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STANDARDS

Hand and portable powered tools and equipment, OSHA 1910.242

1. Purpose

Physical Plant employees use power tools and machinery daily in performing their work. Unfortunately, they do not always use the tools properly and serious injuries have resulted. These include amputations, crushing and bruises from being struck by powered equipment, burns, cuts and other types of injuries. The purpose of this section is to provide basic guidelines to help you avoid these injuries.

Since there are a wide variety of equipment types, one standard cannot provide guidelines for every separate type. Therefore, the general guidelines must be applied where they are applicable and common sense must also be used. Each worker should be familiar with the operations and hazards of the tool being operated and should use the tool properly to minimize the chance of injury.

2. Procedure

- A. Only trained and authorized individuals may use power tools in their work.
- B. Individuals should be familiar with the operating procedures for each tool before starting to use it.
- C. Always use the appropriate personal protective equipment (PPE) recommended for the tool. This includes safety glasses or goggles, gloves, hard hat, steel-toed shoes or other personal protection equipment.
- D. Inspect the tool prior to use to ensure that it is in good operating condition.
- E. When using tools with sharp cutting edges (such as drills or saws), ensure that the blade or bit has been sharpened. This will make the tool easier to use and may also prevent the tool from slipping while making the cut.
- F. If a power tool is equipped with a guard, never wedge the guard back, never remove it, or otherwise try to defeat it. The guard was placed there to protect the operator from serious injury. Defeating the guard has two possible negative results for the operator; they are: (a) be seriously injured by the sharp tool, and (b) be fired for violating a safety rule.

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- G. Many power tools are equipped with constant pressure controls. If the pressure on the trigger is released, the motor will stop. These controls also have a tiedown button to keep the motor running after releasing the trigger. This tiedown button should be used only under well-controlled situations. If the tiedown button is used and the operator gets injured, the operator may not be able to shut the motor off and the tool may keep on cutting causing more injury to the operator until someone can shut it off.
- H. Only use the tool to perform tasks it was designed for. Use for any other task could cause an injury. For example, using a chainsaw (which can catch on a small branch and jump in the operator's hands) to trim a hedge could cause you to get cut by the blade or to be injured by flying branches and leaves. Use a hedge trimmer for this task.
- I. When done with the tool, disconnect the power cord, so that the tool cannot be operated accidentally or by an unauthorized person.
- J. When using a belt-operated piece of equipment, such as a bench grinder, make sure that all pinch points are guarded. Pinch points are the points where the drive belt contacts the pulley.
- K. Make sure that all rotating parts of the equipment that are not used for work on a piece of material are properly guarded. This includes spindles on grinders and any protruding rotating shafts on roller-type equipment.
- L. Abrasive wheel grinders (bench- and pedestal-mounted, as well as portable) should have guards on them to protect against accidental contact. The maximum opening of a circular guard is 180°. On portable grinders, always be sure to keep the guard between the wheel and the operator during use.
- M. All bench and pedestal-mounted grinders should have a tool rest installed. Adjust the tool rest so that it is no more than 1/8" away from the wheel at all times.
- N. Always make sure that you have adequate ventilation when using or refueling gasoline-powered tools.
- O. Store all containers of gasoline in safety cans. When not using the gasoline, store the can in a protected metal cabinet designed for the storage of flammable liquids.



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Electrical Safety for Power Tools

- A. Ensure that the plug is firmly attached to the cable and that the plug provides strain relief. This will keep the wires from pulling away from the pins inside the plug.
- B. Always make sure that the ground pin (the round pin that is longer than the two flat pins) is firmly attached to the plug, not loose or cut off.
- C. Check the power cable for any cracks, broken insulation, abrasions or other damage. Replace the cord if damage is found. OSHA does not allow the use of electrical tape to repair damaged power cables.
- D. Check the controls to ensure that they are all well insulated.
- E. If equipment uses water, check to make sure that the water is kept away from the electrical parts of the equipment or that there are effective seals in place to prevent moisture from getting to the motor.
- F. During use, be observant for any problems, such as sparks, electrical shocks, uneven operation, or unusual noises from the equipment. These may be indications of equipment damage, which could possibly lead to electrical shock.
- G. Keep the power cable away from any sources of water during operation. Keep the equipment away from water unless it is specifically designed for use in water.
- H. When pulling the plug from the receptacle, pull the plug out, rather than the cord. This will reduce the chance of the wire pulling away from the plug's pins, thereby causing a short circuit.
- I. During operation, check equipment periodically for heat buildup. If the equipment becomes too hot to touch, put it down until it cools off.
- J. If you need to provide maintenance or repair service to a piece of equipment, make sure to disconnect the plug before beginning work. If the equipment is "hard-wired" to the building's electrical service, follow the Lockout/Tagout procedures posted on/near the machine.
- K. Electrical outlets should be provided with ground fault interrupter (GFI) receptacles in all areas required by Federal, State and local codes/regulations.

Handheld Drills and Drill Presses

- A. Only trained and authorized personnel should operate a hand drill or drill press.
- B. Inspect the drill before using. Don't use a dull or cracked drill.

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- C. Wear safety eye protection while drilling.
- D. Always hold work in a vise or clamp to the drill table.
- E. Always try to support part on parallels or a backing board when drilling through material.
- F. Use a correctly ground drill bit for the material being drilled. Shop personnel can help select the correct bit.
- G. Use the proper cutting fluid for the material being drilled.
- H. Always clean drill shank and/or drill sleeve and spindle hole, before mounting.
- Never place taper shank tools such as large diameter drills or tapered shank reamers in a drill chuck. Only straight shank tools such as stand drills can be clamped in chucks.
- J. Remove taper shank tools from spindle or sleeve with a drill drift and hammer.
- K. Run drill at correct RPM for diameter of drill bit and material.
- L. Don't drill with too much pressure.
- M. Ease up on drilling pressure as the drill starts to break through the bottom of the material.
- N. If the drill binds in a hole, stop the machine and turn the spindle backwards by hand to release the bit.
- O. When drilling a deep hole withdraw the drill bit frequently to clear chips.
- P. Remove chips with a brush. Never by hand.
- Q. Never try to loosen the drill chuck while the power is on.
- R. Let the spindle stop of its own accord after turning the power off. Never try to stop the spindle with your hand.
- S. Lower the drill spindle close to the table when releasing the drill chuck or taper shank drill to reduce the chance of damage in the event they fall onto the table.
- T. Always remove the drill chuck key or the drill drift from the spindle immediately after using.

Band Saws

A. Only trained and authorized personnel should operate a band saw.



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- B. Use the proper pitch blade for the thickness of the material to be cut. There should be at least 2 teeth in the material when cutting aluminum and three teeth when cutting steel.
- C. The upper guide and guard should be set as close to the work as possible, at least within ¼ inch.
- D. Do not run the band saw at a higher speed than recommended for the material being cut.
- E. If the saw stalls in a cut, turn the power off and reverse the blade by hand to free it.
- F. If the band breaks, immediately shut off the power and stand clear until the machine has stopped.
- G. Examine blade before installing to see if it is cracked, do not install a cracked blade.

Table Saws

- A. Only trained and authorized personnel should operate a table saw.
- B. Use the proper blade for the material and type of cut. Do not use a rip blade for cross cutting, or a crosscut blade for rip sawing. Do not use a plywood blade for anything but plywood.
- C. Inspect the blade before using it to make sure it is sharp and free from cracks.
- D. The circular blade of the table saw should be set to 1/8 inch above the work.
- E. Appropriate guards must be in place at all times. Never remove the guard.
- F. Stand to one side, never directly in line with work being fed through the saw.
- G. Never allow your fingers to get near the blade when sawing. Use a pusher stick to rip narrow pieces of stock. Don't use a pusher stick to remove scrap. For scrap removal, shut off machine and wait until blade stops, then remove scraps.
- H. If a piece of material you are cutting is large, get someone to assist in tailing-off for you. Never try to do it alone. Tailing-off refers to supporting a large workpiece by supporting it underneath with your hands.
- I. If you are tailing-off for someone else, let them guide the work through the saw. You should just support the work without influencing the cut.
- J. Never reach over the saw to obtain something from the other side.



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K. Never make any adjustments to the saw while it is running. Turn off the power and make sure the saw is completely stopped before attempting to adjust it.

- L. Do not allow material to collect on or around the saw table. Sweep up sawdust and material scraps regularly while working to minimize chances of slipping or stumping.
- M. When shutting off the power, never attempt to stop the saw quickly by shoving anything against the blade. Make sure the saw has stopped before leaving it.
- N. Make sure that you clean up thoroughly around the saw before leaving the area. If you don't, you could be the cause of someone else having an accident.

Chain Saws

- A. Only trained and authorized personnel should operate a chain saw.
- B. Managers shall verify that operators are capable and qualified on each type of equipment before allowing the equipment to be operated unsupervised.
- C. Operators shall perform a pre-operational check of equipment. Be familiar with operator's manual. Report all needed repairs promptly and do not use any equipment that is unsafe.
- D. Wear appropriate personal protective equipment consistent with the hazard. This should include eye goggles and hearing protection; gloves, chaps and hard hats when felling trees.
- E. Do not wear loose jewelry and chains. Snug fitting clothing is recommended.
- F. Never start the chain saw until you are at the location where you intend to use the saw.
- G. Operate the chain saw only in well-ventilated areas.
- H. Before you start the engine, make sure the chain or blade is not contacting any object.
- I. Do not allow other persons to be near the chain saw when starting or cutting.
- J. Never start cutting until you have a clear work area and secure footing.
- K. Always hold the chain saw firmly with both hands when the engine is running. Use a firm grip with thumb and fingers encircling the chain saw handles.
- L. Keep all parts of body away from the saw chain or blade when the engine is running.



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- M. Do not cut with the power saw above your head to guard against kickback and to prevent back injuries.
- N. When operating a chain saw, be aware of the stress of the item being cut. Pinching may result on compression side and sudden break may result on tension side.
- O. Always shut off the engine before putting down the saw.
- P. During emergencies, look for downed utility lines before cutting with saw.

Fueling Safety for Power Engines

- A. Always store gasoline in an approved container.
- B. Do not smoke while handling fuel.
- C. Beware of static electricity and sparks between the power engine and fuel cans (metal and plastic).
- D. Always stop the engine to refuel the tank.
- E. Avoid spilling fuel or oil. Spilled fuel should always be cleaned up.
- F. Do not remove fuel tank cap when engine is running.
- G. Move the engine at least 10 feet from the fueling point before starting the engine.
- H. Keep handles dry, clean and free from oil or fuel mixtures.
- I. Know if the motor is a two-stroke engine. Two-stroke engines require a mixture of gasoline and oil in a proper ratio.
- J. Always use the correct type of oil and good quality gasoline and mix them according to the manufacturer's specifications.
- K. Mix the oil and gasoline outside and mix enough for one day's work.
- L. Keep the gasoline/oil mixture away from flames and other heat sources.
- M. Before fueling, shake the container vigorously, to ensure that the gasoline and oil are thoroughly mixed.
- N. Pressure can build up in the fuel tank. Loosen the cap slowly to bleed off that pressure before refueling.
- O. Try not to leave the fuel tank full at the end of a job. This could cause the engine or carburetor to get sticky, which could lead to difficult starts.



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Utility Carts

- A. Only trained and authorized personnel should operate utility carts.
- B. Utility carts should not be operated in a manner that may endanger passengers or other individuals (e.g., pedestrians), or harm University property (e.g., no driving on landscaping, bumping into bollards, etc.).
- C. Do not exceed the passenger limit and load capacity designated by the vehicle's manufacturer.
- D. Utility carts should be restricted to designated streets and paths on campus.
- E. Operators must reduce speed on walkways and in pedestrian areas. In crowded pedestrian areas, operators must park or proceed at a slow walking pace.
- F. Park only on hard covered surfaces (e.g., asphalt, concrete, brick).
- G. Use of utility carts should be prohibited on soft surfaces, including but not limited to: landscaping, unpaved surfaces, tanbark-covered areas, etc..
- H. Do not block entrances to buildings, stairways, disability ramps, or main thoroughfares.
- Do not chain vehicles to trees.
- J. Electric vehicles are to be recharged at location designated for such use.
- K. Use of extension cords from inside buildings to vehicles is prohibited.

Lawnmowers

- A. Only trained and authorized operators should use lawnmowers, especially the commercial-size machines.
- B. Operators should prepare themselves, especially if they will be mowing for extended periods of time. Wear tight-fitting clothes that will protect arms and legs. Sturdy leather shoes are a must, with steel toed shoes a preferred choice. Safety goggles will help protect eyes from any flying debris that may come out from under the mower. Also apply liberal doses of sunscreen lotion, particularly if mowing during the hottest parts of the day. Have access to water, to avoid dehydration.
- C. Prepare the lawn for mowing. Clean up obvious debris that could become flying projectiles if struck by the spinning blade. Direct the discharge chute away from areas where people are likely to be walking and parked vehicles.



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D. Check the equipment prior to use to ensure that all required guards are in place and the equipment is working properly.

For example:

- Check the mower to verify that all "kill" switches are working properly.
- Power-driven chains, belts or gears should be guarded to prevent the operator from coming into contact with them during normal operation.

Discontinue use and arrange for maintenance if the machinery is not working properly.

- E. Always make sure the operating controls are in neutral before starting the engine.
- F. Keep the lawnmower blade higher than the bottom of the circular blade guard.
- G. Never allow passengers on a riding mower while it is operating. It was designed for only one rider.
- H. Always keep feet out from under the lawnmower blade guard. The blade rotates close to the guard and the blade could seriously cut feet.
- I. Never leave a running mower unattended. The vibration from the engine could jiggle the clutch out of neutral and into gear causing the mower to start to move again.
- J. When stopping to refuel:
 - Turn off the engine and let the machine cool down before adding fuel.
 - Wipe up any spills and avoid spilling fuel onto any hot parts of the engine.
 - The operator should take a break, drink water and check to be sure they are not getting overheated.
- K. Keep the fuel supply for refueling in an approved flammable liquids storage container.
- L. When moving:
 - Be aware of people, animals and vehicles that may be injured or damaged by debris from the mower.
 - Stop when people or animals approach.
 - Mow so the discharge is directed away from cars, buildings, sidewalks and parking lots.



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M. Try not to mow wet grass if it can be avoided. Wet grass is slippery and can cause the operator to lose control of the mower. Wet grass also clogs the discharge chute, which could cause the engine to overheat.

- N. When mowing on the side of a hill, the operator needs to be aware of the machine's stability. Safety experts are divided in their recommendations. Some recommend mowing up and down, while others say the safest way is across the slope. Still others recommend using walk-behind mowers across the slope to avoid having the mower either come back down the hill onto the operator or down the hill away from the operator.
 - Our recommendation is to avoid using power mowers on steep slopes and use hand mowers or manual methods to mow the grass. If the hill is large and the operator must use a power mower, try to use a walk-behind mower, rather than a riding mower. Keep all bystanders away in case the mower should get away from the operator. Keep the center of gravity low to minimize the chance of a rollover. Don't become distracted. If some slippage or loss of stability is noted, the operators should protect themselves, i.e., move uphill, away from the machine, until the machine comes to rest.
- O. If the mower uses a catcher bag, always shut the engine off when changing the bag.
- P. If a stone or other object jams the discharge chute of the mower, shut the machine off before trying to clean out the obstruction. Never reach in with a hand to clear the obstruction. Use a stick or other tool. There could be stored energy in the blades. When the obstruction is removed, the blade could begin to rotate, even though the engine has been shut off. The operator could still be seriously injured.
- Q. If the mover requires servicing, disconnect the spark plug. This will reduce the chance of the engine starting from the rotation of the blade.

Weedeaters

- A. Only trained and authorized operators may be allowed to use the weedeater.
- B. Consult the operator's manual before using the tool for the first time each season.
- C. Operators should be in good mental and physical condition to operate the weedeater.



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- D. Wear personal protective equipment (PPE) when using the weedeater. Appropriate PPE includes long pants or high boots, gloves and goggles or full face shield. If in an area where a lot of gravel may be thrown up, consider wearing a hard hat. Wear ear protection if operating a gas motor powered weedeater.
- E. Only use the weedeater for its intended purpose: trimming grass and weeds at ground level around buildings or posts. Never use it for trimming hedges or tree branches.
- F. Make sure that all nuts and bolts are connected tightly before starting the motor.
- G. To minimize the danger of flying stones and debris, make a quick visual check of the area to be trimmed before starting. Remove any small pieces that could be kicked up.
- H. Since the spinning nylon cord can kick up stones and other debris, always keep other people and animals at least twenty feet away when using the weedeater.
- I. Work in a direction that would direct any flying debris away from windows, parked vehicles or other areas where people may be sitting or working.
- J. Keep away from the exhaust—it gets very hot when the engine is running.
- K. Always keep the line guard in place when trimming.
- L. Always use both hands for good control of the cutting line.
- M. Know the limitations of the cutting line and stay away from large bushes or small trees. The line will not cut them and flying chunks could cause injury.
- N. Use only approved replacement nylon cord. Never replace the nylon cord with metal wire.
- O. Make adjustments with the motor off and the spark plug disconnected to avoid accidental motor starts.
- P. Never leave the weedeater unattended.
- Q. Keep the fuel supply for refueling in an approved flammable liquids storage container.

Hedge Trimmers

A. Only trained and authorized personnel should operate a hedge trimmer.



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- B. Hedge trimmers must not be used by minors or by anyone under the influence of drugs and alcohol.
- C. You must have at least the following items of personal protective equipment: goggles, hearing protection and gloves.
- D. Protect other people from the noise and from injury. Keep people at least 30 feet away.
- E. Before starting, clear the area of wire, stout branches and other debris that could foul your hedge trimmer.
- F. Check your machine, engine and all equipment.
- G. Make sure that you understand all of the controls. Before you start the hedge trimmer, you must know how to stop it.
- H. Make sure that any guards on your hedge trimmer are in place and adjusted correctly.
- I. Always hold the hedge trimmer firmly with both hands.
- J. Make sure the cutting blade is running at full speed before starting to cut the hedge.
- K. Do not try to cut thick twigs. This hedge trimmer is only for trimming foliage.
- L. Do not try to cut off all growth in one pass, remove it one layer at a time. Make sure that you can control the amount you are removing before you take off the final layers.
- M. Beware of debris that may be thrown out by the trimming blade.
- N. If the hedge trimmer starts to labor and slow down, do not force it so hard. Do not overload the engine.
- O. Stop the hedge trimmer if someone approaches you.
- P. Stop the engine and make sure the trimming blade has stopped before making any adjustments.
- Q. Stop the engine before leaving the machine unattended.

Snow Blowers

A. Only trained and authorized personnel should operate a snow blower.



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- B. Be aware of how the controls work, especially the engine "kill" switch. The operator may have to find it quickly in the dark while blowing snow on an early winter morning.
- C. Take time before the snow starts to fall to inspect the machine and prepare it for winter.
- D. Prepare yourself for outside winter work, i.e., dress warmly, including sturdy, steel-toed weatherproof boots, warm hats and gloves. Safety goggles are also appropriate, especially if the wind is blowing.
- E. If you will be cleaning a large area during the hours of darkness, visible clothing, such as a reflective safety vest should be worn. Let someone know when to expect you back in so you can be checked on if something happens.
- F. Always keep the controls in neutral when starting the snow blower.
- G. Make sure that all guards are in place before starting the engine.
- H. Before starting to clean an area, check first for any large objects that could be run over. Remove them if possible or mark them if they can't be moved. This will minimize the possibility of striking them.
- I. Move the snow blower to a well-ventilated area before starting the engine.
- J. Aim the discharge chute to minimize the blowing of snow toward people and parked vehicles.
- K. Be aware of the wind, so that you are not blowing snow back onto yourself.
- L. Set the height of the blades at ½" to 1" above the ground. This will minimize the danger of running into a small piece of debris and throwing it into somebody. This will also minimize the chances of damage to the blower.
- M. If the discharge chute should become jammed with packed snow and debris, shut off the engine and wait at least 5 seconds after the engine has shut off. Sometimes there is a brief recoil of the blades after the engine stops.
- N. Use a stick or other object to clear jams. Keep hands away from the augers and other moving parts, even when the machine has been shut down.
- O. If the blades strike an object, immediately stop the blower and turn off the engine. Inspect for damage. Damaged parts could expose the operator to danger from flying metal or possible motor damage.
- P. When the snow blower is in operation, never leave it unattended.



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- Q. When done snow blowing, check the blower over for any damage that may have occurred. Clean off the snow, salt and dirt on the blower, to ensure that it will be ready to go next time.
- R. Keep the fuel supply for refueling in an approved flammable liquids storage container

Snow Plows

- A. Only trained and authorized personnel should operate snow plows.
- B. Operators shall perform a pre-operational check of their equipment. Be familiar with operator's manual. Report all needed repairs promptly. Do not use any equipment that is unsafe.
- C. Managers shall verify that operators are capable and qualified on each type of equipment before allowing the equipment to be operated unsupervised.
- D. Inspect plows and components prior to use as follows and repair or replace any items found to be deficient:
 - 1. Check plow, plow frame and shear flange for cracks, broken welds or loose bolts.
 - 2. Check the shear flange and pins for proper bolt grade, size, tightness and condition.
 - 3. Check safety chains and blade for wear and condition.
 - 4. Check for leaky or damaged hydraulic lines, fittings or cylinders.
 - 5. Check lube points and lube as needed.
 - 6. Check all controls to ensure smooth and correct operation.
- E. Be aware of pinch points when installing or removing plows. Keep your hands away. Do not lift with your back. Get help and use lifting equipment as needed.
- F. Always use safety chains or protective blocking when changing blades or performing other work on plows; never trust the hydraulic system!
- G. Adjust your plowing speed to the conditions, i.e., traffic volumes, pedestrians, highway conditions, material to be plowed, terrain and visibility.
- H. While plowing, watch for bridge joints, water meters, manholes, railroad tracks, etc.



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- Check the condition of the plow periodically during use using the guidelines provided in D above.
- J. The use of flags on ends of plow is recommended for visual contact by driver.
- K. When possible, plow operators should inspect plowing route and note or mark hazards.
- L. For long distance travel (outside normal work area), snow plow should be chained in the up position to relieve stress on the cylinder and lifting mechanism.

Trailers

- A. Managers shall verify that operators are capable and qualified on each type of equipment before allowing the equipment to be operated unsupervised.
- B. Operators shall perform a pre-operational check of their equipment. Be familiar with the operator's manual. Report needed repairs promptly. Do not use any equipment that is unsafe.
- C. Operators shall perform a visual and manual check of the "pintle hooks" to ensure that they are secure before the truck and attachment are put to use.
- D. Make sure cargo is properly loaded and secured using only approved chain and load binders. Safety chains are to be used on any attachment in tow. Ensure that the chains are of the proper strength for the load and are properly secured to both the vehicle and attachment to be towed.
- E. Be aware of height and width of load.
- F. Never load a trailer beyond its recommended capacity.
- G. Do not allow anyone between truck and trailer when backing to hook trailer.
- H. Plan ahead to minimize the need for backing. Always check to the rear before backing and use an observer when available. Make sure back-up alarms are working properly.
- I. Make sure trailer-bed and ramps are clear of any debris.
- J. Make sure tilt-beds or ramps are secure before putting trailer in use.
- K. Hook, unhook, load and unload on stable ground with trailer secure.
- L. Be sure taillights and turn signals are in view when towing any attachment that does not have taillight hookup.
- M. Observe towing speed limit if applicable.

