connecting cables or chains at each of the four corners of the SLT to fixed tie points or to the legs of the SLP.

- 1.6.7.2 Place the Shot Bucket on the scales and load 907 kg $\pm$ 23 kg (2000 pounds $\pm$ 50 pounds) of shot (approximately 57 gallons) into the bucket using the Drum Handler on the forklift. Record the actual weight of the shot in the bucket by subtracting the weight of the empty shot bucket.

Weight of Shot Bucket with shot	_____
- Weight of empty Shot Bucket	_____
= Weight of Shot in Bucket	_____

- 1.6.7.3 Hoist the Shot Bucket and dump the entire amount of shot into the Shot Hopper.
- 1.6.7.4 Ensure that the bottom of the hopper's elephant trunk is inside the Funnel.
- 1.6.7.5 Open the gate on the Shot Hopper and allow shot to flow into the SLT until the annular space is full.
- 1.6.7.6 Clear all personnel from the immediate area of the SLT. All personnel in the area shall use hearing protection as required during vibrator operation. Start the vibrators on the SLT. Verify that the gauge on the FRL unit is reading 2.80 bars $\pm$ 0.14 bars (40 psi $\pm$ 2 psi). Adjust the FRL unit pressure regulator, if necessary, to provide 2.80 bars $\pm$ 0.14 bars (40 psi $\pm$ 2 psi).

Pressure Verified by _____ (initials/date)

- 1.6.7.7 Open the gate on the Shot Hopper and allow shot to flow into the SLT until the funnel is full.
- 1.6.7.8 Run the vibrators for 5 minutes while maintaining a level of shot in the funnel.
- 1.6.7.9 Shut off the vibrators by closing the air supply valve.
- 1.6.7.10 Use the vacuum machine to remove excess shot that remains in the Funnel and in the Shot Hopper's chute.
- 1.6.7.11 Place the vacuum machine on the scales. Determine the weight of the shot in the vacuum machine by subtracting the empty weight of the vacuum machine.

Weight of Vacuum Machine with shot	_____
- Weight of empty Vacuum Machine	_____
= Weight of shot in Vacuum Machine	_____

- 1.6.7.12 Following filling the 1.22 m (48") section, move the SLT to align the observations ports with the opening in the SLP. Remove the plugs from the observation ports on both ends of the 1.22 m (48") section of the SLT. Measure and record the level of the shot in the annular space below each of the observation ports. Replace the plugs in the observation ports.

Level of shot below left port _____

Level of shot below right port _____

- 1.6.7.13 Move the SLT out from under the SLP and place the empty catch drum mounted on the Drum Handler under the SLT. Raise the drum to locate it $30 \text{ cm} \pm 15 \text{ cm}$ ($12" \pm 6"$) below the large trap door on the bottom of the SLT. Check that the catch drum is aligned under the large trap door on the bottom of the SLT. Open the trap door on the bottom of the SLT and unload the shot from the SLT into the catch drum.

- 1.6.7.14 Place the catch drum on the scales and determine the weight of the shot in the drum by subtracting the weight of the empty drum.

Weight of Catch Drum with shot _____
 - Weight of empty Catch Drum _____
 = Weight of shot in Catch Drum _____

- 1.6.7.15 Dump the shot from the catch drum into a shot drum.

- 1.6.7.16 Move the SLT and place the empty catch drum on the Drum Handler under the elephant trunk. Dump the shot from the Shot Hopper into the catch drum.

- 1.6.7.17 Determine the weight of shot remaining in the Shot Hopper.

Weight of catch drum with shot _____
 - Weight of empty catch drum _____
 = Weight of shot remaining in Shot Hopper _____

- 1.6.7.18 Determine the weight of additional shot that the annular space held as follows:

Weight of shot loaded into Shot Bucket _____
 Subtract Weight of shot remaining in Shot Hopper - _____
Subtract Weight of shot in Vacuum Machine - _____

Weight of shot in Annular Space is..... = _____

- 1.6.7.19 Compare the total weight of shot in the annular space determined in the last step to the weight of shot measured in the catch drum as determined in step 1.6.7.14. If the weights differ by more than 4.5 kg (10 pounds), check the annular space for shot remaining inside or for other causes of the difference in weight. Record the weight of shot on the appropriate data sheet in Section 2.0 of this document.
- 1.6.7.20 Close the trap door on the bottom of the SLT and lock the door with the locking pins and hairpin cotter pins.

Testing as directed by this procedure section has been completed. Exceptions, if any, are listed in Section 3.0 of this document.

Test Director: _____ Date: _____

QA Representative: _____ Date: _____

1.7 TEST DATA SHEETS

The test execution data sheets are to provide a record of the shot loading tests and to verify that all steps in the test sequence were executed. Additional data sheets are provided in the Appendix if needed for additional testing.

- The Reference Sequence refers to the paragraph number in the test procedure.
- The Weight column is for recording the measured weight of shot in kilograms (pounds).
- In the Accept/Reject column, indicate appropriately whether the test results satisfy the test criteria.
- Verification that each step has been completed must be indicated by initialing the Completion column.
- Comments should be referenced by the procedure paragraph number.

The "Exception to Acceptance Test" data sheets provided in Section 3.0 shall be used if exceptions to the test sequence specified in Section 1.6 occur during the test execution. An exception can be any unexpected outcome or resulting effect that occurs during the test. This data sheet provides a record in the ATP of exceptions that take place as the test progresses. The paragraph number of the test procedure from Section 1.6 shall be recorded and a description of the exception shall be given. The Exception Data Sheet also provides control of the test when an exception occurs during the test. When an exception is discovered, the Test Director shall stop the test. The Test Director shall evaluate the exception and determine whether the test shall continue per the ATP or if a revision to the procedure is required. Quality Assurance shall review and approve all test exceptions. Revisions to the test procedure will require an ECN as part of the disposition of the exceptions. The ECN will be made part of the ATP and ATR record copies.

2.0 TEST EXECUTION DATA SHEET

Date: _____

Sheet No. ____ of ____

Test Number: _____

Title of Test: Shot Loading System Acceptance Test

Test Performed by: _____

17.8 cm (7") LONG SECTION - NO VIBRATION

Reference Sequence	Weight of Shot Loaded	Accept/ Reject	Completion Sign/Init.	Comments

Test Witnesses: _____
Test Director
Date

Quality Assurance
Date

TEST EXECUTION DATA SHEET

Date: _____

Sheet No. ____ of ____

Test Number: _____

Title of Test: Shot Loading System Acceptance Test

Test Performed by: _____

122 cm (48") LONG SECTION - NO VIBRATION

Reference Sequence	Weight of Shot Loaded	Accept/Reject	Completion Sign/Init.	Comments

Test Witnesses:

_____	_____
Test Director	Date
_____	_____
Quality Assurance	Date

Sheet No. of

Test Performed by: _____ Vibrator Operating Pressure: _____ psig

Vibrator Unbalance Setting: 1b-in

122 cm (48") LONG SECTION - VIBRATORS IN USE

[illegible]

<u>Quality Assurance</u>	<u>Date</u>
--------------------------	-------------

Sheet No. of

Test Performed by: _____ Vibrator Operating Pressure: _____ psig

Vibrator Unbalance Setting: 1b-in

17.8 cm (7") LONG SECTION - VIBRATORS IN USE

[illegible]

Test Witnesses:

Test Director	Date
Quality Assurance	Date

Sheet No. _____ of _____

Test Performed by: _____ Vibrator Operating Pressure: _____ psig

Vibrator Unbalance Setting: _____ 1b-in

3.0 EXCEPTION TO ACCEPTANCE TEST

Test Number: _____

Sheet No. ____ of ____

Title of Test: Shot Loading System Acceptance Test

EXCEPTIONS				CORRECTION APPROVAL		
Paragraph No.	Date	Description	Action Taken	Org.	Initials	Date

TEST APPROVED WITH EXCEPTIONS:

Test Director _____ Date _____

Quality Assurance _____ Date _____

APPENDIX A

TEST EXECUTION DATA SHEET

Date: _____

Sheet No. ____ of ____

Test Number: _____

Title of Test: Shot Loading System Acceptance Test

Test Performed by: _____

17.8 cm (7") LONG SECTION - NO VIBRATION

Reference Sequence	Weight of Shot Loaded	Accept/ Reject	Completion Sign/Init.	Comments

Test Witnesses: _____
Test Director
Date

Quality Assurance
Date

Sheet No. _____ of _____

Title of Test: Shot Loading System Acceptance Test

Test Performed by: _____

122 cm (48") LONG SECTION - NO VIBRATION

[illegible]

Test Witnesses:

<u>Test Director</u>	<u>Date</u>
<u>Quality Assurance</u>	<u>Date</u>

Sheet No. of

Test Performed by: _____ Vibrator Operating Pressure: _____ psig

Vibrator Unbalance Setting: 1b-in

122 cm (48") LONG SECTION - VIBRATORS IN USE

[illegible]

Quality Assurance Date

Sheet No. _____ of _____

Test Performed by: _____ Vibrator Operating Pressure: _____ psig

Vibrator Unbalance Setting: _____ 1b-in

[illegible]

Quality Assurance	Date
-------------------	------

EXCEPTION TO ACCEPTANCE TEST

Test Number: _____

Sheet No. ____ of ____

Title of Test: Shot Loading System Acceptance Test

EXCEPTIONS				CORRECTION APPROVAL		
Paragraph No.	Date	Description	Action Taken	Org.	Initials	Date

TEST APPROVED WITH EXCEPTIONS:

Test Director _____ Date _____

Quality Assurance _____ Date _____

APPENDIX B

WHC-SD-WM-ATP-100 Rev. 0

LIST OF PARTICIPANT PERSONNEL
ACCEPTANCE TEST
SHOT LOADING SYSTEM FOR 241-C-106/AY-102/SY-101

[illegible]

Appendix C

Appendix C includes the following drawings and documents for information:

- Drawing No. H-2-83742 SHOT LOADING TRAINER
- Drawing No. H-2-83738 SHOT LOADING PLATFORM
- Gar-Bro Drawing No. 94-9 SPECIAL 10 CU. FT. BUCKET
- Gar-Bro Drawing No. 94-10 SPECIAL 10 CU. FT. LEAD 'BB' HOPPER
- Global Manufacturing, Inc. GLOBAL DESIGN SERIES PNEUMATIC VIBRATORS
- Model 6139 Versa-Grip Dual Function Drum Handler
- Drawing No. H-2-83745 SHOT FUNNEL

GENERAL NOTES (UNLESS OTHERWISE SPECIFIED)

1. REMOVE ALL BURRS AND BREAK ALL SHARP EDGES.
2. WELD AND INSPECT PER AWS D1.1, VT FINAL PASS OF ALL WELDS. WELD QUALIFICATIONS AND WELDING PROCEDURES PER ASME SECTION IX ARE AN APPROVED SUBSTITUTION.
3. PAINT DRAWING NUMBER AND DRAWING REVISION NUMBER IN THE LOCATION INDICATED ON THE DRAWING PER HS-BS-0015, TYPE B WITH 1" HIGH CHARACTERS. CHARACTERS SHALL BE BLACK ENAMEL.
4. ALL STRUCTURAL SHAPES AND PLATE SHALL BE ASTM A36-1992 CARBON STEEL. ALL STRUCTURAL TUBING SHALL BE ASTM A500 GRADE B-1992 CARBON STEEL.
5. AFTER FABRICATION, SEAL WELD ALL END CONNECTIONS AND JOINTS NOT ALREADY WELDED.
6. PAINT "WEIGHT *** POUNDS" IN THE LOCATION INDICATED ON THE DRAWING PER HS-BS-0015, TYPE B, WITH 2" HIGH CHARACTERS. CHARACTERS SHALL BE BLACK ENAMEL ON A YELLOW ENAMEL BACKGROUND. THE ASSEMBLY SHALL BE WEIGHED PRIOR TO PAINTING THE ABOVE AND THE WEIGHT TO NEAREST POUND SHALL BE INSERTED WHERE THE *** ARE.
7. AFTER FABRICATION PREPARE AND PAINT ALL EXPOSED CARBON STEEL EXCEPT THE 5/8" BOLTS WITH TWO COATS OF AMERLOCK 400 FOLLOWED WITH ONE TOP COAT OF AMERLOCK 450. FINAL COLOR SHALL BE AMERLOCK COLOR NUMBER RT-8314. PREPARATION AND APPLICATION SHALL BE PER MANUFACTURER'S INSTRUCTIONS.

DETAIL SCALE: 1 1/2" = 1'-0"

FOR INFORMATION ONLY
FROM DEVELOPMENT
CONTROL

A ELEVATION SCALE: 1 1/2" = 1'-0"

DRAWING TRACEABILITY LIST				REFERENCES				REVISIONS				DRAWING INFORMATION			
DWG NO	TITLE	REF NUMBER	DESCRIPTION	REV	DATE	BY	CHK	REV	DATE	BY	CHK	DATE	BY	CHK	DATE
45	SHOT LOADING TRAINER														
NEXT USED ON				CADD FILE				CADD CODE				DATE			

DESIGNED BY E. L. REED		CHECKED BY J. R. BELL		DATE 5/94	
U.S. DEPARTMENT OF ENERGY OGE Field Office, Richmond Westinghouse Montford Company					
SHOT LOADING TRAINER					
REV	DATE	REV	DATE	REV	DATE
F	2000	1000	H-2-83742	0

1 ASSEMBLY
SCALE: 1 1/2" = 1'-0"

2 ASSEMBLY
1 SCALE: 1 1/2" = 1'-0"

4 ASSEMBLY (3 REQUIRED)
1 SCALE: 1 1/2"=1'-0"

MBLY
/Z=1-0

PLAN

5 DETAIL
SCALE: 6" = 1'-0" (3 PL)

ELEVATION

8 HANDLE
1 SCALE 1"=1'-0"
DEVELOPMENT
CONTROL

6 ASSEMBLY
1 SCALE: 6"=1'-0"

[illegible]

PLAN TOP SUPPORT
SECTION
SCALE: 1/2"=1'-0"

NOTE:
HANDRAIL NOT SHOWN FOR
CLARITY SEE ELEVATIONS

LADDER SIDE ELEVATION
SECTION
SCALE: 1/2"=1'-0"

HOPPER SIDE ELEVATION

C SECTION
SCALE: 1/2" = 1'-0"

SCALE: 1/2" = 1'-0"

SIDE ELEVATION

D SECTION
SCALE: 1/2"=1'-0"

SCALE: 1/2" = 1'-0"

- ## GENERAL NOTES

(UNLESS OTHERWISE SPECIFIED)

1. REMOVE ALL BURRS AND BREAK ALL SHARP EDGES.
 2. WELD AND INSPECT PER AWS D1.1. VT FINAL PASS OF ALL WELDS. WELD QUALIFICATIONS AND WELDING PROCEDURES PER ASME SECTION IX ARE AN APPROVED SUBSTITUTION.
 3. PAINT DRAWING NUMBER AND DRAWING REVISION NUMBER IN THE LOCATION INDICATED ON THE DRAWING PER HS-BB-0015, TYPE B WITH 1" HIGH CHARACTERS. CHARACTERS SHALL BE BLACK ENAMEL.
 4. ALL STRUCTURAL SHAPES AND PLATE SHALL BE ASTM A36-1992 CARBON STEEL. ALL STRUCTURAL TUBING SHALL BE ASTM A500 GRADE B-1992 CARBON STEEL. ALL PIPE SHALL BE A 53 STEEL.
 5. AFTER FABRICATION, SEAL WELD ALL END CONNECTIONS AND JOINTS NOT ALREADY WELDED.
 6. PAINT "WEIGHT *** POUNDS PER PANEL" IN THE LOCATION INDICATED ON THE DRAWING PER HS-BB-0015, TYPE B, WITH 2" HIGH CHARACTERS. CHARACTERS SHALL BE BLACK ENAMEL ON A YELLOW ENAMEL BACKGROUND. THE ASSEMBLY SHALL BE WEIGHED PRIOR TO PAINTING THE ABOVE AND THE WEIGHT TO NEAREST POUND SHALL BE INSERTED WHERE THE *** ARE.
 7. AFTER FABRICATION, PREPARE AND PAINT ALL EXPOSED CARBON STEEL EXCEPT THE EYE BOLTS WITH TWO COATS OF AMERLOK 400 FOLLOWED WITH ONE TOP COAT OF AMERLOK 450HS. FINAL COLOR SHALL BE AMERON COLOR NUMBER RT-8304. PREPARATION AND APPLICATION SHALL BE PER MANUFACTURER'S INSTRUCTIONS.
 8. 3/4" HOIST RINGS SHALL BE AMERICAN DRILL BUSHING COMPANY PART NUMBER 23101. HOIST RINGS SHALL BE INSTALLED USING 3/4"-10UNC-28 HEX NUTS, ASTM A563 GRADE B - 1993, AND 3/4" HARDENED PLAT WASHERS, ASTM F436-1993.
 9. 1 1/2" ELL'S SHALL BE HOLLANDER SPEED-RAIL FITTING NUMBER 3 (20 REQUIRED), 1 1/2" TEE'S SHALL BE HOLLANDER SPEED-RAIL FITTING NUMBER 5 (14 REQUIRED). 1 1/2" CROSSES SHALL BE HOLLANDER SPEED-RAIL FITTING NUMBER 7 (8 REQUIRED). SPEED-RAIL FITTINGS SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
- HINGES SHALL BE 2 1/2" X 2 1/2" PLAIN BEARING TYPE AB133 PER 101. PRINCESS HINGES SHALL BE FASTENED AS SHOWN USING STEEL FLAT HEAD MACHINE SCREWS.
- TENSION SPRING SHALL BE 9 INCH COIL DOOR SPRING TYPE 2400 AS MANUFACTURED BY BOMMER SPRING HINGE COMPANY. SPRING SHALL BE BOLTED AS SHOWN TO GATE AND RAILING POST WITH 5/16" STEEL BOLTS. PEEN THREADS AFTER INSTALLATION.

FOR INFORMATION ONLY

From DEVELOPMENT
CONTROL

NAME AB PHILLIPS 4/9/4 GRADE DATE TIME BY MR. BELLOMY 4/9/4 DATE TIME DATE TIME DATE TIME DATE TIME		U.S. DEPARTMENT OF ENERGY DOE Field Office, Richmond Washington, Virginia SHOT LOADING PLATFORM PLAN & ELEVATION F 200 1000 H-2-83738 0 RECD NOTED BY 1 of 4	
---	--	--	--

[illegible]

SECTION (8-REQD)
SCALE 3"=1'-0"

PLAN

DETAIL (4-REQD)

SCALE 3" = 1'-0"

FOR INFORMATION ONLY
FROM DEVELOPMENT
CONTROL

NAME		AB PHILLIPS		DATE		2/2/74	
OFFICE		U.S. DEPARTMENT OF ENERGY					
DIVISION		DOE Field Office, Marketing					
PROJECT		Marketing/Household Energy Company					
SUBJECT		SHOT LOADING					
ACTION		PLATFORM					
STATUS		SECTION & DETAILS					
DATE		DATE IN	DATE IN	DATE IN	DATE IN	DATE IN	DATE IN
F		200	1000	H-2-83738		0	
REASON		NOTED		BY		PAGE 2 of 2

2
1
DETAIL LADDER SIDE PLATE
SCALE: 3/4"=1'-0"
1/2" THK PLATE,
1-REQD

15
DETAIL
SCALE: 3/4"=1'-0"

3
1
DETAIL LADDER SIDE FRAMING
SCALE: 3/4"=1'-0"
(AS SHOWN)
(OMIT CENTER MEMBER OPPOSITE SIDE)

4
1
DE
SCALE: 3/4"=1'-0"
4 REQD

REV	NO	DESCRIPTION
1	1	ISSUED FOR CONSTRUCTION
2	2	REVISION
3	3	REVISION
4	4	REVISION
5	5	REVISION
6	6	REVISION
7	7	REVISION
8	8	REVISION
9	9	REVISION
10	10	REVISION

OR PLATE

9-13UNC-2A
2 1/4" A307
PL

TS 8x4x3/8

13/16" HOLE
2 PL PER LEG
ON CENTER

3/4" BOLTS
8

TAIL
1/4" = 1'-0"
ED

SEE NOTE 3

OPENING

TOP ENCLOSURE
SEE DETAIL 15

LABEL HSSB-0019 TYPE B, PAINTING
YELLOW PAINT WITH 3" HIGH CHARACTERS.
LABEL TO READ "LADDER SIDE"
LOCATED APPROX AS SHOWN

LADDER SIDE

HOPPER
3'-0" x 3'-0"

NOTE: ATTACH HOPPER
TO PLATFORM
W/ 3/16 FILLET
WELD

1/2" Ø
13-UNC-2A
(4 PL)

HOIST RINGS
23108 LOAD
RATED 10,000
(4 REQUIRED)
ON FL PL
SEE NOTE 8

5/8" HOLE
(4 PL)

SEE NOTE 6

OPTIONAL
SPICE

2" FLOOR PLATE PLAN

SCALE: 3/4" = 1'-0"
1-REQD

TS 5x5x1/2

SEE NOTE 3

FOR GENERAL NOTES SEE SHEET 1

5 DETAIL
1 SCALE: 3/4" = 1'-0"
4 REQUIRED

U.S. DEPARTMENT OF ENERGY DOE Field Office, Richmond Richmond, Norfolk County	
SHOT LOADING PLATFORM SECTION & DETAILS	
DATE: 5/94	SCALE: 1/4" = 1'-0"
NOTED	1000
H-2-83738 0	

REV	DATE	DESCRIPTION	BY	CHKD	APP'D	DATE
1						
2						
3						
4						
5						

TRACEABILITY LIST
NEXT USED ON H-2-83738 SH 1
CADFILE B083738C
CADCODE COS-3.3.ACD2 12.00.55

FOR INFORMATION ONLY
FROM DEVELOPMENT
CONTROL

6 HANDRAIL DETAIL RIGHT AND LEFT SIDES
SCALE: 1"=1'-0"

7 HANDRAIL DETAIL HOPPER SIDE
SCALE: 1"=1'-0"

8 HANDRAIL DETAIL FRONT SIDE
SCALE: 1"=1'-0"

9 LADDER DETAIL
SCALE: 1"=1'-0"

10 LADDER DETAIL
SCALE: N.T.S.

13 DETAIL
SCALE: N.T.S.

14 DETAIL
SCALE: N.T.S.

11 DETAIL
SCALE: N.T.S.

12 DETAIL
SCALE: 1"=1'-0"

FOR INFORMATION ONLY
FROM DEVELOPMENT
CONTROL

FOR GENERAL NOTES SEE SHEET 1

DWG NO. 150 TITLE SHOT LOADING PLATFORM HANDRAIL & LADDER DET REF NUMBER H-2-83738A SH.1 REFERENCES CADFILE 8083738D REVISIONS CADCODE DGS:3.3:ACD2:12.00:SS				U.S. DEPARTMENT OF ENERGY DOE Field Office, Richmond Washington, Norfolk, Chesapeake SHOT LOADING PLATFORM HANDRAIL & LADDER DET F 200 1000 H-2-83738 0 SCALE 1"=1'-0"			
--	--	--	--	---	--	--	--

HOPPER MAX GROSS WT: 6,000 LBS

[illegible]

NAME	QTY	DESCRIPTION	LENGTH	WT
BILL OF MATERIAL				
LEVEL CAPACITY	10 CU FT		SCALE WEIGHT	725 LB

<p>THIS DRAWING IS DESIGN AND TECH. IS OUR PROPERTY AND MUST NOT BE USED EXCEPT IN CONNECTION WITH OUR WORK AND WITHOUT THE SIGNATURE OF DESIGN OR INVENTION AND REVENUED</p>	
<p>GAR-BRO MANUFACTURING CO.</p>	
<p>HIGHWAY 110 EAST P.O. DRAWER 1077 HESPER SPRINGS AR - 72543 1077</p>	
<p>SPECIAL 30 C.U.F.T. LEAD "EE" HOPPER WESTING-HOUSE HANFORD</p>	
SCALE 1/4"	SHOW NO. SALES
DATE 7-22-51	SHIPPING CUBICS
REVISED	DRAWING NO.
MADE BY AS	94-10
CHANGED 10/1/51	
SUBMITTER	SHEET 1A OF

GLOBAL[®] MANUFACTURING, INC.

GLOBAL DESIGN SERIES PNEUMATIC VIBRATORS

All Global Design Series Vibrators are shipped with a warranty card for each vibrator. This postage paid card must be completed and returned to Global to properly document the warranty.

Global Manufacturing Inc.'s products are manufactured under one or more of the following patents:

4,270,396 * 73/7279 * 3,922,043 * 475,551 * 566,751
 * 3,409,483 * 1,208,181 * 1,227,952 * 2,155,203 *
 4,614,123 * 4,496,076 * 4,469,247.

SAFETY PRECAUTIONS

- Follow all mounting instructions.
- Always use a safety cable or chain for extra support.
- Do not operate vibrators when structure is empty.
- Do not operate vibrators when gate is closed or conveyor is stopped unless consolidation of material is desired.
- Wear ear protection when decibel levels reach 90 dBA.
- Always operate the Design Series pneumatic vibrators with a regulator, filter and lubricator.
- Do not operate vibrator motor above 100 PSI.
- To prevent explosive hazard, do not use combustible gases to drive the pneumatic motor.
- Do not operate vibrator with side covers removed.
- Disconnect air line before maintenance.

INSTALLATION

The key to successful vibration is the correct mounting procedure. Rotary vibration resonates the material inside the structure when the vibrator is mounted rigidly. The vibrator should appear motionless. It is NOT true that vibrators should shake the hopper wall and make an abundance of noise. The vibrations will pass through the resistance of the structure and into the material.

Do not mount the vibrator directly to the structure wall. Use channel iron stiffeners for proper mount rigidity.

The channel iron should be at least two-thirds of the entire length of the sloped portion of the hopper but not greater than 10 feet (3 m). The channel iron width should not be less than the base width of the vibrator.

The following lengths are good guidelines to use as minimum lengths for the channel iron.

C3-6A	--	6" x 2.12" x 5'	(13.0 lb/ft) (19.3 kgs/m)
D4.5-6	--	6" x 2.12" x 5'	(13.0 lb/ft) (19.3 kgs/m)
D4.5-8	--	8" x 2.50" x 6'	(18.7 lb/ft) (27.9 kgs/m)
D4.5-10	--	8" x 2.50" x 6'	(18.7 lb/ft) (27.9 kgs/m)
D7-12	--	8" x 2.50" x 8'	(18.7 lb/ft) (27.9 kgs/m)
D7-18	--	10" x 2.75" x 10'	(25 lb/ft) (37.2 kgs/m)
D7-25	--	10" x 2.75" x 10'	(25 lb/ft) (37.2 kgs/m)
D7-50	--	12" x 3.12" x 10'	(30 lb/ft) (44.6 kgs/m)

The channel iron should be notched to permit access to the mounting bolts. A 3/4" mount plate may be solid welded to the channel iron if the channel is not the proper width.

The channel iron should be stitch welded vertically to the slope of the wall. Stitch weld the channel iron to the structure [weld 3 inches (7.5 cm), skip 1 inch (2.5 cm), weld 3 inches (7.5 cm), etc...] Leave 1 inch (2.5 cm) un-welded on the ends and corners. This allows for distribution of the vibration without causing stress to the hopper or bin. Should the weld fail, the entire mount will not fall off.

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P.O. BOX 3824, LITTLE ROCK, ARKANSAS 72203 / 1102 W. 14TH ST., LITTLE ROCK, ARKANSAS 72202

PHONE: 501-374-7416 FAX: 501-376-7147

REV. 8:040894

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Note: CC models require angle irons or tees with 3/4" to 7/8" web thickness. Solid weld the angle or tee to the channel iron.

Secure the vibrator to the channel iron with SAE coarse thread Grade 8 plated bolts with lock washers or an adhesive such as Loctite[®] 262. Bolting should be a sequential process. At least two passes are required in most situations. Tighten all the bolts about half the maximum torque, then tighten to maximum torque. If Loctite is not used, re-torque the bolts after the vibrator has operated for a few minutes. If Loctite is used, do not re-torque the bolts as this will break the Loctite bond. All bolts should be given the same torque value. Grade 8 bolts can handle more torque than standard bolts.

MOUNTING LOCATIONS

Single Vibrator - Install on a channel iron stiffener on the outside of the sloping wall 1/3 the distance above the discharge opening.

Multiple Vibrators - Use more than one vibrator when the diameter or width of any wall is greater than 12 feet (3.66 m). Always mount the vibrators on different planes.

Two Vibrators on Round or Square Hoppers - Install channel iron stiffeners 180 degrees apart. Install one vibrator on the outside of the sloping wall 1/3 the distance above the discharge opening. Install

the second vibrator on the opposite side on the outside of the sloping wall 2/3 the distance above the discharge opening.

Two Vibrators on Rectangular Hoppers - Install channel iron stiffeners on opposite sides of the long walls. One vibrator should be installed on the outside of the sloping wall 1/3 the distance from the discharge opening. Install the second vibrator on the outside of the opposite sloping wall 2/3 the distance above the discharge opening. When only one wall is sloping, mount both stiffeners on the sloping wall. Install a vibrator on each stiffener, making sure they are on different planes.

Three Vibrators - Install on channel iron stiffeners mounted 120 degrees apart. Install the first vibrator on the outside of the sloping wall 1/4 the distance above the discharge opening. Install the second vibrator on a separate channel iron at 1/2 the distance above the discharge opening. Install the third vibrator on the remaining channel iron at 3/4 the distance above the discharge opening.

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INSTALLATION ON RAIL CARS

Install clamp-on CC7 model vibrators on the center beam between the hoppers. The CC7 model vibrator may be also mounted on one of the four corners nearest the hopper to be influenced.

Attach the C3 model vibrator to a C3/GBM wedge type bracket for hopper pocket mounts. Make sure the air line is connected to the top port of the motor. The direction of eccentric weight rotation will then be toward the hopper and down. This will keep the vibrator in the wedge recipient bracket and influence material to flow down.

INSTALLATION ON CHUTES AND FLOW PIPES

Use channel iron stiffeners mounted vertically or in the direction of material flow. Center the channel if the chute is less than 6 feet (1.8 m) in width. If the chute is greater than 6 feet (1.8 m), use two vibrators on separate channel irons. Two channels should be installed 1/3 the width of the chute from opposite sides. When wall thickness is less than 1/8", additional reinforcement may be required 90° from the vibrator.

DIRECTION OF ROTATION

CC 4.5 and CC 7 models: The weights of the vibrator should rotate in the same direction as the tightening of the square head clamp bolts on the CC models. This will prevent the clamp bolts from loosening.

The axis of rotation for rotary vibrators should be horizontal or perpendicular to the direction the material should flow.

The shaft of the vibrator should be in a horizontal position in order to prolong bearing life. The 7 Series vibrators can be modified for vertical shaft applications. Consult the factory for information and instructions.

The motors of the Design Series vibrators are bi-directional and can be reversed by changing the hose connections.

PATENTED LUBRICATION SYSTEM FOR CC7 AND D7 SERIES

The CC7 and D7 vibrators are shipped with two 1/8" solid pipe plugs installed in the housing for our patented oil lubrication system. Once the vibrator is mounted, remove the solid plug that is at the highest point and replace with the vented plug enclosed with shipment.

The oil should be changed at least once a year. Use 5 1/2 teaspoons (27 ml) of a Mobil SHC626 synthetic oil lubricant, or equivalent. The synthetic oil is compatible with mineral oil, but the synthetic oil has a greater load carry capacity and it improves the spherical roller bearing life. If mineral oil is added to the synthetic oil, the synthetic will degrade to the quality of the mineral oil, but it will still provide lubrication.

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3

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PIPE AND HOSE SIZES

Use an air hose that is the same size or larger in diameter as the inlet port of the vibrator. Use short, flexible hose between the vibrator and the main air line if the main line is metal to avoid strain on the vibrator motor ports. Allow a loose bend of 9" to 16" (23 cm to 41 cm) to be formed by the hose to prevent cracking from vibration.

Connect air line to the highest port, or on the side in direction of material flow. Use a muffler to keep contaminants out of the vibrator, especially when vibrator is turned off. Exhaust air may be hosed away from the vibrator to reduce noise and contamination. The exhaust hose should be at least one size larger than the inlet hose. Install a filter, regulator, gauge, and lubricator in the air line within 10 to 12 ft. (3 to 4 m) of the vibrator motor.

**** Care should be taken to keep the ends of the hoses out of the dirt.**

OPERATION

The air supply must be clean and relatively dry. An air line filter, regulator and lubricator of adequate size should be used and located before the vibrator. Control valves should be located as close as possible to the vibrator. All air lines should be at least the same size as the ports on the motor. Air lines longer than 6 feet (2 m) use larger size lines.

The vibrator may be run continuously at speeds up to the rated running conditions show in our performance data.

The vibrator should be operated with a pressure regulator or needle valve to control the air flow which controls the speed. (A ball valve or solenoid valve should be used to turn the vibrator on and off.) A regulator provides constant speed control even as the plant air pressure varies. Alternatively, a needle valve will control the speed as long as the plant air pressure does not change. Do not connect the vibrator directly to plant air. The motor could operate faster than its maximum pressure rating. Maximum pressure is 100 PSI.

Use a 64 micron filter. The airline filter should be drained regularly and the element examined for signs of clogging.

The airline lubricator should be replenished as required and set to give the following drop rate minimum. Normal ambient temperatures 0° to 32° C.

MOTOR SIZE	CONTINUOUS OPERATION	INTERMITTENT OPERATION
4AC	4 - 5	8 - 12
6AC	5 - 6	10 - 12

Lubricants: Shell - Tellus 37
B.P. - Energol HL65
Castrol - Hyspin 70
Mobil - Alma oil No 1

Operate vibrator with a muffler on the exhaust port. The muffler will prevent contaminants from entering into the motor.

Vibrator should appear motionless. Damage may occur to the vibrator and its application if the mount is loose or flimsy.

Direction of eccentric weight rotation is normally in the same direction as the desired direction of material flow. On a hopper application, where the desired direction of material flow is down, the eccentric weights should rotate toward the hopper wall and down.

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TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	SOLUTION
Vibrator will not operate	Air line blocked	Locate obstruction and remove. Check for kinked air line. Check filter.
	Inadequate air supply	Increase regulator settings or reduce number of units in use at same time. Check capacity of compressor.
	Air line too small for distance used	Use larger air line.
	Contamination in vibrator motor	Disassemble and clean motor. Check filter element.
	Faulty valve or air line couplings	Clean, repair, or replace.
	Clogged filter	Clean or replace filter.
Vibrator operates slowly	Air line leaking or constricted	Repair air line, valves, or filter.
	Air line too small for distance used	Replace air line with larger size air line.
	Filter or muffler clogged	Clean, repair or replace.
	Contamination in vibrator	Disassemble and clean.
	Lubricant too thick in cold weather	Use a lighter weight lubricant.
Excessive noise	Insufficient mount	Replace with stronger mounting apparatus.
	Damaged housing	Replace the housing.
	Lubricator clogged or empty	Check oil level and flow rate. Keep reservoir full.
	Muffler not used	Install a muffler.
	Bearing failure (squealing sound)	Replace bearings.
	Vibrator is running too fast	Reduce speed by adjusting the P.S.I.

PNEUMATIC VIBRATOR PERFORMANCE DATA

MODEL	UNBAL LB-IN (N-M)	START PSI (BAR)	40 PSI (2.8 BAR)			60 PSI (4.1 BAR)			80 PSI (5.5 BAR)		
			SPEED RPM	FLOW SCFM (LPS)	FORCE LB (KN)	SPEED RPM	FLOW SCFM (LPS)	FORCE LB (KN)	SPEED RPM	FLOW SCFM (LPS)	FORCE LB (KN)
C3-6A-4AC	1.5 (0.17)	8 (0.55)	4400	41 (19)	820 (3.6)	5150	55 (26)	1130 (5.0)	5650	74 (35)	1360 (6.0)
	2.0 (0.23)	8 (0.55)	4310	40 (19)	1050 (4.7)	4980	54 (25)	1410 (6.3)	5500	73 (34)	1720 (7.6)
	2.5 (0.28)	8 (0.55)	4220	39 (18)	1260 (5.6)	4820	53 (25)	1650 (7.3)	5350	72 (34)	2030 (9.0)
	3.0 (0.34)	8 (0.55)	4130	38 (18)	1450 (6.5)	4650	52 (25)	1840 (8.2)	5200	71 (34)	2300 (10.3)
	4.0 (0.45)	10 (0.69)	4050	37 (17)	1860 (8.3)	4540	51 (24)	2340 (10.4)	5170	70 (33)	3040 (13.5)
	5.0 (0.57)	13 (0.90)	3980	36 (17)	2250 (10.0)	4440	51 (24)	2800 (12.5)	5130	70 (33)	3740 (16.6)
	6.0 (0.68)	18 (1.24)	3900	35 (16)	2590 (11.5)	4330	50 (24)	3220 (14.2)	5100	69 (33)	4430 (19.7)
D4.5-6-4AC CC4.5-6-4AC	6.0 (0.7)	18 (1.24)	3950	35 (16)	2660 (11.8)	4250	50 (24)	3080 (13.7)	4500	65 (31)	3450 (15.3)
D4.5-8-4AC CC4.5-8-4AC	8.0 (0.9)	18 (1.24)	3600	30 (14)	2940 (13.1)	3900	48 (22)	3460 (15.4)	4300	64 (30)	4200 (18.7)
D4.5-10-4AC CC4.5-10-4AC	10.0 (1.1)	18 (1.24)	3350	32 (15)	3190 (14.2)	3700	47 (22)	3890 (17.3)	3900	62 (29)	4320 (19.2)
D7-12-6AC CC7-12-6AC	12.0 (1.4)	15 (1.04)	4000	55 (26)	5450 (24.2)	5250	85 (40)	9390 (41.8)	OPERATION NOT RECOMMENDED AT PRESSURES ABOVE 60 PSI		
D7-18-6AC CC7-18-6AC	18.0 (2.0)	18 (1.24)	3550	54 (25)	6440 (28.6)	4650	82 (39)	11050 (49.2)	5400	114 (54)	14910 (66.3)
D7-25-6AC CC7-25-6AC	25.0 (2.8)	20 (1.38)	3300	52 (24)	7730 (34.4)	4400	81 (38)	13750 (61.2)	5050	109 (51)	18110 (80.6)
D7-50-6AC CC7-50-6AC	50.0 (5.7)	25 (1.73)	2700	48 (22)	10350 (46.0)	3750	67 (32)	19970 (88.8)	4350	93 (44)	26870 (120)

The table above represents the vibrator's performance at various speeds. It is important to note that with any rotary vibrator the load on the bearings increases as the speed increases; therefore, the life of the bearings is very sensitive to the speed. Increasing the speed by just 10% will cut the bearing life in half. Likewise, reducing the speed 10% will double the bearing life. Please remember that the speed is controlled by the hydraulic flow (GPM), not the pressure (PSI). The pressure across the motor will vary according to the rigidity of the vibrator mount and the type of material being resonated.

Metric:

N-M - Newton-Meter
LPM - Liters per minute
BAR - Unit of measure
RPM - Revolutions per minute
KN - Kilonewtons
KG - Kilograms

American:

LB-IN - Pounds-Inch
SCFM - Standard cubic feet per minute
PSI - Pounds per square inch
RPM - Revolutions per minute
LB - Pounds

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REV. 8:040894

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INSTRUCTIONS FOR ADJUSTING THE WEIGHTS OF THE C3 VIBRATOR

The C3 vibrator has adjustable weights. To change the amount of vibration the weights are simply repositioned on the shaft by removing and reinstalling an adjustment bolt.

To adjust the weights both the back cover and the motor cover must be removed. On each side of the vibrator are two weights, an inside weight and an outside weight. The outside weight is fixed to the shaft with a set screw and a key. The inside weight (adjustable weight) is attached to the outside weight with a single bolt. By removing this bolt the inside weight is free to rotate on the shaft. Rotate the inside weight until the tapped hole lines up under the desired bolt hole of the outside weight and reinstall the bolt. It is important that the weights on both sides are set the same. There is no need to ever loosen the set screw on the outside weight. After securing the inside weight to the outside weight, bolt the covers onto the vibrator using 9 ft. lbs. torque. Make sure the motor coupling aligns with the pins on the weight. The vibrator is now ready for operation.

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GLOBAL[®] MANUFACTURING, INC.

DIMENSIONS DESIGN SERIES VIBRATORS – PNEUMATIC

C3-4AC

* VT. LB. 44
KG. 20

MOUNT WITH 3/4-10UNC GRADE 8
PLATED BOLTS TORQUED TO
282 FT. LBS. (382 N.M.)

DIMENSIONS ARE IN INCHES (MILLIMETERS)

* THIS IS TOTAL WEIGHT WITH LARGEST ECCENTRIC MOUNTED
WEIGHT WILL BE LESS WHEN A SMALLER ECCENTRIC IS MOUNTED

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GLOBAL[®] MANUFACTURING, INC.

DIMENSIONS DESIGN SERIES VIBRATORS – PNEUMATIC

D4.5-4AC

* WT. LB. 52
KG. 24

MOUNT WITH 5/8-11UNC GRADE 8
PLATED BOLTS TORQUED TO
159 FT. LBS. (216 N.M.)

CC4.5-4AC

* WT. LB. 61
KG. 28

MOUNT WITH 1-12UNF CLAMP BOLTS
SUPPLIED WITH UNIT TORQUED TO
893 FT. LBS. (1210 N.M.)

DIMENSIONS ARE IN INCHES (MILLIMETERS)

* THIS IS TOTAL WEIGHT WITH LARGEST ECCENTRIC MOUNTED
WEIGHT WILL BE LESS WHEN A SMALLER ECCENTRIC IS MOUNTED

GLOBAL[®] MANUFACTURING, INC.

DIMENSIONS DESIGN SERIES VIBRATORS – PNEUMATIC

D7-6AC

LB. 104
* WT. KG. 47

MOUNT WITH 3/4-10UNC GRADE 8
PLATED BOLTS TORQUED TO
282 FT. LBS. (382 N.M.)

CC7-6AC

LB. 96
* WT. KG. 44

MOUNT WITH 1-12UNF CLAMP BOLTS
SUPPLIED WITH UNIT TORQUED TO
893 FT. LBS. (1210 N.M.)

DIMENSIONS ARE IN INCHES (MILLIMETERS)

* THIS IS TOTAL WEIGHT WITH LARGEST ECCENTRIC MOUNTED
WEIGHT WILL BE LESS WHEN A SMALLER ECCENTRIC IS MOUNTED

NO.	DESCRIPTION	PART NO.	QTY.	NO.	DESCRIPTION	PART NO.	QTY.
1.	Motor 4AC Pneumatic	10389	1	12.	Fixed Weight - Drive With Pins	11147	1
2.	Muffler 1/2"	10151	1	13.	Adjustable Weight	11149	2
3.	Hex Hd. Bolt 1/4-20 X 1 1/4"	10218	6	14.	Retaining Ring N5000-287	10425	2
4.	Lock Washer 1/4"	10273	10	15.	Retaining Ring 5100-118	10430	2
5.	Key 1/8" Sq. X 1" Long	(1)	1	16.	Bearing 6306 2RS	10241	2
6.	Motor Cover, Pneumatic	10353	1	17.	Shaft	11158	1
7.	Coupling	11211	1	18.	Key 3/16" Sq. X 1/2" Long	11150	2
8.	SCS 1/4-20 X 5/8"	10448	3	19.	Housing	10524	1
9.	Hex Hd Bolt 1/4-20 x 1"	10980	2	20.	Fixed Weight - Driven	11148	1
10.	SSS 1/4-20 X 3/4"	10452	2	21.	Cover	10796	1
11.	SCS 1/4-20 X 3/4"	10449	2	22.	Hex Hd. Bolt 1/4-20 X 2"	10216	4

NOTES:

(1) Key included with motor

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PART NO. : 11152

DESIGN SERIES VIBRATOR

C3-6A-4ACREV. C
4-25-94DWG. NO.
ASD11152

NO.	DESCRIPTION	PART NO.	QTY.	NO.	DESCRIPTION	PART NO.	QTY.
1.	Hex Hd. Bolt M5 X 12		3	10.	Shaft - Rotor		1
2.	Cover Plkte		1	11.	Rotor Blade	(1)	4
3.	O-Ring	(1)	1	12.	Key - 1/8" Sq. X 3/4" Long		1
4.	Dowell		4	13.	Body		1
5.	Bearing, Single Row 6201 D Shield		1	14.	Front Plate		1
6.	SCS M6 X 16		12	15.	Bearing, Double Row		1
7.	End Plate		1	16.	Oil Seal	(1)	1
8.	Body Gasket	(1)	2	17.	Retaining Ring	(1)	1
9.	Ejection Ring		2				

NOTES:

(1) Parts included in repair kit #10180

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PART NO. : 10389

DESIGN SERIES VIBRATOR

4AC PNEUMATIC MOTOR

REV. B
12-10-93

DWG. NO.
ASD10389

PLAN

SHEET, 304L
TM A-240 WELD
SIDE

GENERAL NOTES

1. WELD QUALIFICATIONS AND WELDING PROCEDURES PER ASME SECTION IX ARE ACCEPTABLE. VT FINAL PASS OF ALL WELDS.
2. REMOVE ALL BURRS AND GRIND TOP EDGES SMOOTH.
3. PAINT DRAWING NUMBER AND DRAWING REVISION NUMBER, OUTSIDE, IN THE LOCATION INDICATED ON THE DRAWING PER HS-B5-0015, TYPE 8 WITH 1" HIGH CHARACTERS. CHARACTERS SHALL BE BLACK ENAMEL.
4. PAINT "WEIGHT ^{SEE} POUNDS", OUTSIDE, IN THE LOCATION INDICATED ON THE DRAWING PER HS-B5-0015, TYPE 8, WITH 2" HIGH CHARACTERS. CHARACTERS SHALL BE BLACK ENAMEL ON A YELLOW ENAMEL BACKGROUND. THE ASSEMBLY SHALL BE WEIGHED PRIOR TO PAINTING THE ABOVE AND THE WEIGHT TO THE NEAREST POUND SHALL BE INSERTED WHERE THE ^{SEE} ARE.
5. WELD INSPECTION SHALL BE IN ACCORDANCE WITH HS-VS-0013.

FOR INFORMATION ONLY
FROM DEVELOPMENT
CONTROL

WHC-SD-W320-DA-005 SUPPORT DOCUMENT		U.S. DEPARTMENT OF ENERGY DOE Field Office, Richland Westinghouse Hanford Company	
H-2-83728 62' TRANSPORT ASSEMBLY		PROJECT W-320, EQUIPMENT REMOVAL SYSTEM	
H-2-83724 48' TRANSPORT ASSEMBLY		F 241-G 1001 H-2-83745 10	
REF NUMBER TITLE		REV 1 700196	
DRAWING TRACEABILITY LIST		NEXT USED ON AS ALLOCATED	
CADFILE B083745A		CAGODONE DGS:5ACD2:12:00:SS	
5 65		3	
2		1	

Self-Powered Hydraulic MODEL 6139 VERSA-GRIP™ DUAL FUNCTION DRUM HANDLER with GENERAL PURPOSE JAWS

PRIMARY FUNCTIONS:

- Forward controlled dumping
- Moving
- Stacking
- Palletizing

Designed for Handling
Steel Drums

MODEL 6139 VERSA-GRIP is a two-function drum handler that features both hydraulic gripping and dumping capabilities. It offers controlled dumping forward up to 125 degrees. Jaw opening adjusts hydraulically to handle 55 gallon steel drums and other rigid cylinders from 13" to 24" in diameter. GENERAL PURPOSE JAWS are rubber-lined.

VERSA-GRIP is designed primarily for use in handling STEEL DRUMS of various sizes.

Model 6139 has its own built-in 12-volt battery operated POWER-PAK and is completely self-contained. (batteries not included) Self-contained hydraulics allow the user to utilize the drum grip on almost any brand or style of lift truck. A complete description of the POWER-PAK can be found on page 12 of this catalog.

VERSA-GRIPS are "fork-mounted" and can be easily attached to or unattached from the lift truck in seconds.

A SAFETY CHAIN is provided to secure the grip to the mast.

VERSA-GRIP offers controlled dumping forward up to 125 degrees.

ORDERING INFORMATION

Model Number	Description	Color	Lifting Capacity*	Distance Between Fork Tubes	Distance Between Forks	Fork Tube Size	Jaw Size	Cylinder Diameter Range	Shipping Weight
6139	Self-Powered VERSA-GRIP w/ GENERAL PURPOSE JAWS	OSHA SAFETY GREEN	2000 lbs.*	18-1/2"	19-1/2"	2x6x42"	6"x18"	13" - 24"	514 lbs

* Dumping capacity of an open top drum is limited by the strength and rigidity of the drum itself. It must be capable of retaining its cylindrical shape while dumping the load. Drums should always be gripped towards the bottom of the drum where they are more rigid.

WHC-SD-WM-ATP-100 Rev. 0

Versa-Grip is a trademark of Valley Craft 2001 S. Hwy 61, Lake City, MN
55041-9555