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## **Hand and Portable Power tool safety**

### **29 CFR 1910 (Subpart P)**

#### **Purpose**

This program has been designed to present to employees and employers a summary of the basic safety procedures and safeguards associated with hand and portable power tools. Tools are such a common part of our lives that it is difficult to remember that they can cause physical injuries. Tragically, a serious accident can occur before steps are taken to identify and avoid or eliminate tool-related hazards.

#### **Scope**

This Standard applies to all College personnel who, during the course of their employment, who may operate, use or perform tooling maintenance.

#### **Hazards of Hand Tools**

Manually powered hand tools include anything too screwdrivers, axes, shovels and chisels. The most common injuries occur from misuse or improper maintenance of hand tools. Appropriate personal protective equipment must be worn to ensure the safety of hand tool users.

Examples of misuse or improper maintenance:

- If a chisel is used as a screwdriver, the tip of the chisel may break and fly off, hitting the user or other employees.
- If a wooden handle on a tool, such as a hammer or an axe, is loose, splintered, or cracked, the head of the tool may fly off and strike the user or other employees.
- If the jaws of a wrench are sprung, the wrench might slip.
- If impact tools such as chisels, wedges, or drift pins have mushroomed heads, the heads might shatter on impact, sending sharp fragments flying toward the user or other employees.

The ***employer is responsible*** for the safe condition of tools and equipment used by employees. Employers shall not issue or permit the use of unsafe hand tools. Employees shall be trained in the proper use and maintenance of tools and equipment.

The ***employee is responsible*** for the inspection of hand tools prior to use or maintenance. If the equipment is dull, broken or operating abnormally the equipment should immediately be taken to the supervisor for maintenance or replacement.

Saw blades, knives, cutting tools and grinding tools should be directed away from aisle areas and away from other employees working in close proximity. Knives and scissors must be kept sharp; dull tools can cause more hazards than sharp ones. Cracked saw blades must be removed from operation and replaced immediately.

Wrenches must not be used when jaws are sprung or wound out to the point that slippage occurs. Impact tools such as drift pins, wedges, and chisels must be kept free of mushroomed heads. The wooden handles of tools must not be splintered, cracked or loose.

Iron (ferrous) or steel hand tools may produce sparks that can be an ignition source around flammable substances. Where this hazard exists, spark-resistant tools made of non-ferrous materials should be used where flammable gases, highly volatile liquids, and other explosive substances are stored or used.

Examples of ferrous metals: **Carbon Steel, Alloy Steel, Stainless Steel, Tool Steel, HSLA Steel.**

Examples of non-ferrous metals: **Aluminum, Beryllium, Copper, Magnesium, Nickel, Titanium, Zirconium**

## **Hazards of Power Tools**

Powered hand tools include anything too chainsaws, nail guns, pressure washers and drills. The most common injuries result from misuse or improper maintenance of power tools. Appropriate personal protective equipment must be worn to ensure the safety of power tool users.

Power tools are determined by their power source: Electric, liquid fuel, hydraulic, pneumatic, power actuated.

To prevent hazards associated with the use of power tools, workers should observe the following general precautions:

- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Keep cords and hoses away from heat, oil, and sharp edges.
- Disconnect tools when not using them, before servicing and cleaning them, and when changing accessories such as blades, bits, and cutters.
- Keep all people not involved with the work at a safe distance from the work area.
- Secure work with clamps or a vise, freeing both hands to operate the tool.
- Avoid accidental starting. Do not hold fingers on the switch button while carrying a plugged-in tool.
- Maintain tools with care; keep them sharp and clean for best performance.
- Follow instructions in the user's manual for lubricating and changing accessories.
- Be sure to keep good footing and maintain good balance when operating power tools.
- Wear proper apparel for the task. Loose clothing, ties, or jewelry can become caught in moving parts.
- Remove all damaged portable electric tools from use and tag them: "Do Not Use."

## **Guards**

The exposed moving parts of power tools need to be safeguarded. Belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded. Machine guards must be provided to protect the operator and others from the following:

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

Safety guards must never be removed when a tool is being used. Portable circular saws having a blade greater than 2 inches (5.08centimeters) 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 work material.

### **Operating Controls and Switches**

The following hand-held power tools must be equipped with a constant-pressure switch or control that shuts off the power when pressure is released: drills, tappers, horizontal, vertical, and angle grinders with wheels more than 2 inches (5.08 centimeters) in diameter; disc sanders with discs greater than 2 inches (5.08 centimeters); belt sanders, reciprocating saws, saber saws, scroll saws, and jigsaws with blade shanks greater than 1/4-inch (0.63 centimeters). These tools also may be equipped with a “lock-on” control, if it allows the worker to also shut off the control in a single motion using the same finger or fingers. The following hand-held power tools must be equipped with either a positive “on-off” control switch, a constant pressure switch, or a “lock-on” control: disc sanders with discs 2 inches (5.08 centimeters) or less in diameter; grinders with wheels 2 inches (5.08 centimeters) or less in diameter.

It is recommended that the constant-pressure control switch be regarded as the preferred device. Other hand-held power tools such as circular saws having a blade diameter greater than 2 inches (5.08 centimeters), chain saws, and percussion tools with no means of holding accessories securely must be equipped with a constant-pressure switch.

### **Electric Tools**

Electrical shocks, which can lead to injuries such as heart failure and burns, are among the major hazards associated with electric powered tools. Under certain conditions, even a small amount of electric current can result in fibrillation of the heart and death. An electric shock also can cause the user to fall off a ladder or other elevated work surface and be injured due to the fall. To protect the user from shock and burns, electric tools must have a three-wire cord with a ground and be plugged into a grounded receptacle, be double insulated, or be powered by a low voltage isolation transformer. Three-wire cords contain two current carrying conductors and a grounding conductor. Any time an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong must never be removed from the plug. Double-insulated tools are available that provide protection against electrical shock without third-wire grounding. On double insulated tools, an internal layer of protective insulation completely isolates the external housing of the tool. The following general practices should be followed when using electric tools:

- Operate electric tools within their design limitations.
- Use gloves and appropriate safety footwear when using electric tools.
- Store electric tools in a dry place when not in use.
- Do not use electric tools in damp or wet locations unless they are approved for that purpose.
- Keep work areas well lighted when operating electric tools.
- Ensure that cords from electric tools do not present a tripping hazard.

### **Portable and Fixed abrasive wheel tools**

When using a powered grinder:

- Always use eye or face protection.
- Turn off the power when not in use.
- Never clamp a hand-held grinder in a vise.

Portable and fixed abrasive grinding, cutting, polishing, and wire buffing wheels create special safety problems because they may throw off flying fragments. Abrasive wheel tools must be equipped with guards that: (1) cover the spindle end, nut, and flange projections; (2) maintain proper alignment with the wheel; and (3) do not exceed the strength of the fastenings.

Abrasive wheels must be inspected closely prior to use to ensure that it is free from cracks or defects. Tap the wheel gently with a light, non-metallic instrument. If the wheel sounds cracked or dead, they must not be used because they could fly apart in operation. A stable and undamaged wheel, when tapped, will give a clear metallic tone or “ring.”

To prevent an abrasive wheel from cracking, it must fit freely on the spindle. The spindle nut must be tightened enough to hold the wheel in place without distorting the flange. Always follow the manufacturer’s recommendations. Ensure that the spindle speed of the machine will not exceed the maximum operating speed marked on the wheel.

An abrasive wheel can potentially disintegrate or explode during start-up. Allow the wheel to come up to operating speed before grinding or cutting. Do not stand in the plane of rotation of the wheel as it accelerates to full operating speed. Portable grinding tools need to be equipped with safety guards to protect workers and nearby co-workers, not only from the moving wheel surface, but also from flying fragments in case of wheel breakage.

## **Hydraulic power tools**

The fluid used in 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 exception to fire-resistant fluid involves all hydraulic fluids used for the insulated sections of derrick trucks, aerial lifts, and hydraulic tools that are used on or around energized lines. This hydraulic fluid shall be of the insulating type.

The manufacturer’s recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must be adhered to. All jacks—including lever and ratchet jacks, screw jacks, and Hydraulic jacks—must have a stop indicator, and the stop limit must not be exceeded. Also, the manufacturer’s load limit must not be exceeded.

All jacks—including lever and ratchet jacks, screw jacks, and hydraulic jacks—must have a stop indicator, and the stop limit must not be exceeded. Also, the manufacturer’s load limit must be permanently marked in a prominent place on the jack, and the load limit must not be exceeded.

When using a jack to support a lifted load. The jack must be immediately blocked up. Put a block under the foundation and place a block between the jack cap and load if the cap might slip.

To set up a jack, make certain of the following:

- The base of the jack rests on a firm, level surface;
- The jack is correctly centered;
- The jack head bears against a level surface; and
- The lift force is applied evenly.

Proper maintenance of jacks is essential for safety. All jacks must be lubricated regularly. In addition, each jack must be inspected according to the following schedule: (1) for jacks used continuously or intermittently at one site—inspected at least once every 6 months, (2) for jacks sent out of the shop for special work—inspected when sent out and inspected when returned, and

(3) for jacks subjected to abnormal loads or shock—inspected before use and immediately thereafter.