



MN-PV-CIS-122

Combo Unit Competency Manual

MN-PV-CIS-122 – Combo Unit Competency Manual
Rev 2

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Training Expectation Letter

It is required that this document is completed prior to the Employee starting training on a P&V Combo Unit Truck. This document will serve as formal record that all parties have reviewed and understand the expectations for training on the Combo Unit Truck.

Trainee Name:

Date of Discussion:

Expectations of Supervisor/Leader

- Ensuring trainee has scheduled time for training.
- Ensure trainee has reviewed and understand the technical documentation
- Ensure trainee has been provided a demonstration on equipment operation
- Verify field competency sign offs once completed
- Ensure trainee is working with a competent mentor until they are competent themselves
- Provide support for the assessor, mentor, trainer and trainee whenever possible.
- Ensure training documentation is sent to CEDA Training Department

Expectations of Trainer, Mentor, assessor

- Must be qualified in the position for which he/she is training.
- Educate and support trainee with technical review package.
- Ensure trainee has been provided a demonstration on equipment operation
- Review trainee's technical knowledge and verify acceptable understanding
- Educate and support trainee with field tasks identified in the competency check sheet
- Verify trainee has the ability to perform tasks identified in the competency check sheet
- Communicate to Supervisor that the technical review and field competency is complete

Expectations of Trainee

- Complete all prerequisites outlined within the training program.
- Understand the training process outlined in this document.
- Understanding systems and spending time in the field.
- Ensure all lessons and tasks are signed off by the appropriate personnel as indicated on the training documents.
- Inform Supervisor/Leader on progress of training through face to face meetings.
- Will utilize all the materials provided to ensure a comprehensive training program is followed.
- Provide feedback on the training process and any updates that are required to the training material.
- Inform Supervisor/Leader of any training barriers that may exist during the training process.

Training Expectation Acceptance Agreement

I, _____ understand the expectations of me as a trainee as outlined in this document

(Operator Name)

Operator\Trainee

Name

Signature

Date (MM\DD\YY)

Supervisor/Leader

Name

Signature

Date (MM\DD\YY)



Acknowledgement

This manual has been developed using information and knowledge obtained from manufacturer's documentation and input from experienced Operators. Additionally, this manual has been validated by numerous Subject Matter Experts at CEDA. We welcome any comments or suggestions pertaining to this manual and its contents.

Many thanks to those who have demonstrated a clear dedication to CEDA and our values by participating in the creation of this program.





Objective

Welcome to CEDA Combo Unit Operations Training

This program is designed to provide you with the training necessary to carry out your job in a manner that safeguards yourself, those around you and our environment. Upon Completion of this Module you will be able to:

- 122.01 Review Combo Unit Operations
- 122.02 Operate Combo Unit
- 122.03 Maintain/ Care for Combo Unit

Employee(s) will demonstrate knowledge & skill in the proper application of equipment through practical application.

Instructions

All material must be completed in the order presented to ensure that prerequisites are met.

Employees will demonstrate knowledge and skill in the proper application of equipment through practical demonstration and application.

NOTE: All forms and procedures included are those required by CEDA. Work must be performed in accordance with these standards. On Client work sites, there may be additional standards and modified work procedures that will also have to be met.

Description: This is a knowledge and practical skill that requires written material to be reviewed along with the completion of an on-the-job demonstration prior to the test being written.

Whenever possible, the on-the-job demonstration should be completed at a job site or the shop under controlled conditions.

Arrange a time with your Mentor/Supervisor/Trainer to complete the On-the-Job Demonstration, where you will observe the proper operation of the Steamer unit and its components.

Assessment of Competency: Successful completion of this competency requires:

- A score of 100% on the written examination.
- A successful demonstration by trainee requiring a sign-off from Trainer.



Prerequisites

- CEDA Orientation
- CEDA Introduction to High Pressure Water Blasting
- CEDA Wet Vacuum Operations Training
- CEDA Steamer Operations Training
- Specific work location Orientation

Below is a list of the learning resources that are included and others you must obtain the most recent version from your Supervisor.

- Unit Specific Manufacturer's Operating Manual
- CEDA Pre-Trip Inspection (Vehicle Inspection Report)
- Site specific documentation
- Job Hazard Analysis for the work
- CEDA FLHA
- Other CEDA procedures and practices that pertain to the job being completed

NOTE: All forms and procedures included are those required by CEDA. Work must be performed in accordance with these standards and can be found in CEDA Health, Safety and Environment Management System (HSEMS) or be requested from your Leader. On Client work sites, there may be additional standards and modified work procedures that will also have to be met.

Renewal Period

The entire Module must be redone after:

- Leaving the employ of CEDA for a 6-month period,
- Leaving the Wet Vacuum operations for a period of 6 months, or
- As deemed required by CEDA.

General Overview

Federal & Provincial Legislation

All work must be completed in accordance with applicable Municipal, Provincial, & Federal Acts & Regulations, including but not limited to:

Transportation of Dangerous Goods (TDG)

- Vehicle must be DOT Approved and be equipped with appropriate safety devices
- DOT approved vehicles will have sticker on side of unit
- Operator must place appropriate placards on side of vehicle
- Operator must prepare bill of lading prior to transporting materials

The Workplaces Hazardous Materials Information System (WHMIS)

- All CEDA field employees working with or around equipment will have WHMIS and TDG training prior to starting work.

Occupational Health & Safety (OH&S)

Seat Belts

Anytime a vehicle (CEDA owned or personal) is being operated during business hours for business use, or on CEDA property, the occupants must be wearing seatbelts.



Personal Protective Equipment (PPE)

To operate the Combo Unit, employees must have and utilize the following personal protective equipment (PPE):

- CSA Certified Hard Hat with Face Shield
- CSA Certified Safety Boots (Boot Grips when required)
- Fire Retardant Coveralls
- Hearing Protection (plugs or muffs)
- Approved Gloves for the Site/Task
- Safety Glasses with Side Shields.
- Rain Gear as Required

When using a snap gun and cleaning with high pressure water & chemical cleaning snap gun, all PPE including the list below must be worn:



- Face shield
- Full rain suit
- Rubber gloves
- Approved rubber boots

For hot materials, the following additional personal protective equipment may also be required:

- Rubber gloves
- Steel-toed rubber boots
- Face shield

Workplace Organization

CEDA's goal is to reduce waste (time, energy and materials) by maintaining an orderly and clean workplace, including our trucks and equipment. We ask that you take pride in the equipment you operate; treat it as if it were your own. A clean and organized vehicle/workspace is a safer vehicle/workspace. There are many ways to eliminate waste:

Allocation & Utilization of Resources: Have the right people and equipment in the right place, at the right time. Use equipment and resources on tasks and activities that are required and add value to our business.

Improve Productivity: Eliminate redundant or unnecessary steps/tasks without negative impact to the safety or quality of our products and services.

Use of Materials: Ensure equipment is stocked with required supplies (filter bags, duct tape etc.) before leaving for jobsite – replace the materials you have used during the shift to ensure that the next crew is adequately stocked. Use the correct materials in the quantities required to do the job safely & correctly.

Preventative Maintenance: Tools and equipment should be assessed as per the performance maintenance schedule to ensure safe operation. Regular maintenance will reduce costly breakdowns in the field.

There are steps we can take to improve our current state and move towards a more productive, organized and safe work environment. Improving workplace organization will reduce costs, improve morale and create a safer work environment. The following steps outline how best to achieve an organized workplace:

Sort, organize and eliminate unnecessary items from the workplace to eliminate clutter. Keep only essential items.

- Tools and equipment that are not utilized for day-to-day operations should be repurposed within the organization or discarded.
- Garbage or loose items should be removed or properly stored.

Prioritize tools, parts and materials based on usage and keep them in easily-accessible places.

- A place for everything and everything in its place.



Create storage areas that are easy to access and clearly laid out:

- Tools and equipment should be stored clean and ready for use.
- Storage areas and stored items should be properly identified using signage, labels or a visual outline.

Set clear standards for workplace organization:

- Hold yourself and others accountable for keeping the work areas clean and safe. Make workplace organization a standard work rule in your area.
- Clean general work areas and equipment after each shift.
- Put clean tools away in the proper place.
- Note any spills, leaks or other messes – clean and report if equipment requires maintenance
- Inspect the area(s) regularly and immediately record and correct any infractions. Handle deviations from work rules in a timely manner.
- Review processes and procedures regularly and adjust as required.



Equipment Overview

Combo Unit

Combo units have the ability to provide wet vacuum and steaming services to our clients. The wet vacuum capability is used to transport wet materials from one site to another. The steaming capability allows the unit to provide cleaning services.

Most of the vacuum operations include product removal during tank and vessel cleaning operations, spill recovery and material transfer. Once these materials are collected, they are offloaded either at the client site or at an approved facility capable of processing the materials.

Wet vacuum and steaming operations performed at CEDA utilize a two man crew; an operator and a laborer. The operator is responsible for maintaining the operation of the combo unit and the laborer is responsible for the physical removal of material with the vacuum hose or steam cleaning with a steam hose.

CEDA exercises every caution to ensure that controls are consistent on each unit. However each operator must be aware of all controls (including **safety** controls) and the operating limits of the particular unit in operation.

The subsequent training materials contained in this learning module describe the general operating overview and is not intended to replace the manufacturers' Operator Manual for any given combo unit. Every effort has been made to ensure that key elements of operation have been included. The following section identifies and describes the general components found on the combo unit. The illustrations in this element have been provided for a Westech Combo Unit. Please refer to the appropriate Manufacturer's Operator Manual for more detail, as necessary.

Air Flow

Airflow; when the tank is under negative (vacuum) pressure is described by the following. As the pump creates the negative pressure in the tank, air is drawn into the tank through the intake line. Air is then drawn out of the tank and into the cyclone. From here, the air travels through the external vacuum line and into the microscreen before it enters the pump. Finally the air is forced out of the pump and into a secondary moisture trap and vent discharge.

The airflow is reversed when the tank is under positive pressure. Refer to the next page for air flow illustrations.



Air Flow – Positive Pressure



Air Flow – Negative Pressure



Wet Vacuum Components of the Combo Unit

The combo unit is a partial transportable vacuum system with steaming capabilities. The combo unit consists of the following:

- vacuum cargo tank
- cyclone style moisture trap and overflow tank
- deck mounted secondary moisture trap
- microscreen
- rotary lobe blower pump
- hydraulic system.

Each of these components will be discussed in more detail below.



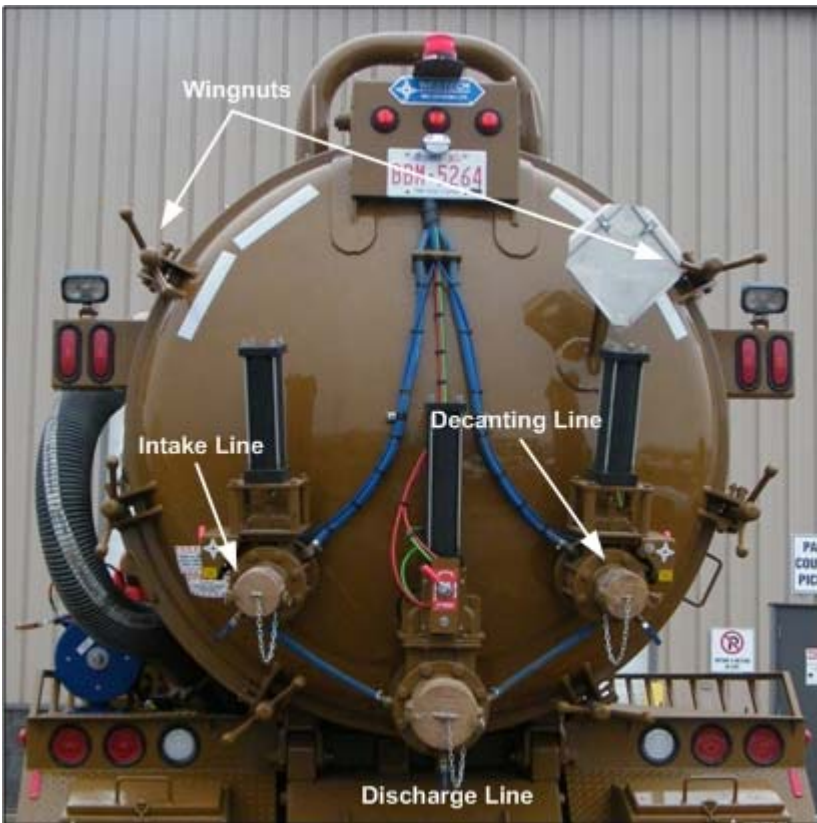
Vacuum Cargo Tank

A pressure tested vacuum cargo tank is used to collect and transport hydrocarbon liquids and hazardous wastes. The cargo tank are made of carbon steel and have a capacity of 11,000 L or roughly 3,000 US gallons.

During normal operation, negative pressure is created within the tank causing a vacuum effect. The entire system must be air-tight so that this negative pressure can be created.

Rear Tank Door

The rear of the tank is sealed with a hinged door that is secured with wingnuts. The wingnuts can be tightened by hand when negative pressure (vacuum) is applied to the tank. The unit must never be moved off the jobsite with the wingnuts unfastened.



Wet vacuum units are subject to corrosive conditions, extra care must be taken to ensure that all wingnuts on the rear door are properly maintained. Before starting a job, it is the operator's responsibility to grease all wingnuts on the rear door.



Wingnut

The rear door is sealed to the tank with a rubber gasket and is raised when access to the tank interior is necessary or when dumping occurs. The wet vacuum unit must never be moved with the rear door partially or fully opened. This may result in hinge failure.

Intake and Discharge Lines

There is one intake line, one discharge line and a decanting line located on the rear of the tank (as seen above). The intake line is used for uploading materials into the tank during routine vacuum operations. The discharge line is used for offloading material from the tank during routine vacuum operations. The decanting line is used to decant liquids, therefore leaving solids at the bottom of the tank. Before using the decanting line, always speak to your supervisor.

The discharge line is also controlled by an air actuated valve. Like the air actuated valve on the intake line, the air actuated valve on the discharge line will only open when the Emergency Use Only switch is in the open position.

Both of these lines have air actuated valves that open and close the lines. This valve system is a requirement for vacuum units that transport materials to commercial waste disposal sites. The air actuated valve will only open when the Emergency Use Only switch is in the open position.



Valve in “Closed” position



Green indicator
(appears when valve in “open” position)



Problems may arise during vacuum operations when air actuated valves do not properly close. During these instances, the valve must be cleaned in order to proceed. If the valve does not close, materials may seep from the tank and/ or proper vacuum pressures may never be achieved.

A bleeder line is located on all lines. It is used to vent excess pressure between the valve and cap before the cap is removed. A spill pan is placed beneath the bleeder line to collect any debris/ liquids.

If excess debris/ liquids drain from the bleeder line, one or more of the valves may be leaking.

The bleeder line is small in diameter and may freeze/ plug prematurely. Care must be taken to ensure bleeder line is clear.

Each line is also equipped with heating lines (blue hose). These lines take glycol and circulate it back to the unit preventing freezing.



Bleeder Line

Tank Interior

Located on the interior of the tank are the following components: sand pipe, float level indicator, baffle, and overflow shut-off. Each of these components will be described in more detail below.

Located on the interior of the tank door is a “**sand pipe**”. This pipe is in the shape of an “S” and directs materials traveling into the tank to be discharged at the rear. Heavy sand and solids will collect near the rear of the tank making unloading and cleaning easier.



Float Indicator, Overflow Shut-Off and Baffle

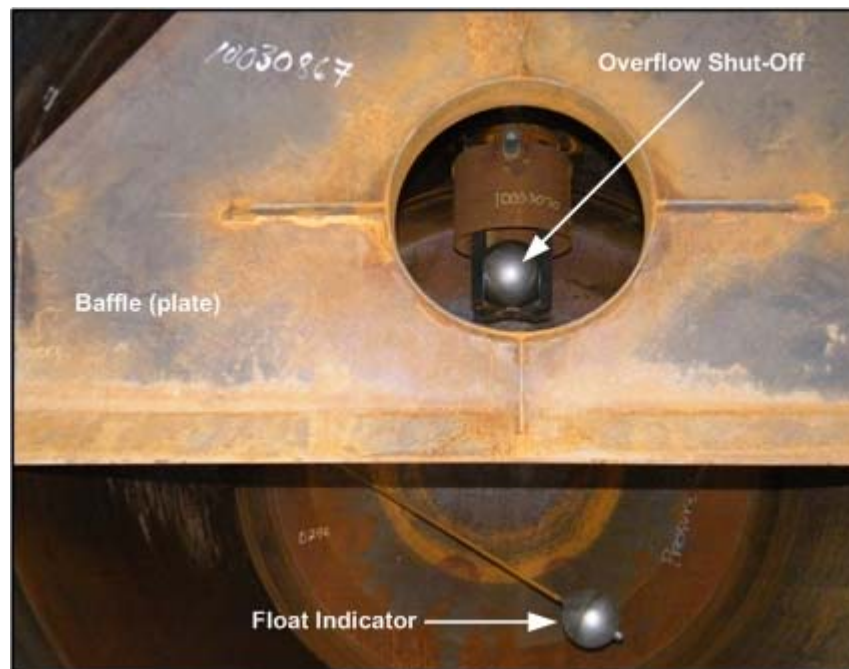
The inside of the tank contains the indicator float. The float indicator is simply a rod with a hollow steel ball on the end. As the material fills the tank, the ball rises. The indicator on the outside of the tank displays to the operator the level inside the tank (below).



Exterior Tank Level Indicator

When the level indicates between $\frac{3}{4}$ and full, the operator must shut down the pump.

Shutting down the pump reduces the chance of material accidentally traveling through the pump or blower if a problem exists with the cyclone or moisture trap.



Baffle

The baffle is the steel plate located inside the tank (above). It is called a full style baffle and allows solids to flow out of the tank without obstruction. It acts as a liquid stabilizer when the unit is traveling on the highway keeping fluid movement to a minimum.

As there is no way to safely clean the entire tank it must be noted that residue will remain at the front of the tank and on the back side of the baffle. Operators of this unit must be trained in Transportation of Dangerous Goods and ensure proper placards are visible on the unit. These requirements may differ from transporting fluids on a job site to traveling down the highway but it is the responsibility of the operator to know and act accordingly.

Overflow Shut-Off Ball

The overflow shut-off ball is contained inside a 'basket' directly below the vacuum line intake. The ball inside the basket, like the indicator float, is also hollow. As the material inside the tank rises, so too does the ball.

When too much material is drawn into the tank, the ball automatically seals the vacuum line intake, preventing materials from entering the moisture trap and pump.



Door Prop

The door prop must always be used when access to the tank is necessary. The door prop must be securely positioned in the recessed pockets mounted to the outside of the tank and the rear door. When opening the rear tank door it is imperative that the door prop be used correctly and consistently. Failure to use the door prop has severe consequences.

The door prop is located in the storage compartment on the driver's side of the unit (as seen to the right). A housing is built into the compartment to ensure it is secure during transportation.

The rear door is sealed to the tank with a rubber gasket and is raised when access to the tank interior is necessary or when dumping occurs. The semi-vac must never be moved with the rear door partially or fully opened. This may result in hinge failure.



Cyclone Separator Moisture Trap Assembly (Primary, Secondary and Overflow Tank)

The cyclone style moisture trap is an auxiliary tank that is used to collect moisture and other debris that may escape from the main tank during vacuum operations. Significant moisture may be present during the removal of materials such as hot condensate. Moisture and other debris can cause premature wear on the pump and must be removed from the system.

Located on the outside of the tank is a pressure gauge and sightglass (to the right).

Below the tank is a drain line that is used to drain moisture after a job has been completed. This must be drained daily to ensure proper operation of the unit, prevent freezing and ensure loss of vacuum does not occur.

The moisture trap has “OPEN” and “CLOSED” indicators (as seen below) located at the bottom of the trap.



The drain line has a manual valve that must be in the closed position during routine vacuum operations. If the line is not closed, vacuum pressure cannot be created in the system. Ensure a spill pan is used to collect the moisture from the drain line.



Cyclone Moisture Trap



Drain Valve

Microscreen

The microscreen is designed to remove debris from the system. The microscreen prevents large particles that may have escaped the moisture trap from entering the pump. The microscreen should be inspected prior to starting the pump and must be cleaned at least twice weekly.



Closed Microscreen Chamber



Open Microscreen Chamber

Hydraulic System

The hydraulic system on the combo unit is used to provide pressure to the valve bank allowing the operator to control different functions on the unit. It is located at the front of the unit beside the moisture trap. It includes the fan and pressurized hydraulic oil reservoir below. The reservoir contains a sight gauge for the oil level as well as a thermometer to ensure the temperature of the oil stays between 120°F and 140°F.

Prior to adding oil, ensure the system is not under pressure and the top of the tank is cleaned off to prevent dirt and debris from contaminating the oil.

A temperature gauge mounted on the reservoir measures the temperature within the hydraulic system.



Hydraulic Cooling System

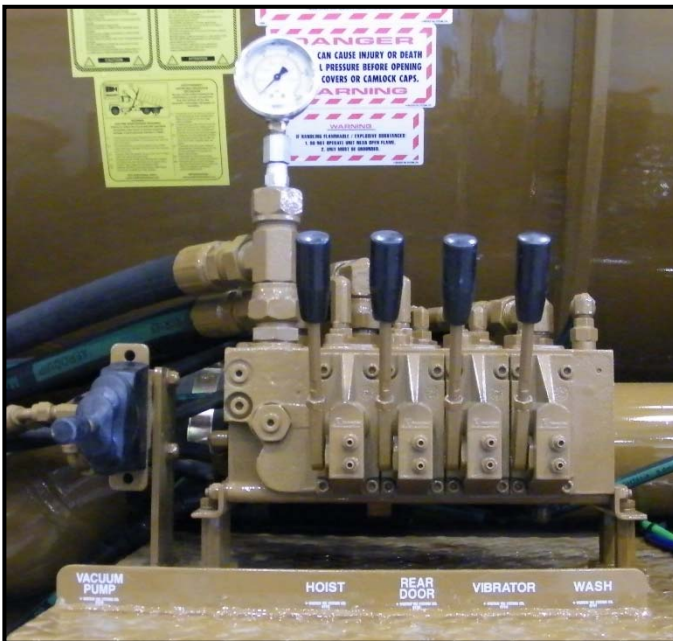
The hydraulic cooling system cools hydraulic oil that passes throughout the system. Ensure the cooling system remains free of dirt and debris. The cooling system will automatically start to operate when the hydraulic oil reaches 115°C. During the summer months it is recommended to turn on the cooler immediately prior to operation of the unit. This will ensure consistent cooling without the potential for overheating.

The system is equipped with switch panel allowing for manual override. When the fan is operating a light will illuminate above the appropriate switch.



Valve Bank

The hydraulic valve bank consists of levers that control the following functions: vacuum pump/ blower, hoist, rear door, vibrator, and steam system.



The valve bank has a pressure gauge mounted on it that indicates the current hydraulic pressure being supplied to the bank. It should not exceed 2500 psi.



Vacuum Pump

The vacuum pump used on Combo Unit is a “rotary lobe blower.” The diagram below shows the operation of a rotary positive blower. The basic unit consists of two figure eight shaped impellers mounted on parallel shafts. The basic operation of the blower is shown through the following illustration, provided by the *Hibon Inc. Installation, Operation and Maintenance Manual for Positive Displacement Blowers*.

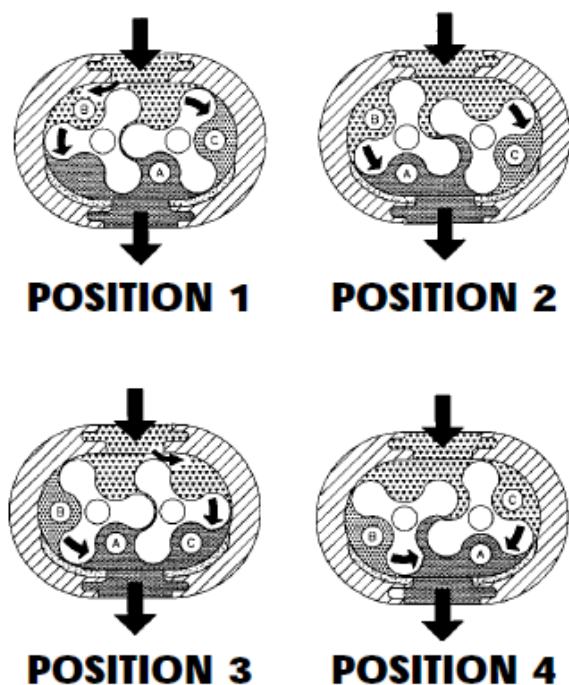


Figure 2. N.B. All blowers are available with either side/side or top and bottom connection.

In position 1

Flow is top to bottom from blower inlet to discharge, the left impeller is mounted on the driving shaft then rotates counterclockwise and delivers a volume into the discharge pressure side. At the same time, space (B) between the impeller and the cylinder wall is filling with another and equal volume at inlet pressure. It is about to be sealed off by the counterclockwise rotation of this impeller. The space (C) is progressively filled and compressed with discharge volume through the precompression passage.

In position 2

The inlet area sealed in (B) and discharge pressure starts to enter space (A) through the precompression passage as rotation continues.

In position 3

Volume (C) is delivered to the discharge pressure side in the same manner as volume (A). Because of the almost complete pressure equalization through the precompression passage, no sudden shock will occur.

In position 4

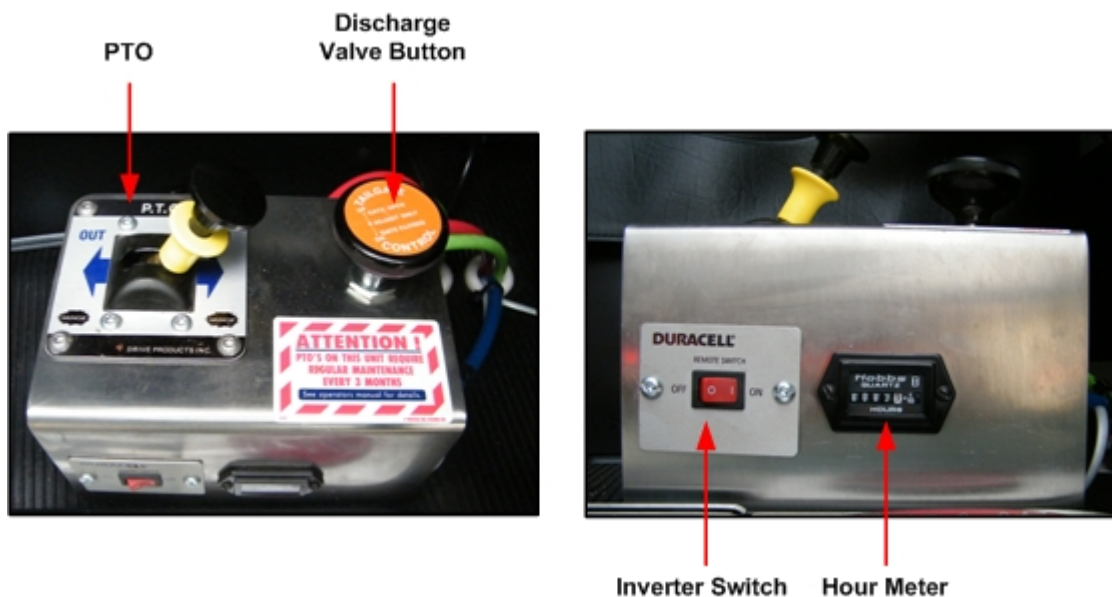
The inlet area volume sealed in (C) and the discharge pressurized volume entering space (B) start to enter through the precompression passage in (C). Volume (A) is delivered to the discharge side and the volume in (B) will also start delivering with (A) as soon as the rotation reaches the outlet side.

This unit can only vacuum LEL materials no greater than up to 10% LEL value as measured at the vent of the vacuum pump (refer to CEDA Vacuuming COP). If unsure, speak to your Supervisor or HSE Advisor.

These impellers rotate in opposite directions within an elongated cylindrical housing. As each impeller passes the inlet, it traps a definite volume of air and carries it around the casing to the discharge, where it is expelled. The cycle repeats four times with every revolution.

The vacuum pump is powered by the unit engine through a transfer case. Refer to manufactures specifications or label in the cab for optimum operating RPM. Prior to engaging the vacuum pump, the vehicle must be placed in neutral, with the brakes applied. The vacuum pump has two site glass where the operator can view the level of oil; one in the front and one located in the back. The vacuum pump must have at least half of the site glass filled with oil.

The pump is powered by a power take-off (PTO) mounted inside the cab. Prior to engaging the PTO, the vehicle must be placed in neutral, with the brakes applied. Located on the same box is the button to open the discharge valve, inverter switch and an hour meter. **Do not open the discharge valve as this could potentially lead to environmental incidents.**



The pump should remain clean and free from grease. Excessive buildup on pump will prevent proper heat loss and contribute to premature wear.

Mounted on the side of the pump is the 3-way valve that controls the airflow produced by the pump. The pump must not be engaged when moving the valve into any position.

When the lever is moved to the “V” position, the pump will create the vacuum necessary for routine loading procedures.

When the lever is moved to the “P” position, the pump will create the positive pressure necessary for pressure unloading.



3-Way Valve in 'Neutral' Position

When the lever is in between “P” and “V”, the valve is said to be in the neutral position.

Also, moving the valve into the neutral position is the simple way to remove positive or negative pressure from within the tank (venting). The valve should be moved slowly to help prevent excessive wear.

The blower is encased as shown below to keep debris out of the blower. Only mechanics will have access to the box containing the rotary lobe blower.



Blower (Outer Case Closed)



Blower (Case Open)



The outer casing of the blower houses a pressure gauge (top) and temperature gauge (bottom). Ensure the temperature does not exceed 1200°C.

Vibrator

Mounted beneath the tank is the vibrator. This device is used during offloading and helps to 'shake out' particulate debris or sludge that has settled to the bottom of the tank. The operator opens the rear door and raises the tank using the hoist lever. Once the tank has been raised, the operator can activate the vibrator to loosen the materials at the bottom of the tank during offloading. A spotter must be used when raising the tank.

Vibrators are preset and adjustments are strictly prohibited.

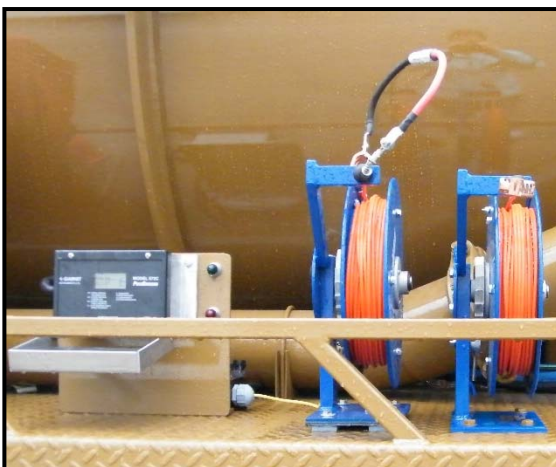
It is important to note that the vibrator should **NOT** be used for longer than 15 seconds. Extended use periods will cause severe damage (e.g. structure of the tank and/ or cracking of the welds at the bottom of the tank).



Hydraulic Vibrator

Grounding System

Combo units are equipped with a 'PosiGround' grounding system. Prior to starting operations, vacuum trucks need to be grounded directly to the earth or bonded to another object that is inherently grounded, such as a large storage tank or underground piping. Grounding minimizes the electrical potential differences between objects and the earth to prevent a static charge. Grounding brings all parts of any system to zero electrical potential by allowing electrical currents to dissipate to earth.



The Posiground system consists of a set of cables that require proper connection to the grounding source and confirmation of the connection is obtained by verifying the reading on the Posiground indicator. Shown below are bad connection (right) and a good connection (left).



Safety Switches

There is an **Emergency Use Only** button located near the front of the unit and is clearly labeled. In an emergency situation, pushing this button will automatically shut down all operation of the unit.

There is also an **Emergency Stop Switch** is located in the cab of the unit. This switch is also known as a “Rig Saver” switch. Some units have this switch located on the face of the panel. Others have this switch located on the side of the panel.

This switch is easily thrown in case of emergency. Engaging this switch will automatically shut-down the engine. The use of this switch will shut down the air intake for the unit.



Emergency Use Only Switches

The unit is also equipped with an **isolation valve**. This valve is located on the top of the tank is air actuated (below). If an emergency situation occurs, the operator can switch the isolation valve to the 'CLOSED' position, thus preventing any materials from entering the moisture trap, microscreen and pump. When this valve is in the 'OPEN' position, the vacuum pump can be used for loading and unloading. This valve must be placed in the 'CLOSED' position during transportation.



Isolation Valve

To activate the isolation valve you can also use the remote PTO panel located in the cab (as mentioned previously).

If the air system is interrupted, the valve will automatically close, sealing-off the materials inside the tank. This valve must remain in the 'CLOSED' position during transport.



Ensure all air-actuated valves are placed in 'neutral' position when not in use. If valves remain in 'closed' or 'open' position the air pressure is continually trying to either open or close the valve. This can cause valve damage or premature failure.

Steamer Operations



The steamer on the combo unit is used for cleaning. The steamer utilizes a wash gun for high pressure washing and a steam lance for wet steaming. Its main application is thawing and cleaning valves, gears, pillars, machinery and equipment.

Before starting any washing activities visually inspect all hoses for damage, check water tank level, and ensure water supply valve is open. Check boiler valves to ensure that they are set for either pressure (steam) or wash (hot water). Ensure that the unit has been set at the required engine speed as show on the sign on the dash board of the unit.



Always check that the water tank is completely full by looking at the sightglasses on the end of the water tank.

Once the PTO has been engaged turn 'on' the inverter switch, this will cause water to be flushed out of the pump. Everything has been preset for either steam or pressure. Ensure that the chimney has been opened, and then start the fuel to the boiler. Remember, the inverter must be on to engage burner.

The steaming operation is performed by two personnel; an operator and a laborer. The operator is responsible for operating the steamer and constantly monitoring the pressure and temperature gauges, while the laborer performs the actual cleaning, steaming operation. A third person is required when a line of sight between the laborer and operator cannot be maintained.

OPERATORS MUST BE PRESENT AT ALL TIMES WHEN THE BURNERS ARE ACTIVATED

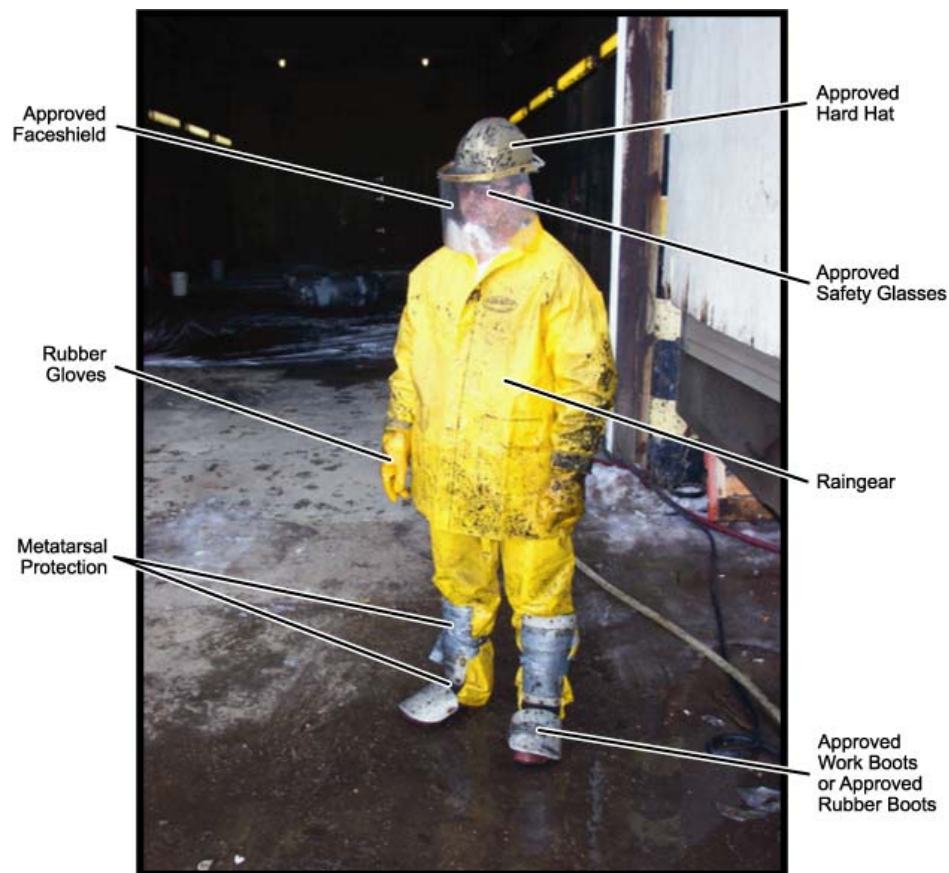
PPE

The operator and laborer must ensure all appropriate PPE is donned prior to starting the job. The minimum PPE requirements include:

- Approved hard hat
- Approved hearing protection
- Nomex III coveralls
- Approved safety glasses with side shield
- Approved steel toed boots

When using a snap gun and cleaning with high pressure water and steam operations, the list below must be worn.

- face shield
- full rain suit
- rubber gloves
- foot/ shin guards
- approved rubber boots.



Steam Cleaning Process



Steam cleaning is accomplished by pumping water from the water tanks and filtering it through the water filter. The water is then taken to the pump and through the boiler as follows:

Water Tanks → Water Filter → Pump → Boiler → Hose Valves → Wash Gun/ Steam Lance

HIGH PRESSURE WATER CAN CAUSE SEVERE BODILY INJURY

Safety Considerations

Failure to read and observe all safety considerations statements could result in severe injury or death to personnel and damage to property.

- Never use a snap gun to clean off yourself or others. Severe injury can occur.
- Machines can cause an explosion when operated near flammable materials and vapors. Do not use this machine with or near fuels, grain, dust, solvents, thinners, or other flammable material. Do not operate this unit in an explosive or flammable environment.
- This machine emits carbon monoxide. Asphyxiation could occur if the unit is used in an area with poor or inadequate ventilation. Operate unit in a well-ventilated area.
- Operate a machine that is not completely or fully assembled could result in injury or property damage. Do not operate this machine until it is completely assembled. Inspect hoses, fittings, and boiler for leaks or fatigue before each use.
- Filling a machine with fuel in an explosive or poorly-ventilated area can cause an explosion. Only fill the fuel tanks in an open area. Care should be taken if fuel tank is located near the engine. Allow engine to cool before refueling depending on location of fuel tank.
- Do not operate the unit with a malfunctioning burner or burner controls.
- Water under high pressure can cause severe injury.
- Injury to the operator or bystanders could occur if the machine is operated without all guards in place on the unit. When operating the machine, all guards must be in place.
- Machines have moving parts and hot areas that can cause injury. Keep hands, feet and loose clothing away from the unit while it is running.
- Always wear correct PPE when operating the unit.
- Shut the machine OFF before servicing. Failure to do so could result in injury.
- All personnel must be properly trained prior to operating this machine.



- Electrical damage can occur if the machine is exposed to direct and/ or over spray. Always point the wand toward the object being cleaned.
- Operating a pressure washer when the pump is low on oil could cause pump damage. Always check your oil before using the machine.
- Pump damage could result from operating the unit with insufficient water flow.
- Pump damage could occur if the pressure washer is ran for more than five minutes with the trigger released (closed).
- Run engine at full RPM when burner is on.
- Ensure unit is winterized in cold weather.
- Ensure boiler is cooled down sufficiently before shutting down engine.
- The snap gun and steam gun must have a 48" barrel.
- Always install whip checks and quick connects prior to operating between the hose and gun connection.

Water Tank

Pressure tested water tanks are used to hold the supply water to the boiler in steaming operations. The water tank is made of carbon steel and has a capacity of 1,000 US gallons.

The tank is filled using the load line on either side of the unit. A water hose is hooked up to the fill line and water is added until the correct level is reached.



The tank must be loaded at least $\frac{3}{4}$ full so water will gravity drain to the pump prior to starting the steaming operation. The water tank is equipped with three sight glasses on the front of the tank so the operator can fill the tank to the correct level.



The picture to the left indicates where the water tank and vacuum cargo tank are welded together. The seam dividing both tanks is quite visible.

Take precaution when filling the tank not to overfill. If overfilled, water will leak out through the bleed/ vent line located on the top of the tank under the manway (as seen below).

When offloading the tank, there is a drain valve located at the bottom of the tank. Always remember to drain away from the drive shaft. Connect the camlock and hose to drain away to a designated offloading area.



Ensure care is taken when connecting hose to the drain valve! If crawling under the unit, ensure the engine is stopped and keys remain with the individual hooking up the drain hose. If hooking up hose with tank in the 'raised' position, tank prop must be in place.

Steamer Control Panel

The control panel shown below is mounted on the inside of the compartment door. This panel allows the operator to open the chimney by flicking the switch. The panel also contains a manual temperature control gauge and a volt meter. The volt meter indicates when the unit has reached the correct voltage to operate the boiler but does not indicate if ignition has been made.

The top portion of the panel is used for test purposes and can only be used by a mechanic.

The temperature control gauge is manually operated and when using pressure should never exceed 100°C. For steam operation, never exceed 160°C. As all hoses have pressure and temperature ratings, DO NOT EXCEED as severe damage to equipment and personnel can occur.

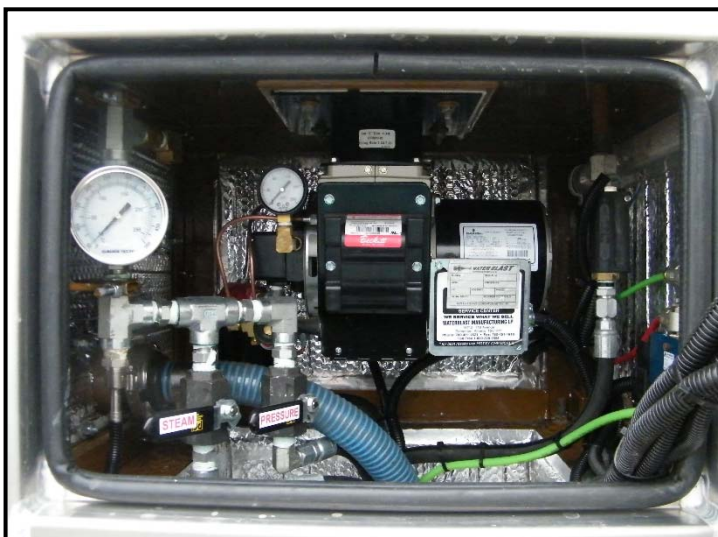
When shutting down, allow adequate time for the boiler to cool off.

The compartment is located directly underneath the boiler and houses the:

- steam and pressure gauges
- chimney override
- pump, and
- fuel pressure.



Steam/ Pressure Gauge



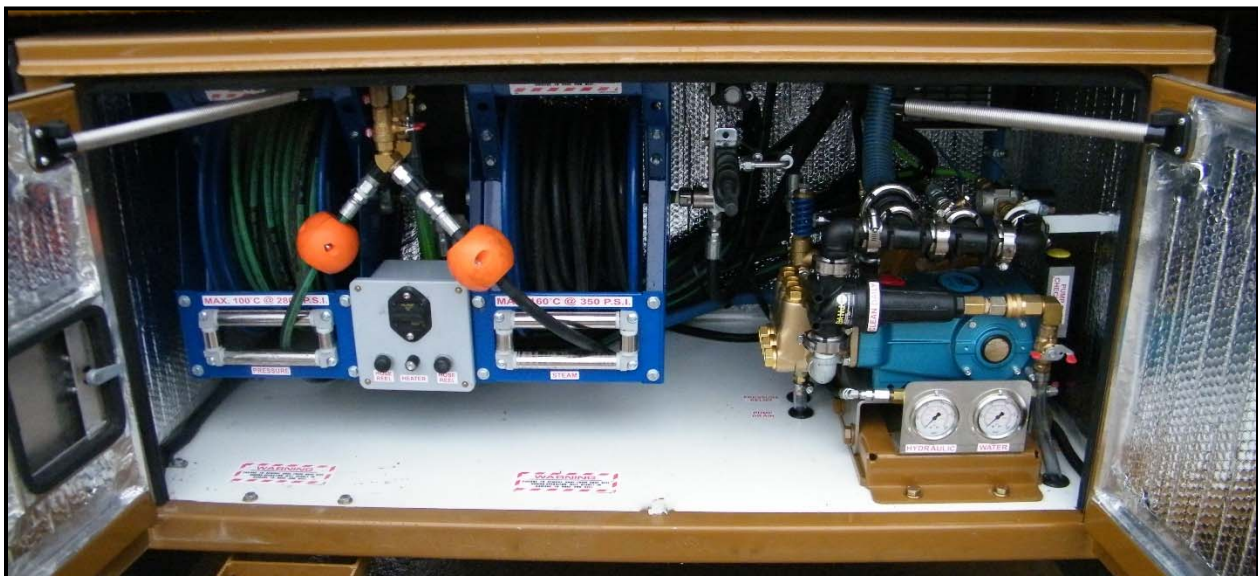
Chimney Override

To override the chimney simply push on the lever located inside the compartment. Ensure the chimney is always open during operation. Below shows the chimney in both the open and closed positions.



Chimney Override

Hose Reel and Pump Compartment

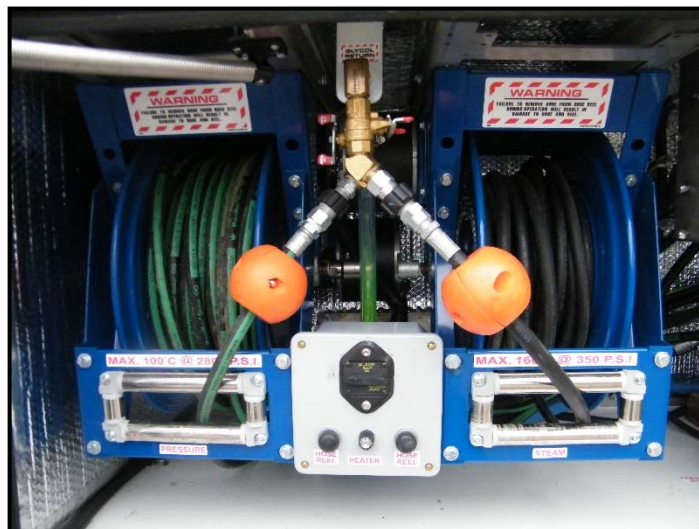


Hoses

The steamer on the combo unit utilizes two types of hoses: a high pressure hose and steam hose. The hose reel (left side of compartment) houses the high pressure hose on the left which is strictly used for high pressure washing. The steam hose located on the right is used for wet steam.

Always remember to install whip checks and quick connects on all hoses.

The panel located between each hose reel contains hose reel buttons and a heater switch.



The hose reel buttons must be pressed to extend or retract the appropriate hose. Take caution when retracting the hose as it retracts quite quickly.

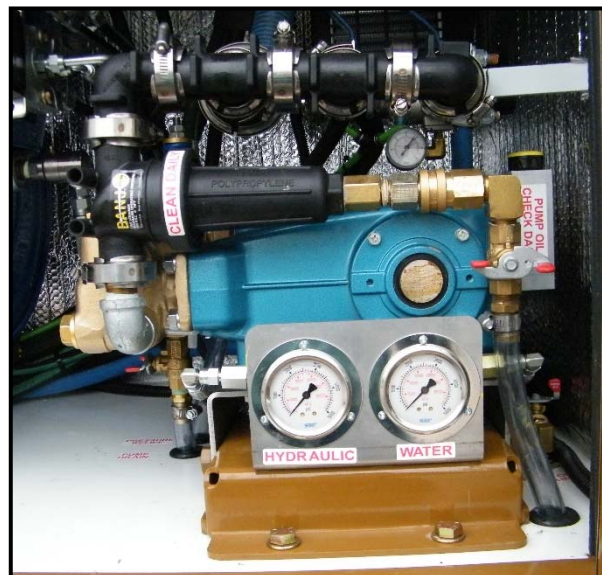
The heater control switch controls heat within the hotbox and can be adjusted accordingly.

Tri-Plex Pump

The combo unit is equipped with a Tri-Plex pump. Ensure the pump oil is checked daily. The water filter (as shown below) must be checked daily.



The pump drain located to the left of the pump must be drained at the end of every shift before applying glycol to the lines.





Ensure the water pressure does not exceed 2000 psi.

Located to the left of the pump is the pressure relief valve. It relieves pressure if it gets too high. It will automatically open to prevent over pressuring of the boiler. Always leave this valve open.

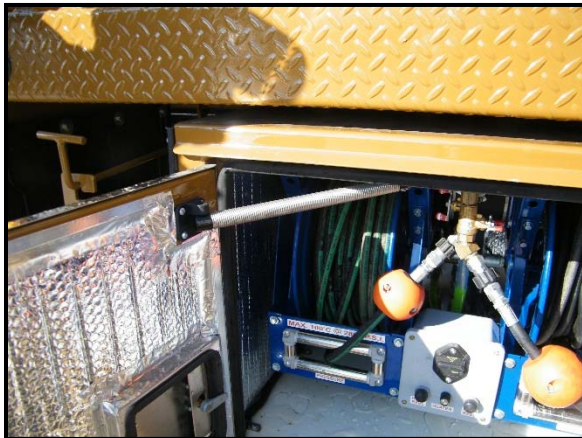
Upon job completion during the winter months (October – May), the lines will need to be blown down to remove all water or winterized to prevent freezing.



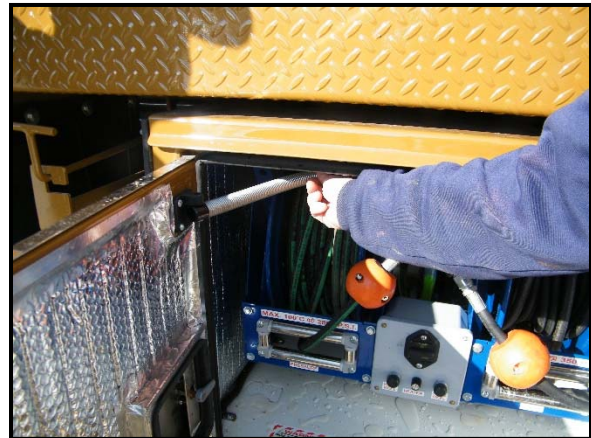
Ensure the unit is running when blow down is performed as the blow down system takes air from the unit. When performing either function ensure the appropriate lever is selected.

The glycol line is located between the cab of the unit and the storage cabinet on the steamer side of the unit.

The doors to the steamer are spring hinged. When closing ensure you press the spring in prior to closing the door (as shown below).



Door hinge – open



Door hinge – being closed



DAILY PRE-JOB CHECKLIST FOR COMBO UNIT

DATE: _____ JOB LOCATION: _____ UNIT #: _____

	YES	NO	N/A
FLUID LEVELS:			
1) ENGINE			
2) HYDRAULIC SYSTEM			
3) WET VAC PUMP			
4) ENSURE ALL CAPS ARE SECURED (IE. RADIATOR CAP)			
SEALS:			
1) BACK DOOR SEAL			
2) TOP HATCH SEAL			
3) SITE GLASS SEALS			
4) VALVE CAP SEALS			
5) OVERFLOW TANK SEAL			
6) DO ALL HOSES AND FITTINGS HAVE APPROPRIATE SEALS			
7) ENSURE ROLL OVER PROTECTION VALVE IS IN PROPER POSITION			
8) ARE VALVES MARKED WITH OPEN AND CLOSED STICKERS			
MISCELLANEOUS:			
1) LEVEL INDICATOR GAUGE WORKING			
2) ALL VALVES IN GOOD WORKING CONDITION			
3) ENSURE ROLL OVER PROTECTION VALVE IS WORKING			
4) ARE ALL CAPS CHAINED AND IN PLACE			
5) ENSURE PUMP IN PROPER MODE FOR APPLICABLE TASK			
6) DID YOU OIL PUMP WITH HAND OILER ON 1200 SERIES PUMP ONLY			
7) ENSURE THAT SCREENS ARE CLEAN AND IN GOOD CONDITION			
8) ENSURE THAT BACK DOORS ARE TIGHT			
9) ARE ENGINE AND VACUUM GAUGES IN GOOD WORKING ORDER			
10) ENSURE PRESSURE RELIEF VALVES ARE IN GOOD WORKING ORDER AND INTACT			
11) ENSURE ALL CAMLOCK FITTINGS ARE IN GOOD WORKING ORDER AND INTACT			
12) ARE TANK AND REAR DOOR SAFETY PROPS ON UNIT			
13) DO YOU HAVE METAL CONTAINER FILLED WITH DIESEL FOR WINTERIZING PUMP			
EQUIPMENT TO PERFORM TASK:			
1) DO YOU HAVE A VEST FOR THE SPOTTER WHEN ASSISTING TO POSITION EQUIPMENT			
2) HOSES 2",3",4"			
3) REDUCERS TO PERFORM TASK			
4) GROUNDING WIRE AND CLAMP			
5) PROPER P.P.E.			
6) JOB PROCEDURES			
7) EXTRA PUMP OIL			



DAILY PRE-JOB CHECK FOR COMBO UNIT (CONTINUED)

	YES	NO	N/A
EQUIPMENT TO PERFORM TASK:			
8) GREASE GUN AND GREASE			
9) EXTRA GASKETS AND CAMLOCS			
10) SIGNS AND PYLONS			
11) FLAGGING AND TAGS			
12) GROUND SPIKE			
13) WHEEL CHOCKS			
FLUID LEVELS:			
1) HIGH PRESSURE PUMP			
HIGH PRESSURE PUMP:			
1) CHECK ALL PLUMBING LEAKS			
2) ENSURE HIGH PRESSURE GAUGE IS APPLICABLE FOR PUMP (50% GREATER THAN MAXIMUM PUMP PRESSURE)			
3) ENSURE NEEDLE IS IN THE OPEN POSITION			
4) IS THE GUARD IN PLACE AND SECURE			
MISCELLANEOUS:			
1) ARE ALL FITTINGS, PIPING AND HOSES IN GOOD OPERATING CONDITION			
2) HAS SYSTEM BEEN FLUSHED BEFORE INSTALLING JETS OR NOZZLE			
3) HAS WATER SCREEN OR FILTER BEEN CHECKED			
4) ARE ALL ENGINE GAUGES IN GOOD WORKING ORDER			
5) IS STEAM GUN IN WORKING CONDITION			

By signature below, I acknowledge that I have completed this document by verifying each item

OPERATOR:	Print: _____	Sign: _____
CEWMEMBERS	Print: _____	Sign: _____
	Print: _____	Sign: _____
	Print: _____	Sign: _____
	Print: _____	Sign: _____
	Print: _____	Sign: _____
	Print: _____	Sign: _____
	Print: _____	Sign: _____
	Print: _____	Sign: _____

Any item not shown as "YES" must be explained below.



Perform Combo Unit Operations

Combo Unit – Vacuum Operations

Precautions: Eye protection must be worn when loading and off-loading truck. Also, exercise caution when handling hot liquids and materials. Inhalation of material may pose respiratory risks.

Ensure you are aware of all the hazards of materials you are handling to ensure proper PPE is worn. When unsure, please refer to the MSDS or job supervisor.

Only individuals who have received tetanus and hepatitis A & B immunization are permitted to handle sewage.

When starting the unit ensure the pump is set to the correct mode:

1. Vacuum
2. Blow/ Pump

Do not over-pressurize tank (beyond 12 psi).

ACTION	NOTES
Pre-Start	
1. OBTAIN work permit...	... CEDA Supervisor or designate.
2. PARTICIPATE in Tool Box Talk targeting potential hazards and steps to minimize hazards.	
3. READ, UNDERSTAND, INITIAL, and ADHERE to all permits and procedures including CEDA'S confined space entry form (if required)...	... all personnel involved.
4. OBTAIN/ REVIEW MSDS...	... ensure present at job site.
5. CONFIRM disposal plans...	... prior to loading.
6. CONDUCT FLHA.	
7. DON appropriate PPE.	
8. PERFORM gas test...	... client.
9. POSITION the unit(s)...	... ensure spotter wearing a reflective vest.
10. PLACE wheel chocks.	
11. FLAG area with “ DANGER DO NOT ENTER ” flagging and tag flagging.	
12. POST sign and pylon.	
13. GROUND the unit...	... if unsure, check with Supervisor to ensure correct ground is obtained.
14. INSTALL explosion proof lights (if required)...	... client to supply.



ACTION	NOTES
Pre-Start continued	
15. RIG IN vacuum hose...	<i>... in a safe manner to avoid tripping hazards.</i>
16. SECURE pipe to each level...	<i>... as required.</i>
17. SECURE all camlock fittings...	<i>... with cam straps or locking cam ears.</i>
Operation	
18. ENGAGE pump and OPEN inlet valve...	<i>... once sufficient vacuum is built up on tank.</i>
19. VERIFY temperature of product...	<i>... ensure all safety precautions are taken during performance to task.</i>
20. MONITOR unit...	<i>... operator must stay with the unit.</i>
21. TRANSFER product...	<i>... ensure drip trays are used under the truck and at each connection prior to disconnecting.</i>
22. MONITOR level to prevent over filling...	<i>... at 3/4, unit is full.</i>
Shut Down	
23. CLOSE valve and SHUT DOWN vacuum pump...	<i>... when unit is full.</i>
24. RIG OUT hoses and INSTALL cap...	<i>... to prevent a spill, ensure spill trays are used.</i>
25. PERFORM final housekeeping.	
26. SIGN OFF permits.	
Unloading (Gravity Flow Offloading)	
1. PARK unit on level ground...	<i>... ensure ground is stable. ... ensure designated dumping area has been identified.</i>
2. ENSURE vehicle is properly grounded...	<i>... use grounding cable to prevent static discharge.</i>
3. ENGAGE PTO...	<i>... rig in hoses if required.</i>
4. ADJUST throttle to efficient working rpm...	<i>... between 800 – 1,800 rpm.</i>
5. OPEN bleed line prior to removing cap...	<i>... when dumping through bottom valve. ... ensure spill container is placed below bleed line to catch debris.</i>
6. ENSURE 3-way valve is in the neutral position.	
7. UNLOAD product.	
8. OPEN load line and drain.	
9. CLOSE all valves and recap.	
Unloading (Pressure Offloading)	
1. PARK unit on level ground...	<i>... ensure ground is stable. ... rig in hoses if required.</i>
2. FLAG area.	



ACTION	NOTES
Unloading (Pressure Offloading) continued	
3. RELEASE truck vacuum (vent unit)...	<i>... release vacuum pressure slowly.</i>
4. ENSURE 3-way valve is in correct position...	<i>... in "P" position.</i>
5. CONNECT grounding equipment.	
6. REMOVE cap from the truck discharge ...	<i>... ensure no one is the line of fire.</i>
7. HOOK-UP hoses...	<i>... ensure whip checks are in place at every connection. ... camlock ears must be secured to prevent from blowing off.</i>
8. OPEN any valves between the truck and the pressure receptacle...	<i>... ensure there is sufficient room for the product in the tank. ... leave discharge valve closed. ... if pressuring off into the atmosphere ensure the hose discharge is secured.</i>
9. ENGAGE PTO.	
10. ADJUST throttle to efficient working rpm...	<i>... between 800 – 1,800 rpm.</i>
11. OPEN discharge valve.	
12. UNLOAD product.	
13. MONITOR pressure gauge...	<i>... do not exceed 10 psi.</i>
14. DISENGAGE pump...	<i>... ensure vent line has not been hooked into a vent scrubber.</i>
15. CLOSE tank valve.	
16. RELEASE pressure from vent line...	<i>... place 3-way valve into neutral position.</i>
17. POSITION mode selector to "Vacuum".	
18. ENGAGE vacuum pump.	
19. DISCONNECT hose from tank...	<i>... ensure the tank valve is open.</i>
20. VACUUM liquid from the hose into the tank...	
21. CLOSE all valves and recap.	
22. STOW all hoses.	
23. DISCONNECT all grounding equipment.	
24. TIGHTEN back wing nuts...	<i>... must be done anytime positive pressure is applied.</i>



Combo Unit – Steamer Operations

ACTION	NOTES
Pre-Start	
1. OBTAIN work permit...	... CEDA Supervisor or designate.
2. PARTICIPATE in Tool Box Talk targeting potential hazards and steps to minimize hazards.	
3. READ, UNDERSTAND, INITIAL, and ADHERE to all permits and procedures including CEDA'S confined space entry form (if required)...	... all personnel involved.
4. DON appropriate PPE.	
5. POSITION the unit(s)...	... ensure spotter wearing a reflective vest or follow CEDA'S Backing Up Alone procedure.
6. CONDUCT FLHA.	
7. PLACE wheel chocks.	
8. FLAG area with " DANGER DO NOT ENTER " flagging and tag flagging.	
9. POST sign and pylon.	
10. GROUND the unit.	
11. RIG IN hoses in a safe manner, avoiding tripping hazards.	
12. INSTALL whip checks at each connection.	
13. SECURE hoses at each level...	... when rigging up any structure. ... ensure drip trays are used when disconnecting hoses and at the back of the unit.
Operation	
14. FLUSH system before installing nozzle...	... DO NOT set the steamer at more than 60°C.
15. PRESSURE UP unit...	... DO NOT exceed 2000 psi.
16. SHUT DOWN and REPAIR/ REPLACE defective equipment as required...	... DO NOT ATTEMPT REPAIRS WHILE SYSTEM IS UNDER PRESSURE.
17. SHUT DOWN pump and Install nozzle	
18. REPRESSURE pump to desired pressure...	... do not exceed 2000 psi.
19. OPEN chimney	... do not engage boiler without chimney open.
20. ENGAGE boiler.	
21. SET required temperature...	...manually. ... do not exceed 160°C.
22. PERFORM steaming operation.	



ACTION	NOTES
Shut Down	
23. SHUT DOWN boiler.	
24. MONITOR water temperature...	<i>... ensure water is cool enough to prevent boiler damage.</i>
25. DEPRESSURE pump.	
26. DISENGAGE pump.	
27. SHUT DOWN system...	<i>... when job is complete.</i>
28. RIG OUT and PERFORM final housekeeping.	
29. SIGN OFF permits.	
30. WINTERIZE pump...	<i>... as per the manufacturer's specifications during Winter Operations – October to May.</i>

Maintain/ Care for Combo Unit

As with any equipment used regularly, all components of the vacuum truck must receive the appropriate preventative maintenance in order to properly operate.

It is important to identify the following components and perform the required maintenance for routine operation.

Part/ Device	Required Maintenance	Frequency
Moisture traps	Drain into spill pan	Daily
Micro screen	Clean as necessary	Daily
Pump oil	Determine appropriate level	Daily
Valve seats	Clean	Daily
Mud gate seal	Ensure proper seal	Daily
Release valve	Ensure proper operation	Daily
Roll-over protection valve	Ensure proper operation	Daily
Shut-off ball	Ensure proper operation	Daily
Bleed valve between gate valve and end cap	Ensure proper operation	Daily
Wing nuts	Grease	Daily
Airflow shut-off ball and basket	Visually inspect	Daily
Level indicator and float	Visually inspect	Daily



Steamer Maintenance

COMPONENT	MAINTENANCE ACTIVITY
Before Each Use	
Burner and Burner Controls	<i>Inspect operation. Failure to inspect regularly may result in an explosion.</i>
Hoses and Fittings	<i>Inspect for worn or frayed ends.</i>
Snap Gun	<i>Inspect for damage.</i>
High Pressure pump	<i>Leaks, oil or water</i>

Winterization

Due to the inclement weather conditions, appropriate winterization of the Wet Vacuum Unit is critical for proper operation. Winterizing of a vacuum pump must be done after the job is completed and the pump will not be used for a period of time. The winterization procedure is as follows:

ACTION	NOTES
Pump Winterization Procedure	
1. ENGAGE PTO system.	
2. ENSURE 3-way valve is in the vacuum position.	
3. TURN ON vacuum system...	<i>... use idle speed.</i>
4. OPEN valve on winterizing line leading to fuel tank...	<i>... to allow vacuum.</i>
5. REMOVE cap from fuel tank...	<i>... proceed to Step 7, if winterizing line is permanently mounted to fuel tank.</i>
6. ENSURE vacuum is present in line and place into fuel tank.	
7. DRAW fuel into pump for approximately 10 seconds to allow fuel to coat pump vanes...	<i>... proceed to Step 9, if winterizing line is permanently mounted to fuel tank.</i>
8. TAKE line out of fuel tank.	
9. REPLACE fuel cap.	
10. SHUT OFF valve on winterizing line.	
11. SHUT OFF vacuum system.	
12. DISENGAGE PTO...	<i>... pump is winterized at this point. ... when pump is re-engaged, ensure pail is placed under pump exhaust to catch any residual fuel.</i>
Air System Winterization (For Units Utilizing Alcohol Pots)	



1. DRAIN-OFF air pressure...	<i>... ensure bleed valve on bottom of alcohol pot is open.</i>
2. OPEN drain valve on pot.	
3. REMOVE fill nut from top of alcohol pot...	<i>... use wrench, if necessary.</i>
4. CLOSE drain valve on pot.	
5. FILL pot with brake line antifreeze.	
6. REPLACE fill nut...	<i>... use wrench to tighten.</i>
7. CLOSE all air bleed valves on system and re-pressurize.	

Scheduled and Unscheduled Maintenance

After 200 hours of operation the combo unit requires scheduled maintenance to be performed by a certified mechanic. Additionally, if problems persist, ensure the unit is serviced when necessary to ensure safe and efficient operation.

Use the standard CEDA Work Order Form and provide the required documentation to initiate required maintenance.

Troubleshoot Combo Unit

As with any equipment used regularly, all components of the vacuum truck must receive the appropriate preventative maintenance in order to properly operate. It is important to identify the following components and perform the required maintenance for routine operation.

SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION(S)
Loss/ reduction of vacuum... Loss/ reduction of pressure....	Plug in vacuum hose	Check for obstruction in hose. Reverse hose if necessary (not vacuum).
	Air leaks in hose due to bad gasket, missing gasket or missing ear on camlock fitting	Clean/ replace gaskets as necessary.
	Pump oil is low	Check pump oil and add as necessary. Ensure proper oil is used.
	Vacuum filter is plugged	Clean filter.
Loss of hydraulic functions...	Hydraulic fluid is low	Add fluid.
	Leaking or loose hoses	Check hose and replace.
	Leaking or loose fittings	Check fittings and replace.
Air leaks...	Air leaks in hose due to bad gasket, missing gasket or missing ear on camlock fitting	Clean/ replace gaskets as necessary.



Leaking valves...	Debris in valve seat	Clean/ replace valves as necessary.
Leaking door...	Debris in door gasket	Clean/ replace gaskets as necessary.
PTO not engaging...	Low air pressure	Wait until air pressure is sufficient to engage PTO.
Tank in down position but raised indicator light still lit...	Bad limit switch	Ensure tank is in lowered position. Write maintenance order at first opportunity.



Multiple Choice Questions (Technical Quiz)

Complete the following test, and have it graded by your assessor. If any questions are answered incorrectly, your assessor will explain what the correct answer is, and why it is correct. Once you understand the correct answer, both the assessor and students initials are required to indicate that mentoring or coaching has taken place.

Question	Assessor's Initials	Student's Initials
1. Combo units: (select all that apply) _____ a. have consistent controls on each unit and the same operating limits. _____ b. provide wet vacuum and steaming services to our clients. _____ c. Store and neutralize hazardous waste. _____ d. Utilize a two man crew – an operator and a labourer.		
2. The steamer on the combo unit: a. requires 3 personnel – two operators and a labourer. b. is used for neutralizing hazardous waste. c. utilizes a wash gun for high pressure washing and a steam lance for wet steaming. d. is a carbon steel tank used to collect and transport hydrocarbon liquids and hazardous wastes.		
3. When not in use, all air-actuated valves need to be placed in the “neutral” position; otherwise the valves could be damaged. a. True b. False		
4. The vacuum pump used on a combo unit is a rotary lobe blower. With this type of pump: (select all that apply) a. the discharge valve should not be opened because it can lead to environmental incidents. b. excessive build-up will prevent proper heat loss and contribute to premature wear. c. prior to engagement the vehicle must be placed in neutral, and the brakes applied. d. the site glass must be ¼ filled with oil as a minimum.		
5. When closing the door to the steamer ensure you press the spring in prior to closing the doors. a. True b. False		
6. On the side of the vacuum pump is a 3-way valve. When the lever is moved into the “V” position a. the valve is said to be in the neutral position. b. the pump will create the positive pressure necessary for pressure unloading. c. the pump will create the vacuum necessary for routine pressure unloading. d. the pump will create the vacuum necessary for routine loading procedures.		
7. Select the correct statement about the steamer unit. a. Upon job completion during the winter months the lines need to be blown down to prevent water in them from freezing.		



	b. If pressure becomes too high, manually release the rear tank door. c. The vibrator and heater supply steam to the high pressure hose. d. All of the above		
8.	The cargo tank are made of _____ and have a capacity of _____ L. a. carbon steel; 12,000 b. stainless steel; 6,500 c. carbon steel; 11,000 d. stainless steel; 11,000		
9.	In order to create negative pressure within the cargo tank the system must be air-tight. a. True b. False		
10.	What is the purpose of the baffle inside the tank? (select all that apply) a. It is used for uploading materials into the tank during routine vacuum operations. b. It allows solids to flow out of the tank without obstruction. c. It is used to provide pressure to the valve bank, allowing the operator to control different functions on the unit. d. While traveling, the baffle acts as a liquid stabilizer to minimize fluid movement.		
11.	The grounding system: a. is in the shape of an “S” and directs materials traveling into the tank to be discharged at the rear. b. is a rod with a hollow steel ball on the end which rises as material fills the tank. c. is used to provide pressure to the valve bank, allowing the operator to control different functions on the unit. d. minimizes the electrical potential differences between objects and the earth to prevent a static charge.		
12.	The operator must never exceed ____ °C on the temperature control gauge when using high pressure water and ____ °C when using steam. a. 100; 160 b. 150; 200 c. 125; 160 d. 100; 200		
13.	What must be in place prior to connecting the drain hose to the valve under a raised tank? (select all that apply) a. engine is stopped b. keys remain with the individual hooking up the drain hose c. tank prop must be in place and secure d. the valve can be accessed at any time with no restrictions		
14.	All operators of the combo unit must be trained in TDG as it is his/ her responsibility to understand the requirements of transporting fluids on a job site or down the highway. a. True b. False		
15.	The combo unit is strictly rated to only vacuum materials no greater than 10% LEL as specified in CEDA's Vacuuming Code of Practice. a. True b. False		
16.	The vibrator should be run for 30 seconds or longer at a time.		



a. True b. False		
17. Which of the following maintenance should be done daily? (select all that apply) a. Ensure proper operation of the shut-off ball. b. Inspect the snap gun for damage. c. Clean the valve seats. d. Visually inspect the level indicator and float. e. Drain the moisture traps into the spill pan. f. Inspect the hose and fittings for worn or frayed ends.		
18. Indicate which of the following maintenance should be done before each use? (select all that apply) a. Ensure proper operation of the shut-off ball. b. Inspect the snap gun for damage. c. Clean the valve seats. d. Visually inspect the level indicator and float.		
19. Winterization is critical to ensuring proper operation of the combo unit. Place the steps in the correct order by writing 1 to 12 on the appropriate line. a. Disengage the PTO system. b. Shut off the valve on winterizing line. c. Open valve on the winterizing line leading to the fuel tank. d. Take line out of the fuel tank. e. Ensure the 3-way valve is in the vacuum position. f. Turn on the vacuum system. g. Ensure a vacuum is present in line and place into the fuel tank. h. Shut off the vacuum system. i. Engage the PTO system. j. Replace the fuel cap. k. Remove cap from the fuel tank. l. Draw fuel into the pump for approximately 10 seconds to allow fuel to coat pump vanes.		
20. After _____ of operation the combo unit required scheduled maintenance performed by a certified mechanic. a. 600 hours b. 200 days c. 600 days d. 200 hours		
21. The process for air system winterization for units utilizing alcohol pots includes removing the fill nut from the top of the alcohol pot, closing the drain valve, and filling the pot with brake line antifreeze. a. True b. False		
22. A loss of hydraulic functions in the combo unit can be caused by: a. Low air pressure b. Debris in the valve seat c. A plugged vacuum filter d. Leaking or loose hoses or fittings		



23.	Leaking valves in the combo unit can be caused by: a. Low air pressure b. Debris in the valve seat c. A plugged vacuum filter d. Leaking or loose fittings		
24.	If the PTO in the combo unit is not engaging, a cause can be: a. Low air pressure b. Debris in the valve seat c. A plugged vacuum filter d. Leaking or loose hoses or fittings		
25.	If you have a loss of hydraulic functions due to leaking or loose hoses you should: a. Reverse the hose. b. Visit a mechanic. c. Check the hose and replace d. Check for an obstruction in the hose		
26.	If the tank is in the down position but the raised indicator light is still lit you could have a bad limit switch. To correct the problem you should ensure that the tank is in the lowered position and clean/repair the switch. a. True b. False		
27.	A loss/reduction of vacuum can be caused by a plug in the vacuum hose or filter. Correction should be attempted by: a. Replacing the hose and filter. b. Reversing the hose and filter. c. Reversing the hose if necessary and removing the filter. d. Checking for obstructions in the hose and cleaning the filter.		



Practical Assessment – Combo Unit Operations

This form is to be filled out by the assessor as they observe the student successfully demonstrate these items in order to be deemed competent.

Assessment Check List

Section 1			
The following items must be identified and their purpose, inspection requirements, and preventative maintenance must be explained. Failure to successfully explain inspection and maintenance requirements does not constitute a FAIL, but will require a mentorship agreement to bring the employees level of knowledge to an acceptable level.			
ITEM		YES	NO
1	Tank: • Shut-off ball(s) • Float level indicator (interior) • Tank level indicator (exterior)		
2	Rear Door		
3	Wingnuts		
4	Intake Line/ Valve		
5	Intake Valve Switch		
6	Deflector Plate		
7	Isolation Valve		
8	Moisture Traps		
9	Microscreen		
10	Vibrator		
11	Discharge Line/ Valve		
12	Discharge Valve Switch		
13	Bleeder Valves		
14	Pump		
15	3-Way Valve		
16	Hydraulic Bank		
17	Emergency Use Only and Isolation Valve Switches		



18	Vacuum Gauge		
	Grounding Cables and Posiground Panel		
20	Operating Control Panel • Preheat Light • Engine Warning Lights • Volt Meter • Burner On/ Off Switch • Green Inverter Light (if applicable)		
21	Temperature Control Panel • Thermostat • System Reset Button • Reset Indicator Light		
22	Control Valves		
23	Steam Hoses		
24	High Pressure Hoses		
25	Hose Valves		
26	Soap and Glycol Tanks		
27	Fuel Filter and Fuel Pressure Gauge		
28	Water Tanks		
29	Water Valves		
30	Sightglass		
31	Pressure Relief Valve		
32	Boiler		

Section 2

The following tasks must be completed in the prescribed sequence. Any exceptions must be noted in the comments section with justification. Assessor will check YES column if the item was actioned satisfactorily, or circle the number in the NO column if it was not. If enough demerits are accumulated to warrant a fail, or employee performs an unsafe or dangerous action, the assessment may be terminated immediately. If necessary, all near-miss/incident reporting requirements must be met.

**Copies of the completed Daily Inspection, FLHA and Procedure must be attached to the assessment.*

TASK	YES	NO
Pre-Start		



1	Don proper PPE for vacuuming or steaming operation: - approved safety “hard hat”, approved safety footwear and glasses, “Nomex” coveralls, rubber and/ or leather work gloves, hearing protection.		
2	Review job specific procedures.		
3	Complete Daily/ Pre-Job Checklist, FLHA.		
4	Check general job conditions: -visual inspection of complete job site. -acknowledge performance parameters.		
Operation			
5	Demonstrate familiarity with the combo unit -no hesitation or inability to locate controls, gauges, components, etc.		
6	Perform effective start up according to procedure.		
7	Ensure complete and proper prime: -recognize signs like proper pressures, sound, etc.		
8	Use proper and efficient operating techniques: -remain within job specific procedures and parameters. -remain within equipment design limits as stated in the operator's manual(s).		
9	Apply smooth operation of controls.		
10	Perform ongoing and sufficient checks of all equipment: -throughout each shift -e.g. fuel and engine oil pressures.		
11	Recognize problem symptoms: -load changes, blockage, vibrations, visual cues.		
12	Ability to effectively troubleshoot equipment: -if and when required -anytime throughout operation.		
13	Respond to problems in a timely and effective manner.		
14	Use effective communication with team members throughout operations.		
15	Correctly follow procedures (observed throughout the observation period).		
Shut Down			
16	Follow proper shut-down procedure.		
17	Winterize the pump in a safe manner (if required).		
18	Follow safe shut down procedures.		
19	Observe safety considerations: -shut down equipment during inspection. -follow all CEDA procedures.		



20	Turn on burner.		
21	Re-adjust throttle to read 110-120 volts.		
22	Check fuel pressure gauge ensuring it reads 100 psi (max 140 psi).		
23	Check temperature gauge ensuring it reads 180°F to 200°F		
24	Mix soap in chemical tank if using soap.		
25	Turn burner off before releasing engine throttle control.		
26	Decrease engine speed.		
27	Disengage pump.		
28	Close roof hatch and lock.		
29	Close water supply valve to pump.		
Comments:			
Section 3			
The following precautions must be observed at all times. Assessor will check YES column if the item was actioned satisfactorily or NO column if it was not. If the employee fails to adhere to any of these precautions at any time, it constitutes a fail and the assessment shall be terminated immediately. If necessary, all near-miss/incident reporting requirements must be met.			
PPE: Has all necessary PPE to perform task. PPE has been inspected and is in good condition. Proper PPE is worn at all times.		YES	NO
Backing: Operator- Proper spotter briefing and walk down of area with spotter before backing. window down, radio off, hearing protection removed. Confirmed hands signals with spotter before backing for the first time. Sounds horn prior to backing, keeps spotter in mirror, follows spotters direction.		YES	NO
Backing: Labourer- Proper spotter briefing and walk down of area with operator before backing. wears high visibility vest, confirms hand signals with operator before backing for the first time. Uses proper hand signals, does not walk backwards while spotting or repositioning, always facing unit while it is in motion.		YES	NO
Line of fire: Does not place themselves in the line of fire at any time. This includes standing off to the side when opening valves, removing caps, and disconnecting hoses. Does not place themselves directly in front of/behind unit while in motion. Uses whip checks on all connections		YES	NO



Communication: Has established and reviewed method of communication with co-workers to ensure equipment is operated safely and all hand signals are understood.	YES	NO
Paperwork: Properly complete or participate in the completion of any required paperwork. Have necessary paperwork completed prior to commencing a task.	YES	NO
If there are any items that are marked NO, it is a failure of the assessment	PASS	FAIL

Comments:

Section 4

Trainee must be able to clearly explain or demonstrate the proper procedure for winterizing the Steamer. Failure to successfully explain winterization requirements does not constitute a FAIL, but will require a mentorship agreement to bring the employees level of knowledge to an acceptable level.

WINTERIZATION

TASK		YES	NO
Pump Winterization			
1	Engage PTO system.		
2	Ensure 3-way valve is in the vacuum position.		
3	Turn on vacuum system.		
4	Open valve on winterizing line leading to fuel tank.		
5	Remove cap from fuel tank.		
6	Ensure vacuum is present in line and place into fuel tank.		
7	Draw fuel into pump for approximately 10 seconds to allow fuel to coat pump vanes.		
8	Take line out of fuel tank.		
9	Replace fuel cap.		
10	Shut off valve on winterizing line.		
11	Shut off vacuum system.		
12	Disengage PTO.		



Air System Winterization (for units utilizing alcohol pots)			
1	Drain-off air pressure.		
2	Open drain valve on pot.		
3	Remove fill nut from top of alcohol pot.		
4	Close drain valve on pot.		
5	Fill pot with brakeline antifreeze.		
6	Replace fill nut.		
7	Close all air bleed valve on system and re-pressurize.		



Assessment Sign Off

All boxes must be completed before signing an employee competent.

- ☐ Expectation Letter Signed
- ☐ Minimum 100 hours of on the job training completed
- ☐ On the Job Practical Assessment Completed by an approved Assessor
- ☐ Has reviewed and understands the operator manuals
- ☐ Reviewed and understands Procedures and Safety Documentation
- ☐ Technical review and Knowledge Exam complete
- ☐ Training documentation sent to CEDA Training Department

Assessor

I, _____ have taken the below named employee through this Assessment, and he/she has successfully demonstrated competence in the areas identified.

Signature Date

Student

I, _____ have completed this competency, including the on-job demonstration, practical assessment and multiple-choice questions. I understand the information presented and agree to follow all of the rules and procedures set out by CEDA.

Signature Date



Revision Log

Revision Date	Section Affected	Changes Made
January 11, 2023	All	Updated Template, multiple changes throughout.



Training Change Request Form

Date: _____

Location: _____

Name: _____

Contact information: _____

Email/Phone number

Description

Please use the back of this sheet to make additional comments.

Section Name: _____

Page Number: _____

Description of Problem/ Suggested Resolution:
