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Vacuum Truck Maintenance Guide

**A Quick-start Guide to
Extending the Life of Your Equipment**



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Table of Contents

Section I. System Components Page 1-2

Section II. Vacuum Pump Maintenance Page 3

Section III. Excessive Pump Wear Page 4-6

Section IV. Vacuum Pump Drives Page 7

Other Maintenance Tips Page 8-9

Pump Troubleshooting Guide Page 10



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Section I. System Components

Primary Float

Your truck's pump is designed to move air, not liquid. The primary float keeps water out of your pump. If the primary float would fail, the secondary scrubber will catch the water and protect the pump.

Secondary Scrubber

The secondary scrubber is a back-up safety feature to the primary scrubber on the top of the tank. If you purchased a secondary scrubber with a final filter, this filter is incorporated into the secondary scrubber.

At the end of the work day, you should drain the secondary scrubber.

Final Filter

The final filter is a cleanable device designed to catch airborne dust particles or debris. Turbulence can be caused by material that may have dried or dust particles that may have entered the tank before water or waste is loaded.

Not all pumps come with final filters. Call customer service to find out more about the final filter and how it can extend the life of your vacuum truck.

Oil-catch Muffler

The oil-catch muffler silencer is designed to reduce noise and catch oil, water or other matter. Most Pik Rite units have mufflers with access for cleaning when needed.

The oil-catch muffler should be drained daily.

Load Level Indicators

Pik Rite tank trucks have one of four types of load level indicators:

- Site Glasses (standard on most trucks)
- Site Tubes
- Site Arrow Indicator with Float Ball
- Digital (LED) Display Indicators



Arrow Indicator



Site Tube

Site level indicators, or manual indicators, should be removed and cleaned periodically.

Your truck may have an electronic load level indicator called a SeeLevel Annihilator with a digital display. If you notice you are getting sporadic readings the float may not be operating properly. To keep this operating properly, periodically check to make sure the float and the sensor bar are clean and free of debris or mud. Consult your owner's manual for additional information on periodic cleaning and maintenance.

Another type of level indicator is the sonar indicator which also has a digital readout that can be placed inside the cab. In order to ensure you are not getting a false reading you should periodically inspect the lenses to make sure they are clean and free of dirt and debris.

System Components (Continued)

Valves

There are two types of valves; lever valves and butterfly valves.

Lever valves are most commonly used on septic trucks because they open completely for full flow-through.

Butterfly valves have a flapper that doesn't allow full flow-through. These valves are mainly designed for water hauling. If you switch from water hauling to more solid hauling like sludge or mud, debris can get caught on the butterfly valve. You will want to shift to a lever valve.

Lever valves are available in 2", 3", 4" and 6" sizes.

Stand Pipe System Components

The inlet on your tank may have a stand pipe that goes up to the top of the tank with a deflector plate. Without the stand pipe, as the tank fills up you will begin to pull against the load. As this happens, air gets into the tank and the truck will start to hop.

The stand pipe eliminates the head pressure that you are pulling against because it takes the material to the top of the tank. You may not be pulling against your load but you are pulling to a higher level. The stand pipe will lighten the overall load on your vacuum pump and increase the life of your pump.

Maintenance Tip

Inspect the Tank & Clean Inside!

Depending on the type of material you haul, you may find it necessary to clean out the inside of the tank. In the septic business, for example, solids may settle to the bottom of the tank.

We recommend you inspect the tank inside and outside on a weekly basis, depending on how often the tank is filled and the type of material you haul.

Open all man-ways and clean out the tank.



Inside Tank

SAFETY ALERT:

Depending on the type of material you are hauling, combustible or toxic gases can accumulate inside the tank. Make sure to allow ample time for these gases to ventilate before entering the tank! Before entering the tank, test the air quality. We recommend wearing approved breathing apparatus when entering the tank.

Section II. Vacuum Pump Maintenance

There are three critical procedures that will extend the life of your system and truck:

1. Maintain the oil level
2. Flush the pump
3. Drain the secondary and exhaust muffler

1. Check the Oil Level of the Pump

Pumps are designed to consume some oil during normal usage. One of the first things you want to do is check the oil level in your pump. Vacuum pumps are manufactured with either an internal or external oil reservoir.

Recommended Maintenance:

- If you have an external oil reservoir or a site tube, you can look at the tank and visually check the oil.
- If your pump has an internal oil supply, pull the dipstick to determine the level of the oil.



*External
Oil Reservoir*



*Internal
Oil Reservoir*

Pump oil should be checked daily depending upon hours of use. Check the owner's manual for specific recommendations.

2. Flush the Pump

If your pump unit has a flushing kit with an external tank, you can visually check the oil level. It is recommended that you flush your pump at the end of each work day to keep debris from building up inside the pump.

Engage the pump. To flush the pump you will first put it into vacuum and create 10 inches of pressure. Next, open the valve for the flushing kit and run 7 ounces of flushing fluid through the pump. After adding the flushing fluid, close the valve and let the fluid circulate through the pump for several minutes. After the fluid circulates through the pump, shut down the system and drain the secondary scrubber.

Check the pump manufacturer's manual for complete flushing instructions.

3. Drain the Secondary & Exhaust Muffler

The secondary and exhaust muffler have ball valves located on the bottom to allow moisture and oil that accumulates during use to drain. If the secondary and exhaust muffler have lids they should be removed to inspect the inside to make sure they are clean and free of debris. Inspect the valves to make sure they are not blocked with material that could prevent draining.



Section III. Excessive Pump Wear

Several things can go wrong with your pump including:

1. Rotary vanes can wear out and begin to chatter
2. The oil pump can wear and develop problems
3. The bearings can begin to wear
4. Vacuum pump housing wear

1. Rotary Vane Wear

As you run the vacuum pump the first few times you will begin to learn the sound of your pump. If the sound changes over time it could mean that burnt oil or other foreign matter has built up in the vanes of the pump or that the vanes are beginning to wear.

Depending on the size of your vacuum pump, there may be three to eight vanes inside the pump housing.

If you notice the sound of the pump gets louder or begins to change over time this may indicate excessive wear on the pump housing.

Depending on the brand, your pump may have access ports where a gauge can be inserted to check the clearance of the vanes of your pump. Check the pump maintenance manual to determine how to check rotary vane wear and recommended vane clearance.

2. Oil Pump Wear

Vacuum pumps come with one of two types of oil pumps; fixed-flow and adjustable. Fixed-flow oil pumps are set from the factory and do not need to be adjusted.

If your vacuum pump has an adjustable oil pump make sure to adjust the pump for correct oil flow according to the manufacturer's recommendations.

Over time the oil pump can wear out and most likely will need to be replaced.

You may have a vacuum pump that has an automatic oiler. If blue smoke is coming from your exhaust muffler, you may need to check and adjust the vacuum pump oil or make adjustments to the pump.

Some vacuum pumps have sight gauges that will indicate how the oil is dripping. The owner's manual will tell you how many drips per second are recommended and provide adjustment instructions.

Check your owner's manual for manufacturer's recommendations and adjustment instructions.



Broken Rotary Vane

3. Seal or Bearing Wear

The only time you would need to replace your pump is when your existing pump is completely worn. In most cases, the Pik Rite service department can rebuild or refurbish your pump when it shows signs of excessive wear. Pik Rite parts department stocks a full line of repair kits if you choose to rebuild or refurbish the pump yourself.

Pik Rite stocks the following pump repair kits:

- Gasket & seal kits
- Gasket & seal kits with vanes
- Complete rebuild kits with bearings



Rebuild Kit

Maintenance Tip

Check All Seals for Leaks!

When the truck is new or when the seals are replaced, you can check the seals by putting your truck in pressure mode and spraying them with soapy water. If they are leaking the soap will bubble. Put the truck in vacuum, then tighten the wing nuts and recheck for leaks. If the seal is still leaking they will need to be replaced.

4. Vacuum Pump Housing Wear

Depending on the age and overall condition of your pump, when vacuum pump housings are worn they can be brought back to within the manufacturer's specified tolerances. This is done by re-boring the housings of the pump.

Pik Rite's Service Department can re-bore the pump housings and refurbish your vacuum pump.

Important Pump Operating Tips

Do

- Regularly check to ensure pump is running at manufacturer's suggested RPM.
- Flush pump daily.
- Check and clean components regularly.
- Drain oil catch muffler twice daily depending on use.
- Drain secondary scrubber after each load, or daily depending on use.
- Check and clean pre-filter regularly if one is provided.
- Always bleed tank to atmosphere before switching valve from vacuum to pressure or pressure to vacuum.
- Ensure vacuum relief valve and pressure relief valve are installed in system and adjusted to recommended settings.
- Make sure the temperature gauge on the pump, if provided, reads at the same temperature as the truck when using liquid cooled pumps.

Don't

- Do not open ball valve on scrubber with vacuum on tank. This will allow foreign material to enter the pump.
- Do not over speed or under speed the pump.
- Do not engage PTO at high RPM. Only engage at idle.
- Never run pump without oil.
- Never spin pump backwards.
- If a water cooled pump, never run pump without circulating water connected and flowing.
- When draining secondary scrubber, if nothing comes out when ball valve is opened, never assume the scrubber is empty. Always check for blockage.

Section IV. Vacuum Pump Drives

There are three primary ways to drive a vacuum pump:

1. PTO-driven (standard or automatic transmission)
2. Hydraulic-driven
3. Belt-driven



Run Engine at RPM Label

1. PTO-driven Pump

If your vacuum pump is PTO driven you need to check your universal joints and grease the PTO drive shaft regularly.

If you have a PTO driven unit with a gearbox you should check the gearbox occasionally to make sure it has the proper amount of gear oil. We recommend you use 80/90 gear oil.

Standard Transmission

For trucks with a standard transmission, as you engage your pump you will want to start your truck and have it idling before you engage the PTO drive. You will then flip the switch to engage the PTO activation and gradually release the clutch to engage the unit.

The gearbox on this type of unit will have a flex coupler between the gearbox and vacuum pump that will take the shock when the PTO unit is engaged. This flex coupler is a safety feature that is designed to fail in order to prevent the truck transmission from being damaged if the internal working parts of the pump freeze or cease up.

Automatic Transmission

A Hot-Shift PTO is designed for a truck with an automatic transmission. The hot-shift PTO has an electrical switch that activates the PTO. Hot-shift PTOs are harder on the couplers because engagement is instant. This generally creates more wear on the flex coupler. If the teeth are worn, the flex coupler should be replaced.

2. Hydraulic-driven

Hydraulic driven pumps require the proper amount of oil in the hydraulic fluid reservoir. Hydraulic fluid should be checked daily.

3. Belt-driven

If your vacuum pump is belt-driven, you will want to make sure the belt is properly aligned and has the proper tension.

Maintenance Tip

Check Pressure & Vacuum Relief Valves!

Pressure and vacuum relief valves are set at the recommended settings from the factory. If something gets stuck in the primary float or the secondary float, that will affect the vacuum. When the pump is engaged check your pressure and vacuum reliefs.

The pressure relief valve is set to allow a maximum of 10 PSI in the tank. The vacuum reliefs for air cooled pumps are set at 18 inches of vacuum, while liquid cooled pumps are set at 22 inches of vacuum. Please read your vacuum pump operators manual for more specific instructions for your pump.

If for any reason the pressure relief valve or the vacuum relief valve needs to be reset, follow the instructions listed in the safety and operating instruction manual.



Pressure Relief Valve



Vacuum Relief Valve

Maintenance Tip

Check Vacuum Pump Temperature!

A liquid cooled pump is tied into the cooling system of your truck engine and should be running close to the temperature of your engine, typically 180°F to 200°F. If the pump is running above 200°F the system should be checked.

If you have an air cooled pump you won't have liquid to give you that temperature.

Maintenance Tip

Check Your Tank Mounting Brackets!

A general inspection of the tank will include checking the spring-loaded mounting brackets. Depending upon the size of the tank you may have three or four mount pockets on each side of the truck. Periodically check the mount pockets and springs for wear or cracking.

The rear pocket is bolted solid. This spring system provides flexibility between the tank and the truck.



Spring Mounts



Fixed Mounts

Maintenance Tip

Check Your Wing-nuts for Proper Tightness!

Check the top, primary and rear man-way wing-nuts regularly. In addition, check the wing-nuts on your secondary and final filter if your truck has these.



Wing-Nuts

Maintenance Tip

Check your dust cap fittings!

Outlets and inlets have dust cap fittings. The rubber washers can be replaced if they get loose from normal wear.



Dust Cap & Fittings

Pump Troubleshooting Guide

The Pump is Overheating

Cause	Remedy
Faulty lubricant	Check the oil pump
Low oil level	Fill the oil tank
RPM too high	Reduce pump speed
Running too long at too high vacuum rate	Decrease vacuum rate
Clogged filters on the air injection system	Clean/replace the filters
Exhaust port/check valve partially clogged	Remove crusts and scales
Improper hose diameter	Make sure you're using manufacturer's recommended hose size

The Pump is Locked Up

Cause	Remedy
Broken vanes	Replace the vanes
Broken vanes due to foreign matter or liquid	Clean filters/elements in the line and replace vanes
Broken vanes due to faulty lubrication	Check the lubrication pump and replace vanes
Pump is frozen due to low temperature	Warm-up pump and drain liquid
Damaged drive system	Replace damaged parts

Reduced Performance

Cause	Remedy
Four-way valve is in neutral	Move handle against the pin
Worn vanes	Replace the vanes
Leaking check valve	Make sure check valve is free of dirt and debris
Worn o-rings or seals	Replace o-rings or seals
Leaking gaskets or valves	Replace damaged parts
Obstructed float ball or air filter	Dismantle and clean
Clogged exhaust manifold	Dismantle and clean
Undersized hoses	Make sure you're using manufacturer's recommended hose size
Rubber connection damaged or obstructed	Change the connections

Abnormal Oil Consumption

Cause	Remedy
Insufficient lubrication	Adjust the oil pump flow per manufacturer's specifications
Excessive oil consumption	Adjust oil flow/replace oil pump components