



Hand and Portable Power Tools

Safety Program

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1. Introduction

It is the policy of The Ohio State University (Ohio State) to take precautions to eliminate hazards associated with the use of hand and portable power tools and to ensure employees are properly trained to utilize these tools in a safe manner to minimize injuries related to their use. This Hand and Portable Power Tool Safety Program prescribes the duty to maintain tools and equipment; use hand and portable power tools in a safe manner; and to minimize injury and/or accidents associated with their use. This program is developed in accordance with the following Occupational Safety and Health Administration (OSHA) regulations:

- 29 CFR 1910 Subpart P, “Hand and Portable Powered Tools and Other Hand-Held Equipment”
- 29 CFR 1910.241 – Definitions
- 29 CFR 1910.242 – Hand and portable powered tools and equipment, general
- 29 CFR 1910.243 – Guarding of portable powered tools
- 29 CFR 1910.244 – Other portable powered tools
- OSU Building Design Standards – Appendix V: Safety Health & Environment; 1.6-Use of Power Actuated Fastener Tools

1. Scope

This program outlines responsibilities for hand and power tool safety, identification of safety hazards and control measures, training requirements, and the inspection and recordkeeping for hand and portable power tools. The program applies to all Ohio State employees whose work duties require them to utilize hand and portable power tools. All hand and portable powered tools and other hand-held equipment utilized at Ohio State for construction, alteration, repair, demolition, electrical, plumbing, vehicle maintenance, and general purposes are covered by this policy.

2. Responsibilities

Environmental Health and Safety

Environmental Health and Safety (EHS) provides program oversight and consultation to Ohio State employees who utilize hand and portable power tools. This includes including training, maintaining applicable records, performing program reviews and updates as necessary and providing recommendations for safety procedures to supervisors and departments.

Ohio State Departments

Each department or working units within a department where hand and portable power tools are utilized are responsible for the following:

- Ensure the applicable components of the Hand and Portable Power Tool Safety Program are available to employees.
- Provide training to employees expected to utilize hand and portable power tools as part of their job duties.
- Ensure hand and portable power tools are properly maintained and any equipment deficiencies are addressed to ensure employee safety.
- Maintain manufacturer manuals and other applicable documentation related to the hand and portable power tools in use.



3. General Safety Requirements

All hand and portable power tools must be maintained in a useable condition. The following applies to all hand and portable power tool maintenance and use to minimize hazards associated with their use.

- Maintain all tools in useable condition through following manufacturer recommendations for service. Store tools in the appropriate manner to minimize exposure to excessive temperature, humidity and corrosive materials and report defects or deficiencies associated with tools to departmental supervisors upon discovery.
- Use the appropriate tool for the job. Hand and portable power tools are designed and manufactured for specific uses. Supervisors shall ensure the proper tools are available to complete a job. If a task is required to be completed by an employee where an appropriate tool is not present, the supervisor shall ensure the job is not completed until the appropriate tool is available.
- Prior to use, tools and equipment should be inspected by the user to ensure they are in proper working order with no defects or deficiencies, which may result in unsafe use or injury to the user.
- Damaged tools and equipment must be removed from service and tagged to ensure unauthorized use does not take place.
- Operate tools and portable power equipment according to the manufacturer's specifications. Failure to do so may result in injury to the user.
- Proper personal protective equipment (PPE) must be provided and work areas must be adequately lighted for the work to be performed.
- Departments must maintain the following records as part of the hand and portable power tool safety program:
 - Employee training records
 - Specialized Standard Operating Procedures (SOPs)
 - Manufacturer specifications/manuals
 - Maintenance/service records

4. Machine Guards and Safety Switches

Many tools and equipment protect exposed moving parts through various machine guarding techniques. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts are typically guarded with safety shields or switches. Machine guards must be provided to protect the user from the following:

- Point of operation hazards
- In-running nip points
- Rotating parts
- Flying particles and sparks.

Machine guards directly cover a hazardous area of a tool or piece of equipment to prevent contact by the user. An example of a machine guard is the retractable cover on a circular saw, which exposes only the area of the blade performing the cutting action.

Safety switches are incorporated into many portable power tools to prevent unintended activation of the equipment. An example of a safety switch is a constant pressure switch, which requires the user to place pressure on the activation switch and releasing of the switch results in the tool shutting off or stopping.

Machine guards, safety switches, and any other safety elements of a tool or power tool, must not be removed, manipulated or tampered with in any way.

5. Personal Protective Equipment (PPE)

Employees who use hand and portable power tools and are exposed hazards, such as noise, vibration, particulate, sparks/chips, abrasive, splashing objects, harmful dusts, fumes, mists, vapors and/or gases must be provided with the appropriate PPE.

The following considerations should be evaluated, at a minimum, in the selection and use of PPE when utilizing hand and portable power tools.

Eye protection - Safety glasses or goggles must be worn at all times when using hand and portable power tools. A face shield may be used in addition to safety glasses or goggles to protect the face and neck.

Foot protection – Appropriate foot protection, which may include closed toed shoes or steel-toed boots, must be worn when working with hand and portable power tools.

Hearing protection – If the tool or equipment being utilized generates excessive noise, the use of hearing protection may be necessary. Follow the manufacturer’s recommendations for hearing protection and contact EHS to conduct personal noise dosimetry to determine if employees should be enrolled in the University’s [Hearing Conservation Program](#).

Respiratory protection – Tools and equipment, which generate excessive dust, may require the use of a particulate filtering respirator. Contact EHS to determine if the use of a respirator is required or could be used voluntarily. Refer to the University’s [Respiratory Protection Program](#) for additional information on respiratory protection.

Hand protection – Whenever there are sharp objects or elevated temperatures associated with the work being conducted, adequate hand protection must be provided to the employee performing the work.

Body protection – Depending on the hazard present, appropriate clothing must be worn during the use of hand/portable power tools. Examples include long sleeves, long pants, or a leather apron.

Hair Protection – Long hair must be tied back and secured during the use of power tools to prevent hair being caught in moving parts.

6. Hand Tool Safety

Hand tools are tools that are powered manually and do not require additional power sources such as electric, hydraulic, compressed air, etc. Examples of hand tools include anvils, axes, hammers, planers, pliers, punches, saws, screw drivers, tin snips, and wrenches.

Hazards associated with hand tools are typically associated with misuse of the equipment and/or improper maintenance of the tools. To prevent injury when utilizing hand tools, the following precautions should be taken:

- Use hand tools only for their intended purposes. For example, using a screwdriver as a chisel may result in the tip of the screw driver breaking and becoming a flying particle hazard.
- Inspect hand tools for damage prior to use.
- Maintain hand tools in good working condition and free from damage. Handles of tools should be maintained free from grease and oil to prevent slipping and deterioration of the materials of construction. Damaged hand tools must be removed from service and repaired or replaced.



- When using tools, such as knives, saws, or other cutting devices, always direct the tool away from the worker and any other personnel in the area.
- Maintain cutting tools so that the cutting edges are sharp. Dull cutting edges may present additional hazards.
- Cracked cutting blades must be removed from service and replaced.
- Wrenches must be used to prevent slippage, to prevent injury to the user.
- Impact tools, such as chisels, drift pins, and wedges must be kept free from mushroomed heads.
- Iron or steel hand tools may produce sparks when struck. Ensure the use of iron and steel tools does not occur near flammable or combustible materials. If flammable or combustible materials are present, ensure the use of non-sparking hand tools.
- Maintain both the work area and tools in a clean and organized manner. This will help prevent potential injuries.
- Store hand tools in a clean and dry location.
- Wear the appropriate PPE.

7. General Requirements for Portable Power Tool Safety

Portable power tools, when used improperly, can result in serious injury or death. Types of portable power tools are determined by their power source, each of which will be addressed in this program, and include electric, pneumatic, liquid fuel, hydraulic, and power actuated portable fastener tools. To reduce hazards associated with the use of portable power tools, employees should observe the following general safety practices:

- Safety mechanisms, such as machine guards and safety switches, must never be removed or disabled.
- Read and understand the owner's/user manual for each portable power tool expected to be used by the employee. The manual should address the tool's proper use, limitations, proper operation, hazards, PPE, storage, and maintenance practices applicable to the equipment.
- Tools should not be carried or lowered from an elevated position by the power cord.
- Never pull a power cord or hose when disconnecting it from a power source.
- Ensure cords associated with the use of power tools do not present excessive trip hazards.
- Ensure cords and hoses are kept clear from heat, oil, and sharp edges during use.
- When not in use, before service, cleaning and during blade/bit replacement procedures; power tools should be disconnected from their power source.
- When portable power tools are in use, unauthorized personnel must be kept clear of the work area. Utilize appropriate signage to indicate when portable power tools are in use and clearly define restricted areas.
- It may be necessary to secure a material with vice or clamps to allow for proper use of equipment when two hands are required to be on the power tool during use.
- To avoid accidental start-up of power tools, do not hold fingers on the triggers during transportation of equipment.
- Maintain tools in a clean manner free from oil and grease.
- Maintain cutting surfaces in a sharp manner. Dull cutting edges present additional hazards.
- When operating power tools, ensure adequate footing and maintain good balance while in use.
- Wear appropriate PPE during the use of power tools including hand, head, eye, foot, hearing, respiratory and body protection. Loose clothing, long hair, ties, or jewelry can become caught in moving parts. Employees must be appropriately dressed to perform the necessary work with portable power tools.



- Inspect portable power tools prior to use. And defects or deterioration of the equipment should result in the tool being removed from service. Portable power tools removed from service due to defects must be tagged with “DO NOT USE” or the equivalent to prevent unauthorized use.

8. Electric Portable Power Tool Safety

Portable power tools, when used improperly, can result in serious injury or death. Types of portable power tools are determined by their power source, each of which will be addressed in this program, and include electric, pneumatic, liquid fuel, hydraulic. Employees utilizing electric powered portable tools must be aware of many hazards associated with their use. One common hazard with all electric power tools is the possibility of burns, shock or electrocution. Even a slight shock or small burn can cause a worker to fall from a ladder or result in serious injury depending on the work conditions. The following are usage requirements specific to electrical power tools:

- To protect users from shock hazards, electrical power tools must have a three-wire cord with a ground prong and be properly grounded during use.
- Three-wire cords contain two current carrying conductors and a grounding conductor. One end of the grounding conductor connects to the tool’s metal housing; the other end is grounded through a prong on the plug.
- The use of an adapter to fit a two-hole receptacle is not recommended, but if necessary, the equipment must be properly grounded to a known ground.
- The third prong on the electrical cord of power tools must never be tampered with or removed for any reason.
- Some tools are equipped with double-insulated electrical cords, which contain an internal layer of insulation to isolate the external housing of the tool, and do not have a ground prong. Only double-insulated cords are permitted to be used without a ground wire.
- Never use electric power tools in wet or damp locations, unless they are approved for use in these locations.

Saws

Portable or semi-portable electric power saws can include circular, table, saber, radial arm, miter, and band saws. The following outlines the safety precautions to take when working with these types of saws.

Circular Saw – A portable saw using a toothed metal cutting disc/blade used for cutting wood, metal and concrete depending on the blade being used.

- Portable circular saws with blades greater than 2 inches in diameter must be equipped at all times with guards. An upper guard must cover the entire blade of the saw. A retractable lower guard must cover the teeth of the saw, except where it makes contact with the work material.
- The lower guard must automatically return to the covering position when the tool is withdrawn from the material being cut.

Table Saw – A portable/semi-portable cutting tables with a fixed, toothed blade used for cutting longer lengths of wood and ensuring flush cuts.

- The blade on a table saw must be adjustable in height to allow the user to adjust the blade no more than 1/8 inch above the material to be cut.
- Ensure the material set to be cut does not contact the blade when starting or stopping the saw.
- Keep the body away from the saw.
- Use a push stick to keep hands and fingers away from the cutting blade.
- Guards covering the blade at all times should operate freely when the material to be cut is introduced to the saw blade.



- When not in use, lower the blade fully below the tabletop to prevent inadvertent contact.

Saber Saw – A portable reciprocating saw used to make custom cuts in wood or metal.

- Always select the blade appropriate for the material being cut.
- Ensure the blade is sharp. Dull blades can present additional hazards.
- Do not turn on the saw when the blade is in contact with the material to be cut. This may cause the tool to “jump” or chip the material to be cut.
- Ensure the material to be cut is secure to prevent movement during cutting.
- Keep hands and other objects free from the cutting area at all times.

Radial Arm Saw – a semi portable saw equipped with a cutting table where the saw blade is above the table and moved along a rod to allow for flush cutting.

- The material to be cut should be placed firmly against the saw’s back guide.
- The blade should rotate downward.
- Pull the saw with one hand and hold the wood with the other, ensuring it is clear from the cutting area.
- Never reach across the line of a cut.
- Return the saw to the rear position after completing a cut.
- Radial arm saws should be equipped with blade guards, which operate freely when contacting materials being cut.

Miter Saw – A portable/semi-portable saw used to cut flush angles on materials with a pull down blade.

- Miter saws use a downward cutting motion; therefore, keep hands and fingers well outside the cutting area.
- Miter saws must be equipped with a blade guard, which must operate freely when the blade contacts the material to be cut.
- Only use the manufacturer specified blade sizes and rpm ratings.
- When changing saw blades ensure all bolts are adequately tightened and secured to the saw.

Band Saw – A portable/semi-portable saw used for precision cuts on wood and metal with a rotating belt blade.

- Set the blade evenly and with the correct tension before cutting.
- Push the cutting item through the blade with both hands on either side of the blade ensuring hands and fingers are clear of the cutting area.
- Ensure guards are in place.

Drills

Electric power drills are typically used to put holes in various materials including wood, metal, concrete and brick; and can be equipped with a hammer function. The following outlines the safety precautions to take when working with drills:

- When operating a drill, use the proper size and type of bit for the job. Ensure the bit is sharp and not damaged.
- Ensure the chuck is secured to the spindle. Tighten the bit securely as outlined in the owner’s manual. Remove the chuck key prior to starting the drill.
- Ensure the handles are securely attached.
- When drilling, brace the drill to prevent torque on the hands/wrists.



- Never force a drill. Forcing a drill can cause the motor to overheat and damage the bit. Apply the appropriate pressure for the job. If the drill slows, relieve the pressure.

Abrasive Wheel Tools

Portable abrasive wheel tools are used to grind, cut, polish, buff, etc. through a rotating wheel attached to the tool body, which typically generate large amounts of dust and particulates during cutting operations. The following outlines the safety precautions to take when working with these abrasive wheel tools:

- Abrasive wheel tools must be equipped with guards that cover the spindle end, nut and flange projections; maintain proper alignment with the wheel; and do not exceed the strength of the fastenings.
- Inspect wheels before use. Any damage or defects must be addressed prior to use. To ensure cutting wheels are not cracked, tap with a non-metallic instrument. If the wheel sounds cracked or “dead” it could disintegrate during use and must not be used. A stable and undamaged wheel, when tapped, will give a clear metallic tone or “ring”.
- Abrasive wheels must fit freely on the spindle. If a wheel is installed too tightly it may crack during use. Always follow the manufacturer’s instructions on wheel replacement.
- Allow the wheel to reach optimal operating speed before conducting cutting, grinding, buffing, etc. operations.
- Stand clear of flying particles coming from the tool during use if possible.
- Always utilize the appropriate PPE when using powered abrasive cutting tools including, but not limited to, eye/face, hand and body protection.
- Turn off and unplug abrasive grinding tools when not in use.
- Never clamp a grinding tool in a vise or to a surface to perform a function.

9. Pneumatic Portable Power Tools

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, sanders, and nailers. Hazards associated with pneumatic power tools include noise, vibration, fatigue, and being struck by objects. The following are usage requirements specific to pneumatic power tools:

- ANSI approved eye protection is required anytime employees are working with pneumatic tools. A significant hazard of using pneumatic power tools is being struck by one of the tool’s attachments or by a fastener used with the tool.
- Ensure the air hose is securely attached to the tool being used prior to activating the tool to minimize the potential for the hose disconnecting during use.
- Air hoses greater than 1/2 inch in diameter must be equipped with a safety excess flow valve to shut off the air automatically in case the hose breaks.
- All pneumatic tools should be equipped with safety clips or other safety elements to prevent the release of tool parts during use. Safety features of pneumatic tools must not be tampered with or altered in any way.
- Pneumatic tools, which shoot nails, rivets, staples, or similar fasteners and operate at pressures above 100 psi, must be equipped with a muzzle safety feature to prevent fasteners from firing unless the muzzle is pressed against the materials to be fastened.
- Never pull the muzzle safety switch back manually to fire fasteners for any reason.
- Pneumatic paint spray equipment must be equipped with safety switches to prevent accidental discharge of paint.
- When using pneumatic power tools, ensure the work area is isolated to prevent unauthorized access.



- Compressed air should not be used for cleaning purposes at pressures greater than 30 psi.
- Never use compressed air for cleaning debris off a person.

10. Liquid Fuel Powered Tools

Fuel-powered tools are typically powered by gasoline or gasoline/oil mixtures. Common hazards associated with gas powered equipment are handling flammable liquids/vapors and exposure to exhaust fumes. The following are usage requirements specific to liquid fuel powered tools:

- Fuel (fuel/oil mixtures) must be handled, stored and transported only in approved containers for flammable liquids.
- When a fuel powered tool is used in an enclosed area, effective ventilation and/or appropriate respiratory protection must be provided to avoid exposure to carbon monoxide.
- Utilize only the manufacturer specified fuel when powering the equipment.
- When refueling a tool or piece of equipment, ensure the motor is shut down and the engine is cool before refueling.
- Fire extinguishers should be available wherever fuel powered tools are in use.
- Cutting tools, such as chain saws or concrete saws, must be equipped with guards and/or safety switches to ensure safe use.

10. Hydraulic Power Tools

Hydraulic power tools utilize pressurized lines filled with hydraulic fluid to provide the pressure. The fluid within hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The following are usage requirements specific to hydraulic power tools:

- Follow the manufacturer's recommendations for safe operating pressures for hoses, valves, pipes, filters, and other fittings at all times.
- Hand-held power tools, powered by hydraulic lines must be equipped with a constant-pressure switch, or a control that shuts off the power when pressure is released.
 - This includes drills, tappers, fastener drivers, angle grinders (with wheels greater than 2 inches in diameter), disc sanders (with discs greater than 2 inches in diameter), belt sanders, reciprocating saws, saber saws, scroll saws, jig saws and other similar tools.

Hydraulic jacks -These include lever, ratchet, and screw jacks.

- Jacks must have a stop indicator, and the stop limit must not be exceeded.
- Load limits must be determined by the manufacturer and be marked on the jack. Load limits must not be exceeded.
- A jack should be used to raise a load, but not fully support a lifted load. Once raised, blocking should be placed firmly under the base of the load.
- When setting up a jack:
 - Place the base of the jack on a firm, level surface.
 - Center the jack correctly on the load.
 - Place the jack head against a level surface.
 - Apply the lifting force evenly.
- Jacks should be lubricated regularly.
- All jacks must be inspected regularly according to the following:
 - Jacks used regularly: inspect at least once every 6 months



- Jacks sent out for special work: inspect when sent out and returned
- Jacks subjected to abnormal loads/shock: Inspect before and after use.

10. Power-Actuated Fastener Tools

Power actuated fastener tools are a class of fastening tools utilized in construction activities to join materials to hard substrates such as steel or concrete. This technology relies on the release of controlled energy in the form of a small chemical propellant charge (powder), compressed gas, or pneumatic means to drive the fastener. Due to the characteristics of the energy source, these tools present potential health and safety hazards to the worker and work area. Based upon these circumstances, there is a need for safe work practice requirements whenever such equipment is used. The basic requirements regarding the use of this equipment are as follows:

The University Building Design Standards currently prohibit the use of power actuated fastener devices on construction, renovation, or remodeling projects unless a variance has been granted. Once granted, all rules and guidelines provided in the [Ohio State Building Design Standards, Appendix V](#), Section 1.6 must be followed.

11. Training Requirements

Employees expected to utilize hand and portable power tools as part of their job duties must be adequately trained prior to using such tools. Employees should be trained in the following areas:

- Be able to recognize hazards associated with different types of tools and equipment; and the safety precautions necessary for use.
- The PPE required to be worn during the use of tools.
- The proper use of hand and power tools and other hand-held equipment
- Be able to recognize defects in tools, which may render them out of service.
- When applicable, provide access to the manufacturer specifications and manual's for specific equipment to be used.
- Department-developed standard operating procedures (SOPs) outlining specific safety precautions for certain tools or activities.
- Retraining may be necessary to maintain employee knowledge of working with tools or if a near-miss or injury has occurred.

An online training module is available from EHS on Hand and Power Tool Safety. To find this training, visit <https://buckeyelearn.osu.edu/> and search for "Hand and Power Tool Safety." This training will cover the general safety precautions related to hand and power tools. However, employees must still be trained on any additional precautions specific to their equipment or work areas.