OPERATION AND MAINTENANCE MANUAL

SHARON CLEANERS
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SARATOGA SPRINGS, NEW YORK 12866

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Introduction

The Soil Vapor Extraction System located on the Sharon Cleaner property is comprised of two, 20 foot, 4" PVC soil vapor extraction wells located on the northern end of the property in front of the building that are connected by 2" PVC pipe running along the eastern property line to a Fuji blower located on a concrete slab, enclosed by a shed; presently located in the southeast corner of the property. The exhaust stack for the system is located on the north end of the shed and extends seven feet from the roof for a total of fourteen feet above grade. A ½" diameter exhaust sampling port is located into the exhaust stack, approximately six feet above grade.

Each SVE well has ten feet of 0.020-slotted pipe for vapor extraction with a ten-foot solid well section extending to grade. Each well was sealed using sand pack from 20 to 8 feet, bentonite chips from 8 to 6 feet and backfill from 8 feet to the surface.

The Fuji regenerative blower chosen for the project is Stock #4Z751, Fuji Model VFC 404P-5T that has a maximum airflow of 98 cubic feet per minute (cfm).

A Carbitrol carbon filter system is located between the Fuji blower and exhaust to remove PCE and TCE prior to discharge into the atmosphere.

There are a total of five monitoring wells to monitor and determine the efficiency of the system; four monitoring wells are on site and one off-site, across Lincoln Avenue.

System Operation

The soil vapor extraction system (SVE) described above is designed for 24-hour per day operation. The SVE system will remain in continuous operation until four consecutive groundwater sample events identify concentrations of PCE and TCE at or below the NYSDEC groundwater standard of 5.0 ug/l.

If groundwater sample events stabilize prior to reaching the water quality standard for TCE and PCE, the SVE system will be re-evaluated to determine the modifications required to reach the water quality standards.

System Maintenance

Due to the system operation schedule of 24 hours per day, the soil vapor extraction system (SVE) requires per periodic maintenance to ensure maximum efficiency. The following maintenance procedures are required to be completed during each site visit or as needed throughout the duration of the system operation:

- Examine the air filter for clogging: Inlet filters are specifically designed to protect regenerative blowers by filtering damaging particles from inlet air. The filters have perforated outer cylinders and inner cylinders wrapped with fine (0.009") mesh screen.

  If the air filter is clogged, the following steps are performed:

  a) Shut off the entire system using the switch located on the electric control panel located within the shed.
  b) Remove air filter using a standard screwdriver and inspect filter.
  c) Replace filter cover if deemed necessary. The replaceable filter covers are made of 7/8" thick, 100% polyester filter media that provides an 80% efficiency to 5 microns.
  d) Once the filter has been inspected and/or replaced, re-connect the filter to the system and continue system operation using the main switch.

- Drain water from the moisture separator: The moisture separator allows for a maximum of 24" of water to accumulate between releases, therefore, the moisture separator should be inspected daily or every two days to prevent possible build-up and damage to the system.

  To drain the moisture separator:

  a) Shut off the entire system using the switch located on the electric. control panel located within the shed.
  b) Locate and drain the moisture separator.
  c) Return the system to full operation using the main switch.

- Check carbon filter: Check SVE exhaust levels for PCE and TCE by measuring concentrations with Sensidyne sample tubes after the carbon canister. Replace carbon prior to TCE or PCE concentrations reaching 5ppm.

- Provide normal pump operation: The Fuji blower is specifically designed to require little or no routine maintenance. In the event that problems occur with the blower, the following instructions are provided to ensure that the correct actions are taken:

INSTALLATION, MAINTENANCE AND TROUBLESHOOTING INSTRUCTIONS

Installation Instructions

1. **Bolt It Down** - Any blower must be secured against movement prior to starting or testing to prevent injury or damage. The blower does not vibrate much more than a standard electric motor.

2. **Filtration** - All blowers should be filtered prior to starting. Care must be taken so that no foreign material enters the blower. If foreign material does enter the blower, it could cause internal damage or may exit at extremely high velocity.

   Should excessive amounts of material pass through the blower, it is suggested that the cover(s) and impeller(s) be removed periodically and cleaned to avoid impeller imbalance. Impeller

3. **Support the Piping** - The blower flanges and nozzles are designed as connection points only and are not designed to be support members.

Caution: Plastic piping should not be used on blowers larger than I HP that are operating near their maximum pressure or suction point. Slower housing and nearby piping temperatures can exceed 200'F. Access by personnel to the blower or nearby piping should be limited, guarded, or marked, to prevent danger of burns.

4. **Wiring** - Blowers must be wired and protected/fused in accordance with local and national electrical codes. All blowers must be grounded to prevent electrical shock. Sio-Blo or time delay fuses should be used to bypass the first second of start-up amperage.

5. **Pressure/Suction Maximums-** The maximum pressure and/or suction listed on the model label should not be exceeded. This can be monitored by means of a pressure or suction gage installed in the piping at the blower outlet or inlet. Also, if problems do arise, the representative will need to know the operating pressure/suction to properly diagnose the problem.

6. **Excess Air** - Bleed excess air off. DO NOT throttle to reduce flow. When bleeding off excess air, the blower draws less power and runs cooler.

   Note: Remote Drive (Motoriess) Blowers - Properly designed and installed guards should be used on all belts, pulleys, couplings, etc. Observe maximum remote drive speed allowable. Due to the range of uses, drive guards are the responsibility of the customer or user. Belts should be tensioned using belt gauge.

Maintenance Procedure

When properly piped, filtered, and applied, little or no routine maintenance is required. Kee the filter clean. Standard models have sealed bearings that require no maintenance. Bearing should be changed after 15,000 to 20,000 hours, on average. Replacement bearing information is specified on the chart below.

Bearing Part Number	Size	Seal Material	Grease	Heat Stabilized
510217 510218 510219	205 206 207	Polyacrylic	Nye Rheotemp 500 30% +/- 5% Fill	Yes – 325 F
510449 516440 516648	203 202 307	Buna N	Exxon Polyrex Grease	NO
516840 516841 516842 516843 516844 516845 516846 516847	206 207 208 210 309 310 311 313	Buna N	Exxon Polyrex Grease	NO

Troubleshooting

		Possible Cause	Out of Warranty Remedy
Impeller Does Not Turn	**Humming Sound**	1. *One phase of power line not connected 2. *One phase of stator winding open 3. Bearings defective 4. Impeller jammed by foreign material 5. Impeller jammed against housing or cover 6. **Capacitor open	1. Connect 2. Rewind or buy new motor 3. Change bearings 4. Clean and add filter 5. Adjust 6. Change capacitor
	No. Sound	1. *Two phases of power line not connected 2. *Two phases of stator winding open	1. Connect 2. Rewind or buy new motor
Impeller Turns	**Blown Fuse**	1. Insufficient fuse capacity 2. Short circuit	1. Use time delay fuse of proper rating 2. Repair
	Motor Overhead or Protector Trips	1. High or low voltage 2. *Operating in single phase condition 3. Bearings defective 4. Impeller rubbing against housing or cover 5. Impeller or air passage clogged by foreign material 6. Unit operating beyong performance range 7. Capacitor shorted 8. *One phase of stator winding short circuited	1. Check input voltage 2. Check connections 3. Check bearings 4. Adjust 5. Clean and add filter 6. Reduse system pressure/vacuum 7. Change capacitor 8. Rewind or but new motor
	Abnormal Sound	1. Impeller rubbing against housing or cover 2. Impeller or air passages clogged by foreign material 3. Bearings defective	1. Adjust 2. Clean and add filter 3. Change bearings
	Performance Below Standard	1. Leak in piping 2. Piping and air passages clogged 3. Impeller rotation reversed 4. Leak in blower 5. Low voltage	1. Tighten 2. Clean 3. Check writing 4. Tighten cover, flange 5. Check input voltage
	*** 3 Phase Units** **** 1 Phase Units** ***** Disassembly and repair of new blowers or motors will void the warranty. Factory should be contacted prior to field repair an in –warranty unit.**		

Blower Disassembly.

WARNING: Attempting to repair or diagnose a blower may void the warranty. It may also be difficult to successfully disassemble and reassemble the unit.

1) Disconnect the power leads. **CAUTION:** Be sure the power is disconnected before doing any work whatsoever on the unit.

2) Remove or separate piping and/or mufflers and filters from the unit.

3) Remove the cover bolts and then the cover. **NOTE.** Some units are equipped with seals. It is mandatory that these seals be replaced once the unit has been opened.

4) Remove the impeller bolt and washers and then remove the impeller. **NOTE:** Never pry on the edges of the impeller. Use a puller as necessary.

5) Carefully note the number and location of the shims. Remove and set them aside. NOTE: If the disassembly was for inspection and cleaning the unit may now be reassembled by reversing the above steps. If motor servicing or replacement and/or impeller replacement is required the same shims may not be used. It will be necessary to re-shim the impeller according to the procedure explained under assembly.

6) Remove the housing bolts and remove the motor assembly (arbor/.housing on remote drive models).

7) Arbor disassembly (Applicable on remote drive models only):
   a) Slide the bearing retraining sleeve off the shaft at the blower end.
   b) Remove the four (4) screws and the bearing retaining plate from the blower end.
   c) Lift the shaft assembly far enough out of the arbor to allow removal of the blower end snap ring.
   d) Remove the shaft assembly from the arbor.
   e) If necessary, remove the shaft dust seal from the pulley end of the arbor.

Muffler Material Replacement

1) Remove the manifold cover bolts and them manifold cover.

2) The muffler material can now be removed and replaced if necessary. On blowers with fiberglass acoustical wrap the tubular retaining screens with the fiberglass matting before sliding the muffler pads over the screens.

3) Reassemble by reversing the procedure.

Blower Reassembly.

I) Place the assembled motor (assembled arbor assembly for remote drive models) against the rear of the housing and fasten with the bolts and washer.

2) To ensure the impeller is centered within the housing cavity re-shim the impeller according to the procedure outlined below.

3) If blower had a seal replace the seal with a new one.

4) Place the impeller onto the shaft making sure the shaft key is in place and fasten with the bolt, washer and spacer as applicable. Torque the impeller bolt per the table below. Once fastened carefully rotate the impeller to be sure it turns freely.

5) Replace the cover and fasten with bolts.

6) Reconnect the power leads to the motor per the motor nameplate.

Bolt Size	Torque
¼ - 20	6.25 +/- 0.25
5/16 – 18	11.5 +/- 0.25
3/8 – 16	20.0 +/- 0.5
½ - 13	49.0 +/- 1
5/8 - 11	90.0 +/- 2

Impeller Shimming Procedure:

WARNING: This unit may be difficult to shim. Extreme care may be exercised.

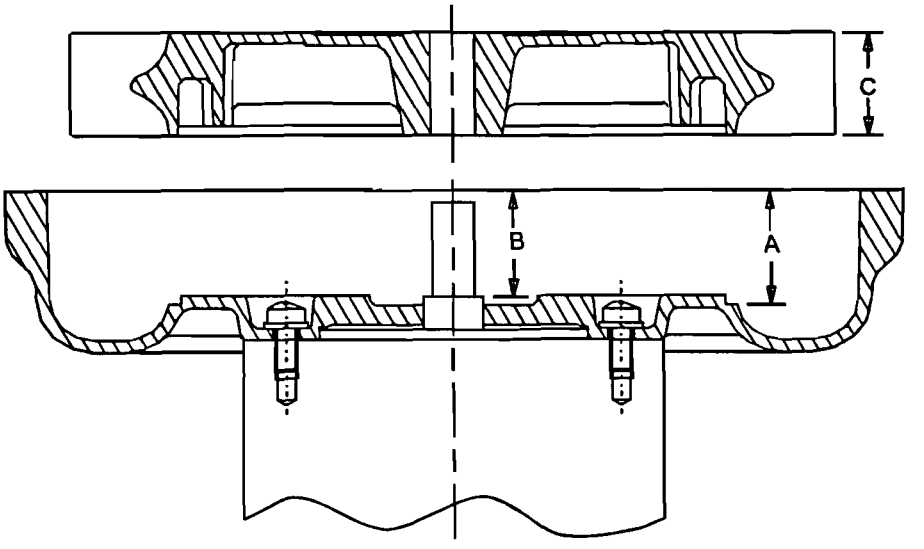
Tools Needed: Machinist's Parallel Bar
Vernier Caliper with depth measuring capability
Feeler gauges or depth gauge

Measure the Following:
Distance from the flange face to the housing (A)
Distance from the flange face to the motor shaft shoulder
(S) Impeller Thickness (C)

Measurements (A) and (B) are made by laying the parallel bar across the housing flange face and measuring to the proper points. Each measurement should be made at three points, and the average of the readings should be used.

Shim Thickness = B - (A+C)/2

After the impeller installation (step #4 above) the impeller/cover clearance can be checked with feeler gauges, laying the parallel bar across the housing flange face. This clearance should nominally be (A+C)/2.



APPENDIX I

UPSTATE LABORATORY QA/QC
CATEGORY B REPORT
FOR
MW-1, MW-2 MW-4 AND MW-5

APPENDIX J

UPSTATE LABORATORY QA/QC
CATEGORY B REPORT
FOR
MW-3