
MODULE 7 - Safety On A Job-site

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7.1 Job-site Safety

Arriving at a job-site can sometimes be overwhelming if there is a crowd of people. Scheduling jobs takes more planning than just putting the job on a the schedule at a random time that works for you, or whoever is going to be doing the job. Knowing traffic routes, high vehicle traffic hours, parking hours, pedestrian/crowd patterns, weather, noise bylaws, and special events are all factors to consider when planning a job. The common denominator between most of these is safety to people in one form or another.

Since you will be driving a large vehicle and possibly a trailer as well to a job-site, you don't want to show up and realize that you cannot work at the site because of the mentioned variables. When writing a quote, be sure to make a side note for anyone at your company who might be working at the job-site. Include what the landscape is like, specific arrival times, if 2 people are required, who to contact at arrival (if required), if parking can be an issue, if a ladder is needed, or anything else that might help or prevent the job from being completed on the first arrival.

A second trip to a job-site can cost valuable time and gas, both of which cost your company money and potential growth. If you have to drive to half of your job-sites twice, you won't only take on extra costs, but you might also hurt your reputation because you didn't prepare, which now prevents you from completing the job when you told the client it would be done.

Prepare to fail if you fail to prepare.

Some situations will require you to bring extra hose, or will require 2 people. Two people can often be needed if the graffiti is in an area that doesn't have a slow time of the day (pedestrian or vehicle traffic) during the hours that comply with the local noise bylaws. If you have to perform a job in-between crowds of people, try to find a slower part of the day to do so. These times vary from city to city and even block to block, but normally first thing in the morning, 10am, 2pm, or after rush hour or later are your best opportunities. One person will have to be crowd control, hose controller, and operate the machine on and off. Make sure to place a lot of cones around where you are working, but be prepared for people to avoid them and carry on as if they don't know what they are there for. It is up to you to make sure your work area and the public people are safe. Assume people don't know what you are doing and they need to be asked to wait, stop, watch out for water/hoses, etcetera.

Other sites that will require 2 people are rooftops and other hard to reach areas that you cannot go with a pressure washing wand if your machine is turned on. For example, you might/will come across graffiti that is on the other side of a chainlink fence from where you can park. In order to get your hose there you would either have to throw the hose and wand over the fence while the machine is on (which is never recommended for multiple safety concerns, such as hoses blowing, the wand hitting something, wand breaking, etcetera), or you can pass the hose through the fence without the wand attached and the pressure washer turned off. The latter is recommended, so you would need a second person to turn the machine on/off and be able to watch the machine, water level, hose, and crowds as it is not a good idea to turn your machine

on or off without the wand trigger being pulled in order to prevent excessive load on the engine or pump.

You also shouldn't ever practice climbing a ladder or be in a difficult position with a loaded hose/wand where you cannot reach the pressure washer while the machine is turned on. You should be able to quickly react to anything that could go wrong with a pressure washer, such as if the machine catches fire, a pedestrian tampers with the machine because they see you can't react in time, hose is laying on the ground where people could trip on it, if you run out of fuel while your burner was still burning hot, or many other scenarios where you need to react quickly. Your vehicle or trailer will be unlocked if your pressure washer is in it and running, so be careful to not put yourself in a compromising position at any job-site.

As you become more comfortable with various job-site obstacles, don't overlook the safety requirements. Make safety a habit, standard, and requirement. You don't get a second chance when it comes to being hurt and it most likely will never have been worth the risk.

Never operate a pressure washer while on a ladder. This is one of the most dangerous performances you could do as the PSI from your machine is more than capable of throwing you off balance, even when your feet are both planted on the ground. A ladder has a narrower stance than most people's natural stance when bracing for a pressure washer, so even if you feel stable, your ladder is not.

Parking

Once you arrive at a job, the first thing to do is make an assessment for safety. This might take 1 minute, 10 minutes, or more, but it's up to you to make the right decision on when to start the job. Other than what was previously mentioned you will also need to make sure that when you open the doors to your vehicle and/or trailer you are going to be protected from passing vehicles or people. The doors by your pressure washer will need to remain open for the duration of the job (while the pressure washer is running) because you need the airflow to help with exhaust as well as proper air intake for the engine.

If your engine's exhaust is going to be coming out of the side or back of your machines location, as opposed to a top vented chimney, then you should be aware of where it is pointed in relation to where you park.

Once you have made the decision of where to park, the first thing to do when you arrive is to place your safety cones out around your vehicle to block off a safe place for you to walk. This includes where you will be laying out hose. Be sure to mark/cone off further back towards the direction of traffic, as cars need to see the cones before they are too close to stop or make a safe lane change.

The more cones you have and place around your work space, the safer you and everyone around you will be.

Pedestrians

As much as you cone off an area, there will still be people who are not paying attention. Don't assume your cones are going to work for everyone, but make sure you don't forget to use them.

Mark off an area that you feel is a safe distance. For example, if you are going to be working on a brick wall that has a 2'h x 4'w tag on it, you will also need to assess if there is wind or not. If there is a strong breeze going to your left, then you should mark your coned off area much further down the sidewalk to the left to account for wind drift. If you can close off a large section, do it. The larger the zone is that you cone off, the safer everyone will be.

You also need to account for the hose that people might be walking over. Place cones along the hose and give people walking by a verbal notice to watch out for the hose. If people need to cross the area you are working, stop immediately and let them pass. If there is a large amount of people in the area you are going to work, don't even start up. Assess when a better time of day is to do the work and come back. Getting a job done in a bad situation is not worth the risk you are putting people in, including yourself.

A common occurrence that will happen while working is that people will stop and ask you about the graffiti, comment on it, or tell you a personal experience of theirs with graffiti. It isn't a common occurrence to see a company removing graffiti (think about how many trades people you see a day or year and how many were graffiti removal?) so be aware that people will come talk to you. If you are working with a pressure washer, let them know you can't talk at the moment, or if you aren't, ask them to keep a distance as they don't have protective gear. Understanding that this might be their first time seeing someone do what you're doing can help curb impatience in having someone interrupt you on a job-site.

Personal Protection

Once you have parked your vehicle at any job-site, the first thing to do is put on your safety glasses and high visibility vest. Wearing these throughout the day, even when you are driving, is a good habit to get into. Your eyes require extremely low PSI to do permanent damage, so safety approved eye protection should always be worn.

Safety glasses come in a wide range of options at any safety store. Find a brand or style that works for you and get more than one pair. For example, once you find a style that doesn't slide off of your face, has full side protection as well, and fits well under your ear protection, find what other lens or colours they are available in. A tinted pair with UV protection is a good idea to have as well as clear because it can be tempting to put on your regular sunglasses when working on a sunny day and you find yourself squinting. Don't risk your eyes by reaching for a standard pair of sunglasses that might not be able to take high pressure from a piece of masonry breaking off and ricocheting towards you. You could even do more damage with a broken pair of sunglass lenses hitting your eye than the piece that was going to hit your eyebrow. Your regular glasses are also not approved eye protection, so find out more from your optometrist on how you can wear eye protection over your existing glasses or if you can get safety approved prescription eye wear.

Do not overlook eye protection. A small flying object can cause damage to many parts of the eyeball and even puncture it. This can cause bleeding between the iris and cornea (hyphema), a change in the size or shape of the pupil, or damage the structures inside of the eyeball. These types of damage can require medical treatment.

For smaller debris or fluids in your eye that don't require special treatments (know the products you are using and their safety requirements) have your eye wash station ready at all times and know how to use it in advance.

If in doubt, seek medical attention immediately.

Steel toe gum boots might not be a government safety requirement, but should be a company requirement. Do not operate a high pressure machine that will possibly be inches or a few feet away from your feet without protecting them. Street shoes will get product and water on them, which will leave your feet wet for hours, but the pressure coming from your wand tip is capable of etching out concrete. Cutting a toe or your foot (through your shoe and sock) with this high pressure will happen in less than a second. The pressure being forced into your foot (or any other body part) can cause more damage by the pressure getting into the blood stream, which can effect your blood or heart. Water contamination is also a major threat. An infection might not show up immediately, but it will. Even if purified water was being used, which it won't be, the contamination from your hoses, holding tanks, sock/shoe materials, products, and surface you are washing all have contaminates that will cause infection.

If you ever have a high pressure accident, no matter how minor you think it is, you must seek medical attention by a doctor immediately. You are at risk of losing your limb, or even worse, if you don't get looked at by a professional.

Ear protection should always be worn by everyone when the pressure washer is running, even if you aren't the person using the wand. It may seem like a small period of time and take a bit of getting use to, but prolonged bursts of high decibels can take a toll on your hearing. Muff style ear protection can also be a physical barrier to debris, water, or anything else that could come your way.

The best option for your safety is to have a hard hat that is fitted with a flip up face shield that also has ear muffs attached. They can click in to make them close to your head or hover slightly away from your ears when putting the helmet on or if you aren't working and don't need sound protection.

Rubber gloves and a rubber 2 piece suit are also the best options for preventing water and product getting onto your clothing and skin. There are many high visibility options for coveralls, so try some on and find what works best for you.

For the most protection on your face and airways you should have a respirator system that can block out airborne particles, which can also act as a secondary face shield. Prolonged exposure to product smells (even if they are safe) can be annoying or cause some people discomfort like headaches. You can find a silicone mask at many hardware stores and almost every safety shop. There are various options for screw in air filter cartridges, so ask whoever you are buying it from to fit you with the correct size and find out what the different filters offer. Price will reflect on the safety features. For example, one of the lowest costing cartridges is very thin and will protect mainly against dust, but a more expensive one will filter VOC's as well as gasses. Pressure washing buildings can cause a lot of dust, so it is a smart idea to have one on hand for those purposes if your company offers pressure washing services as well as graffiti removal.

Your Team

When you are working with a team, everyone should be aware of your company Safety Plan. Protocol on emergency situations should be understood by all members. Know if your working partner knows them like you do because they are most likely the one who is going to have to help you if you are in trouble. Remind each other if they miss a step and help them if you can. Forgetting to put on eye protection is a common issue with people who don't wear eye glasses, as it isn't something they may have had to think about in their past. Once someone

forgets to put eye protection on when they arrive at a job-site it is likely that they will carry on without remembering. Make a safety check when you first arrive at a job-site a habit so you can focus on the tasks after that. Stopping a job half way through to go find your safety glasses can put your partner in a precarious position. They might have to leave whatever they are doing to help you and now neither of you are doing what you originally planned on doing at the site.

Communication can be difficult when everyone has ear protection on. Your company should have a standard set of hand signals that everyone abides by. For example, if you are backing up a trailer there should be an understanding of what the person guiding is trying to explain to the driver with only using their hands. The same goes for operating a hot water pressure washer.

These are the actions that you should have a set understanding of signals for.

Vehicles:

- Keep coming backwards
- Go forward
- Stop
- Turn left
- Turn right
- Indication of how far to keep driving
- Watch your vehicle front
- Slow down

Machine Operating:

- Turn machine on
- Turn burner on
- Turn burner off
- Turn machine off
- Stop work (commonly used for pedestrians being too close by person using wand)
- Indicate how much water is left in reservoir/holding tank

Over time you might find more signals that are needed, which can be passed throughout your company.

Pressure Washer

Safety based on gasoline or diesel pressure washers only. If using an electric pressure washer you must also refer to the Centre for Disease Control (CDC) for instructions on electrical safety.

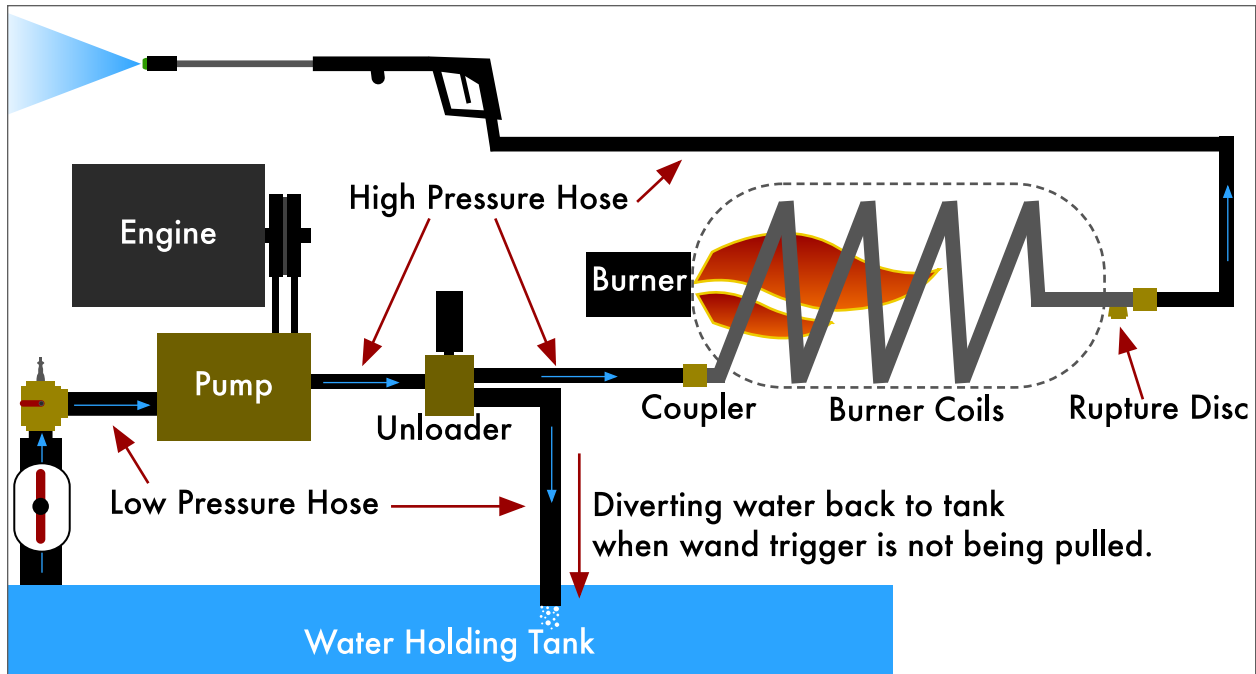
Operating a small, residential purposed, pressure washer with low GPM has little consequences if you don't operate it with any knowledge. It could damage the machine, but personal injury is slightly lower. The machine you will be working with has an extremely larger amount of pressure and risk attached to it because of the larger GPM it produces. Caution and respect for what it is capable of must be at the top of your list whenever you turn the machine on, and even when you turn it off.

The following topics will go through the basics that must be followed when operating a pressure washer; however, your machine will have its own safety precautions and owners manual. Include and follow those safety guidelines in your safety plan and make them your minimum standards. Your personal safety and responsibility for the people around you should be your top priority.

Starting The Machine

When starting a machine that produces a large amount of PSI and water volume, you will want to create an easy direction of water flow in order to reduce the pressure that can be placed on the machine. What this means is that when the water doesn't flow through the machine at the easiest path of resistance (straight through to a pulled trigger on the wand), it will put more pressure on every part it is pushing outwards on. What happens is that the trigger prevents flow and puts pressure on the hose, which puts pressure on the unloader to divert and direct water to the overflow (which should be redirected back to your holding tank to prevent losing water). This is a small amount of pressure, but over time it can cause issues and isn't necessary. The water built up will also reflect on the pump, which is in line before the unloader, and in return can put pressure on the starting of the engine that turns the pump. Every part of the machine can handle this pressure as long as your unloader is working as it should and if there is a build up of excessive pressure, the machine should have a rupture disc that is a sacrificial disc that will burst and allow water flow to happen, which will save your pump, engine, and everything else. The issue with using the rupture disc is that you'll have to replace it before your water flow will work again. Unless you have one with you, this will end your ability to complete your jobs that require pressure washing.

The best practice to be in is to have your wand pressure turned down (available only on variable wands) to the lowest setting, securely pointed at the ground, and the trigger pulled for maximum water flow. If your wand is a single tube coming off of the trigger handle, then this won't be an option. This wand will be full pressure all of the time, so have it secured when starting a machine in this situation.



Pressure washer parts and water flow diagram.

Hoses

The hoses you are using should all be rated for the machine's maximum pressure and temperature. Every hose will (or should) have this rating clearly stated on it. If the PSI or temperature doesn't meet the minimum requirements, don't use it. You will run the risk of blowing a hole in a hose, which will produce a large bang sound and shoot water out of it. This can be extremely dangerous if you have hot water coming out of it and it is close to a person or animal.

It is important to not let people stand near a hose because a hose can break at any section. Your liability is at stake if you aren't managing people around your equipment. Just because your machine is 50 feet from people and the wand is another 50 feet away (100 foot hose), the people near the hose still aren't in a safe location. Near the hose is still your safety area that you need to manage.

Hoses are made up of a metal weave or braid around them to increase strength. Not all hoses are created equal just because they are rated for the same PSI and temperature. When buying or using a hose, you should know what it is you are getting into. A single braid versus a double braid is the difference in price and longevity of the hose. The stronger the hose, the safer it is and the longer it will last. Hoses wear out and break, so even if you only use double braided hoses, you still need to prepare for them to eventually break down.

There will eventually be situations where your hose will be in a vulnerable place across a vehicle pathway such as an alley that will expose it to being run over by a vehicle. If you aren't paying attention and a vehicle drives over it while you are pulling the trigger, you will notice a pulse in the pressure. This is not something you want to have happen as it puts pressure on the machinery as well as weakens the hose strength. Whenever possible, move the hose out of the way and let a vehicle pass or ask them to wait. You definitely don't want a vehicle to

stop and park with their tires on the hose too. The weaker your hose becomes because of these activities, the likelier you will have to replace a hose because it breaks.

Hoses aren't cheap and they can cause damage or injuries, so make sure your hoses are in the right places, such as close beside the edge of building if you are in an alley (watch out for debris directly against the buildings), or away from doorways and areas that people might walk or drive over it.

Dragging a hose is going to happen as they are heavy and long, so if you can park close to a job without getting your vehicle wet from overspray, do so. The less hose extended out the better for safety and wear and tear.

Wand Control

Like anything that projects anything from an end of it, you need to be in control of it even if it isn't projecting. For example, rifle safety is explained that even if you don't have a loaded gun, you don't ever point it at anything you don't intend to shoot or can be safely discharged into, such as the ground. The exact same goes for the wand. As explained earlier, the danger of being hit with the pressure coming out of the wand you are using can be life threatening.

If you are equipped with a variable wand, lower the pressure adjustment whenever you aren't pulling the trigger in order to prevent it from kicking into a direction when you pull it again.

When you start on a job, slowly increase the pressure of the wand and start further back than you think you'll need to be. For example, if you are going to start pressure washing off graffiti, you should start with the wand being at least 2+ feet away from the wall. This will prevent damage and you can then increase the pressure with the variable wand adjustment as well as how close you will be from the wall. You can't work backwards in this situation, so if you do damage at the beginning, it is your own fault. Play it safe and slowly increase to your highest pressure, or what the substrate will allow, before you cause damage.

If you have a leak coming from anywhere on the wand, take a look at what is the issue. Sometimes it might be reapplying plumbing tape and tightening a threaded portion of the wand, or it could mean there's a broken part on it. Using broken equipment is a recipe for an accident that could have been prevented.

O-Rings

All high pressure hoses that are attached with a coupler will have an o-ring inside of the female end. If you look into the end of it, it will be where the male fitting end will touch. The male fitting will put pressure on the o-ring and create a seal for the hoses to be continuous without a leak. These couplers are in a few places on your machine as well, so if there is a coupler, there is an o-ring. Hot water o-rings are usually orange, which means they have a higher temperature rating and will last longer under hot water conditions. Black o-rings are less expensive and can be used as well, but you will have to replace them more often.

The tips for the wand also use o-rings, but they will be a smaller size than the hose's.

If an o-ring is damaged or fully blows, you will most likely notice it because your pressure at the wand will drastically drop. You will also notice water spraying out of the connection where the o-ring has broken. To replace an o-ring, cool down and turn off the machine. You can pull it out with anything small and metal, but an o-ring pick is the best tool to use. Simply pull out all of the damaged o-ring material and replace with a new one.



Heating Up & Cooling Down

Using a hot water pressure washer has many differences than a small personal use pressure washer, so read the owners manual and understand what each section is telling you.

Starting a machine and turning the burner on activates different parts of a hot water pressure washer. The burner injects diesel into the coils, where the water is moving through, after the pump and unloader. Two rods, which produce an electrical current between them, ignite the diesel and produce a flame. This flame encompasses the area where the water coils are and heats them up. This is what produces the hot water.

Once you are finished with the job and need to turn the machine off, you must first cool down the coils. Turn the burner off, cycle water through the entire system, and wait for the hose and wand to feel cool when you touch them. This is extremely important. If you were to turn the machine off and put everything away hot you are setting a time bomb that could go off causing extreme damage and even death.

What would happen is that the hot water, which is often heated to a temperature above what water needs to boil at, is now trapped inside a closed area. Think of how canning is done with fruits or vegetables. You heat up an area and then the contraction pulls and seals everything from the inside as it cools. You are now doing this with a giant industrial coil if you turn off a machine without running cold water through it. This is why it is important to know how much water you have in your holding tank, so that you can cool it down before running out of water.

The safest thing to do, even if you cool your machine down, is to keep the end of the hose coming out of your machine open. This means that you don't keep the wand attached to the hose when you are done with a job. If the water is still warm because you forgot to cool it down, or you ran out of water because you weren't paying attention to the water levels (which can happen if you park on a slope, so be cognizant of that), then your wand detached from the hose will give the expanded and retracting water a place to go. Do not rely on this process as your method of finishing a job. This is a safety fallback practice only.

If you are using a low pressure hose (garden hose) from a building and it is hooked directly into your machine as your water source, it will be constantly forcing water through your machine and out of your wand, even when the machine isn't running (this means it is NOT filling your holding tank). This is the least common way to draw water as a mobile service, but if you are in this situation and run out of fuel or water with hot water in your coils, you can allow this water to run through the machine as if it was running and it will eventually cool down the coils. This is a rare scenario, but it is important to know as a third option in a rare case.

Exhaust

When parking, you must consider where your exhaust will be going. If you notice a NO SMOKING sign, it might be because of a building's air intake. Park in a place that doesn't effect the quality of air for a building and do not ever park inside of a building or parkade when operating your engine or burner. Try to park so that the current direction of the wind will take the exhaust away from your machine or buildings.

When you are finished at a job-site, try to let your entire machine cool down as much as possible before locking it in a small area. If you have anything flammable in the same place, remove it and keep the area safe.