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Safety and Operation Manual
VSK/ECO100G Vacuum Machine

Table of Contents

Manual Part No. 8040350

Revised 02.09.17

California Proposition 65

⚠ WARNING ⚠

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

FORWARD

This manual contains important safety information and operational instructions for your McLaughlin Vacuum. Read and understand this manual before operating this equipment. Failure to do so may result in serious personal injury or equipment damage.

Keep this manual with the equipment at all times for future reference. If you sell this equipment, be sure to give this manual to the new owner. A replacement copy of this manual is available through your local Vermeer dealer or by contacting McLaughlin Group, Inc. directly at:

McLaughlin Group, Inc..
2006 Perimeter Road
Greenville, SC 29605
Toll free: 800-435-9340
Worldwide: 864-277-5870
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www.mclaughlinunderground.com

The illustrations, instructions and specifications in this manual are subject to change. McLaughlin Group, Inc.reserves the right to make product changes at any time. Contact your McLaughlin Group, Inc. dealer for the latest information on McLaughlin equipment.

MAINTENANCE

Weekly Maintenance:

Grease all grease points.

Check engine air filter.

Check all safety shutdowns for proper operation.

Clean the water tank shutdown switch using low pressure water to prevent float from sticking.

Check water tanks for any foreign debris such as sand or dirt. If present suck the water tanks out with vacuum.

Wash out gate valve gates to prevent damage to the gate.

If vacuum or pressure is ever in question for proformance always zero gauge with engine off to check. Full vacuum should be 9 to 11”HG.

Standby water pressure should be 2900-3100PSI system. The rotary lance should be 2700 to 3000 PSI (3000 PSI MAX). The wand should be 1400 to 1600 PSI. If equipped the potholing tool should be 1600 to 2000 PSI (2000 PSI MAX).

Monthly Maintenance:

Inspect all suction hoses and air connection hoses for any signs of cracks.

Inspect door seal for splits or cuts.

Hazard Alert Decals

BE AWARE OF SAFETY INFORMATION

This is the safety-alert sign. This symbol is placed in the manual and on your machine to alert you to potential bodily injury or death.

SIGNAL WORDS

The safety-alert icon is used with the following signal word: DANGER, WARNING, AND CAUTION. When you see these words in the manual or on decals on your machine, care fully read and follow all instructions. Watch for these words and learn their meanings.

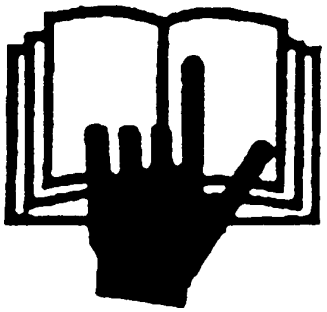
DANGER **Imminent hazard which, if not avoided, will result in death or serious injury.**

WARNING **Potentially hazardous situation which, if not avoided, could result in death or serious injury.**

CAUTION **Potentially hazardous situation which, if not avoided, may result in minor personal injury or property damage.**

READ YOUR OPERATOR'S MANUAL

Read and understand the operator's manual for your machine. Do not operate your machine unless you have read and understand the warnings and instructions contained in it. Contact your McLaughlin dealer if your manual becomes damaged or lost.



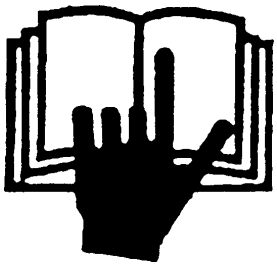
Keep hands, feet and clothing away from moving parts.

Keep all shields and guards in place. Do not modify or remove guards.

Turn off the machine before servicing.

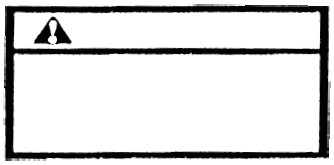
Specific Hazard Alert Symbols

READ MANUAL



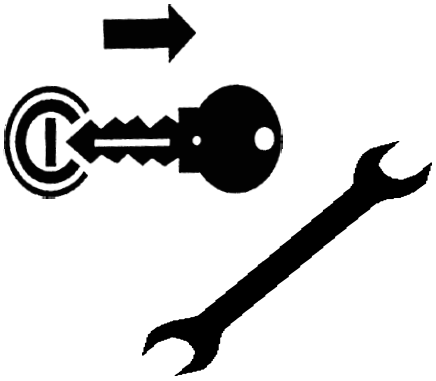
Carefully read and understand all safety decals and proper operating techniques.

The safety decals in this manual contain important information. Understanding these decals will help you operate your equipment properly. Replace missing or damaged decals.



Allow only authorized personnel to operate equipment. Closely supervise inexperienced operators.

SERVICE AND MAINTENANCE



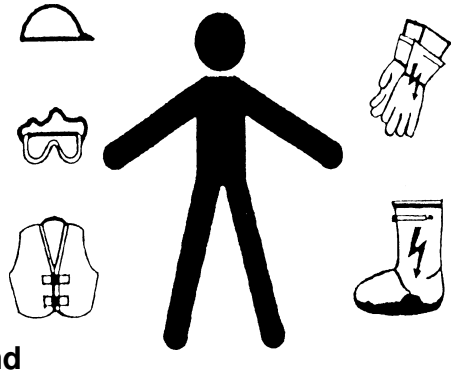
Make sure the machine is always in good working condition. Safety devices must always be installed and be funtioning property.

Check machine daily before operating.

Do not modify this machine. Use only McLaughlin repair parts

Follow service and maintenance intervals.

PERSONAL PROTECTIVE EQUIPMENT



Proper protective equipment is required for safe operation of this equipment.

Protective Equipment:

1. Hard hat	**2. Safety Glasses/Shield**
3. Safety Vest	**4. Ear Protection**
5. Electric Gloves	**6. Electric Boots**

Wear close fitting clothes.

Avoid jewelry such as bracelets, necklaces and watches. Restrain long hair.

Specific Hazard Alert Symbols Cont'd

LOCATE UNDERGROUND UTILITY LINES

Before starting work, make sure all underground utilities have been properly located.

Inadvertent contact with buried utilities may cause death or serious injury. Contact with electric lines can cause electrocution. Contact with gas lines can cause explosion or fire.

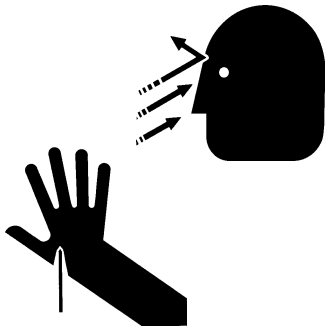
MOVING PARTS

Keep hands, feet and clothing away from moving parts.

Keep all shields and guards in place. Do not modify or remove guards.

Turn off the machine before servicing.

HIGH PRESSURE AIR AND FLUIDS



This machine may use water, air, and hydraulic fluid at high pressure.

Water from wand and air from lance can cause serious injury. Wear protective clothing.

Relieve pressure before servicing.

FLAMMABLE LIQUID

Fumes and/or fuel can explode or catch fire.

Shut off engine before refueling.

Keep engine and trailer free of fuel. Wipe up any spilled fuel immediately.

Specific Hazard Alert Symbols Cont'd

HOT FLUID UNDER PRESSURE

Hot fluid can burn or scald.

Wear protective clothing when servicing.

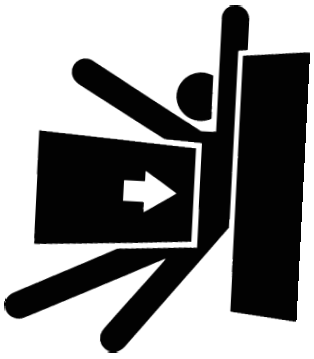
BATTERY ACID AND FLAMMABLE FUMES

The battery contains acid which can cause severe burns. Avoid contact with eyes, skin and clothing.

Fumes from the battery may explode. Keep sparks and flame away from battery. Cables and tools may cause sparks. Protect eyes and face from battery.

CRUSHING WEIGHT

The spoil, tank, and door are very heavy. Stay clear of the door when dumping the tank.



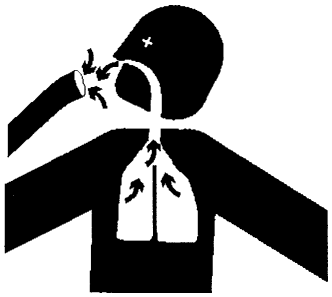
Trailer mounted systems may roll or tip if not properly secured to the towing vehicle. The following must be followed for operation, dumping, and servicing the tank.

1. **The trailer tongue must be properly attached to the towing vehicle.**
2. **The towing vehicle's tires must be chocked.**
3. **The towing vehicle's parking brake must be applied.**

Skid mounted units must be properly secured to transporting vehicle or system before operating or servicing. Transporting vehicle must have wheels chocked and parking brake applied during operation and servicing.

Specific Hazard Alert Symbols Cont'd

SUFFOCATION HAZARD



This machine produces a high volume of air flow.

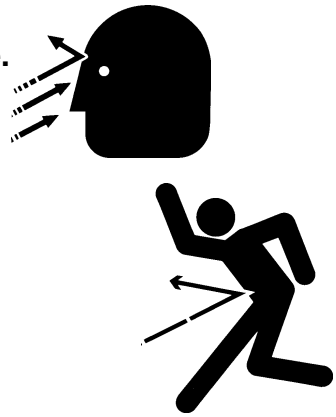
Direct contact of the mouth and/or nose to the vacuum air flow can result in death by suffocation.

Do not allow hoses or tools to come in contact with skin, hair and clothing.

Never put the suction end of a tool or hose near your face. The vacuum can collapse your lungs.

Never use this machine in a manner that is inconsistent with its intended design.

FLYING OBJECT HAZARD



This machine uses either water or air under pressure.

The ground engaging tools can cause objects to become airborne.

Flying objects can cause injury or property damage.

Keep all nonessential people away from the work area.

TRANSPORTING MACHINE

Make sure all components are stored properly.

Turn off the engine and relieve water system pressure.

Trailer units should be verified for the following:
1) The hitch, safety chains, and trailer wiring is properly connected.
2) The jack is in its fully retracted position.

Close all valves and doors.

Remove wheel chocks.

REMEMBER: A fully loaded or partially loaded unit will pull differently than when it is empty. A loaded unit requires longer stopping distances. Also, liquid tend to "slosh" when stop.

Make sure that the tires are inflated properly and that the brakes work properly.

WARNING: Failure to follow any or all of the safety instructions in this manual, could result in death or serious injury. Do not use this machine in a manner that is inconsistent with its intended design.

Hazard Alert Decal Placement

HAZARD ALERT DECAL MAINTENANCE

Hazard alert decals on your machine contain important information that will help you operate your equipment safely.

Decals maintenance:

1. **Keep decals clean. Clean with soap and water. Do not use harsh chemicals, or spray decals directly with a high pressure washer.**
2. **Replace decals when they become damaged or hard to read. Clean the surface of dirt, grease and oil before applying.**
3. **When replacing a mabhine component with a decal on it, replace the decal also.**
4. **See your local dealer or contact McLaughlin for replacement decals.**
5. **Replacement part number appears on each decal, as well as in this manual.**

Decal: J200440

Decal: J200430

Hazard Alert Decal Placement Cont'd

Decal: J200415

Decal: J200473

Decal: J800030

Decal:J200420

Hazard Alert Decal Placement Cont'd

Decal: J200425

Decal: J200445

Decal: J200415

Decal: J200450

Hazard Alert Decal Placement Cont'd

Decal:J200410

Decal:J200455

Decal: J200473

Decal:J200466

Decal:J200423

POWER UNIT
Engine Controls

1.	Throttle Control	Down Position	Runs engine at idle.
		Up Position	Runs engine at full throttle.
2.	Ignition Switch Clockwise	First Stop	Turns on electrical system.
		Fully	Starts engine.
3.	Toggle Switch	Vacuum Tank Full Control Switch	Shuts down the engine when tank is full when in the on position.
		Full Tank Override	By-passes shut-off system to dump tank.
4.	Toggle Switch	Water Pump	Turns water pump on and off.

VACUUM TANK DOOR
Quick Lock Handle and Door Holder

To Open Door

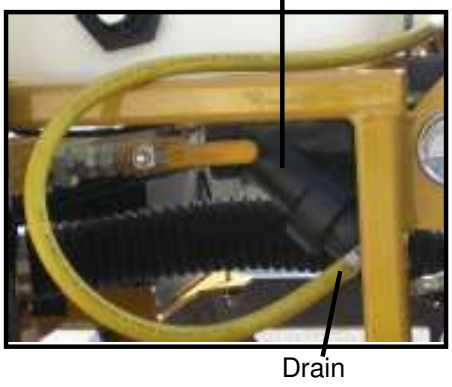
1. Open inlet port.
2. Start engine and run at idle speed.
3. Cap inlet port to build vacuum.
4. Turn Quick Lock handle counterclockwise, 5-6 full turns or until it unscrews from inner door rod.
5. Turn off engine.

DANGER: CRUSHING WEIGHT. SPOIL AND DOOR WILL CAUSE DEATH OR SERIOUS INJURY. UNLOCK DOOR ONLY UNDERVACUUM. STAY AWAY FROM DOOR WHEN DUMPING.

WATER SYSTEM
Water Tank Ball Valve and In-Line Strainer

The Water Tank Ball Valve is located on the bottom of the tank, on the operator's side.

1. **On -** Turn handle in line with the valve.
2. **Off -** Turn handle perpendicular to the valve.



The ball valve on the water tank must always be open when the water pump is drawing water from the tank. Operating the water pump with the ball valve closed will result in damage to the water pump. Close the ball valve to clean the strainer or service the water system without draining the tank.

The in-line strainer protects the water pump from particles that may cause damage. A drain plug is located at the bottom of the strainer which may be used to drain the entire system. The strainer should be periodically checked for debris and cleaned.

WATER SYSTEM
Water Assisted Tools

Water Assisted Tools have the water control on the tool. A trigger lever controls the water flow.

1. **On -** Squeeze the trigger lever.
2. **Off -** Release the trigger lever.

Changing tool in operation:
1. Turn off the water pump clutch at the control panel.
2. Squeeze the trigger lever to relieve pressure in the hose.
3. Disconnect the Water Supply Hose and change tools.
4. Turn on the water pump clutch at the control panel.

Specifications and Maintenance

SPECIFICATIONS

ENGINE

Model:	Honda GX660, air cooled,	
gas,	w/12V electric start.	
Horsepower @ 3600 rpm:	24 hp	18kW

ELECTRICAL

Electrical System:	12V DC	

BLOWER

Air Flow:	570 cfm	16.1 m^3/min
Vacuum Relief Setting:	(+/- 2" of Hg.)	10" of Hg.
Suction Hose Dia.:	3 in.	76 mm

Filtration: Cyclone Separator
Air cleaner element: 2 micron filter (washable)

WATER SYSTEM

Water Tank: Cylinder Style, Plastic	50 gal	189 L
Pump Flow Rate, (max):	4 gpm	15 Lpm
Water Pressure, (max)	3000 psig	207 bar

HOLDING TANK

Capacity:	100 gal.	379 L

GENERAL

Fuel Capacity:	14 gal	52.9 L
Dimensions:		
Overall Length:	98 in	2489 mm
Overall Width:	54 in	1372 mm
Overall Height:	80 in	2032 mm
Dry Weight:	1480 lbs	671 kg

MAINTENANCE

GAS ENGINE (Per Specs in Honda GX660 Operator's Manual)

Engine Oil Specs:
SAE 10W-30, API SJ

Above 50°F (10°C)	SAE 30 or SAE 10W-30
0°-50°F (0°-18°C)	SAE 5W-30 / 10W-30
Below 0°F (-18°C)	SAE 5W-30

Service Intervals: Refer to engine Operator's Manual for complete Service Schedule.
- Change engine oil: First 20 hrs., every 100 hrs.
- Change oil filter: Every 200 hrs.
- Clean air filter: Every 50 hrs.

BLOWER
Recommended Fluid Type: Industrial Type, Heavy Duty, NON-DETERGENT Motor Oil
Temperature Range:

30° F (-1°C) and under	SAE 20
30-90° F(-1-32°C)	SAE 30
90° F (32°C) and above	SAE 40

Approximate Capacity: Total Per Unit 1/2 qt (1.47 L)
Fill each gear end separately.
Remove breather from each gear end.
Pour oil through the breather port.
Keep oil at proper level in **each sight gauge**.
Service Intervals: Check oil level daily. Change oil every 500 hrs. or twice annually.

Never attempt to change or add oil while blower is running. Personal injury or equipment failure will result. Allow unit to cool down before attempting any maintenance.

WATER PUMP
Recommended Fluid Type: General Pump Series 100 oil or SAE 30, NON-DETERGENT, Motor Oil.
Remove fill cap and fill crankcase to dot on oil gauge window.
Service Intervals: Check oil level daily.
Change oil after 40 hr. break-in peroid.
Change oil every 500 hrs, or every 3 months, whichever comes first.

MAINTENANCE

WATER PUMP BELT

Replacement Belt: Goodyear AX-45 or equivalent - 1 required

Belt Tension: Check belts daily for the first week, weekly thereafter. Tightn as needed. Replace when worn or stretched.

Belt Tension Spec: New Belts - 16 lbs. of force.

BLOWER, AIR CLEANER ELEMENT

Replacement element: McLaughlin #8031178 Washble Filter Element
Replacement Belt: BX 57 or equivalent - 2 required
Service Intervals: Inspect and wash element daily. Replace when worn.

Replace damaged elements immediately. Never operate without the element.

GREASE GUN LUBE POINT

Vacuum Tank Door: Grease fitting weekly (1 pump typically) with EP NLGI 2 grease or equal.

DOOR SEAL

Clean the door seal daily and after emptying the tank.
Leave the door open when storing for an extended peroid of time.
Replace the door seal when necessary. Replace entire seal. Do not splice.

TOOLS

Remove dirt and mud daily. Do not allow mud to buildup on the inside of the tool. This will restrict the flow of spoil and reduce the performance of the tool. Check that nozzles are clean and working properly. Unplug clogged nozzles. Clean and replace nozzles as necessary. Check daily the fittings and the condition of the hoses on the tools. Tighten or replace as necessary. Replace broken and worn-out gaskets.

VACUUM HOSES

Clean hoses with water. Do not spray with the digging lance. High pressure water from the digging lance can cut the hoses. Check hoses for holes, cracks etc. Salvage damaged hoses by cutting off the damaged section. Replace hoses when necessary.

ELECTRIC SAFETY GLOVES AND BOOTS

Electric safety gloves and boots must be carefully inspected before each use.

The rubber gloves must be field air-tested before each use. Rubber gloves must be inspected inside and out. Also, gloves must always be stored with the boad on the outside, never inside out. Finally, gloves must also be stored in the glove bag to protect against mechanical and chemical damage. The ASTM In-Service Specification F-496 requires that the electrical retest interval not exceed 6 months. In addition, a visual inspection of gloves shall be made in the field by a designated person at intervals not to exceed 6 months. Contact McLaughlin for a list of test labs in your area.

Rubber gloves are the basic protection from electric shock, because the hands are the most likely portion of the body to make initial contact with energized parts.

In order for rubber gloves and boots to provide protection they should be put on before a person is in a position where it may be possible to touch energized utilities or equipment.

Do not allow rubber gloves or boots to come in contact with any petroleum based products, such as inhibitors, hydraulic fluids, and other lubricants. Also, do not allow fuels, such as gasoline or diesel to come in contact with the gloves. Wipe gloves clean, with a clean rag, as soon after contact as possible. Do not spray gloves off with high pressure water.

Electric safety boots provide no protection when other parts of the body are in contact with the ground (ex. while kneeling).

Visually inspect rubber gloves, leather outers, and rubber boots before each use.

1. Check for signs of physical damage (cuts, rips, tears, etc.).
2. Check for signs of physical deterioration (stiffness, thin or swollen spots, discolored areas, etc.).
3. If damage is suspected, replace immediately.

ELECTRIC SAFETY GLOVES AND BOOTS CONT'D

Field air test procedure for rubber gloves.

1. Grab the cuff and pull it over the fingers.
2. Hold the glove downward and twirl the cuff upward toward your body to close the cuff.
3. Bend the rolled cuff into a "U" shape to trap the air inside the glove. Squeeze the inflated glove to pop out the fingers.
4. Squeeze the inflated glove and look for damage exposed by inflation.
5. Hold the inflated glove close to your face and ear. Squeeze the glove to feel and listen for air escaping from any holes.
6. Turn the glove right side out.

Rinse gloves and boots daily with clean water inside and out and allow to dry thoroughly before returning to service. Apply a coat of Armor-All protectant to the outer surface of the boots.

DANGER: ELECTROCUTION POSSIBLE. CONTACT WITH ELECTRIC LINES WILL CAUSE DEATH OR SERIOUS INJURY. LOCATE ALL UNDERGROUND UTILITIES. ALWAYS WEAR PERSONAL PROTECTION EQUIPMENT.

Damaged gloves or boots do not provide adequate electrical protection.

Operation of Machine

STARTING THE ENGINE

1. Throttle Switch must be in the Idle Speed position. (Do not start the engine at full throttle.)
2. Remove the inlet cap from the Spoil Tank.
3. Pull the choke out on the engine.
4. Turn key clockwise to start engine. Let the engine run for a minute.
5. Press the choke in on the engine. Allow engine to warm up for 3-5 minutes before using the machine.

COLD WEATHER STARTING

Refer to engine maintenance section for proper oil requirements before operating in cold temperature conditions. Let engine run longer before releasing the choke.
IMPORTANT: Do not use aerosol Starting Fluids.

SHUTDOWN PROCEDURE

1. Reduce engine speed to idle.
2. Shut off the engine and remove the key.
3. Relieve water pressure from the Water Assisted Tools by squeezing trigger.

WARNING: MOVING PARTS. DEATH OR SERIOUS INJURY MAY RESULT. STOP ENGINE BEFORE SERVICING.

JUMP STARTING

WARNING: FLAMMABLE FUMES. FUMES MAY EXPLODE OR CATCH FIRE. KEEP AWAY SPARKS AND OPEN FLAME. BATTERY ACID. BATTERY ACID CAN BURN SKIN AND EYES. PROTECT FACE, HANDS AND BODY WHEN SERVICING.

Use only a 12 volt system for jump starting. Use only an approved set of jumper cables.
Avoid inadvertent contact with cables and surrounding components.

1. Connect first RED clamp to POSITIVE (+) terminal of discharged battery.
2. Connect second RED clamp to POSITIVE (+) terminal of charged battery.
3. Connect first BLACK clamp to machine frame of the machine with the charged battery.
4. Connect second BLACK clamp to machine frame of the machine with the discharged battery.

PRE-OPERATING INSTRUCTIONS

Before operating the vacuum system on a job site, the operator should be trained in slurry vacuum excavation and cable locating. All sections of the maual should be read and understood. Prior to beginning to excavate a hole, the operator should:

1. Check all fluid levels in the engine, vacuum pump, and water pump.
2. Check all vacuum hoses and tools for blockages and damage.
3. Check all filters and clean or replace as necessary.

WARNING: DO NOT OPERATE WITHOUT FILTER SYSTEM INTACT.

4. Inspect all safety equipment, like boots, gloves etc. for wear and damage. Replace if necessary.
5. Check any utility maps for locations of buried utilities that need to be exposed.
6. If excavations are to be conducted near or on roadways, make sure local authorities are contacted for regulations regarding traffic control and safety.
7. Know the contents of the material you are excavating or remediating.
8. Know the local regulations for disposing of liquid material and/or mud.
9. Have a place or a plan for the disposal of the material taken into the tank.

DO NOT VACUUM HAZARDOUS MATERIAL WITH THIS SYSTEM. CONSULT FEDERAL, STATE, AND LOCAL REGULATIONS REGARDING CLASSIFICATIONS OF HAZARDOUS MATERIAL.

JOB SITE PREPARATIONS

When pot-holing for non-destructive exposure of underground utilities prior to excavating, trenching or boring, coordinate with all local utilities and mapping services. The area of the proposed excavation should be marked. The one call service should have been contacted and the area marked or cleared. Any underground plant owners not participating in the one call system should be notified and have their underground facilities marked.

Use a pipe and cable locator to do a search of the area to be excavated to determine if any unmarked facilities exist. This may also help determine a more precise location of any marked facilities. Consult area utility maps or seek advice on non-metallic pipes such as sewer or storm water lines that may not be marked.

WARNING: WHEN EXPOSING UTILITY LINES FOR AVOIDANCE IN A DIGGING APPLICATION, VERIFY THAT THE EXPOSED LINE IS THE CORRECT LINE. EXCAVATIONS MAY CONTAIN MULTIPLE LINES OR ABANDONED LINES, AS WELL AS THE LINE TO BE EXPOSED.

Establish and maintain traffic control procedures to keep the vacuum crew safe during the operation. Traffic cones or barricades should be used to establish a “safe” area around the vacuum unit. When working in low light conditions, use work lights to illuminate the area and provide visibility.

Determine the proper safety equipment to wear. When doing vacuum slurry excavation, it is required that the reduction tool operator wear electric insulated boots and gloves. This is to protect the operator from becoming shocked or electrocuted if the reduction tool comes into accidental contact with a leaking power line.

DANGER: ELECTRIC SHOCK CAN KILL. ALWAYS WEAR PROTECTIVE BOOTS AND GLOVES WHEN USING A REDUCTION TOOL FOR EXCAVATION.

Electric boots and gloves should be maintained by following the manufacturer’s specific instructions. Read and follow those directions carefully. They are contained in section 5 of this manual. Replace worn out or torn boots and gloves. Always wear personal protective equipment including hard hat, reflective vest, work boots and safety glasses. Ear protection should also be used when operating the vacuum system.

WARNING: DO NOT WEAR LOOSE FITTING CLOTHING OR LONG HAIR. THESE CAN BE SUCKED INTO THE VACUUM HOSE AND CAUSE SERIOUS INJURY .

Keep bystanders and spectators away from the vacuum truck/trailer and work site. Loose flying debris can injure or blind bystanders. Allow only authorized personnel with proper safety equipment in the work area.

JOB SITE OPERATIONS CONT'D

VACUUM SLURRY EXCAVATION

The slurry vacuum excavation unit uses a two step operation to "reduce" and "remove" material from the hole.

In the reduction step, water or air is used to reduce the soil to a size small enough to fit up a vacuum hose. A water/air lance or a wet reduction tool is used for this step. It is important to let the air or water do the "cutting" of the soil so as not to damage the utility being exposed.

In the removal step the "reduced" soil is sucked out of the excavation. When using a wet reduction tool, both the reduction and removal steps occur simultaneously.

To begin the job site operation:

1. Position the vacuum unit as close to the area to be excavated as possible.
2. Set the parking brake and chock wheels.
3. Start the power unit and allow the engine to warm up. (Refer to the Start-Up Procedure in this section of the manual.)
4. Place necessary traffic control measures.
5. Use proper personal safety protection equipment, including electric boots and gloves.
6. When preparing to pot-hole in a grassy area, use a spade or other appropriate digging tool to loosen and remove the grass plug over the area to be excavated. If pot-holing under asphalt or concrete, use a hydraulic or air operated breaker or saw to remove the top material and expose the earth.
7. Choose the appropriate reduction and removal tool.
8. Connect the water line to the tool.
9. Attach the vacuum hose to the tool.

DO NOT ATTACH THE VACUUM HOSE TO THE UNIT UNTIL YOU ARE READY TO START REMOVING SPOIL.

10. Attach the vacuum hose to the inlet port on the spoil tank. Standard length of the vacuum hose is 16'. If additional hose is needed, attach using the cam lock fittings provided on the hose ends. Note: Adding additional hoses over 32 ft. in length, proportionally reduces the airflow through the hose. This can result in the solids settling in the hose, causing clogs.To stop the vacuum, shut down the engine on the power unit.

DANGER: SUFFOCATION HAZARD WILL CAUSE SERIOUS INJURY OR DEATH. KEEP HOSES AND VACUUM TOOLS AWAY FROM FACE AND BODY.

JOB SITE OPERATIONS CONT'D

11. When excavating using the reduction tool, the speed of the excavation can be controlled by using water. Holding the water control full open will saturate the soil, reducing it for faster penetration. In some light soils, like sand, limited water will be needed in the pot-holing operation.
12. Move the reduction tool in a semi-circular motion so both water jets will cut an even straight hole as the tool penetrates the ground.
13. When using an air lance or water lance, the procedure is to make several penetrations into the ground in a circle to reduce or loosen the soil. Then take the vacuum and suck up the loosened soil. Repeat the process using the lance to reduce the next level of soil. When using this method of excavation, loose particles of soil will be blown into the air. Use a traffic cone or other protection to stop these particles.

WARNING: FLYING OBJECTS CAN CAUSE SERIOUS INJURY OR BLINDNESS. WEAR EYE PROTECTION.

WARNING: HIGH PRESSURE AIR OR WATER FROM LANCE CAN CAUSE SERIOUS INJURY. WEAR PROTECTIVE CLOTHING AND DO NOT POINT LANCE TOWARD BODY PARTS.

14. As the reduction step continues to expose the utility, be aware of changes in soil conditions. A soft area that allows faster penetration will usually mean that the tool is approaching the utility. This type of excavation is considered non-destructive to utilities. Allow the water or air pressure to do the excavating. When resistance is encountered, STOP THE PROCESS AND REMOVE THE REDUCTION TOOL. OBSERVE THE UTILITY IN THE EXCAVATION.
15. When using the water jet reduction tool, the jetting action of the tool will also clear the underside of small utilities. If the utility can not be completely exposed from one hole, the hole size must be enlarged to allow observation of the complete pipe or cable. It is important to be able to observe the entire pipe or cable to determine the diameter.
16. If the utility exposure is for excavation or boring purposes, leave the utility exposed until work in that area is complete.
17. After work in the area is complete, backfill the hole with a clean dry backfill material.

REMEDIATING LIQUIDS

Remediation for the purpose of vacuum excavation is the process of removing liquids or drilling fluids from pits, lawns, roadways, or improved areas. This is accomplished using one of several tools designed for vacuuming fluids or mud.

DO NOT VACUUM HAZARDOUS MATERIAL WITH THIS SYSTEM. CONSULT FEDERAL, STATE, AND LOCAL REGULATIONS REGARDING CLASSIFICATIONS OF HAZARDOUS MATERIAL.

To begin the job site operation:

1. Position the vacuum unit as close to the area to be cleaned as possible.
2. Set the parking brake and chock wheels.
3. Place necessary traffic control measures.
4. Start the power unit and allow the engine to warm up. (Refer to the Start-up Procedure in this section of the manual.)
5. Use proper personal protection equipment.
6. Choose the appropriate remediation tool.
7. Attach the vacuum hose to the remediation tool.

DO NOT ATTACH THE VACUUM HOSE TO THE UNIT UNTIL YOU ARE READY TO START REMEDIATING THE SPOIL.

8. Attach the vacuum hose to the inlet port on the spoil tank. Standard length of the vacuum hose is 16'. If additional hose is needed, attach using the cam lock fittings provided on the hose ends. Note: Adding additional hoses over 32 ft. in length, proportionally reduces the airflow through the hose. This can result in the solids settling in the hose, causing clogs. Once the vacuum hose is connected to the spoil tank and the engine is running, the remediation tool is removing material. To stop the vacuum, shut down the engine on the power unit.

DANGER: SUFFOCATION HAZARD WILL CAUSE SERIOUS INJURY OR DEATH. KEEP HOSES AND VACUUM TOOLS AWAY FROM FACE AND BODY.

9. When vacuuming fluids, it is more efficient to turn the liquid into an aerosol by not completely submerging the remediation tool in the fluid. By keeping part of the remediation tool out of the fluid, the airflow through the vacuum tube will move the material quicker to the spoil tank.
10. The spoil tank is equipped with a "full tank" engine shut down sensor. When the fluid level in the tank reaches capacity, a sensor will automatically shut down the engine and vacuum. This prevents overfilling the tank and sending fluid into the filter. When this occurs empty spoil tank. (Refer to the section titled Emptying the Spoil Tank.)

EMPTYING THE SPOIL TANK

DO NOT VACUUM HAZARDOUS MATERIAL WITH THIS SYSTEM. CONSULT FEDERAL, STATE, AND LOCAL REGULATIONS REGARDING CLASSIFICATIONS OF HAZARDOUS MATERIAL.

Emptying the vacuum spoil tank presents several hazards that the operator should be aware of.

DANGER: CRUSHING WEIGHT. SPOIL AND DOOR WILL CAUSE DEATH AND SERIOUS INJURY. UNLOCK DOOR ONLY UNDER VACUUM. STAY AWAY FROM DOOR WHEN DUMPING.

CRUSHING WEGHT. ROLLING OR TILTING UNIT WILL CAUSE DEATH OR SERIOUS INJURY. CHOCK TIRES AND APPLY PARKING BRAKE BEFORE OPERATING OR SERVICING. DO NOT OPERATE UNLESS ATTACHED TO THE VEHICLE.

Before beginning vacuum operations, a plan and site for disposing of the spoil in the tank should be established.

1. After arriving at the disposal site, set the parking brake and chock the wheels.
2. Open the inlet port.
3. It is recommended that liquids be drained from the tank, prior to dumping the tank. Use the 4” gate valve located in the door.
4. At the operator’s console, make sure the water pump switch is off.
5. Hold the tank full override switch up while starting the engine at low idle. Close inlet port. Increase engine speed to full throttle.
6. With the engine running at full, and all inlet ports closed, spin the door handle open. This may take four or five complete turns.
7. Return to the operator controls and shut off the engine. Wait for the vacuum to drop.
8. As the vacuum drops, the door will release allowing the spoil to dump from the tank.
9. The spoil in the tank is very heavy. Stay clear of the door when dumping.
10. Once the tank has been emptied, it can be cleaned using the spray wand.
11. Restart the engine and turn the water pump on. The spray wand can now be used to clean the spoil tank. The inlet port is an ideal spot to use the wand for removing trapped spoil.
12. Clean the door seal and mating surface.
13. Clean the cyclone housing.
14. Check the air filter and clean if necessary.
15. Close the door and tighten the handle.
16. Remove any dirt or mud which might cover lights or license plate.

Note: Vacuum tank door handle should be untightened when unit is not used. This will increase the life of the door seal.

WARRANTY

RETURN GOODS POLICY

LIMITED WARRANTY

The Manufacturer warrants its products to be free from defects in material and workmanship for a period of twelve months from the date of shipment from the factory. Hole Hammer pistons, bodies, and nose pieces are warranted to be free from defects in material and workmanship for a period of three years from the date of shipment from the factory. The Manufacturer shall not be responsible for any damage resulting to or caused by its products by reason of installation, improper storage, unauthorized service, alteration of the products, neglect or abuse, or use of the product in a manner inconsistent with its design. This warranty does not extend to any component parts not manufactured by Manufacturer; however, Manufacturer's warranty herein shall not limit any warranties made by manufacturers of component parts which extend to Buyer.

Claims for defects in material and workmanship shall be made in writing to Manufacturer within ten days of discovery of defect. Manufacturer may either send a service representative or have the product returned to its factory at Buyer's expense for inspection. Upon notification of defect, Manufacturer will issue a return goods authorization number to Buyer. The return goods authorization number must accompany the product returned. If judged by the Manufacturer to be defective in material or workmanship, the product will be replaced or repaired at the option of the manufacturer, free from all charges except authorized transportation. Buyer shall be responsible for all maintenance services consisting of lubrication and cleaning of equipment, replacing expandable parts, making minor adjustments, and performing operating checks, all in accordance with procedures outlined in Manufacturer's maintenance literature.

THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES AND NO REPRESENTATIONS, GUARANTEES, OR WARRANTIES, EXPRESS OR IMPLIED, (INCLUDING BUT NOT LIMITED TO A WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), ARE MADE BY THE MANUFACTURER IN CONNECTION WITH THE MANUFACTURE OR SALE OF ITS PRODUCTS. NO EMPLOYEE, DISTRIBUTOR, OR REPRESENTATIVE IS AUTHORIZED TO CHANGE THIS WARRANTY ON BEHALF OF MANUFACTURER THE REMEDIES OF BUYER SET FORTH HEREIN ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER REMEDIES. THE LIABILITY OF MANUFACTURER WHETHER IN CONTRACT, TORT, UNDER ANY WARRANTY, OR
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GENERAL RETURNS OF MERCHANDISE

1. All returns must be pre-authorized
   A. Please call our parts department for an RGA number
   B. Please include RGA number on the outside of box
   C. Include any required paper work or special instructions

Maintenance Record

DATE	SERVICE PERFORMED	BY

Notes